Federaal Kenniscentrum voor de Gezondheidszorg
Centre Fédéral d'Expertise des Soins de Santé
KCE

Lombalgie chronique

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Préface

Comme la rage de dent ou le fameux sparadrap de Tintin, la lombalgie chronique est un fléau dont tout un chacun essaie de se débarrasser au plus vite sans toujours y parvenir de manière très concluante. A côté du caractère pénible de ce mal au niveau individuel, les désagréments et les coûts collectifs liés aux traitements et à l'absentéisme sont bien connus également.

Il était dès lors fatal que le KCE hérite un jour ou l'autre de la question avec l'espoir qu'il mette à jour, sinon des recettes radicales, au moins des pistes de traitement claires et efficaces.

A cet égard, le simplisme n'est pas de mise : rares sont les tests et traitements qui ont fait leurs preuves. Le savoir et le redire n'est pas inutile pour éviter de s'engager dans des soins coûteux et peu efficaces.

Pas de découragement pourtant. Il existe en effet suffisamment de données scientifiques pour recommander de manière univoque des démarches diagnostiques et thérapeutiques spécifiques. Celles-ci devraient être la pierre d'angle de la prise en charge de tout patient souffrant de mal de dos chronique et si possible le plus tôt possible dans le décours de l'affection : le temps presse.

Jusqu'à présent un lien important manquait dans de nombreuses recommandations : la prévention et la prise en charge de la lombalgie chronique dans le milieu du travail. Des réflexions très pertinentes à cet égard ont été produites dans le cadre de la médecine du travail et de celle des assurances, dans la mesure où les maux de dos sont souvent liés à l'activité professionnelle. Ce fut l'occasion pour le KCE de s'ouvrir à cette discipline nouvelle pour lui, et de mettre en évidence des pistes fécondes, comme c'est souvent le cas dans le cadre d'une démarche multidisciplinaire.

Nous remercions les équipes de recherche qui ont collaboré à ce projet, pour avoir joué le jeu de manière exemplaire. Elles venaient d'horizons culturels et scientifiques très variés et sont parvenues à produire un travail collectif enrichi par la confrontation des différents points de vue. Les résultats d'une telle approche transversale confirment la raison d'être d'un centre fédéral pour progresser dans la résolution individuelle et collective de problèmes complexes comme la lombalgie chronique.

Jean-Pierre CLOSON
Directeur général adjoint

Dirk RAMAEKERS
Directeur général

Executive summary

Ce projet analyse le problème de la lombalgie chronique "commune", définie comme une douleur lombaire de plus de trois mois, avec ou sans sciatalgie (irradiation vers la cuisse ou la jambe suite à une compression nerveuse) et sans suspicion de pathologie sévère sous jacente. Le problème est examiné sous trois angles. Une première partie analyse les données probantes relatives au diagnostic et au traitement du mal de dos chronique. Une seconde partie étudie les bases de données disponibles en Belgique pour évaluer l'ampleur de cette pathologie et des coûts qui y sont liés. Une troisième partie examine les conséquences de la lombalgie sur la population ayant un emploi, sur base des données disponibles en médecine du travail et elle analyse les données de la littérature relative à la prise en charge optimale de ce problème en médecine du travail.

Diagnostic et traitement du mal de dos chronique: que disent les données probantes?

Méthodologie

Vu l'ampleur du sujet, la revue de littérature s'est focalisée en priorité sur les revues systématiques de littérature (notamment recherchées dans Medline, Embase et dans la Cochrane Database of Systematic Reviews) et sur les recommandations de bonne pratique. D'autres sources ont été également consultées (dont les bases de « Health Technology Assessment »). Une recherche complémentaire a identifié quelques essais cliniques randomisés postérieurs à ces publications. Les revues systématiques et recommandations de bonne pratique ont été évaluées en utilisant les listes proposées par AGREE et par la Cochrane Collaboration. Les conclusions ont reçu un « level of evidence » en suivant le système de classification de GRADE.

Résultats

La recherche de littérature confirme l'abondance de publications relatives à la lombalgie. Pour certaines procédures, les études disponibles concernent une population mixte de patients (aigus, sub-aigus et/ou chroniques) ou doivent être extrapolées à partir de données relatives à la lombalgie aiguë. D'autres données concernent spécifiquement la lombalgie chronique « commune », diagnostic posé après exclusion de « red flags » (signaux d'alerte à prendre en considération dans le cadre de l'anamnèse ou de l'examen clinique afin d'exclure une suspicion d'étiologie grave sous-jacente).

De nombreux éléments de la démarche diagnostique clinique reposent sur des traditions ou des avis d'experts. En particulier, lors de lombalgie commune chronique, il n'existe pas suffisamment de données probantes pour recommander des examens complémentaires spécifiques (imagerie, biologie, électromyographie, techniques interventionnelles et évaluation de la condition physique). Ce manque de données probantes relatives à la validité des tests diagnostiques s'explique en partie par l'absence de « gold standard » pour le diagnostic de lombalgie chronique.

Lors de l'examen clinique, une information rassurante donnée au patient est un élément fondamental de la thérapeutique, supporté par des données probantes de qualité. Pour la prise en charge thérapeutique de la lombalgie chronique, plusieurs traitements conservateurs non invasifs sont à privilégier : les programmes d'exercices, les interventions de type comportemental (sans définition précise possible de leur contenu), les interventions brèves comprenant une éducation du patient et les interventions multidisciplinaires répondant au modèle biopsychosocial. Une approche multidisciplinaire comprenant plusieurs interventions (telles qu'éducation, programmes d'exercices, approche comportementale, relaxation et visite sur le lieu du travail) est plus efficace qu'une intervention isolée ou une prise en charge classique. A l'opposé, des données probantes de qualité existent en défaveur de l'utilisation des tractions et de l'«EMG biofeedback» pour le traitement de la lombalgie chronique.

Il existe peu d'études cliniques de qualité permettant de recommander l'efficacité de traitements médicamenteux (sauf pour le tramadol et la codéine). Les études manquent en particulier pour le paracetamol et les anti-inflammatoires.

Les conclusions sont identiques pour les traitements invasifs non chirurgicaux (techniques d'injections) et pour la chirurgie : peu d'études montrent leur valeur ajoutée et aucune publication n'analyse spécifiquement les effets secondaires. Or ces techniques sont fréquemment utilisées, génèrent des coûts importants et peuvent s'accompagner de complications graves et d'invalidité. De manière plus spécifique, des données probantes existent en défaveur de l'arthrodèse, alors que plus de 7000 interventions de ce type ont été pratiquées en Belgique en 2004.

Résumé des données probantes relatives au diagnostic de la lombalgie chronique « commune »

Anamnèse	**Quality of evidence**
"Red flags" (cf. definition dans le texte)	Very low
"Yellow flags" * (hors du contexte de la médecine du travail)	Moderate
Signes de Waddell	Moderate against
Evaluation fonctionnelle	Very low
Evaluation de la douleur	Very low
Examen clinique	
Examen orthopédique	Very low
Examen neurologique	Very low
Lasègue	No evidence
Tests palpation et pré-manipulation	Moderate against
Biologie	Very low
Imagerie	
Radiographie	Moderate against
Résonance magnétique	Moderate against
CT Scan	Very low
Discographie	Moderate against
Electromyographie	
ENMG classique	Very low
EMG de surface	Very low
Techniques diagnostiques invasives	
Facet joint blocks	Moderate, but conflicting
Selective nerve root blocks	Very low
Evaluation capacité physique	
Endurance cardiorespiratoire	Very low
Force musculaire du tronc	Very low
**Facteurs de risque psychosociaux associés à un risque de passage vers la chronicité ou à un allongement de la durée d'incapacité de travail*	
***Moderate quality of evidence pour l'utilisation de la RMN si symptômes radiculaires ou forte suspicion de discite ou néoplasme*	

Résumé des données probantes relatives au traitement de la lombalgie chronique « commune »

Traitements non invasifs	Quality of evidence	Médicaments	Quality of evidence
Information au patient	High	Paracetamol	No evidence
Repos lit	No evidence (« high against » :lombalgie aiguë)	Antiinflammatoires	Low
Supports lombaires	Very low	Acide Acetylsalicylique	No evidence
Massage	Low	Codéine/tramadol	Moderate
Chaud-Froid	No evidence	Opioïdes forts	Very low
Electrotherapie, thermotherapie	Low	Benzodiazépines	Low
Ultrasons, laser	Low	Myorelaxants	Very low
TENS	Low	Antidépresseurs	Moderate but conflicting
Balnéothérapie	Moderate	Gabapentine	Low
Hydrothérapie	Low	Phytotherapie	Low
Tractions	High against	AINS topiques	No evidence
EMG biofeedback	High against	**Traitements invasifs**	**Quality of evidence**
Ecoles du dos (sauf médecine du travail)	Low	Injections épidurales conventionnelles sans sciatique	No evidence
Intervention éducationnelle brève	Moderate	Injections épidurales conventionnelles avec sciatique	Very low
Intervention de type cognitivo – comportemental	Moderate	Injections épidurales transforaminales si sciatique	Low
Exercices et reconditionnement physique	High	Autres injections (facettes, trigger points, sacro-iliaques…)	Very low
Multidisciplinaire – intensif (éducation, exercices, relaxation, interventions comportementales…)	High		
Manipulations	Moderate, short term only		

Traitements Invasifs autres	**Quality of evidence**
Acupuncture	Moderate, but conflicting
Intradiscal techniques	Very low
Radiofrequency facet denervation	Low
Radiofrequency lesioning dorsal root ganglion	Very low
Radiofrequency neurotomy of sacro-iliac joint	No evidence
Neuroreflexotherapy	Low
Percutaneous electrical nerve stimulation	Low
Adhésiolyse	Very low
Spinal Cord Stimulation	Low (failed back surgery syndrome)
Chirurgie	**Quality of evidence**
Discectomie en cas de prolapsus, hernie discale sans sciatique	No evidence
Discectomie lors de conflit discoradiculaire avec sciatique	Low
Arthrodèse (fusion) lors de CLBP sans sciatique	Low against

Ampleur du problème de la lombalgie chronique en Belgique

Sources de données

Pour les soins de première ligne, la base de données INTEGO a été utilisée pour étudier la fréquence des consultations et évaluer la consommation de soins. Ces données sont collectées par un échantillon de médecins généralistes en Flandre. L'analyse des données en milieu hospitalier s'est basée sur le résumé clinique minimum (RCM) de 2004. Cette analyse a été complétée par celle des données de l'INAMI comprenant l'ensemble des procédures diagnostiques et thérapeutiques qui peuvent être effectuées pour la prise en charge de la douleur lombaire. La base de données des mutualités socialistes a permis une approximation des coûts liés à la consommation de soins en 2004 d'une population de patients souffrant de lombalgie chronique.

La lombalgie est fréquente en médecine générale

En médecine générale, près d'un quart des patients entre 18 et 75 ans ont consulté leur médecin généraliste pour un problème de lombalgie durant les dix années précédentes. L'incidence reste stable. En 2004, la lombalgie constituait un motif de consultation pour 5% des patients enregistrés chez un médecin généraliste (« practice population »). En comparaison avec les autres patients, ces patients lombalgiques présentent plus souvent des co-morbidités, reçoivent trois fois plus de prescriptions d'anti-inflammatoires et ont plus fréquemment des tests de biologie clinique.

La lombalgie chronique: une affection qui a un coût

Environ 40 000 séjours hospitaliers classiques et 46 000 admissions en hôpital de jour ont été enregistrés pour des problèmes de lombalgie. Le diagnostic le plus fréquent est « hernie discale sans radiculopathie » (diagnostic pour lequel une intervention de discectomie est effectuée dans deux tiers des cas). L'interprétation des données hospitalières est limitée par les erreurs de codage (ICD-9-CM). D'importantes disparités régionales sont notées avec une proportion plus élevée d'admissions et d'interventions chirurgicales au Nord du pays et à Bruxelles.

Les données de l'INAMI offrent une approximation des dépenses en relation avec le traitement de la lombalgie : imagerie (36 640 000 €), kinésithérapie (128 750 000 € pour l'ensemble des affections), revalidation (73 200 000 € pour la revalidation relative à l'ensemble des affections, les tractions et le traitement multidisciplinaire), traitement percutané de la douleur (876 000 €), « spinal cord stimulation" (3 301 278 €) et chirurgie avec arthrodèse (18 984 000 €) ou sans arthrodèse (3 816 000 €). Les limites inhérentes à ces estimations sont d'une part l'absence de spécificité des codes de nomenclature pour les douleurs lombaires (a fortiori chroniques) et d'autre part le manque de nombreuses autres informations relatives aux coûts (telles que les consultations, l'hospitalisation et autres dépenses).

Les données longitudinales des Mutualités Socialistes évaluent approximativement à 922 euros par an les coûts médicaux liés à la prise en charge d'un patient souffrant de douleurs lombaires chroniques et pour qui des codes d'imagerie médicale ont été facturés. Cette estimation est aussi limitée par plusieurs facteurs: la méthode de sélection des patients souffrant de douleurs lombaires chroniques, l'absence de données relatives aux consultations, le manque de précision pour la région anatomique à laquelle s'appliquent certaines prestations et l'intervalle de temps inconnu entre le diagnostic et une intervention potentielle.

Cette étude conclut que le coût direct médical total de la lombalgie chronique varie entre 81 et 167 millions € en Belgique. Suivant la littérature, les dépenses médicales à charge de l'assurance maladie ne représenteraient que 10 % à 30 % de l'ensemble des

coûts indirects pour le patient et la société. Le montant global pourrait dès lors être estimé avec prudence entre 270 millions et 1.6 milliard €.

Des conséquences lourdes pour la sécurité sociale

Si les coûts indirects ne peuvent être estimés avec précision, l'analyse des bases de données en médecine du travail révèle les conséquences néfastes de la lombalgie chronique pour la société et le milieu professionnel. Les résultats se basent sur les données de l'Intermédicale (un service de Prévention et protection au travail) et sur celles du Fonds des Accidents du Travail (FAT).

En médecine du travail, 11,9 % des absences-maladie de 28 jours ou plus trouvent leur origine dans un problème de lombalgie. Ce type d'incapacité survient préférentiellement chez les travailleurs de sexe masculin, de statut ouvrier, travaillant souvent depuis peu dans une entreprise. Les secteurs du nettoyage, de la construction et des industries alimentaires sont les plus fréquemment touchés. En conséquence, un patient sur vingt sera jugé incapable de reprendre le travail, et ce, de manière permanente. Dans 15 % des cas, le retour au travail sera possible moyennant une adaptation de ce dernier, ce qui souligne le rôle primordial du médecin du travail dans la prise en charge de la lombalgie.

La base de données du FAT révèle que chaque année en Belgique, douze mille accidents du travail entraînent des douleurs dorsales, soit 6.63% des accidents enregistrés annuellement. Les conséquences sont impressionnantes: parmi les travailleurs ayant présenté un épisode aigu de lombalgie dans le cadre d'un accident du travail, 72 % ont été absents du travail et de ce total, 8,2 % pendant 3 mois ou plus. Respectivement, 62.4% et 9.5% des travailleurs présentent une incapacité de travail temporaire ou définitive. Les secteurs les plus touchés sont l'industrie du bois, de la construction et du métal. Les secteurs de la construction et de la santé/du social enregistrent le plus d'incapacités permanentes. Les données révèlent par ailleurs des disparités géographiques avec des incapacités partielles permanentes plus nombreuses en Wallonie qu'en Flandre. Les efforts excessifs (« overexertion ») constituent la circonstance d'accident la plus fréquente déclarée tandis que les chutes constituent la première cause de lésion avec incapacité permanente.

Prise en charge optimale en médecine du travail : rôle du médecin du travail et du médecin conseil

Ce projet met en évidence le rôle crucial du médecin du travail et celui du médecin conseil afin de minimiser les conséquences du mal de dos tant pour le patient que du point de vue sociétal.

Le premier rôle de ces médecins doit être un rôle d'information des travailleurs : le mal de dos est une affection fréquente, certaines fonctions et positions présentent plus de risques, le mal de dos aigu se résout fréquemment de manière spontanée (90% dans les six semaines), il est important rester actif malgré la douleur. Si les contraintes physiques liées au travail jouent un rôle sur le plan étiologique, des facteurs psychosociaux (tels que le stress, l'anxiété ou le manque de satisfaction au travail) influencent la gravité de l'évolution et la probabilité d'un passage à la chronicité. Dans ce domaine, les données scientifiques restent moins tranchées.

Un second rôle de ces médecins est la promotion de stratégies de prévention pour éviter le passage à la chronicité. La littérature offre des données probantes pour les écoles du dos (sur le lieu du travail et incluant une composante d'exercices) et pour les interventions multidimensionnelles ou multidisciplinaires (voir supra).

La revue critique de la littérature met en évidence le rôle de l'exercice comme facteur-clé pour la guérison. Une approche multidisciplinaire combinant un programme d'exercices et une prise en charge psychologique et/ou sociale est particulièrement bénéfique. Les médecins du travail et des assurances ont dès lors une responsabilité dans la prise en charge des travailleurs en incapacité pour lombalgie, en collaboration

avec le ou les médecin(s) traitant(s). Le médecin veillera idéalement à minimiser la période d'incapacité en recommandant la poursuite des activités habituelles. Une reprise du travail peut aussi être accélérée par une adaptation temporaire des tâches (durée, charges).

En cas de douleur lombaire récurrente ou constante, l'analyse des "yellow flags" permettrait d'identifier les travailleurs qui risquent un passage à la chronicité (problèmes psychologiques ou dépression). Le médecin du travail analysera également les attentes du travailleur lorsqu'un retour au travail est planifié. L'organisation d'un programme de retour au travail qui s'appuie sur une collaboration entre le secteur curatif et la médecine du travail est à ce titre bénéfique pour favoriser la reprise du travail et diminuer le nombre de jours perdus.

Discussion

Les conclusions de ce rapport donnent un fil conducteur pour la prise en charge de la lombalgie chronique, que ce soit dans le secteur curatif ou en médecine du travail. Cette prise en charge commence par le maintien autant que possible des activités habituelles. Par ailleurs, les programmes d'exercices ont un rôle favorable dans la rééducation et une prise en charge multidisciplinaire est bénéfique. La multiplication de procédures diagnostiques est à éviter. De nombreux traitements non invasifs actuellement appliqués reposent sur peu de données probantes ou ne fonctionnent pas. Les études actuelles ne permettent pas encore de définir de manière précise l'efficacité et les effets secondaires potentiels de nombreuses techniques invasives (injections).

Les données manquent en Belgique pour évaluer avec précision l'ampleur de la lombalgie chronique. Les bases de données disponibles en médecine du travail et celles des mutualités ne permettent pas systématiquement d'identifier ces travailleurs / patients et de les suivre dans le circuit des soins. De plus, ces bases de données ne permettent pas de formuler des hypothèses relatives aux disparités géographiques observées. L'évaluation des coûts médicaux proposée ici est largement sous-estimée et nécessiterait une collecte de données axée sur l'épidémiologie et sur les dépenses liées spécifiquement à cette pathologie.

Vu que la majorité des coûts est liée aux conséquences indirectes de la pathologie, le médecin du travail et le médecin conseil ont un rôle primordial à jouer afin de réinsérer au plus vite le travailleur dans le circuit du travail, en collaboration avec le médecin traitant: les données montrent qu'une absence prolongée ouvre la voie à la chronicité.

Recommandations

L'analyse scientifique de la prise en charge et des conséquences de la lombalgie conduit à la formulation des recommandations suivantes:

- Tous les prestataires de soins doivent être plus sensibilisés aux dangers de l'inactivité chez les patients souffrant de lombalgie chronique, à l'inutilité de multiplier des procédures diagnostiques, aux données probantes qui existent pour certains traitements conservateurs (basés sur une réactivation physique et une approche biopsychosociale), à l'absence de telles données pour de nombreuses autres interventions actuellement utilisées. Lors de lombalgie chronique, il est crucial que le patient soit réinséré le plus rapidement possible dans le circuit du travail. La prescription de tests inutiles et le recours à des traitements non indiqués peuvent entretenir le caractère chronique du mal de dos et faire plus de tort que de bien au patient.
- L'ensemble de ces pratiques nécessite une collaboration étroite entre médecins du travail et médecins du secteur curatif, du médecin généraliste aux médecins de diverses spécialités. Les tâches et responsabilités respectives du médecin du travail et du médecin conseil sont à redéfinir : leur rôle dans la prévention du passage à la chronicité doit être renforcé, dans la mesure où la réinsertion rapide des travailleurs souffrant de lombalgie chronique est une priorité des autorités.
- Les sources de données actuelles sont trop fragmentaires : elles ne suffisent pas, d'un point de vue politique, pour suivre de manière optimale les conséquences d'un problème sociétal tel que la lombalgie.
    - Les données relatives aux affections chroniques manquent en première ligne, de manière générale et en particulier pour la lombalgie.
    - Des données existent pour la consommation de soins mais ne sont pas couplées à une codification précise des raisons d'incapacité de longue durée au niveau des organismes assureurs.
    - En médecine du travail, les bases de données devraient rapidement évoluer vers un encodage standardisé d'affections spécifiques qui entraînent des incapacités de longue durée afin de permettre des analyses et des comparaisons.

Scientific summary

Table of contents

I INTRODUCTION

This project analyses the problem of non-specific chronic low back pain (CLBP) defined as pain lasting more than three months, without or with radicular pain, without any suspicion of severe underlying pathology. CLBP is studied from three points of view. A first part analyses the evidence-based literature on the diagnosis and treatment. The second part analyses the available databases in Belgium in order to assess the size of this public health problem and its related costs. The last part examines the consequences of CLBP on the workers' population using databases from occupational health and also reviews the available data from the literature on the optimal care of CLBP patients in the occupational setting.

The literature review in part I summarizes the evidence based literature sources currently available. It aims to serve as a clinical practice guideline to help primary care and specialized practitioners involved with chronic low back pain. This part mainly searched for the available evidence in guidelines, meta-analyses and systematic reviews. Hence, it should not be considered as an exhaustive list of all available evidence on all diagnostic and therapeutic procedures. No specific search has been conducted on the safety aspects of the procedures and only the most common ones that have been described in the selected references are summarized in this report.

The literature study on occupational medicine (part III) is in the same way a synthesis of the best available evidence for occupational physicians and medical advisers.

The literature reviews from part I and part III are useful to help interpreting the results of the analysis of available Belgian data about medical care (diagnostic and therapeutic) provided to patients with chronic low back pain in our country (part II). Those literature reviews allow appraising to what extent Belgian medical care for chronic low back pain is based on an evidence-based approach.

Finally the combination of current data on CLBP in Belgium and the synthesis of the available evidence will allow policy makers to orientate their decisions for designing policies in relation with chronic low back pain. These decisions can relate to multiple facets as for example the availability of databases, their content, the quality and organisation of care (e.g. multidisciplinary teams, roles of occupational physicians).

2 PART I: EVALUATION AND TREATMENT OF PATIENTS WITH CHRONIC LOW BACK PAIN

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Important preliminary remarks

This report focuses on evaluation and treatment of patients with non-specific chronic low back pain (lasting for more than three months) with or without nerve root/radicular pain. Less common origins of chronic low back pain such as spinal stenosis, spondylolisthesis, spinal tumor or infection are not specifically addressed in this report.

Chronic low back pain is a symptom : the different possible etiologies are voluntary not cited. For some specific techniques, pain generators are however discussed.

The European guidelines for the management of chronic non-specific low back pain (COST B13) are an important source of evidence for this report given their methodological quality, recent date of publication and applicability to European settings. Numerous other references have been consulted and added in this systematic literature search, in particular if they were more recent or addressed specific techniques. The extensive literature search is described in appendix.

2.1 INTRODUCTION

Low back pain (LBP) is generally defined as a pain that occurs in an area with boundaries between the lowest rib and the creases of the buttocks. LBP may be termed as 'acute', 'sub acute', 'chronic' and/or 'recurrent'. Most authors agree that an acute episode of LBP usually resolves within six weeks. The definition of chronic LBP (CLBP) varies among authors. When LBP lasts for more than six weeks, most authors agree to define it as 'sub acute'. When a LBP episode lasts over 3 months (12 weeks) it is generally termed as 'chronic'. After the resolution of an acute LBP episode, further episodes may occur generating a situation defined as 'recurrent LBP'.

LBP may be due to specific medical conditions such as cancer (metastases), infection (discitis) or rheumatologic diseases. However, most cases of LBP are caused by degenerative changes of the lumbar column (so-called "common" or non specific LBP).

Non-specific LBP may be accompanied by nerve root/radicular pain (sciatica) radiating in the lower limbs as degenerative changes may narrow the lumbar spinal canal and/or the foramen(s) leading to nerve root compression. Such nerve root/radicular pain will also be addressed in the present report.

This report addresses non-specific LBP lasting more than 3 months (12 weeks) and/or recurrent episodes of non-specific LBP. CLBP with nerve root/radicular pain (sciatica) is also included in this study.

The aim of the present chapter is to search and summarize the literature on diagnosis and treatment of CLBP patients with or without radicular pain. Recommendations based on the available evidence are also be included in this report.

The detailed searching methodology and references selection after critical appraisal are described in the appendices.

In this chapter and in the chapter about occupational medicine (part 3), the quality of evidence is presented following the GRADE system [1].

2.2 DIAGNOSIS OF CHRONIC LOW BACK PAIN

Non-specific CLBP is generally considered as a clinical syndrome needing comprehensive evaluation (diagnosis) in order to provide each patient with a well-adapted and effective treatment strategy. The first step of the diagnostic evaluation of patients with CLBP consists in ruling out any possible specific cause of LBP that could remain unrecognized or may develop with time.

2.2.1 History-taking

This section focuses on the information obtained through history-taking that is relevant to evaluate and manage patients with CLBP with or without sciatica (radicular pain).

A thorough history should be obtained in all patients with LBP, in the acute and the sub-acute stage. Likewise, it is generally admitted that a thorough physical examination including a well-conducted history-taking should also be repeated in the chronic stage.

Several diagnosis systems have been proposed, in which patients with LBP are classified on the basis of pain distribution, pain behavior, functional disability, clinical signs, etc. None of these systems of classification have been adequately validated [2]. However, several factors such as "red flags", yellow flags", pain distribution, functional status and disability are generally considered as contributing to refine the diagnosis of CLBP.

2.2.1.1 Pain characteristics

The pain characteristics reported by the patient (localization, intensity, type, frequency…) are important in the history-taking. For instance, pain localization must be taken into account, as it often constitutes the first clinical information that may lead to suspect radicular pain (see next section on "red flags").

Evidence

Some tools have been developed to assess pain characteristics (Visual Analogic Scale, Dallas…). These tools are used in daily practice but their utility has not been established (ANAES [3]; expert consensus).

Very few references address the issue of pain evaluation specifically in the context of CLBP. Hence, no specific recommendations can be made to evaluate pain as reported by CLBP.

2.2.1.2 "Red Flags"

"Red flags" are factors, signs or other medical conditions that may be identified through a well-conducted history-taking and that may be associated with non musculoskeletal or with specific origins of LBP. They are traditionally used to rule out specific underlying medical conditions in patients with acute LBP. They may however also be useful in the context of sub acute or chronic LBP.

"Red flags" should be screened on a regular basis, even in the chronic stage, to rule out any specific origin. Some "red flags" indicators of radicular pain may also be useful. Their definitions vary as they are based on expert consensus. The "red flags" proposed by COST B13 [2] (based on the guidelines from the Royal college of general practitioners [4, 5]) are the followings:

- Age of onset of LBP < 20 or > 55 years,
- Constant, progressive, non-mechanical pain (not relieved by rest),
- Thoracic pain,
- Past medical history of malignant tumor,
- Prolonged use of corticosteroids,
- Drug abuse, immunosuppression, HIV,

- Systematically unwellness,
- Unexplained weight loss,
- Widespread neurological symptoms (including cauda equina syndrome),
- Structural deformity,
- Fever.

Koes added the following "red flags" suggesting radicular pain due to nerve root compression [6]:

- Unilateral leg pain > low back pain,
- Pain radiating to foot or toes,
- Numbness and parenthesis of same distribution,
- Passive Straight Leg Raise test (see below) inducing more leg pain than back pain,
- Localized neurological deficit (limited to one nerve root).

Evidence

European COST B13 [2] and ANAES guidelines [3] recommend that "red flags" should be screened on a regular basis, even in the chronic stage, to rule out any specific origin that may reveal itself or develop with time (expert consensus).

Red flags have not been evaluated comprehensively in any systematic review [2]. Serious conditions theoretically associated with "red flags" like neoplasm, infection, and cauda equina syndromes are extremely rare (Carragee [7] in COST B13 [2]). More over, "red flags" are not always associated with any specific pathology, but merely indicate a higher probability of an underlying condition that may require further investigation. A recent study reported an incidence of spinal tumor of 0.69% and 0.12%, respectively in 33 academic and 18 private practice settings (all together 19 312 patients) [8, 2]

2.2.1.3 "Yellows flags"

Psychosocial "yellows flags" may be defined as factors identified during history-taking of patients with LBP that are related to a higher risk of developing or perpetuating chronic pain and long-term disability [9, 2]. The relationship between "yellow flags" and the development of CLBP may be of varied nature. Some "yellow flags" may act as direct or indirect causal factors. Others may reflect more serious conditions (recurrence, radicular pain…).

"Yellow flags" are factors that are generally related to a higher risk of developing CLBP. They may already be screened for in patients with acute LBP. However, the identification of "yellow flags" is particularly relevant when LBP becomes sub acute, chronic or recurrent as, when possible, interventions aiming at eliminating or reducing such "yellow flags" may play an important role in the treatment of CLBP.

The "Yellows flags" described in the European COST B13 guideline are the followings:

- Inappropriate attitudes and beliefs about back pain (for example, the belief that back pain is harmful or potentially severely disabling, or a high expectation from passive treatments rather than from staying active),
- Inappropriate pain behavior (for example, fear-avoidance behavior and reduced activity levels),
- Work-related problems as:

  Poor job satisfaction, compensation issues,

Low-level of support and concern for the LBP sufferer at his work place (COST B13, level A),

Shorter job tenure, heavier occupations with no modified duty (COSTB13 level B),

- Long off-work period of time. For a worker having difficulty returning to normal occupational duties at 4-12 weeks after the onset of LBP, the longer the worker is off-work, the lower the chance is that he will ever return to work (level A),
- Prior episodes of LBP, severity of pain, important functional impact of LBP, psycho-social distress, excessive symptoms report, unrealistic patient expectations,
- Radicular findings (level B in COST B13),
- Emotional problems such as depression, anxiety, stress, tendency to withdraw from social interaction [9].

Evidence

According to Roach et al.[10] who studied a series of 174 patients with LBP, insomnia, trouble sleeping and back pain aggravation through walking are more often associated with severe LBP (sensibility = 0.87; specificity = 0,5). However, this study did not precise clearly the type of LBP (acute, sub-acute or chronic LBP).

2.2.1.4 Psychological evaluation

Any anxiety and/or depression state may play an important role in the development and/or perpetuation of CLBP (see the "yellow flags" section). Psychological evaluation may be performed using specific tools (Hamilton scale, Beck Depression Inventory). Likewise, some signs and behaviours (the so-called "Waddell non-organic signs" such as tenderness, simulation, distraction, regional weakness or sensory abnormality, over-reaction) may suggest the presence of psychological distress, which may be associated with an elevated risk of pain perpetuation. Hence, it is generally admitted that, to some extent, psychological evaluation should be performed during history-taking in patients with CLBP.

Psychological evaluation is useful when yellow flags are present. Psychological evaluation may identify psychological distress that may be related to pain perpetuation. Specific tools developed to assess anxiety and/or depression states may be used in patients with CLBP. However, their validity has not been established in the context of CLBP. The so-called "Waddell non-organic signs" do not correlate with any psychological distress, nor do they discriminate organic from non-organic problems.

Evidence

The ANAES consensus [3] recommends that anxiety and/or depression states should be evaluated using specific tools (Hamilton scale, Beck Depression Inventory). Such tools may be helpful in daily practice but their utility and validity have not been demonstrated.

Fishbain et al. conducted a good-quality systematic review (61 studies) on Waddell's non-organic signs[11]. They concluded that the Waddell's signs do not correlate with psychological distress, nor do they discriminate organic from non-organic problems. They may be explicable by an underlying organic condition and are associated with poorer treatment outcome, with greater pain levels and are not associated with secondary gain. Overall, most studies included in this review had methodological limitations and mixed patient populations with acute and chronic LBP.

2.2.1.5 Functional state and disability assessment

It is generally admitted that functional state and disability level must be addressed in patients with CLBP. The rationale is that chronic pain often leads to physical inactivity, physical capacity reduction (so-called "physical deconditioning"), work loss and ultimately may greatly alter quality of life of the patients.

Functional repercussions in terms of physical activity and capacity levels and occupation should be evaluated in patients with CLBP using specific methods whenever significant physical activity reduction and work loss may be suspected. Only a restricted number of specific tools may be considered as valid.

Evidence

ANAES [3] states that the most commonly and best validated tools are the Oswestry Disability Index and the Roland Disability Questionnaire [12].

Our additional search identified two systematic reviews on functional status assessment [13]; [14]. However, those two complementary references focus on LBP in general and not specifically chronic LBP.

In the good methodological quality systematic review by Grotle et al. [13]}, the authors listed 36 back-specific questionnaires designed for assessing the functional status or disability in patients with LBP. Several versions of the 2 most commonly used questionnaires, the Roland-Morris Questionnaire (6 versions) and the Oswestry Disability Index (4 versions), have been identified. Ten questionnaires were considered as well-validated and recommended without further validation studies: the original version of the Roland-Morris Disability Questionnaire [12], the Oswestry Disability Index 1.0 [15], the Oswestry Disability Index 2.0 [16], the Oswestry Disability Index Chiropractic version [17], the Clinical Back pain Questionnaire [18], the Disability Rating Index [19], the General Function Score[20], the Million Visual-Analogue Scale [21], the Quebec Back Pain Disability Index [22] and the Waddell Disability index [23].

In a low-quality systematic review, Calmels et al.[14] concluded that the metrological properties (content validity, construct validity, applicability, translation and international applicability) of the following functional and disability assessment tools were satisfying: the Dallas Pain Questionnaire [24], Roland-Morris Questionnaire[12], the Quebec Back Pain Disability Index [22] and the Oswestry Disability Index [15]. Noteworthy, the version of the Dallas Pain Questionnaire by Lawlis [24] had been evaluated as insufficiently validated by Grotle et al.[13]}

Key messages for history- taking

- **The patient history-taking has been extensively described in the context of acute low back pain but it has been seldom addressed in the context of chronic low back pain,**
- **Pain characteristics (localization, intensity, type…) reported by the patient must be evaluated. However, the validity and utility of tools specifically designed to assess pain characteristics have not been established,**
- **"Red flags" are traditionally used to rule out any specific underlying medical condition in patients with acute low back pain. Some radicular pain-specific "red flags" have been also proposed to identify nerve root pain during history-taking. The definition and implementation of "red flags" are based on expert consensus. It is recommended to assess the presence of "red flags" also at the chronic stage of LBP,**
- **"Yellow flags" are psychosocial factors that might be predictors of chronicity in acute or sub acute LBP. It is recommended to identify the presence of "yellow flags" in the patient with CLBP also,**
- **It is advisable to evaluate the psychological state of the patient with CLBP. Some specific tools are traditionally used in that context although their utility has not been established yet. Waddell's non-organic signs do not correlate with psychological distress, they should not be used to discriminate organic from non-organic conditions and are not associated with secondary gains,**
- **Functional status and disability should be evaluated whenever significant physical activity reduction and work loss may be suspected during history-taking. Numerous specific tools have been developed therefore but only a limited number of them may be considered as sufficiently valid. There is no evidence that the use of such tools generates any benefit in patients with CLBP.**

2.2.2 Physical examination

A history-taking combined with physical examination allows evaluating the degree of pain and functional disability in order to outline a management strategy that matches the magnitude of the problem. This section addresses the relevant findings obtainable through physical examination. This review did not find any reference focusing on the impact of physical examination on the outcomes of CLBP.

2.2.2.1 Information given to the patient during physical examination

Physical examination may serve as a basis for providing the patient with valuable information regarding diagnosis, management and prognosis. It may help to reassure the patient and act in this way as a therapeutic intervention by addressing for instance misbelieves that may be identified and corrected.

It is advised to provide the patients with information based on a biopsychosocial model in order to change their misbelieves about LBP. Information should be given in easily understandable terms.

Evidence

The COST B13 guideline [2] recommends that "Information given to the patient should be provided in a common language understandable by the patient. Preferably, the information should be given consecutively during the clinical examination and when evaluating imaging. Terms like "positive" findings for a significant pathology should be

avoided as they often are hard to understand for the patient. Likewise, concepts such as vertebral instability, disc displacement, isthmic fracture (spondylolisthesis), hyper mobility, that refer to mechanical disorders not yet clearly defined nor verified by experimental or clinical studies, should thus be avoided".

A recent systematic review concluded that information based on a biopsychosocial model is recommended in primary care to shift patient beliefs on LBP. In this model, the message is focused on patients "beliefs and attitudes" and stresses the advantage of remaining active and avoiding best rest, combining with reassurance that there is likely nothing seriously wrong. Traditional information on anatomy, ergonomics, and back-specific exercises is markedly reduced. Nevertheless, information delivery alone is not sufficient to prevent absenteeism and reduce health care costs [25].

2.2.2.2 *Orthopedic examination and mobility of the lumbar spine*

Many physical tests are routinely carried out as part of the physical examination of the patient with CLBP (trunk mobility tests, orthopedic tests focusing on bones, joints, tendons and ligaments…). Traditionally, physical examination aims at assessing the level of pain, the mobility of the lumbar spine, at identifying the presence of nerve root/radicular pain, at ruling out any neurological deficit or clinical "red flag" and at identifying the pain generator as precisely as possible. Physical examination aims at gathering the useful information needed by the clinician to elaborate an adapted treatment strategy.

No maneuver has been validated as a part of the orthopedic examination of the CLBP patient. Most physical tests are based on expert consensus.

Evidence

COST B13 does not address physical examination [2]. KNGF 2005 recommends a history-oriented physical examination including anthropometrical evaluation (trunk and leg lengths…), mobility and strength testing and some functional testing (e.g. sitting, pushing)[26].

ANAES advises to proceed to a general physical examination to rule out any specific orthopedic or neurological abnormality [3]. It identified two trials with unknown methodological quality that aim at establishing a physical examination total score. One trial by Waddell [27] suggests that a total physical examination score based on 8 different traditional physical tests is able to discriminate CLBP patients from controls (sensitivity 0.86 ; specificity 0.76). The second trial by Llorca [28] suggests that a global trunk mobility score obtained by summing several trunk mobility indices is able to discriminate LBP patients from controls (sensitivity 0.93 ; specificity 0.95).

2.2.2.3 *Neurological examination: the Lasegue test*

It is generally admitted that physical examination of the patient with acute LBP should include neurological tests. These neurological tests in patients with LBP mainly aim at:

- Ruling out any "red flag" associated with a specific medical condition or a severe neurological (radicular) complication that may seldom develop in CLBP (paresis, paralysis, cauda equina syndrome…),

- Identifying any radiating pain that may have a nerve root/radicular origin.

This neurological examination should be performed on a regular basis during follow-up. Traditionally, it encompasses the osteo-tendinous reflexes testing, motor and sensory testing and the Lasegue test.

The Lasegue test, also known as the Passive Straight Leg Test (PSLR) in North-America, is routinely used to identify the presence of nerve root/radicular pain due to nerve root compression. COST B13 [2] describes this test as follows: "*The Lasegue test requires a firm level couch, with a supine, relaxed patient with trunk and hips without lateral flexion. The practitioner should ensure that the patient's knee remains extended, with the foot in the*

vertical plane. The affected leg is supported at the heel and the limb gently elevated. The angle of leg elevation at the onset of pain and the site of pain is recorded. If the PSLR is unilaterally limited, induces unilateral symptoms, or is bilaterally limited to less than 50°, then each leg should be raised in turn to the onset of pain, lowered a few degrees (to reduce pain) and, in turn, the ankle dorsiflexed, the hip medially rotated and the neck flexed. Symptom reproduction by one of these tests would be interpreted as a positive PSLR outcome, suggesting increased root tension".

The use of the PSLR (Lasègue) test to identify radicular pain due to nerve root compression at the lumbar level (L4-L5 and L5-S1) is not supported by the selected references.

Evidence

Two high-quality systematic reviews [29, 30] were identified by the COST B13 systematic review. In the first review by Deville et al.[29], all studies were surgical case-series at non-primary care level. According to COST B13, "*It was found that the pooled diagnostic odds ration for PSLR was 3.74 (95% CI 1.2-11.4); sensitivity was high 0.91 (0.82-0.94), but specificity was low 0.26 (0.16-0.38). The pooled diagnostic odds ratio for the crossed PSLR test (pain evoked in the symptomatic lower limb by performing a PSLR in the contra-lateral limb) was 4.39 (95% CI 0.74-25.9); with low sensitivity 0.29 (0.23-0.34), and high specificity 0.88 (0.66-0.90). The authors concluded that the studies do not enable valid evaluation of diagnostic accuracy of the PSLR test".* This test is not sufficient to make the diagnosis of radiculopathy. An important methodological weakness is that disc herniation was selected as the outcome variable.

According to Rebain et al.[30], "The sensitivity (0.8) of the PSLR test was also far greater than its specificity (0.4). There remains no standard PSLR procedure and no consensus about the interpretation of the results". The authors concluded that: "Until there is a standard procedure for carrying out and interpreting the PSLR, with well-documented reliability and validity, clinicians and researchers should treat the test with caution" [2].

The use of the Lasegue test as a valid and reliable test to identify radicular pain due to nerve root compression at the lumbar level (L4-L5 and L5-S1) is not supported by the quality of evidence available in the selected references. This lack of evidence contrasts with opinions of experts, who generally consider a properly conducted PSLR test as *"the most accurate test to identify nerve root pain"* [31].

2.2.2.4 Spinal palpation and motion pre-manipulative tests

Spinal palpation tests are sometimes performed as a part of the physical examination to determine whether manipulative therapy is indicated and/or to evaluate the effectiveness of a therapeutic intervention. Such tests consist in the assessment of symmetry of bony landmarks (posterior superior iliac spines for instance), evaluation of regional segmental motions, Para spinal soft tissue abnormalities, tenderness during active trunk movements and palpation. The validity and reliability of such pre-manipulative tests remain vastly debated [2].

Palpatory and motion pre-manipulative tests are neither reliable, neither valid. Moreover, the presence of a manipulable lesion remains hypothetical.

Evidence

The COST B13 systematic review found two good quality systematic reviews on pre-manipulative tests: Seffinger et al. [32], Hestebaek and Leboeuf-Yde [33]. Our additional search identified one more systematic review by van Trijffel et al. [34]. However, this review was excluded from this analysis: most included studies did not fulfill the criteria for external and internal validity e.g., an adequate report of the study protocol and statistical tests.

COST B13 concludes "There is conflicting evidence that spinal palpatory tests are reliable procedure to diagnose back pain (level C: conflicting evidence). Pain provocation tests are the most reliable of the palpatory tests (level B). Soft tissues tests are unreliable (level A). Regional range of motion is more reliable than segmental range of motion (level A). Intra-examiner reliability is better than inter-rater reliability for all palpatory tests (level A). As palpatory diagnostic tests have not been established as reliable and valid, the presence of the manipulable lesion remains hypothetical (level B).

Key messages for physical examination

- **Specific physical examination of the patient with CLBP is not well documented in the literature. No test commonly included in the physical examination of the patient with CLBP has been sufficiently validated. The content of the traditional physical examination of patients with CLBP is based on expert consensus. It is generally admitted that the physical examination recommended in patient with acute LBP should be repeated at first evaluation of the CLBP and during the follow-up.**
- **The use of the PSLR (Lasegue) test as a valid and reliable test to identify radicular pain due to nerve root compression at the lumbar level (L4-L5 and L5-S1) is not supported by the evidence.**
- **Palpatory and motion pre-manipulative tests are neither reliable, neither valid. Moreover, the presence of a manipulable lesion remains hypothetical.**

2.2.3 Biology tests

This systematic review did not identify any good-quality study about biology tests neither for the diagnosis of CLBP nor for the impact of the use of biology tests on the outcomes of CLBP. It can only be assumed that recommendations about biology testing in patients with CLBP should follow the same rules as for acute/sub acute LBP. For instance, the presence of "red flag" such as loss of weight, general unwellness, should lead to test biology.

Evidence

Cost B13 [2] related one systematic review of 36 studies that evaluated the accuracy of history-taking, physical examination and erythrocytes sedimentation in diagnosing low back pain in general practice [35]. The review found that few of the studied signs and symptoms seemed to provide valuable diagnosis. The combined history and the erythrocytes sedimentation rate had relatively high diagnostic accuracy in vertebral cancer [2]. Another review cited in COST B13 concluded that "*For patients 50 years of age and older, or those whose findings suggest systemic disease, plain radiography together with simple laboratory tests can almost completely rule out underlying systemic diseases".* [36]

Key message for biology tests

- **No evidence is available about the value of biology tests in CLBP. It can only be assumed that recommendations about biology testing in patients with CLBP should follow the same rules as with acute and sub acute LBP.**
- **Authors suggested that for patients 50 years of age and older, or those whose findings suggest systemic disease, plain radiography together with simple laboratory tests can almost completely rule out underlying systemic diseases.**

2.2.4 Imaging

Imaging patients with CLBP encompasses conventional radiography; more sophisticated imaging techniques (CT, MRI) and interventional imaging as discography. Some imaging techniques (fluoroscopic guidance) may also be used as an aid in the context of invasive therapeutic procedures: those techniques will be addressed in the following sections.

Two guidelines specifically address the issue of imaging in the context of CLBP [2,3] : ANAES and COST B13. The ANAES [3] guideline refers to an earlier guideline on imaging by the same institution: "Imagerie dans la lombalgie commune de l'adulte" [37]. COST B13 found 5 systematic reviews of high quality: Boos and Lander [38] (technical efficacy level), Jarvik and Deyo [36] (diagnostic accuracy of imaging for patients in primary care settings), Littenberg et al [39] (SPECT), Saal [40] (diagnostic tests in the evaluation of CLBP with a focus on invasive techniques, such as discography), van Tulder et al [41] (relationship between radiographic findings and non specific low back pain) The quality of some additional studies mentioned in COST B13 [42-54, 36, 55, 56, 8, 57] is not defined.

The "Recommandations du Consilium Radiologicum Belge" (currently being revised) are based on a European experts consensus (Radioprotection 118 : recommandations en matière de prescription de l'imagerie médicale de la Commission Européenne). A recent KCE HTA report on Magnetic Resonance Imaging (MRI) was also considered [58].

2.2.4.1 Conventional radiography

Conventional radiography for CLBP usually includes several views: front and oblique views of the whole lumbosacral spine, front and oblique views centered on the lumbosacral junction and coned lateral views (left and right) of the lumbosacral junction to visualize the facet (zygoapophyseal) joints.

Systematic imaging of adults with CLBP between the age of 20 and 55 years is not recommended: the relationship between degenerative changes and LBP is weak and most common abnormalities seen on conventional radiographs (spondylolysis/spondylolisthesis, spina bifida, transitional vertebrae and sequel of Scheuermann's disease) are not associated with back pain. Moreover, conventional radiography is not a good screening procedure for the suspicion of compression fractures, cancer and metastases, as its sensitivity is too low.

Evidence

According to COST B13, "there is moderate evidence that radiographic imaging is not recommended for chronic non-specific low back patients (level B)"[2].

A systematic review of observational studies [41] cited in COST B13) concludes that "there is no firm evidence for the presence of absence of a causal relationship between radiographic findings and non-specific low back pain. Degeneration, defined by the presence of disc space narrowing, osteophytes, and sclerosis, turned out to be associated with non specific low back pain, but odds ratio were low, ranging from 1.2 to 3.3. Spondylolysis and spondylolisthesis, spina bifida, transitional vertebrae, spondylosis and Scheuermann's disease did not appear to be associated with low back pain"[2].

The review of Jarvik and Deyo [36] (cited in COST B13) concluded that "for adults younger than 50 years of age (in primary car settings) with no signs or symptoms of systemic disease, symptomatic therapy without imaging is appropriate. For patients 50 years of age and older, or those whose findings suggest systemic disease, plain radiography together with simple laboratory tests can almost completely rule out underlying systemic diseases. Advanced imaging should be reserved for patients who are being considered for surgery or those in whom systemic disease is strongly suspected".

Two studies in primary care [53, 54] cited in COST B13 randomized unblinded controlled trial with 421 patients), concludes that *"the use of lumbar spine radiography prior to treatment was not associated with improved functioning, reduced pain or improved overall*

status after treatment, and was associated with an increase of General Practitioner workload. Participants receiving X-rays were more satisfied with their care, but were not less worried or more reassured about serious disease causing their low back pain."

A study in primary care patients [42] cited in COST B13 concluded that "the presence of a lytic or blastic lesion on plain radiographs was 60% sensitive and 99.5% specific for cancer. This suggests that plain radiography is not a good screening procedure for cancer and metastases. Sensitivity was 70% and specificity 95% for compression fractures."

A recent study of 33 academic and 18 private practice settings (altogether 19,312 patient files) "*reported an incidence of spinal tumor of 0.69% and 0.12% respectively*" (Slipman et al [8] cited in COST B13). *"It has been shown that, with careful clinical assessment revealing no red flags, X-rays detect significant spinal pathology in just one in 2500 patients"*(Waddell [51] cited in COST B13).

A study (van den Bosch et al [57] cited in COST B13) identifies "many abnormalities that are unrelated to back symptoms. The abnormalities are equally prevalent in persons with and without back pain : spondylolysis, facet joint abnormalities, some congenital anomalies, Schmorl's nodes, herniated discs, disc dehydration ("black discs"), disc protrusion, and mild scoliosis (Cobb angle <10°). Imaging identifies abnormalities that are unrelated to back symptoms". That may be considered as an adverse effect.

ANAES [3] recommendations contrast quite significantly with those of COST B 13: it recommends systematic imaging of patients with CLBP through conventional radiography. However, such recommendations are only based on an expert consensus.

Belgian Consilium Radiologicum recommendations recall that degenerative changes that can be seen on plain lumbosacral films are frequent and not specific. Those recommendations also state that conventional radiography should only be systematically obtained in patients below the age of 20 and older than 55 years old.

2.2.4.2 CT and MRI

Computed Tomography (CT) and Magnetic Resonance Imaging (MRI) are more advanced imaging procedures traditionally used to diagnose herniated disks as a common cause of nerve root compression and radicular pain and to rule out non-specific origins of LBP in the presence of "red flags". Noteworthy, when CT is a technique that uses ionizing radiations, MRI does not.

There is moderate-quality evidence that MRI should not be used for common CLBP, even if some experts recommend MRI when CLBP persists after well-conducted treatment (very-low quality evidence).

A previous KCE report concluded that MRI is the best imaging procedure for patients in whom a specific origin of LBP is suspected in the presence of one or more "red flags" (suspicion of nerve root compression, discitis, neoplasm).

CT scan is not recommended for patients with CLBP.

Evidence

COST B13 concluded: "MRI is the best imaging procedure for use in patients with radicular symptoms, or for those in whom discitis or neoplasm is strongly suspected (level B). Facet joint MRI is not reliable procedure for the differential diagnosis between facet joint pain and discogenic pain level B)" [2] .

COST B13 [2] recommends "MRI in patients with serious red flags and for evaluation of radicular symptoms. Plain radiography is recommended for structural deformities.". COST B13 [2] considered the following studies about the use of MRI for specific diagnoses:

- Metastases: "MRI is a good, but not perfect method to detect spinal metastases. In one study the sensitivity varied from 0.83 to 1.00, and specificity from 0.85 to 0.96 [46]" .
- Herniated discs: "In one study, computed tomography and MRI had a high sensitivity and low specificity for herniated discs" (Jarvik et al. [6]).
- Spinal stenosis: A meta-analysis showed that for spinal stenosis the sensitivity of CT imaging ranges from 0.7 to 1.0 and the specificity ranges from 0.8 to 0.96 (Kent et al [44]).
- Discogenic pain: "MRI and discography are commonly used in the diagnosis of non-specific low back pain when common degenerative changes are suspected to cause discogenic pain. Studies of MRI have revealed that high proportions of asymptomatic individuals (up to 80%, depending on the "MRI-abnormality" in question) have such changes [43, 45, 47-50, 52] and some of these increased with age [47]. Among symptomatic subjects, MRI findings of mild to moderate neurological compression, disc degeneration or bulging, and central stenosis were not to correlate with severity of symptoms [43, 52]".

Substituting rapid MRI for radiographic evaluations in the primary care setting offers little benefit to patients. "Although physicians and patients preferred the rapid MRI, substituting rapid MRI for radiographic evaluations in the primary care setting offered little additional benefit to patients (in terms of the subsequent pain and disability levels 12 months after the original examination), and increased the costs of care (Jarvik et al.[56]; RCT cited in COST B13 [2]). There is currently not enough evidence to support the routine use of rapid MR to detect cancer as a cause of LBP in primary care patients (Hollingworth et al [55] cited in COST B13 [2])".

The « Recommandations du Consilium Radiologicum Belge » do not either recommend the use of CT for patients with non-specific CLBP. It states that MRI may be needed when local pain persists after treatment or in the presence of any abnormal finding suggesting a possible specific origin of LBP.

The conclusions of the recent KCE HTA report do not focus specifically on the CLBP patient but the role of MRI in low back pain is defined as follows [58]:

- MR imaging is accurate in detecting and characterising degenerative intervertebral disc disease and disc herniation (evidence level 2).
- A wide spectrum of imaging findings is found in both symptomatic and asymptomatic individuals (evidence level 2).
- Correlation between imaging findings and clinical symptoms is low (evidence level 2).
- Urgent MR is indicated in patients with acute neurological deficit (evidence level 5).
- A rapid MR technique is not recommended to replace radiography of the lumbar spine, because it increases costs (increased number of spine operations) (evidence level 6).
- Magnetic resonance imaging is accurate in detecting and characterising spinal vertebral metastasis and more sensitive and specific than plain radiography, computed tomography and bone scintigraphy (evidence level 2).
- There is currently not enough evidence to support the routine use of „rapid MR imaging" to detect cancer as a cause of low back pain in primary care patients referred for imaging to exclude cancer as a potential cause of their pain (evidence level 6).
- In suspected malignancy (metastatic or multiple myeloma) with spinal cord compression, MRI is highly indicated (evidence level 2).

2.2.4.3 *Scintigraphy and SPECT*

In two-dimensional (planar) and three-dimensional (SPECT) bone scintigraphy (also called "bone scanning") a radioisotope tracer (Te^{99}) injected intravenously is captured by osteoblasts in areas where bone formation rate is elevated. After injection of the bone marker, images can be obtained using a gamma camera. Planar images are obtained in traditional bone scintigraphy. In a similar way to X-ray Computed Tomography (CT), Single Photon Emission Computed Tomography (SPECT) allows obtaining three-dimensional images. Planar and SPECT scintigraphy are used to detect possible causes of LBP [2].

There is low-quality and conflicting quality of evidence that SPECT and scintigraphy are effective in diagnosing pseudarthrosis after surgery for spinal fusion, in suspected stress fractures, in the evaluation of malignancy and in diagnosing symptomatic painful facet joints and osteoid osteoma.

Evidence

According to COST B13 [2], there is conflicting evidence that SPECT and scintigraphy are effective in diagnosing pseudarthrosis after surgery for spinal fusion, in suspected stress fractures, in the evaluation of malignancy and in diagnosing symptomatic painful facet joints (level C).

The review of Littenberg et al. [39] (cited in COST B13 [2]) states that "There is a weak evidence that SPECT is useful in detecting pseudarthroses after failed spinal fusion, evaluating back pain in the young child, the adolescent (spondylolysis, osteoid osteoma) and the young adult (stress fractures associated with anorexia or hormonal disturbances), and distinguishing benign from malignant lesions in cancer patients. SPECT has not been sufficiently studied in the detection of others disorders"

COST B13 cites one study from Kanmaz et al.[59, 2]) :"When used to examine adults patients with CLBP, SPECT detects significantly more scintigraphic abnormalities than does planar imaging. However the clinical utility of this procedure could not be confirmed".

Another additional smaller study suggested that *"SPECT scan might enhance the identification of patients benefiting from facet joint injection"* (Dolan et al.[60] cited in COST B13[2]).

In one study on planar imaging and SPECT, *"estimates of sensitivity ranged from 0.74 to 0.98"* (Jarvik and Deyo[36] cited in COST B13[2]).

According to ANAES[3], there is only low-quality evidence to support the use of scintigraphy in patients with CLBP.

2.2.4.4 *Discography*

Discography is an invasive radiological diagnostic procedure consisting in injecting a contrast medium into the disc under fluoroscopic guidance and obtaining two-dimensional conventional radiographs to identify the presence of degenerative changes in the disc. Discography has been proposed as a diagnostic tool, as it allows imaging degenerative discs and as it may also elicit pain during intra-discal injection, which is generally interpreted as the disc acting as a pain generator (so-called "discogenic pain").

There is moderate-quality evidence that discography is not a reliable procedure for the diagnosis of common chronic low back pain.

Evidence

Two guidelines address this topic: COST B13 [2] (based on the systematic review of Saal[40] and on the studies of Carragee and Hannibal [7]) and Boswell [61]. An additional search identified one supplementary systematic review by Shah [62].

The Cost B13 [2] concludes that there is moderate-quality evidence that discography is not a reliable procedure for the diagnosis of discogenic pain (level B). These conclusions are based on the following studies. One systematic review [40] on invasive techniques concluded that there are inherent limitations in the accuracy of all diagnostic tests, including discography. The review of Carragee and Hannibal [7] reported that 73% and 69% of discs with a high intensity zone were positive on discography in symptomatic and asymptomatic individuals respectively. The review concluded that discography is unreliable to diagnose CLBP patient's primary cause of illness.

On the other hand, the systematic reviews by Boswell [61] and by Shah [62] favour discography as a useful test to diagnose discogenic pain. However, these references use the pathological disc morphology as "gold standard": this may be a major methodological flaw. While the accuracy of discography as an imaging test is high, with high specificity and sensitivity for the diagnosis of disc degeneration, the key question with discography remains whether this test is accurate for the diagnosis of discogenic pain as the relationship between degenerative changes and pain is weak. An integral part of the problem is the lack of an adequate gold standard [61, 62].

Finally, it must also be underlined that Shah is also one of the authors of the guideline of the American Society of Interventional Pain Physicians [61] and is a member of this Society. Most of the members of the American Society of Interventional Pain Physicians are more favorable than other authors about the effectiveness of invasive diagnostic and therapeutic procedures. This important issue will be further discussed in the section on invasive therapeutic procedures for CLBP.

Safety of discography

The complications cited by Boswell include septic discitis, subdural abscess, spinal cord injury, epidural and prevertebral abscess. The frequency of these complications is not stated [61].

2.2.4.5 *Safety and adverse effects of imaging*

COST B13 related that lumbar radiography and in particular computed tomography may be harmful because they expose the gonads to ionizing radiation, especially with oblique views or repeated exposures. The ionizing radiation associated with one conventional lumbar radiograph is equivalent to that of 15 radiographic examinations of the thorax or the average ionizing radiation experienced from all other sources for 8 months [63]. This is particular concern in younger female patients [2].

Key messages for imaging

- **In the absence of red flags, radiographs in CLBP adults between 20 and 55 years are not recommended.**
- **Conventional radiography is not a good screening procedure for compression fractures, cancer and metastases, as its sensitivity is too low.**
- **There is moderate-quality evidence that MRI should not be used for common CLBP There is moderate-quality evidence that MRI is the best imaging procedure for use in CLBP patients with radicular symptoms, or for those in whom discitis or neoplasm is strongly suspected. There is moderate-quality evidence that facet joint MRI is not reliable procedure for the differential diagnosis between facet joint pain and discogenic pain,**
- **CT scan is not recommended for patients with chronic low back pain,**
- **There is low-quality evidence that scintigraphy and SPECT are effective if specific diagnoses are suspected,**
- **There is moderate-quality evidence that discography is not a reliable procedure for the diagnosis of common chronic low back pain.**

2.2.5 Electrophysiological tests

The most commonly used neurophysiological tests are Electro-Neuro-MyoGraphy (ENMG) and sensory and/or motor evoked potentials studies. Other more recently developed tests such as Laser-evoked potentials studies and quantitative sensory testing are however seldom implemented in more complex cases (for instance, chronic pain in the context of so-called "failed back surgery syndrome").

Surface-EMG is also sometimes used to study trunk muscle activation patterns, which may supposedly be modified in patients with CLBP.

Two guidelines (ICSI [64] and COST B13 [2]) address the ENMG. COST B13 [2] consider 4 systematic reviews dealing with ENMG (needle and/or surface) and LBP [65-68] and additional studies: Haig [69] , De Luca [70], Elfving [71], Mannion [72-74], Geisser [75]. The quality of the studies is not defined. Our additional search finds two systematic reviews on surface electromyography [76, 77].

No studies were found that focus on the use of electrophysiological tests in relation with their possible impact on the outcomes of CLBP patients.

2.2.5.1 Traditional ENMG

The traditional ENMG includes nerve conduction studies and needle EMG. Nerve conduction examinations include studies of motor nerve conduction, sensory nerve conduction, late responses (F waves) and reflexes (H reflex). Needle-EMG examination includes the study of muscle electrical activity at rest and during voluntary contraction through a needle electrode inserted in the studied muscle. Spontaneous activity at rest (denervation potentials), muscle activity firing patterns and motor unit action potentials morphology during voluntary contraction are studied through needle-EMG. ENMG studies are able to detect motor unit involvement such as conditions affecting ventral horn motoneurons, nerve roots and more peripheral nerves. In the context of LBP and CLBP, ENMG is traditionally used to diagnose a radiculopathy and to exclude peripheral neuropathy. By definition, ENMG explores mostly motor consequences of possible radicular involvement in CLBP. Sensory involvement can be explored by Evoked Potentials studies.

The validity and reliability of ENMG as a diagnostic tool to detect spinal radiculopathies and stenosis has not been sufficiently established in common chronic low back pain.

Evidence

COST B13 [2] concluded that there is conflicting evidence for the usefulness of ENMG in patients with lumbar spinal stenosis and spinal radiculopathies (level C). The use of electromyography as a diagnostic procedure in CLBP is not recommended by COST B13 [2].

One review article (with methodological limitations) concluded that, among the available electrophysiological techniques for evaluating radiculopathies, ENMG is the best method to evaluate radicular pain [67].

In the context of spinal stenosis assessment, studies are conflicting. When Fisher concludes that ENMG should be considered as an insufficiently sensitive diagnostic tool in patients with lumbar spinal stenosis [67], Haig concluded that paraspinal denervation observed through needle-EMG may be a better marker than MRI findings for symptomatic spinal stenosis (Haig [69] in COST B13[2]).

The ICSI guideline addresses the ENMG by the patient with chronic sciatica and considered that it should be ordered according to the preferences of specialists to whom the patient will be referred. This recommendation is based on low-quality studies (non-RCT and non-cohort studies) [64].

2.2.5.2 *Surface electromyography (surface-EMG)*

Surface-EMG has not been established as a diagnostic procedure. It is generally used in experimental studies, in order to examine global trunk muscle activation or muscle fatigue characteristics [2]. It has indeed been hypothesized that surface EMG could detect abnormal trunk muscle activation and/or fatigue that could be specific to CLBP.

The validity and reliability of surface-EMG as a diagnostic tool in non-specific CLBP has not been established in common chronic low back pain.

Evidence

COST B13 [2] concluded that there is conflicting evidence that surface-EMG is able to discriminate patients with non-specific CLBP from controls and for monitoring rehabilitation programs (level C). However, the validity and reliability of surface-EMG as a diagnostic tool in CLBP remains largely understudied.

The meta-analysis by Geisser concluded that further research is needed to determine the combination of measures that are cost-effective, reliable, valid and discriminate with a high degree of accuracy between healthy persons and those with LBP [77].

Key messages for electrophysiological tests

- **Electrophysiological studies are generally used to diagnose and/or evaluate radiculopathy in patients with CLBP and to exclude other neurological conditions,**
- **However, the validity and reliability of ENMG as a diagnostic tool to detect spinal radiculopathies and stenosis have not been sufficiently established in chronic low back pain. There is very low-quality conflicting evidence that ENMG may be a good method to evaluate radicular pain.**
- **There is very low-quality and conflicting evidence that surface-EMG is able to differentiate patients with non-specific CLBP from controls,**
- **There is no evidence available in the literature on the usefulness of other electrophysiological tests often used in the context of CLBP with sciatica.**

2.2.6 Interventional diagnosis techniques

Chronic refractory spinal pain poses a diagnostic challenge because of multiple putative pain sources, overlapping clinical features, and non-specific radiological findings. Diagnostic injection techniques are employed to isolate the source(s) of pain. Noteworthy, most of such techniques may also be therapeutic as well as diagnostic, as corticosteroids are generally injected along with anesthetizing drugs. The therapeutic aspects of these techniques will be discussed in the part on treatment of CLBP.

This review did not find any literature on the impact of interventional diagnosis techniques on the outcomes for the patient with CLBP.

2.2.6.1 *Facet (zygoapophyseal) joint blocks*

In order to locate more precisely the origin of the CLBP, facet joint blocks are sometimes performed by injecting an anesthetic drug in the facet (zygoapophyseal) joint with or without the help of fluoroscopy guidance. When pain is alleviated after such a facet block, it is hypothesized that pain origin is located in the injected facet joint(s). For instance, the facets are thought to be the pain generators in the so-called « facet syndrome ». It must be noted that steroids are also often injected along with the anesthetic drug. In that case, when efficacious, the facet injection becomes therapeutic as well. This section will only address facet blocks as possible diagnostic tools in CLBP.

Evidence about the validity and reliability of facet joint blocks as a diagnostic tool to identify the facet joint as a pain generator is moderate but conflicting.

Safety of facet joint blocks remains largely unknown.

Evidence

Two guidelines address this topic: COST B13 [2] (based on Schwarzer et al. [78-81] and Boswell 2005 [61] (based on Revel [82, 83], Manchikanti [84], Laslett [85], Schwarzer [86, 81]).

Our additional search identified one systematic review [87].

Diagnostic blocks of a facet or zygoapophyseal joint are proposed to subgroups of patients suffering with chronic spinal pain eligible to undergo commonly utilized and effective interventional technique [61, 2] or subjects experiencing more than 3 months of chronic spinal pain of sufficiently severe intensity to warrant further investigations or justify referral spinal/spine specialist, and who add failed adequate trial of conservative management with medications, physical therapy, psychological interventions [87].

Cost B13 [2] concludes that there is moderate-quality evidence that facet joint injections are not reliable procedure for the diagnosis of facet joint pain (level B). According to COST B13[2], the zygapophysial facet joint may be a source of chronic low back pain, but the existence of a « facet syndrome » is controversial (Schwarzer et al [78] cited in COST B13 [2]). One study concluded that pain relief after facet joint blocks does not correlate with facet arthrosis (Schwarzer et al [81] cited in COST B13). Another study concluded that there remains no standard test with which to establish the validity of facets blocks of any type in making a diagnosis of facet joint pain (Schwarzer et al [79] cited in COST B13[2]). Reproducibility of the facet joint block is low; the specificity is only 65%. Approximately 30% of patients undergoing lumbar facet joint blocks report complete relief of their pain after subcutaneous injection of physiological saline (Schwarzer et al [80] cited in COST B13[2]).

The systematic review of the American Society of Interventional Pain Physicians [61] concludes that, based on multiple evaluations, the validity, specificity and sensitivity of facet joint nerve blocks are considered as strong in the diagnosis of facet joint pain. Facet or zygoapophyseal joints have been implicated as the source of chronic spinal pain in 15% to 45% of patients with chronic low back pain. Reported false positive rates varied form 17 to 47% in lumbar spine. The false negative rate of diagnostic was shown to be 8%.

One recent systematic review that focused on the accuracy of the technique [87] included 6 good quality RCTs [82, 86, 81, 83-85, 87]. The reliability of the diagnosis with clinical history, physical examination and medical imaging is poor. Based on 9 good-quality studies in selected populations (failed conservative treatments, no neurological signs, severe pain often more than 6 months of duration) with facet joint injection, the prevalence of facet syndrome is 15 to 45%. The false positive rate varies from 17 to 47%. Accuracy must be compared with a "gold" or criterion standard that can confirm presence or absence of a disease. There is, however, no available gold standard, such as biopsy, to measure presence or absence of pain. Hence, there is a degree of uncertainty concerning the accuracy of diagnostic facet joint injections. Sehgal's study however concludes that the data obtained from literature review suggest that controlled comparative local anesthetic blocks of facet joint nerves are reproducible, reasonably accurate and safe. Sehgal [87] is also one of the authors of the guideline of the American Society of Interventional Pain Physicians [61]. The conclusions of those these authors are more favorable than European's conclusions and are based on studies of members of the American Association. Confirmation by others studies in others sites would be necessary before generalizing such favorable conclusions.

Safety of facet blocks

According to Boswell [61], the potential complications are dural puncture, spinal cord trauma, infection, intravascular injection, spinal anesthesia, chemical meningitis, neural

trauma, and hematoma formation; steroids side effects, radiation exposure, facet capsule rupture if large volume is injected. The frequency is not stated.

In the systematic review from Sehgal [87], only one vaso-vagal episode and short duration procedure-related discomfort was reported in one study. No major complications were reported in any other studies.

2.2.6.2 Selective nerve root blocks

Selective nerve root blocks consist in injection of contrast, local anaesthetics or other substances around nerve roots under fluoroscopic guidance. Selected subgroups of patients with CLBP with clinical findings suggesting radicular pain due to nerve root involvement are eligible to undergo such interventional technique when history, examination, imaging and other diagnostic injections and electrophysiological testing fail to identify the pain generator. There is no gold standard described for such a technique. Diagnosis is based on provocative response and analgesic response. Noteworthy selective nerve root blocks are sometimes proposed to better define the involved nerve root before invasive therapeutic procedure such as surgery or injection.

The quality of evidence supporting selective nerve root block in CLBP as a valid and reliable procedure to diagnose radicular pain due to nerve root involvement is very low.

Although major complications of selective nerve root blocks have been reported in the literature, the safety of such techniques remains largely unknown.

Evidence

One systematic review identified only one practice guideline (Boswell 2005 [61] based on North et al [88]) and some low-quality studies. An additional search did not find any more good-quality studies.

According to Boswell [61], "The reported sensitivity of a diagnostic selective nerve root block ranges from 45% to 100%. A prospective randomized study (North [88] cited in Boswell) examined the specificity and sensitivity of a battery of anaesthetic local blocks. They compared it to a sham procedure consisting of a lumbar subcutaneous injection of 3 ml of 0,5% bupivacaine. False positive results were common and specificity was low". Boswell's systematic review concluded that "the evidence was moderate (based on low quality studies) for transforaminal epidural injections or selective nerve root blocks in the preoperative evaluation of patients with negative or inconclusive imaging studies and clinical findings of nerve root irritation". Such a conclusion by Boswell et al. [61] should be considered with caution as it is based on a paucity of low-quality studies.

Safety and complications

Case reports of complications such as dural puncture, infection, intravascular injection, air embolism, vascular trauma, particulate embolism, epidural haematoma, neural damage are found in the literature [61]. However, safety of such techniques remains largely understudied.

Key messages for interventional diagnostic techniques

- **The quality of evidence about the validity and reliability of facet joint blocks as a diagnostic tool to identify the facet joint as a pain generator is low and the results are conflicting,**
- **Only selected subgroups of patients are eligible for selective nerve root blocks as a diagnostic test. The quality of evidence supporting selective nerve root block as a valid and reliable procedure to diagnose radicular pain due to nerve root involvement is low.**
- **Major complications of interventional diagnostic techniques have been reported in the literature and the safety of those techniques remains largely unknown.**

2.2.7 Physical capacity and fitness evaluation

Patients with CLBP are often thought to be less physically active in relation with pain and/or fear of pain. As a consequence, CLBP may supposedly have a negative impact on physical fitness in some patients, which may perpetuate CLBP, in the manner of a vicious circle. Hence, assessing physical fitness in patients with CLBP may be relevant. Although the reality of physical deconditioning in patients with CLBP remains vastly debated [89], physical reconditioning is still often implemented as part of the management strategy in less active and less fit individuals. Hence, physical fitness evaluations are sometimes implemented during physical reconditioning programs to monitor the gains achieved by the patients undergoing such programs.

Physical fitness is generally defined as a set of attributes that people have or achieve that relates to the ability to perform physical activity [90]. It is a multi-factorial construct that includes several components: cardio respiratory endurance (CRE), muscular strength and endurance, flexibility (range of motion, mobility) and body composition, although CRE is generally considered as the most fundamental attribute [91]. Thorough physical fitness evaluation should thus theoretically encompass assessment of all components. Such comprehensive fitness evaluation has been described and is sometimes implemented in patients with CLBP although the validity and reliability of maximal performance physical tests for patients with LBP remains largely debated in the literature [92]. More practically, physical fitness evaluation in CLBP generally focus on cardio respiratory endurance, trunk musculature strength and endurance as those components are generally considered as the most important in the context of CLBP.

2.2.7.1 Cardio respiratory endurance

Cardio respiratory endurance (CRE), also termed as "cardiovascular fitness" or "aerobic fitness", may be altered in patients with CLBP as such a phenomenon has been reported by numerous studies using varied testing procedures. Hence, assessing CRE in CLBP may be relevant to evaluate whether physical reconditioning should be implemented as a part of the comprehensive therapeutic management of CLBP.

The evidence about cardiovascular deconditioning in patients with CLBP is very low and conflicting. There is low-quality evidence for wasting of the multifidus muscle.

No CRE testing procedure has been validated in patients with CLBP.

Evidence

No evidence on physical capacity/fitness evaluation is available in the selected references. Our additional search identified one systematic review on the topic [89].

The systematic review[89] shows that there is conflicting evidence (based on observational studies that include CLBP and also others low back pain, and 5 RCTs) that

cardiovascular deconditioning is present in CLBP and low-quality evidence (based on observational studies and 9 RCTs) for wasting of the multifidus muscle

No CRE testing procedure has been validated in the context of CLBP. It may only be hypothesized that sub maximal testing procedures are probably more appropriate, as they should theoretically be better tolerated and less likely to be influenced by pain, fear of pain and other non-physiological factors in such patients.

2.2.7.2 *Trunk muscle strength evaluation*

Trunk muscle strength and endurance are generally considered as important components of physical fitness, especially in the context of CLBP. Whether patients with CLBP have weaker trunk musculature is still debated in the literature [93]. Most commonly used methods to evaluate trunk muscle strength and endurance may be classified into non-instrumented testing procedures (Sorensen, Ito tests…) and instrumented methods (e.g. isokinetic or isoinertial dynamic and/or isometric procedures) using sophisticated expensive equipment interfaced to computers. It must however be pointed out that all those testing procedures require maximal effort from the tested subject, which may raise some concern about the validity of such maximal tests in the context of CLBP.

The validity and reliability of the testing procedures commonly used to evaluate the fitness component in patients with CLBP have not been sufficiently established. The discriminative validity, the reproducibility and the safety of the Sorensen test seem good in patients with CLBP.

Performance on these tests should be interpreted with caution, as the maximal performance of CLBP patients may be hampered by many parameters (pain, fear of pain, fear avoidance behavior, anxiety…).

Evidence

On the basis of two studies [94, 95], the consensus from the ANAES[3] concludes that the reliability of isokinetic evaluation of trunk strength is questionable. Isokinetic trunk musculature strength evaluation may be exceptionally implemented in patients with CLBP to help elaborating trunk musculature strengthening programs.

One recent systematic review addresses spinal muscle evaluation in patients with CLBP using the non-instrumental Sorensen test [96]. According to Demoulin et al., the discriminative validity, the reproducibility and the safety of this test are good in patients with CLBP.

Key messages for physical fitness evaluation for the diagnosis of CLBP patients

- **The results of the literature about cardiovascular deconditioning in patients with CLBP are conflicting. There is low-quality evidence for wasting of the multifidus muscle.**
- **No cardio respiratory endurance testing procedure has been validated in patients with CLBP.**
- **Physical fitness tests (cardio respiratory endurance, spinal musculature strength and endurance) have not been validated in the context of CLBP. Hence physical fitness measurements obtained in patients with CLBP should be interpreted with caution,**
- **The discriminative validity, the reproducibility and the safety of the Sorensen test seem good in patients with CLBP.**

2.3 TREATMENT OF CHRONIC LOW BACK PAIN

2.3.1 Non-invasive therapeutics to treat CLBP

2.3.1.1 Bed rest

Patients with LBP are sometimes advised to rest in bed for periods of time ranging to several days up to several weeks. Not so far ago, bed rest was considered as an important and effective treatment of acute LBP with or without sciatica. So-called "bed rest" treatment for LBP generally consists in remaining supine in bed for days or weeks without any other treatment.

No evidence has been identified about the effectiveness of bed rest in chronic LBP. There is high-quality evidence that bed rest is not effective in non-specific acute and sub acute LBP. Patients with CLBP should be advised to stay as active as possible and to gradually increase their physical activity level in every day life.

Safety of bed rest in CLBP is unknown although it is well know that it may generate many adverse effects.

Evidence

Bed rest is a therapeutic modality addressed in CBO 2003 [97] and ANAES 2000 [3] guidelines, which included studies on acute and sub acute LBP [98, 99]. Our additional search failed to identify any good-quality reference addressing bed rest.

ANAES 2000 [3] does not favor bed rest (expert consensus).

CBO 2003 [97] bases its recommendations about bed rest on the International Paris Task Force on Back Pain [99]. The CBO[97] states that there is high-quality evidence that bed rest is not effective in patients with LBP of less than 12 weeks duration. At the contrary, patients with CLBP should be advised to stay as active as possible and to gradually increase their physical activity level in every day life.

Safety of bed rest

It is well known that bed rest leads to numerous adverse effects such as muscle atrophy, joint stiffness, bone mass loss, decubitus, deep venous thrombosis, alteration of general health [98, 97]. However, safety of bed rest has not been specifically studied in the context of CLBP.

2.3.1.2 Lumbar supports

Lumbar supports are sometimes proposed to patients with CLBP to alleviate pain. They consist in rigid (reinforced leather, thermoplastic, plaster…) or semi-rigid (soft leather, elastic materials…) belts that must be worn permanently or during specific physical activities following medical advice. The rationale is that lumbar supports reduce mechanical constraints on the lumbar spine leading to pain and inflammation reduction.

There is conflicting evidence that lumbar supports are more effective than no treatment. Most studies on lumbar supports are of low-quality and only focus on patients with acute and sub acute LBP. There is no evidence that lumbar supports are effective to prevent recurrent episodes of LBP.

Adverse effects (skin lesions, gastro-intestinal disorders, elevated blood pressure and heart rate and trunk muscle wasting) have been reported.

Evidence

Lumbar supports in LBP is addressed in several guidelines[3, 100, 97, 2]. An additional search identified one Cochrane review [101] and one Health Technology assessment by the

Centre for Reviews and Dissemination[102], based on the earlier version of Cochrane review by van Tulder et al.[103].

Lumbar supports versus no treatment

The Cochrane systematic review[101] showed that "There is limited evidence that lumbar supports are more effective than no treatment". The COST B13[2] guideline concludes that *"There is no evidence for the effectiveness of lumbar supports compared with sham/placebo treatments"*. However, this reference is based on 6 studies among which only one evaluated lumbar supports in CLBP patients[2]. On the basis of one moderate–quality study, CBO 2003 concludes that lumbar supports may be effective to reduce pain [97]. According to ANAES[3], the effectiveness of lumbar supports is still not demonstrated (based on three low-quality studies). The guideline SBU 2000 concludes that there is limited evidence for the effectiveness (based on one moderate-quality study).[100]

Lumbar supports versus other interventions

The Cochrane review [101] concludes that "It is still unclear if lumbar supports are more effective than other interventions for the treatment of low back pain". The COST B13 guideline concludes that "There is no evidence for the effectiveness of lumbar support compared with other treatment" [2]. CBO[97] concludes that lumbar supports are not effective in terms of pain reduction and that there is conflicting evidence that they have a positive effect on function (based on 3 moderate-quality studies) and on return to work (based on 2 moderate-quality studies).

Type of lumbar support

CBO 2003 states that only one moderate-quality study favors rigid lumbar supports as compared to flexible ones[97].

Lumbar supports to prevent the recurrence of LBP

The Cochrane review by van Tulder et al.[101] found on the effectiveness of lumbar supports for secondary prevention.

Safety of lumbar supports

COST B13 [2] related that adverse effects of lumbar supports have been reported in the literature: skin lesions, gastrointestinal disorders, muscle wasting, higher blood pressure and higher heart rates.

2.3.1.3 Rehabilitation

Massage

Massage is a soft tissue manipulation using the hands or a mechanical device [104]. Different techniques have been described e.g. "effleurage", "petrissage", friction, hacking.

There is low-quality evidence that massage is effective for LBP as compared to passive therapeutic modalities such as relaxation, acupuncture and self-care education.

Evidence

Massage effectiveness has been evaluated in good-quality guidelines : SBU[100], ANAES[3], KNGF[26], Philadelphia[105], CBO[97] and COST B13 [2] (both based on two good-quality systematic reviews by Ernst et al. [106] and by Furlan et al.[104] based on RCTs [07-115]). An additional search identified a recently updated Cochrane review [116].

SBU [100], ANAES [3], Philadelphia [105], KNGF [26] guidelines conclude that no study can be found that demonstrate the effectiveness of massage therapy in patients with CLBP. Most studies on massage have indeed focused on the effects in patients with acute or sub acute LBP.

Massage versus sham treatment

COST B13 [2] and the recently update Cochrane review [116] conclude that massage is superior to sham massage and to no treatment.

Massage versus other interventions

COST B13 [2] and the recent Cochrane review [116] conclude that massage is superior to relaxation therapy, acupuncture and self-care education. There is conflicting evidence that massage is superior to spinal manipulative therapy and to Transcutaneous Electrical Nerve Stimulation.

Other citations of COST B13 [2] include:

- "Immediately after treatment, massage therapy led to significantly greater disability and pain improvements compared with remedial exercise and posture education" (limited evidence based on one high-quality RCT by Preyde et al.[112]),
- *"There is more pain relief after massage therapy in comparison to progressive relaxation therapy"* (limited evidence based on one low-quality study by Hernandez-Reif et al.[114],
- "Massage is better than self care education in reducing pain and improving function in the short term but not in the longer term" (limited evidence based on one high-quality study by Cherkin et al.[113],
- "Effectiveness of massage is equally effective in pain relief than spinal manipulation, but that spinal manipulation results in better function".
- "Acupressure massage is more effective in mid-term pain relief versus general physical therapies.
- "There is no difference between massage and transcutaneous muscle stimulation with regards to improvements in either pain or function.

Massage is not superior to lumbar supports (corsets) (low-quality evidence) : "Massage in combination with remedial exercises and education is better than massage alone, remedial exercises alone or sham laser therapy for short term pain relief and improved function" (limited evidence based on one high quality RCT Preyde [112] cited in COST B13[2]).

None of the numerous studies on massage included in the COST B13 [2] guideline have been included in the CBO [97] guideline.

Which type of massage is the best?

Two recent SR (COST B13[2] and Furlan [116]) conclude in favor of acupuncture massage versus classic Swedish massage (limited evidence based on one high-quality study Franke et al.[111] cited in COST B13).

Miscellaneous

COST B13 [2] concludes there is limited evidence that massage therapy is superior to sham laser in terms of pain and disability reduction up to one month post-treatment. (based on one high-quality RCT by Preyde et al.[112]).

The CBO guideline is based on two good quality systematic reviews [106, 116], which included the same four RCTs with important limitations. In these studies, massage is a control intervention to which another therapeutic intervention is compared. Hence, no conclusions can be drawn from those studies.

The Cochrane systematic review [116] addresses massage in non-specific LBP. Nine publications reporting on eight randomized trials were included. Three had low and five had high methodological quality scores. Massage was compared to an inert treatment (sham laser), in one study that showed that massage was superior, especially if given in combination with exercises and education. In the other seven studies, massage was compared to different active treatments. They showed that *"Massage was inferior to*

manipulation and TENS; massage was equal to corsets and exercises; and massage was superior to relaxation therapy, acupuncture and self-care education. The beneficial effects of massage in patients with CLBP lasted ad least one year after the end of the treatment. One study comparing two different techniques of massage concluded in favor of acupuncture massage with classic (Swedish) massage" [116]. Noteworthy, this Cochrane review by Furlan et al[116] does not specifically focus on CLBP but on non-specific LBP in general.

Safety of massage

Safety of massage is unknown.

Heat and cold therapy

Heat and/or cold therapy is often proposed to patients with CLBP by means of local application of heat and/or cold packs. When cold therapy is generally proposed in the more acute phase, heat therapy is commonly used in the chronic phase. Hot mud, hot baths, hot wrappings and varied physical therapy modalities are commonly used to implement heat therapy. Ice packs, local massages with ice and other varied techniques are also used to provide patients with cold therapy. The rationale for heat therapy is that it relieves pain-related muscle spasms. The rationale for cold therapy is that it reduces inflammation.

There is no evidence available for or against the effectiveness of heat and/or cold therapy in patients with CLBP. In acute and sub acute patients. There is moderate-quality evidence that heat wrapping therapy and low-quality evidence that cold therapy are effective to alleviate pain. There is conflicting evidence whether heat is more effective than cold therapy and vice versa.

Evidence

The effectiveness of heat and cold therapy is addressed in good-quality guidelines (SBU[100], ANAES[3], CBO[97] and COST B13[2]). An additional search identified a Cochrane review [117].

All guidelines agree that there is no study on the effectiveness of such therapeutic modalities as applied to patients with CLBP.

The Cochrane review by French et al. also identified studies that evaluated the effectiveness of heat and cold in the context of acute and/or sub acute LBP only. Whatsoever, this Cochrane review concludes that *"There is moderate evidence in a small number of trials that heat wrap therapy provides a small short-term reduction in pain and disability in a population with a mix of acute and sub-acute low back pain, and that the addition of exercise further reduces pain and improves function. The evidence for the application of cold treatment to low back pain is even more limited, with only three poor quality studies located. There is conflicting evidence to determine the difference between heat and cold for low back pain."* [117].

Safety of heat and cold therapy

Safety of heat and cold therapy is unknown.

Conventional physical therapy modalities (electrotherapy, ultra-sound, laser…)

Conventional physical therapy modalities encompass a wide variety of techniques based on hypothetical therapeutic effects of electricity (electrotherapy), high frequency sound waves (ultrasound) and electromagnetic radiations (infra-red, ultra-violet and Laser therapy). The rationale for electrotherapy is that it may hypothetically generate pain relief, reduction of swelling, muscle relaxation, speeding up of the healing process, and alleviate pain through stimulation of acupuncture points. The rationale for ultrasound is that it supposedly provides the patients with a deep heating effect in painful soft tissues (muscles). The emission frequency may also be adjusted to hypothetically decrease inflammation and pain. Laser therapy implemented in physical therapy consists in low-

energy Laser applied superficially on muscles, tendons and/or joints. This electromagnetic radiation has a hypothetical cellular effect that leads to inflammation and pain reduction.

There are no good-quality studies on the effectiveness of traditional physical therapy modalities (laser, therapeutic ultrasound, diathermy, electrotherapy…). No evidence was found to support the effectiveness of these methods in CLBP. There is low-quality evidence against therapeutic ultrasound and against low-energy laser therapy. The effectiveness of electrotherapy techniques (ionophoresis, diadynamic and interferential currents) has not been established. The effectiveness of thermotherapy (conventional thermotherapy, diathermy…) has not been established.

Evidence

Conventional physical therapy modalities are addressed in some good-quality guidelines: SBU [100], ANAES [3] (based on Klein et al. [118] and De Bie et al. [119]), Philadelphia [105] (based on Roman et al.[120], CBO [97] (based on van Tulder et al. [121], and van der Heijden et al.[122]), COST B13 [2] and KNGF [26]. Our additional search identified a low-quality HTA [123].

Low energy Laser therapy

ANAES 2000 recalls that one RCT [118] studied the effectiveness of low-energy Laser (Gallium-Arsenic) in combination with home exercises and found no difference in terms of pain and function between Laser and sham Laser. CBO 2003 (based on a good quality RCT De Bie, 1998 #353}) also concludes that laser applied in different dosages is not more effective than sham Laser. Finally, the guidelines KNGF [26] and Prodigy [124] do not either recommend laser therapy in CLBP.

No conclusion can be drawn from the selected HTA[123] on low-energy Laser therapy as it includes only one low-quality trial in CLBP.

Therapeutic ultrasound

The Philadelphia guideline [105] refers to one low-quality RCT [120] that showed that one month of continuous therapeutic ultrasound was not effective to reduce LBP. All other references conclude that there is no evidence supporting the use of ultrasound in CLBP [100, 97, 26, 124, 2].

Thermotherapy

There is no available evidence supporting the use of shortwave diathermy, infra-red therapy, short and micro wave therapy (SBU [100], ANAES [3], Philadelphia [105], COST B13 [2]) in patients with LBP.

Electrotherapy: ionophoresis, diadynamic and interferential currents…

All the selected references conclude that there is no evidence supporting the use of electrotherapy methods such as ionophoresis, diadynamic and interferential currents [3, 105, 26, 124]. In particular the CBO [97] based on the systematic review by van der Heijden et al.[122] concludes that the evidence for electrotherapy is insufficient.

Safety of conventional physical therapy modalities

Safety of conventional physical therapy modalities has not been specifically studied in the context of CLBP.

Transcutaneal Electrical Nerve Stimulation (TENS)

Transcutaneous Electrical Nerve Stimulation (TENS) is one of the numerous available electrotherapy methods. TENS is traditionally used to obtain pain alleviation and has been used in many varied painful medical conditions. Noteworthy, TENS may also be used as a muscle electrostimulation method. During TENS therapy, currents of varied types are applied transcutaneously using electrodes that are positioned on the skin of painful regions. The rationale for analgesic TENS is that the stimulation of subcutaneous

nerve endings in the painful regions leads to pain inhibition according to the so-called « Gate control theory » by Melzack and Wall.[125]

Other techniques similar to TENS have also been developed such as ALTENS (acupuncture-like TENS), PENS (Percutaneous Electrical Nerve Stimulation; see section on invasive treatment below).

There is low-quality conflicting evidence that TENS as an isolated intervention is effective in patients with CLBP. Only few studies support a limited effect of TENS or ALTENS (acupuncture-like TENS) in reducing pain and improving function.

Evidence

TENS as a therapeutic modality to alleviate LBP is addressed in the following guidelines : SBU [100], ANAES [3], Philadelphia [105], CBO [97] (based on Van Tulder et al.,[98]), COST 13 [2] (based on Brosseau et al [126] ; Milne et al.[127] ; van Tulder et al.[98]), PRODIGY [124] (based on Airaksinen et al.[2], KNGF [26]. Our additional search identified two Cochrane re views[128, 129], one good-quality systematic review [130] and one HTA by the NHS Centre for Reviews and Dissemination [102].

PHILADELPHIA [105] conducted a meta-analyses of five included RCTs (only one good-quality study) and concluded that effectiveness of TENS is not established in terms of pain alleviation, function, ROM, strength, physical activity level improvement.

CBO [97] (based on the systematic review by van Tulder et al.[121]) concluded that there is conflicting evidence.

COST B13 [2] is based on Philadelphia [105], and on three Cochrane reviews [127, 126] van Tulder et al.[121], and concluded that *« TENS was not more effective than placebo or sham TENS »* and that *« TENS was no more effective than vertebral axial decompression, acupuncture, PENS, or electroacupuncture »*

KNGF 2005 and a report from the CRD [102] based on publications of van Tulder et al.[121103] conclude that evidence of TENS in LBP is conflicting. More recently, PRODIGY [124](based on Airaksinen et al.[2]) also concludes that evidence is lacking.

The Cochrane review by Khadilkar et al. [129] addresses TENS effectiveness specifically in CLBP. After exclusion of 37 RCTs, only 2 studies fulfilled the selection criteria and were considered. The conclusions of this review are that there is *"limited and inconsistent evidence to support the use of TENS as an isolated intervention"*. Noteworthy, the same conclusions were available in another less recent systematic review by Khadilkar et al. [130].

A recently updated Cochrane review [128] on TENS and ALTENS (acupuncture-like TENS) included six RCTs focusing on the effects of TENS and ALTENS versus placebo in CLBP and concluded that TENS seemed to reduce pain and improve range of motion (ROM) in patients with CLBP. However, sufficiently powered RCT should be conducted before the effectiveness of TENS can be definitely established.

SBU 2000 [100] (based on four randomized trials) found limited evidence that TENS is superior to sham TENS.

ANAES [3] (based on SBU [100] and on the 2000 version of the Cochrane review by Gadsby [128]) concluded that TENS is effective to alleviate pain only during the utilization period.

The safety of TENS has not been specifically studied in the context of CLBP.

Balneotherapy, health resorts

Balneotherapy may be defined as the combination of numerous therapeutic modalities that are proposed in health resorts. The therapeutic modalities applied during balneotherapy are quite varied (massage, mud baths, relaxation, exercise…). One of the most traditional therapeutic methods included in balneotherapy is hydrotherapy in

pools of different types of waters (sea water, spring waters with high mineral content…). Hydrotherapy in those various water types consists in gentle warm water pool exercises, water jet massages…

The SBU guideline states that there is moderate-quality evidence that balneotherapy provided in health resorts is beneficial for old patients (>60 years) with CLBP. However, many confounding interventions are included in balneotherapy and it is not possible to identify which therapeutic modality is responsible of its beneficial effect.

Evidence

Only SBU [100], ANAES [3] address balneotherapy. An additional search failed to identify any other reference addressing this therapeutic modality. SBU [100] concludes that there is a strong evidence that balneotherapy is beneficial in older (>60 years) patients with CLBP. ANAES [3], more specifically focused on hydrotherapy as a traditional component of balneotherapy. Its conclusions will be commented in the next section on hydrotherapy.

Safety of balneotherapy, health resorts

Safety of balneotherapy, health resorts has not been specifically studied in the context of CLBP.

Hydrotherapy

Hydrotherapy may be defined as a physical therapy modality that generally takes place in a warm water pool. Hydrotherapy generally includes a combination of light-intensity exercises and water jet massages. The rationale for the effectiveness of hydrotherapy relies on several hypothetical mechanisms. Light exercises performed in partial immersion (partial weight bearing) in warm water are thought to have a muscle relaxant and a general analgesic effect. Hydrostatic pressure on immersed body parts is thought to alleviate pain due to swollen joints. Finally water jet massages applied on the lower back can be performed under water level and are also thought to be beneficial.

There is low-quality evidence that hydrotherapy is effective in CLBP. Exercises performed in a pool are not superior to traditional exercises.

Evidence

Hydrotherapy is only addressed in ANAES[3] (based on ANAES 1998[131], Sjorgen et al.[132], Mc Ilveen et al.[133]) and in KNGF[26]. An additional search failed to identify any other relevant reference. ANAES [3] concludes that hydrotherapy seems to be superior to placebo in terms of function (no superiority in terms of pain, ROM and neurological tests) and is not superior to traditional exercises. KNGF [26] draws similar conclusions.

Safety of hydrotherapy has not been specifically studied in the context of CLBP.

Tractions

Traction consists in applying a distraction force (30% to 50% of body weight) to the cervical, thoracic and/or lumbar spine using varied devices and systems. The rationale for traction is that such a distraction force hypothetically reduces intradiscal pressure and inflammation and alleviates pain.

There is high-quality evidence that tractions are not effective in patients with CLBP.

Safety of traction has not been specifically studied. However, adverse effects related to heavy traction (more than 50% of body weight) have been reported, e.g. increased blood pressure and respiratory constraints due to the traction harness and a theoretical potential increase of nerve root impingement in case of medial or distal disc protrusion.

Evidence

Tractions have been addressed in the following guidelines: SBU 2000[100], ANAES [3], Philadelphia [105], CBO [97], Cost B13 [2] et KNGF [26]. Original systematic reviews included in these references are those by van der Heijden et al.[134] and by van Tulder et al.,[98]. Our additional search has identified a Cochrane review [135] that included 24 RCTs (among which five high-quality ones) and one systematic review [136] on LBP in general. One CRD HTA [102] based on a systematic review by van Tulder [103]

All selected guidelines agree that traction is not effective in CLBP in terms of pain alleviation, function and general outcome. Moreover, they underline that traction may lead to varied adverse effects.

The conclusions available in the references identified in our additional search are similar. The Cochrane review by Clarke [135] concludes that there is no significant difference in short or long term outcomes between either continuous or intermittent traction and placebo, sham, or other treatment for patients with a mixed duration of LBP, with or without sciatica. Noteworthy, CLBP have not been studied separately in this review.

Safety of tractions

According to COST B13 [2], adverse effects related to lumbar traction with forces exceeding 50% of total body weight have been reported. Such adverse effects include increased blood pressure and respiratory constraints due to the traction harness, and a theoretical potential increase of nerve root impingement in case of medial or distal disc protrusion.

Biofeedback (EMG biofeedback)

Biofeedback is a rehabilitation technique consisting in providing the patient with information about the activity level of his trunk musculature during some positions, movements or at rest. Muscle activity is recorded on the analyzed muscles by means of surface electrodes and an electromyography system, which translates the muscle activity level into a visual or an auditory signal. The rationale for biofeedback (EMG biofeedback) is that, by allowing facilitation of inhibition of some muscle activity patterns, trunk musculature functioning is hypothetically improved and LBP is attenuated.

There is high-quality evidence that EMG biofeedback is not effective in patients with CLBP.

Evidence

Biofeedback is addressed in SBU 2000[100], ANAES [3], Philadelphia [105] and CBO [97]. The systematic review most guidelines are based on is the review by van Tulder et al.[98]. Our additional search identified one HTA report [102].

All retrieved guidelines conclude that biofeedback is not effective to treat CLBP :SBU [100], ANAES [3] (based on 6 low to moderate-quality trials), Philadelphia [105] (meta-analyses of 5 RCTs of low-quality), CBO [97] and KNGF[26] (both based on van Tulder et al.[98]).

The conclusions of the HTA report by the Centre for Reviews and dissemination are similar[102]. On the basis of a systematic review.[103], the report concludes that biofeedback is ineffective.

Safety of EMG biofeedback

Safety of EMG biofeedback has not been specifically studied in the context of CLBP.

Exercise and physical reconditioning

In the context of LBP rehabilitation, physical reconditioning encompasses exercises aiming at improving cardio respiratory endurance (cardiovascular fitness, aerobic fitness)

and strengthening trunk musculature. In that context, exercise therapy may be defined as a program in which the patient is asked to perform repeated voluntary, dynamic or static movements of regions of the body (legs, arms, trunk…) or of the whole body, with or without external loading (weights)[2]. The rationale for exercise is generally based on the hypothesis that reduced cardio respiratory fitness and weak trunk muscles (abdominal and back musculature) may play a role in the onset and the perpetuation or recurrence of back pain. Hence, physical reconditioning including cardiovascular training and trunk muscle strengthening exercises is often included in comprehensive rehabilitation programs of patients with CLBP.

There is high-quality evidence supporting a positive short- (one month) and mid-term (three to six months) modest effect of exercise programs. There is moderate-quality evidence that exercise is more effective than traditional GP care, balneotherapy and home exercises. There is a low to moderate-quality evidence supporting a long-term positive effect on pain and function and number of sick days in the year following the intervention in patients with CLBP. There is conflicting evidence that exercise therapy increases the rate of return to work and that it is more effective than intensive multi-disciplinary programs.

There is no evidence on the type of exercises that should be recommended. Likewise, there is no evidence on the frequency, duration and intensity of exercises that should be recommended.

Safety of exercice in CLBP has not been specifically studied.

Evidence

Exercise programs as a treatment for CLBP is addressed by SBU [100], ANAES [3], Philadelphia [105], CBO [97], COST 13 [2], KNGF [26], ICSI [64] and SSMG [137]. Our additional search identified the following references ; one Cochrane systematic review [138], two meta-analyses[139, 138], three systematic reviews [140, 141, 89] and one review that presents with methodological limitations but that addresses safety of exercises for LBP. Our search also identified two HTA reports [102, 142] . Our search failed to identify studies evaluating the long-term impact of exercise on CLBP.

The intervention under study is exercise therapy (alone or as part of a multidisciplinary treatment) versus no treatment and/or versus other conservative treatments. The outcomes are: pain, function, return to work/absenteeism, and/or global improvement outcomes.

Exercise effectiveness on pain and function

According to SBU [100], ANAES[3] (based on six RCTs of varied quality), SSMG[137] (based on non-RCT trials), Philadelphia [105] (based on one meta-analysis of five RCTS of moderate to good quality), CBO [97] and KNGF [26] (based on two good-quality systematic reviews), quality evidence is high for a short-term effectiveness of exercise on pain and disability. COST B13 [2] (based on good-quality RCTs) concluded that quality evidence is high (level A) that exercise is effective in CLBP at least at mid-term (three to six months).

According to the recent Cochrane review [138] and to the meta-analyses by the same author [138], evidence exists for the effectiveness of exercise on pain and function in adults with CLBP, particularly in healthcare workers. The improvement obtained by exercise therapy is modest but present at all follow-ups. However, as evoked in this Cochrane review, the magnitude of the effect of exercise is difficult to evaluate as most studies on the topic are of low-quality as they present with numerous methodological limitations: heterogeneous outcome measures, inconsistent and poor reporting, and possibility of publication bias [138].

The ICSI [64] guideline also pointed out the methodological weaknesses of most studies that were included in the Cochrane 2006 review [138] and in the HTA report [102] on exercise in CLBP. Hence, ICSI [64] guideline concludes that exercise has, at best, only a modest positive effect on pain and function in patients with CLBP.

COST B13 [2] evaluated the relationship between physical performance (spinal range of motion, trunk strength) that can be obtained through exercise programs and changes in clinical symptoms (pain and disability) and concluded that clinical improvement consecutive to exercise programs is not proportional to improvements of any aspect of physical performance.

Exercise and return to work, absenteeism

The Philadelphia[105] meta-analysis (based on three moderate to good-quality RCTs) found no positive effect of exercise on return to work at short-term (one month).

The CBO [97] concludes that there is no difference in terms of return to work between exercise therapy and conventional physiotherapy treatment.

COST B13[2] concludes that exercise therapy is more effective than traditional general practitioner care on the return to work rate, at least in the mid-term (3-6 months) (based on good-quality RCTs).

The Centre for Reviews and Dissemination HTA report [102] is based on the Cochrane review by van Tulder [143] and concludes that there is strong evidence that exercise therapy may help CLBP patients to resume normal daily activities and return to work.

Hence, it may be concluded that there is conflicting evidence that exercise therapy is effective in increasing the return to work rate.

The meta-analysis by Kool [139] concluded that qualitative and quantitative analysis showed strong evidence that exercise therapy reduces sick days during the first follow-up year.

Exercise versus other treatments.

According to ANAES [3] (based on 17 good to low-quality RCTs), CBO [97] (based on two good-quality systematic reviews), COST B13 [2] (based on good-quality RCTs), there is high-quality evidence (level A) that exercise is as effective as different traditional physiotherapy treatments.

CBO [97] (based on one SR by van Tulder et al.[98]) and COST B13 [2] (good quality RCTs) qtate that exercise is more effective than traditional general practitioner CLBP care. Moreover, COST B13 concludes that there is conflicting evidence that exercise program on an outpatient-basis is more effective than an intensive multi-disciplinary program.

According to ANAES [3] (based on 17 good to low-quality RCTs), exercise is more effective than balneotherapy and home exercises.

What kind of exercise is the best?

According to CBO [97] (based on the two good-quality systematic reviews by van Tulder et al.[98] and by Hilde et al.[144]), there is no particular exercise program that is found more effective than others. Likewise, COST B13 [2] concludes that muscle reconditioning based on strengthening is not more effective than types of exercises. More precisely, according to COST B13 [2] and ANAES [3], among aerobic, trunk flexion and extension exercises, there is limited or conflicting evidence that any of them is more effective in CLBP.

According to COST B13 [2] (based on one low- and one good-quality RCT) concluded that there is moderate-quality evidence that individually supervised exercise programs are not superior to supervised group programs.

One systematic review[140] (based on good and moderate-quality studies) aimed at identifying what exercise characteristics were essentials to achieve and maintain successful results. It concluded that, although varied exercise programs are implemented, which generally include strengthening as a common component, all types of programs have a positive effect on patients with CLBP and that positive results are still present at follow-up. Nevertheless this review underlines that the role of exercise co-interventions must not be minimized in the assessment of exercise programs effect in CLBP.

The systematic review by Smeets et al. [89] concludes that "no study examined the effectiveness of cardiovascular training specifically. General and lumbar muscle strengthening are equally effective than other active treatments…Only moderate evidence is available for the effectiveness of intensive low back extensor muscle strengthening compare to less intensive strengthening."

The HTA report by the Centre for Clinical Effectiveness [142] is based on the Cochrane review by van Tulder et al.[143] and on eight good-quality RCTs. It concludes that supervised gym workouts were superior to unsupervised home exercises (outcome : pain reduction, spinal ROM and muscle flexibility), that a 3-month muscle strengthening using training devices was as effective as aerobics and traditional physiotherapy (outcome : pain and disability reduction), that aerobics were as effective as flexion exercises (outcome : reduction of pain score) and that functional trunk muscle training was superior to passive thermotherapy and massage (outcome : reduction of pain and disability, improvement of lumbar endurance).

As a conclusion, there is no evidence that any specific type of exercise program may be superior. It may thus be hypothesized that reduction of pain an improvement of function is obtained through general and non-specific physical reconditioning which should be the main goal of exercise programs for patients with CLBP.

Duration, frequency, intensity of exercise therapy

Exercise interventions in the context of the therapeutic management of patients with CLBP are of various durations. Most program durations range from one to three months. There is no evidence available to define the optimal duration, frequency and intensity for exercise programs to treat CLBP.

Most exercise programs that lasted up to three months are effective, no matter the type of exercises [142]. Exercise performed for a total of more than 20 hours seemed more effective than exercise over shorter periods [64].

Safety of exercise, physical reconditioning

One low-quality study concluded that exercise is safe for individuals with back pain, because it does not increase the risk of future back injuries or work absence [145].

Two studies reported cardiovascular problems, apparently unrelated to the treatment programs [2].

Back Schools

Back schools have originally been developed in Sweden more than twenty years ago. They were originally mainly composed of group education sessions for patients with chronic or recurrent LBP as mentioned by COST B13 [2]: *"the original "Swedish back school" (1980) consisted of four sessions of 45 minutes (information on the anatomy and function in the back, discussion of the mechanical strain in different positions and teaching of the semi-Fowler position) but in some studies, back school include exercises program. The lessons are given to groups of patients and supervised by a paramedical therapist or medical specialist".* As evoked in this description, back schools programs vary considerably among studies in terms of total duration, frequency of sessions and components (proportion of education versus exercise). Most back schools programs currently include exercise in varied proportions. In the systematic reviews by van Tulder, only back school programs with exercise are included.

The components of back schools programs vary between the studies; this disparity probably explains some of the contradictory findings of studies on the effectiveness of back schools. Positive effects of some back schools programs may essentially be related to their exercise component.

There is moderate-quality evidence suggesting that back schools have better short and intermediate-terms effects on pain and function in patients with recurrent or CLBP than other more traditional treatments. Paradoxically, conflicting evidence was found about the effectiveness of back schools as compared to placebo or waiting list controls.

There is moderate-quality evidence suggesting that back schools, in an occupational setting, are effective in reducing pain, improving function and return to work rate at short and intermediate-term follow-up.

Evidence

Back schools are addressed in the following guidelines: CBO [97], ANAES[3], SBU [100], COST 13 [2]. Initial systematic reviews on which these guidelines are based are those by van Tulder et al.[146]. An additional search identified a Cochrane systematic review [147] and one HTA report [102].

Back schools versus placebo or waiting list controls

ANAES [3] (five trials on back school programs without exercise) concludes that back schools are not effective in terms of pain reduction.

SBU [100] concludes that there is low-quality evidence that back schools are effective.

CBO [97] (based on the systematic review by Van Tulder et al.[98], which included six good-quality RCTs on back schools with exercise), COST B13 [2] (based on two studies of less good quality), NHS CRD [102] (based on van Tulder et al.[146]) concluded that there is conflicting evidence that back schools are effective to alleviate pain, improve function and increase return to work rate.

Back schools (including exercise) versus education only

According to ANAES [3] (based on four low- to moderate-quality trials) and to COST B13 [2] (based on several RCTs: one of good quality and the remaining of low-quality), back schools are more effective than education only at short-term.

Back schools (including exercise) versus exercise only

ANAES [3] (based on four low- to moderate-quality trials) concluded that there is conflicting evidence whether back schools are superior to exercise only.

CBO [97] (based on the Cochrane review by van Tulder et al.[146], which included five good-quality RCTs) concluded that back schools are more effective than exercise only at mid-term (six months).

COST B13 [2] (based on several RCTs: one of good quality and the remaining of low-quality), also concluded that back schools were more effective.

As a conclusion, although exercise is probably an important component of effective back schools programs, education effect must not be neglected as good-quality references [97, 2] found that back schools were superior to exercise only.

Back schools versus spinal manipulation, NSAIDs, physiotherapy

According to CBO [97] (based on the Cochrane review by van Tulder et al.[146], which included five good-quality RCTs) and to COST B13 [2] (based on several RCTs : one of good quality and the remaining of low-quality), back schools are more effective in terms of pain reduction and function improvement.

According to COST B13 [2] (based on two low-quality RCTs), there is moderate-quality evidence that back schools are not more effective than other traditional treatments at long term.

A recent Cochrane review [147]; based on six high-quality RCTs) concludes that there is moderate-quality evidence that back schools are more effective at short and long term on pain and function than other traditional treatments in patients with chronic or recurrent LBP. However the authors of this review point out that the clinical relevance of most studies is weak as it is not possible to perform subgroup analyses according to the presence of radicular pain.

Back schools in an occupational setting

CBO [97] (based on van Tulder et al.[146]), states that there is low-quality evidence that back schools in an occupational setting reduces more absenteeism than no intervention.

The recent Cochrane review [147] concludes that there is moderate-quality evidence suggesting that back school for CLBP in an occupational setting, are more effective than other treatments and no intervention or waiting list controls on pain, functional status and return to work rate at short and intermediate-term follow-up.

Safety of back schools

The safety of back schools is unknown, as it has never been specifically studied.

Brief educational interventions to promote self-care

Brief educational interventions to promote self-care must be distinguished from back schools. They may be defined as therapeutic intervention that includes several types of components aiming at promoting active self-management of CLBP and at reassuring and correcting threatening misbelieves that are common in patients with CLBP. Generally, contact with the health care professional (physician, physiotherapist, psychologist…) is minimal and other components of such brief educational interventions to promote self-care may be of various kinds: educational books and booklets, group discussions, internet-based discussion groups…

There is moderate-quality evidence that brief educational interventions provided by different care providers (physician, physiotherapist…) are effective to reduce disability and increase return to work but are ineffective to reduce pain level. The quality evidence is particularly high when the brief intervention is provided by the physician or by the physician and by a physiotherapist.

There is low-quality conflicting evidence that internet-based interventions based on discussion groups are effective to reduce disability and pain level.

There is low-quality evidence that brief self-care interventions are effective to reduce pain and disability.

Evidence

This intervention is addressed in COST B13 [2] (based on ten RCTs, among which four of good-quality) and in CBO [97] (based on the systematic reviews by Van Tulder et al.[98], Maher et al.[91]). Our additional search identified one recent Cochrane review [148] and one RCT [149].

According to COST B13 [2]:

- There is strong evidence (level A) that an intervention encouraging a return to normal activities provided by a physiotherapist or a physiotherapists and a physician is as effective as traditional physiotherapy or aerobic exercises in terms of disability reduction,
- There is moderate evidence (level B) that brief interventions (addressing concerns, encouraging return to normal activities and favouring self-care) are more effective than traditional care in terms of increase of return to work rate, disability reduction (up to 6 months), but not in terms of pain alleviation,
- There is limited evidence (level C) that such brief interventions (education and internet-based discussion groups) are more effective than no intervention in terms of disability reduction, and conflicting evidence (level C) in terms of pain alleviation,
- There is limited evidence (level C) that brief interventions favoring self-care are as effective as massage and acupuncture in terms of pain and disability reduction.

CBO [97] (based on the systematic reviews by van Tulder et al[98] and by Maher et al.[91]) concludes that there is a high-quality evidence that advice to stay active is effective in patients with acute and sub acute LBP (LBP of less than twelve weeks). Benefits of brief

interventions advising to stay active are faster return to work, less disability and less recurrence of LBP.

The Cochrane review by Hilde et al.[148] also focuses on patients with LBP of less than twelve weeks and draws similar conclusions: small beneficial effects of interventions limited to advices to stay active in patients with acute LBP without sciatica. Interestingly, this Cochrane review found no effect of the same "advice to stay active" intervention in patients with sciatica of less than twelve weeks. Finally, this review stated there is no evidence that such an intervention may be harmful in patients with acute LBP and/or sciatica.

A recent prospective randomized trial [149] compares combined manipulative treatment, exercise and physician consultation group versus physician consultation alone (information and advice) by 204 patients with CLBP pain in Finland. The combined treatment was slightly more effective for reducing pain but leads clearly to increase patient satisfaction. Physician consultation alone was more cost-effective for health care use and work absenteeism and led to equal improvement in disability and quality of life.

An other randomized controlled trial [150] studies individual sessions for education about pain neurophysiology and find that it change pain cognitions and physical performance but it is insufficient by itself to obtain a change in perceived disability.

Multidisciplinary programs

Multidisciplinary programs may be defined as intensive rehabilitation programs including various therapeutic interventions such as education, physical reconditioning, psychotherapeutic (cognitive-behavioral) interventions, relaxation, postures and movements corrections (ergonomics), traditional physical therapy modalities… They may be administered by a multidisciplinary team generally composed of health care professionals of various disciplines (physician, physiotherapist, occupational therapist, psychologist, nurse…).

According to COST B13 [2], "Multidisciplinary treatment programs for CLBP were originally based on a model of operant conditioning (Fordyce et al [151]. Because CLBP is believed to be associated with physical deconditioning effects, an exercise component is always included. Because many patients with CLBP have problems at the work-place and are relatively young (mean age of 42 years in most studies), there has been a strong belief in so-called work hardening or conditioning exercises and these are included in the treatment in most trials".

The definition of multidisciplinary programs for patients with CLBP varies considerably between studies. They usually include graded activity, physical reconditioning, "work hardening" using a behavioral approach and other more conventional approaches as for example back schools, traditional physiotherapy or medications.

There is high-quality evidence that intensive multidisciplinary biopsychosocial rehabilitation with functional restoration is more effective in reducing pain and improving function in patients with CLBP than conventional treatments. More intensive programs seem more effective than less intensive ones, especially in terms of return to work and improvement of physical capacity.

There is moderate-quality evidence that intensive multidisciplinary biopsychosocial rehabilitation with a functional restoration approach improves pain when compared with outpatient non-multidisciplinary rehabilitation or usual care.

Evidence

Multidisciplinary programs are addressed in SBU [100], ANAES[3], CBO [97], COST 13 [2]. The original studies these guidelines are based on are: Fordyce et al.[151] ; van Tulder et al.[103] ;

Guzman et al.[152]; Schonstein et al.[153] ; Rose et al.[154]. Our additional search identified one Cochrane review[155], one HTA report [102] and one RCT [156].

SBU [100] concludes that there is high-quality evidence that multidisciplinary treatments are effective.

ANAES[3] (based on 16 studies of varying quality) concludes that intensive multidisciplinary programs (intensive exercise combined with psychotherapeutic interventions) have positive effects (grade B) on pain and function at mid-term (one year) and on return to work at short-term in patients with CLBP; intensive programs being more effective than less intensive ones (grade B).

CBO [97] (based on the four good-quality RCTs included in the systematic review by van Tulder et al.[103]) concludes that multidisciplinary programs are effective (level 1) particularly in still working industrial workers with important functional limitations due to CLBP in whom insufficient results were obtained by traditional treatments.

COST B13 [2] (based on Guzman et al.[152], Schonstein et al.[153], and additional RCTs) concludes that there is strong evidence that *"intensive multidisciplinary biopsychosocial rehabilitation with functional restoration reduces pain and improves function in patients with CLBP (level A) and that there is strong evidence that intensive multidisciplinary biopsychosocial interventions are effective in terms of return to work, work-readiness"* (level A).

Multidisciplinary programs versus other treatments

According to COST B13 [2], there is moderate-quality evidence that intensive multidisciplinary biopsychosocial rehabilitation with functional restoration approach improves pain as compared with outpatient non-multidisciplinary rehabilitation or traditional care (level B).

Based on the Cochrane review that evaluated the effectiveness of physical reconditioning programs for workers with back and neck pain in terms of time lost from work reduction [153], COST B13 [2] also concluded that there is high-quality evidence that *"work hardening" programs with a cognitive-behavioral component are more effective than usual care in reducing work absenteeism in workers with back pain"* (level A).

One more recent RCT [156] compares an multidisciplinary rehabilitation in groups (physical training, workplace interventions, back school, relaxation training, and cognitive-behavioral stress management methods for 70 hours) and an individual physiotherapy (physical exercise and passive treatment for 10 hours) by 120 women with CLBP and concludes *"semi light outpatient multidisciplinary program does not offer incremental benefits when compared with rehabilitation carried out by a physiotherapist having a cognitivo-behavioral way of administering the treatment".*

Composition and intensity of multidisciplinary programs

NHS CRD [102] report is based on the systematic review by van Tulder et al [146]. [103] and concluded that multidisciplinary treatment programs, involving components such as education, active exercise programs, behavioral treatment, relaxation exercises, and work-place visits, can improve pain, functional status and sick leave compared with other treatments for CLBP, at long term.

According to COST B13 [2], one high-quality study on 26 patients[154] found no difference between group and individual programs.

According to COST B13 [2], the studies by Guzman et al. [152] and Schonstein et al. [153] strengthen the evidence identified in the Cochrane reviews on multidisciplinary programs for a greater effectiveness of intensive multidisciplinary treatments as compared to less intensive ones, especially in terms of return to work or work ability (level A).

The recent Cochrane review [155] draws similar conclusions about the effectiveness of multidisciplinary programs in CLBP. It concludes that "*intensive multidisciplinary bio-psycho-social rehabilitation with a functional restoration approach improves pain and function. Less intensive interventions did not show improvements in clinically relevant outcomes".*

2.3.1.4 Spinal manipulative therapy

Spinal manipulations must be distinguished from spinal mobilizations. According to COST B13, "Spinal manipulation is defined as a high velocity thrust to a joint beyond its restricted range of movement. Spinal mobilization involves low-velocity, passive movements within or at the limit of joint range [157, 158] cited in COST B13 [2]". Various manipulations techniques are described and widely used. The rationale for spinal manipulation is that a small, displaced disc fragment or a small mechanical disorder in a facet joint may be the origin of pain in the lower back. By manipulating the intervertebral segment, the mechanical disorder may be eliminated and pain alleviated.

There is moderate-quality evidence that spinal manipulative treatment/mobilization is more effective than no treatment but only at short-term.

There is moderate-quality evidence that spinal manipulative treatment is not more effective than traditional treatments such as efficacious NSAID, GP care, physical therapy, exercise and back schools.

There is few conflicting literature on safety of manipulative treatment for low back pain. Minor secondary effects seem frequent and self-limiting. Major complications seem very uncommon but are potentially dramatic.

Evidence

Spinal manipulative treatment is addressed in SBU [100], ANAES[3], CBO [97] (based on four systematic reviews : Assendelft et al.[159]; Koes et al.[157]; van Tulder et al.[160]; Bronfort et al.[161]), COST 13 [2], PRODIGY [124] (based on UK BEAM trial[162]). An additional search identified a recent Cochrane review (Assendelft [163]) and systematic reviews [164, 165,166, 167]. Two of them [166, 167] were discarded as they focused on LBP in general and not CLBP. This search also identified two HTA reports[102] and two studies that evaluated spinal manipulation plus exercise[162, 168].

In the selected references, spinal manipulations are compared to sham procedure, conventional general practitioner care and analgesic, traditional physical therapy and exercise and to control interventions considered as ineffective (traction, corset, bed rest, home care, topical gel, no treatment, diathermy, and minimal massage)

Effectiveness of spinal manipulations in general

SBU[100] and ANAES [3] conclude that spinal manipulations are effective in terms of short-term pain reduction.

CBO [97] (based on Assendelft et al.[159]; Koes et al.[157]; van Tulder et al.[160] and Bronfort et al.[161]) concludes that spinal manipulative therapy is more effective (moderate-quality evidence) than placebo and traditional GP care at short-term.

According to COST B13[2:] "Manipulation is superior to sham manipulation for improving short term pain and function" (consistent findings of four moderate-quality studies, level B). "Manipulation is superior versus treatments considered to be ineffective (such as traction, corset, topical gels) for short-term pain relief and for short-term improvement of function" [159], based on five studies, among which, three of good-quality). "There were no significant benefits in relation to long-term pain and function."

The NHS Centre for Reviews and Dissemination report [102] concludes that manipulation can provide short-term improvement in pain and activity levels and higher patients satisfaction. They are however contradictory results between the studies.

The Cochrane systematic review [163] and the meta-analysis [164] identified thirty-nine RCTs. *"Meta-regression models were developed for acute or chronic pain and short-term and long-term pain and function. For patients with acute low back pain, spinal manipulative therapy was superior only to sham therapy (10mm difference (95% CI 2 to 17mm) on a 100mm visual analogue scale) or therapies judged to be ineffective or harmful. Results for patients with chronic low back pain were similar. Radiation of pain, study quality, profession of manipulator,*

and use of manipulation alone or in combination with other therapies did not affect the results."

The systematic review by Bronfort et al. [165] concludes that "There is moderate evidence that spinal manipulation therapy/mobilization is effective in the short term when compared with placebo (based on three low- to moderate-quality studies) or general practitioner care (based on one moderate-quality study), and in the long term compared with physical therapy (based on one moderate-quality study)".

Spinal manipulations versus other treatments

The Cochrane systematic review [163] and the meta-analysis [164] concluded that spinal manipulation was not more effective than traditional GP care, analgesics, physical therapy, exercises and back schools.

COST B13 [2] draws similar conclusions with a strong evidence level (A) for the comparison with GP care and analgesics and a moderate one (B) for other comparisons.

Based on one good-quality study, the systematic review by Bronfort et al.[165] concludes that manipulation is as effective as effective non-steroidal anti inflammatory drugs (NSAIDs) (moderate level of evidence according to Bronfort et al.[165]). Based on one poor quality study, this same review by Bronfort et al. concludes that evidence is limited that spinal manipulation is superior to sham manipulation and to chemonucleolysis at short-term.

ANAES [3] found no difference in effectiveness between manipulations plus exercise and manipulations plus NSAIDs (one study of unknown quality) but found that manipulations are more effective than NSAIDs only (two studies of unknown quality). ANAES [3] also concludes that evidence is conflicting when manipulations are compared to short wave therapy in terms of pain reduction (based on moderate-quality studies).

Brown[169] evaluated the costs and outcomes of chiropractic treatment for LBP. Chiropractic treatment includes a full range of treatment options (e.g., chiropractic spinal manipulation). The conclusions of this report are that: *"Overall results suggest that for acute and chronic low back pain, chiropractic treatment gives outcomes similar to those of medical care and physical therapy. The results of the review suggest that serious adverse events are unlikely to occur with chiropractic treatment for LBP."*

Spinal manipulation combined with exercise therapy

Geisser [168] (one RCT of low-quality) evaluated four therapeutic regimens in CLBP patients. The study concludes that patients who received specific exercises plus manual therapy reported significant pain reduction. However, differences between groups are not mentioned in this study.

The UK BEAM [162] study in primary care showed that manipulation followed by exercise provide an additional benefit that lasts up to one year in patients with sub-acute LBP.

Which spinal manipulation technique is the best one?

Our search failed to identify any good-quality reference on evaluating the effectiveness of various manipulation techniques as compared to each others.

Safety of spinal manipulations

Few systematic reviews address the safety of spinal manipulations. Most severe reported adverse effects are: vertebrobasilar vascular accidents (for cervical manipulations), disc herniations, cauda equina syndrome. The incidence of such dramatic complications probably ranges from 1 per two millions to 1 per 4000.000 manipulations. More benign and transient adverse effects such as local discomfort, headache, fatigue and general discomfort are more frequent as their incidence may be close to 50% [2].

Brown 2005[169] concludes that "The results of the review suggest that serious adverse events are unlikely to occur with chiropractic treatment for LBP."

2.3.1.5 Psychotherapeutic cognitive-behavioral interventions

According to COST B13 [2], "Cognitive and behavioral methods involve procedures where changes in the cognitions and behaviors are the main aspect of the treatment offered. They are commonly used in the treatment of chronic (disabling) low back pain. The main assumption of a behavioral approach is that pain and pain disability are not only influenced by somatic pathology, if found, but also by psychological and social factors (e.g., patients attitudes and beliefs, psychosocial distress, and illness behavior)[170]. Consequently, the treatment of chronic low back pain is not primarily focused on removing an underlying organic pathology, but at the reduction of disability through the modification of environmental contingencies and cognitive processes. In general, three behavioral treatment approaches can be distinguished: operant, cognitive and respondent [171, 172]. Each of them focuses on the modification of one of the three response systems that characterize emotional experiences i.e., behavior, cognitions, and physiological reactivity. A large variety of behavioral treatment modalities are used for chronic low back pain, because there is no general consensus about the definition of operant and cognitive methods. Furthermore, behavioral treatment often consists of a combination of these modalities or is applied in combination with other therapies (such as medication or exercises).

The various cognitive and behavioral treatments have in common 1) the assumption that the individual's feelings and behaviors are influenced by his/her thoughts; 2) the use of structured techniques to help patients identify, monitor and change maladaptive thoughts, feelings and behaviors; 3) an emphasis on teaching skills that patients can apply to a variety of problems [173]."

There is high-quality evidence that most behavioral interventions are more effective than no treatment in reducing pain and improving function in patients with CLBP.

There is low-quality evidence that behavioral interventions are as effective as exercise in terms of pain, function and depression.

There is moderate-quality evidence that there is no difference in terms of effectiveness between the different types of behavioral interventions.

There is moderate-quality evidence that adding a behavioral intervention to traditional treatments is not effective in improving function as compared to the traditional treatment alone. However, graded activity programs using a behavioral approach seem more effective than traditional care for returning patients to work and reducing sick-leave.

Evidence

Cognitive-behavioral interventions are addressed in SBU [100], ANAES [3], CBO [97], COST B13 [2]. The original systematic reviews on which these guidelines are based on are the reviews by van Tulder et al. [103, 174, 175],. The main original studies cited are the studies by Turner et al.[173]; Brox et al.[176] ; Lindstrom et al.[177]; Staal et al. [178] ; Kole-Snijders et al.[179]; Turner and Clancy, [180]. An additional search identified one Cochrane review [181], one HTA report [102] and one RCT [182].

Cognitive-behavioral interventions versus placebo

All guidelines agree to conclude that cognitive-behavioral interventions are more effective than placebo or no intervention (waiting list controls).

SBU [100] concluded that there is strong evidence for behavioral therapy,

ANAES[3] (based on seven low-quality trials) concludes that cognitive-behavioral interventions is effective to reduce pain and disability at short-term.

CBO[97] concludes that cognitive-behavioral interventions are more effective (strong evidence) than a wait-and-see policy, especially in terms of pain reduction. The effectiveness is less marked on functional status (based on the systematic review by van

Tulder et al.[175], which included 21 RCTs). CBO [97] also recalls similar conclusions of the meta-analysis by Turner et al.[173].

COST B13 [2] concluded that evidence is strong that cognitive-behavioral interventions are more effective than placebo, no intervention and waiting list controls in terms of pain reductions, functional status and behavioral outcomes (based on van Tulder[103, 174] and on two good-quality RCTs and five low-quality RCTs).

Also based on the Cochrane review by van Tulder et al. [103], the (NHS CRD [102]) report draws similar conclusions.

The recently updated Cochrane review on the topic [181] includes 7 randomized high-quality trials on behavioral treatment for non-specific CLBP. This Cochrane concluded that evidence is strong that behavioral treatment (combine respondent-cognitive therapy) is superior to waiting list control (based on four studies; 134 patients) and alleviates pain moderately. It also concluded that there is moderate-quality evidence that progressive relaxation has a short-term positive effect on pain and behavioral outcomes (based on 2 trials; 39 patients). On the other hand, operant treatment is no more effective at short-term than waiting list control (strong evidence; based on 2 trials; 87 patients) in terms of general functional status and on behavioral outcomes (moderate-quality evidence; based on 3 trials; 153 patients).

Effectiveness of cognitive-behavioral interventions might be related to underlying psychosocial factors as COST B13 underlines that in most studies, patients with severe long-lasting non-specific CLBP are included and that patient inclusion is done without any psychosocial factors screening.

Cognitive-behavioral interventions versus other treatments

On the basis of low-quality studies, ANAES [3] is unable to conclude.

CBO [97] (based on the systematic review by van Tulder et al.[175]) it is not clear whether cognitivo-behavioral interventions are more or less effective than other treatments.

The Cochrane review [181] concluded that there is limited evidence (1 trial; 39 patients) that cognitive-behavioral interventions are as effective as exercise.

COST B13 [2] also concludes that cognitive-behavioral interventions are as effective as exercise in terms of pain, function and depression up to one year post intervention (limited evidence; based on one low-quality trial). COST B13 [2] also concludes that there is limited evidence (based on one high-quality trial by Brox et al. [176].) that cognitive-behavioral treatment is as effective as surgical fusion in terms of disability up to one year after treatment in patients with CLBP. On the other hand, COST B13 [2] (based on 2 good-quality RCTs: Lindstrom et al.[177] (sub acute LBP) and Staal et al. [178]) that a graded activity program using a behavioral approach is more effective in terms of return to work than traditional care (high evidence level).

Likewise, the Cochrane review [181] concludes that there is limited evidence (based on 1 trial; 98 patients) that *"a graded activity program in an industrial setting is more effective than usual care for early return to work and reduced long-term sick leave".*

Cognitive-behavioral interventions in combination with another intervention versus the other intervention only

ANAES [3] concludes that cognitive-behavioral interventions in combination with another treatment (exercise, physiotherapy…) are more effective than in terms of pain reduction than the other treatment alone (based on 6 low-quality studies).

According to COST B13 [2] (based on 6 low-quality RCTs), evidence is moderate that the addition of a cognitive-behavioral intervention to another treatment does not improve its effectiveness in terms of function and behavioral outcomes at short- and mid-term.

The conclusions of the Cochrane systematic review [181] are similar: "there were no significant differences in short-term and long-term effectiveness when behavioral components are added to usual treatments programs for CLBP (i.e. physiotherapy, back education) on pain, generic functional status and behavioral outcomes".

One recent RCT [182] compared a standard exercise program and a combined exercise and motivational program (93 patients with CLBP): "*5 years after the supervised combined program, patients had significant improvements in disability, pain intensity, and working ability".*

Which cognitive-behavioral intervention is the best?

ANAES [3] have important methodological limitations. It concludes that there is no evidence available supporting the superiority of any cognitive-behavioral method. On the basis of the systematic review by van Tulder et al. [175] that included 21 RCTs, the CBO [97] draws similar conclusions.

COST 13 [2] (based on the 2 high-quality RCTs by Kole-Snijders et al.[179]; Turner and Clancy [180] and on 5 others low-quality RCTs) concludes that evidence is strong that there is no specific cognitive-behavioral method that has proven superior to any other one.

Key messages on non invasive (non drug treatment) of CLBP

- **There is high-quality evidence that bed rest is not effective in non-specific acute and sub acute LBP. CLBP patients should be advised to stay as active as possible and to gradually increase their physical activity level in every day life.**
- **The quality of evidence for the effectiveness of lumbar supports is very low and the results are conflicting,**
- **There is a low-quality evidence that massage is effective in CLBP patients,**
- **There is no evidence available for or against the effectiveness of heat and/or cold therapy in patients with CLBP,**
- **There is no evidence supporting electrotherapy (ionophoresis, diadynamic and interferential currents) and thermotherapy ; there is weak evidence against therapeutic ultrasound and low-energy laser in patients with LBP,**
- **There is low-quality conflicting evidence that TENS as an isolated intervention is effective in patients with CLBP,**
- **There is moderate-quality evidence that balneotherapy provided in health resorts is beneficial in older patients (>60 years) with CLBP. However it is not possible to identify which therapeutic modality is most responsible of the beneficial effect,**
- **There is low-quality evidence that hydrotherapy is effective in CLBP. Exercises performed in a pool are not superior to traditional exercises,**
- **There is a high-quality evidence that traction is not effective in patients with CLBP,**
- **There is high-quality evidence that EMG biofeedback is not effective in patients with CLBP,**
- **There is high-quality evidence supporting a positive short- (one month) and mid-term (three to six months) modest effect of exercise programs. There is no clear evidence on the type of exercises that should be recommended.**
- **There is low-quality evidence suggesting that back schools have better short and intermediate-terms effects on pain and function in patients with recurrent or CLBP than other treatments.**
- **There is moderate-quality evidence that brief educational interventions are effective to reduce disability and increase return to work but they are ineffective to reduce pain level. The effect is more beneficial when the brief intervention is provided by the physician or by the physician and by a physiotherapist,**

- **There is high-quality evidence that intensive multidisciplinary biopsychosocial rehabilitation with functional restoration is more effective in reducing pain and improving function in patients with CLBP than conventional treatments. More intensive programs seem more effective than less intensive ones, especially in terms of return to work and improvement of physical capacity.**
- **There is moderate-quality evidence that spinal manipulative treatment/mobilization is more effective than no treatment at short term, but no more than traditional treatments such as NSAID, GP care, physical therapy, exercise and back school. There is conflicting evidence on the safety of spinal manipulations in low back pain.**
- **There is moderate-quality evidence that most behavioral interventions are more effective than no treatment in reducing pain and improving function in patients with CLBP. There is no difference in terms of effectiveness between the different types of behavioral interventions.**

2.3.2 Medications to treat chronic low back pain

Medications are frequently used for alleviating pain in CLBP. The most frequently types of drugs are analgesics, non-steroidal anti inflammatory drugs (NSAIDs), muscle relaxants, antidepressant and antiepileptic drugs. The patient takes these medications either continuously or for shorter periods of time during recurrent episodes of pain. In one longitudinal study of primary care patients with LBP, 69% of them received NSAID's, 35% muscle relaxants, 12% narcotics, and 4% acetaminophen; only 20% of the patients received no medications [183].

Medications to treat CLBP are addressed in the following guidelines: SBU [100], ANAES [3] (based on the systematic review by van Tulder [160]), CBO [97] (based on the systematic review by van Tulder [98]), COST 13 [2] (based on the systematic reviews by van Tulder[160,184]).

Our additional search identified one Cochrane systematic review [185] on antidepressants for neuropathic pain. This reference does not specifically focus on neuropathic pain of lumbar origin. Our search also identified two others systematic reviews [186, 187].

In all selected references, the study intervention consists in analgesics, NSAIDs, muscle relaxants, antidepressant, antiepileptic drugs or any other medication prescribed to alleviate CLBP with or without sciatica.

2.3.2.1 Analgesics

Level I analgesics (non-opioid analgesics): paracetamol

CBO [97] and ANAES [3] (based on the systematic review by van Tulder [160]) mention of one study [188] on the effects of paracetamol (acetaminophen) versus diflunisal. No conclusion can be drawn given the low methodological quality of this study.

CBO [97] (based on the systematic review by van Tulder [98]) and the present literature search did not identify any other study on the effect of paracetamol versus placebo.

There is no evidence about the efficacy of paracetamol to treat CLBP.

The recommended dosage (4 times 1 g per day) is safe according to CBO [97]. The toxicity of paracetamol at high doses is well known.

Level II analgesics: weak opioids

The most frequently studied drugs in this group are tramadol alone, tramadol associated with paracetamol and paracetamol associated with codeine.

There is moderate-quality evidence that weak opioids are effective to treat CLBP and their effectiveness seems comparable in the literature. However

their intolerance rate is relatively high as between 4 to 35% of patients interrupt such medications in relation with secondary effects.

Evidence

Weak opioids versus placebo

The ANAES consensus [3] conclude that tramadol is effective in patients who withstand the treatment (level B). This statement is based on a RCT by Schnitzer et al. [189] (200 to 400 mg of tramadol per day versus placebo; 380 CLBP patients, some of them having undergone back surgery more than five years before)

COST B13 [2] also refers to a RCT by Ruoff [190] (35,5 mg of tramadol in association with 325 mg of paracetamol (acetaminophen) as compared to placebo to treat during 3 months patients (n=318), with moderate to severe CLBP). In this study, tramadol/paracetamol association was found to significantly improve pain, disability (Roland Morris) and quality of life. According to COST B13, there is strong evidence that weak opioids relieve pain and disability in the short-term in CLBP patients (level A). The systematic review by Schnitzer [187] refers to two studies [191, 189] and also concludes that weak opioids are effective in CLBP.

Tramadol versus paracetamol/codeine

On the basis of one RCT [191] with a limited number of patients, ANAES concludes that the association paracetamol (1g) /codeine (60mg) has the same effectiveness in CLBP as tramadol (level C).

Weak opioids versus NSAIDs

Only one low-quality methodological study by Jamison [192], cited by ANAES [3], suggested that oxycodone (4 x 5 mg/day) may be superior to naproxen and no treatment in CLBP. The authors of COST B13 [2] found that the methodology of this study did not allow drawing any conclusion on the effects of oxycodone as compared to naproxen.

Safety of weak opioids

The systematic review by Schnitzer [187] reports that safety results vary between studies. Patients' withdrawals due to adverse effects varied from 4% to 35% according to the studies.

Level III analgesics: strong opioids (morphine, oxycodone, hydromorphone, fentanyl, buprenorphine)

There is very-low quality of evidence supporting the use of strong opioids in patients with CLBP. The potential adverse effects of such medications are important, including physical addiction.

CBO [97] states that there is insufficient evidence supporting the effectiveness of strong opioids in CLBP (level C). This conclusion is based on one study by Maier et al [93]. The most frequent adverse effects are constipation, urinary retention, liver pain and effects on central nervous system. When physical addiction is possible, psychological addiction seem less frequent in CLBP patients. Moreover, COST B13 [2] reports other adverse effects as sexual impotence, dizziness and excessive sweating.

2.3.2.2 *Anti inflammatory drugs*

Non-Steroidal Anti inflammatory drugs

The literature search failed to identify any good-quality reference on the lowest dosages of NSAIDs to treat CLBP (dosages recommended for analgesia). The results presented here relate to NSAIDs dosages recommended for their anti-inflammatory effect.

There is low-quality evidence that NSAIDs are more effective than paracetamol or placebo to treat CLBP. Moreover, treatment of CLBP with

NSAIDs does not seem more effective than other traditional treatments such as physiotherapy, spinal manipulations, back school or local treatments. Finally, side effects at long-term have been understudied although they are known to be frequent and harmful.

Evidence

NSAIDs versus placebo

ANAES [3] (based on the systematic review by van Tulder [160]) and CBO 2003 refer to a trial by Berry et al. [194] on the efficacy of naproxen and diflunisal versus placebo. They conclude that a short-duration treatment with such molecules is more effective that placebo on CLBP. This conclusion is debatable given the low quality of this trial.

According to COST B13 [2], there is strong evidence that NSAIDS are effective to alleviate CLBP (level A). These conclusions are supported by the systematic reviews of van Tulder et al. [160, 184]and by four other high-quality references on the effect of rofecoxib/etoricoxib versus placebo[195196197198]. Rofecoxib has been withdrawn since then given its higher risk for cardiovascular effects.

Finally, although the Cochrane systematic review of van Tulder, recently updated [174], supports a statistically significant effect of NSAIDs versus with placebo, it must be noted that this review focuses on acute LBP and that the authors conclude that evidence on CLBP is still lacking.

In the systematic review by Schnitzer [187], four studies focus on NSAIDs [194, 199, 188, 200]. Evidence supports the efficacy of NSAIDs as compared to placebo in CLBP. Three comparison studies on varied NSAIDs (i.e., indomethacin, loxoprofen, naproxen, piroxicam and tenoxicam) showed significant improvements in most efficacy measures from baseline for the treatment. Studies were medium- or low- quality, with small sample size and lack of placebo-control design.

NSAIDs versus other treatments

ANAES [3] refers to two studies on NSAIDs efficacy as compared to other treatments in CLBP: Hickey [188] (diflunisal versus paracetamol, n=29) and Postacchini [201] (diclofenac versus spinal manipulations or physiotherapy or back school or anti-edema gel). There is no evidence supporting a superior effect of NSAIDs as compared to these other traditional treatment modalities. CBO [97] based on the same Hickey's study [188] concludes that a short term treatment with NSAID is more efficacious on pain reduction than paracetamol.

A report from the NHS Centre for Reviews and Dissemination [102] is based on the same references as those selected in the Cochrane review on NSAIDs and acute LBP by van Tulder[103]. This review (updated in 2005)[174] concluded that there is conflicting evidence that NSAIDs are more effective than paracetamol and that there is moderate-quality evidence that NSAIDs are not more effective than other drugs. As mentioned above, they conclude that evidence about CLBP is still lacking.

Comparison between different NSAIDs

All reviews conclude that no significant difference of efficacy between NSAIDs can be found: there is a lack of studies on this topic and the available studies mainly deal with acute low back pain [3, 174, 97].

Safety of NSAIDs

In the systematic review by Schnitzer [187], withdrawals due to adverse events were reported in all of the three included studies incidence of adverse effects was relatively high (1% and 7% in patients receiving tenoxicam and indomethacin, respectively) in trials that lasted 2-6 weeks long. In a eight-week trial[199], the percentage of patients who withdrew from the study due to NSAIDs-related adverse events ranged from 3% among oxamethacin-patients to 23% among indomethacin-patients.

According to COST B13 [2], "no back pain specific studies examined the side-effects of NSAIDs. However, gastrointestinal complications (irritation, ulcers and bleeding) are generally known side effects of NSAIDs that may lead to hospitalization. Cox 2 inhibitors have been shown to have a better gastro-intestinal safety profile in osteoarthritis and rheumatoid arthritis studies. However, one of these drugs (rofecoxib) increases cardiovascular risk (myocardial infarction and stroke) with long term use (> 18 months) [202]".

The CBO [97] also recalls the potential risks of myocardial and renal failure, arterial hypertension and incidents related to drugs interactions. This guideline concludes that the treatment of CLBP with NSAIDs must remain of short duration as there is a lack of evidence on the long term benefits and risks of NSAIDs treatment.

Acetylsalicylic acid

No evidence was found on the efficacy of acetylsalicylic acid to treat CLBP.

Oral steroids

No evidence was found on the efficacy of oral steroids to treat CLBP.

2.3.2.3 Myorelaxants, anxiolytica

Myorelaxant drugs include benzodiazepines, non-benzodiazepine muscle relaxant drugs (e.g. cyclobenzapine, tolperisone, tinazidine, flupirtin) and antispastic medications (e.g. dantrolene, baclofen). Tetrazepam has a positive short-term effect on CLBP and muscle spasms. No evidence supporting the effectiveness of diazepam or other benzodiazepines in CLBP is available. Evidence about the effectiveness of non-benzodiazepines myorelaxants on CLBP is conflicting. Adverse effects of muscle relaxants drugs should be kept in mind as they are far from being negligible.

Benzodiazepines

Tetrazepam

One RCT by Arbus et al. [203](10 days of tetrazepam versus placebo in CLBP patients), concluded to a positive short-term effect of tetrazepam on muscle spasm. On this basis the ANAES [3] reports significant alleviation of pain with tetrazepam without any significant adverse effect. On the opposite, CBO [97] refers to the same study to conclude that there is weak evidence that tetrazepam is effective in CLBP.

In addition to this trial, COST B13 [2] and Schnitzer [187] refer to a RCT by Salzmann et al. [204] (50 mg of tetrazepam versus placebo) that concluded to the short-term effectiveness of tetrazepam on pain.

Diazepam

COST B13 mentions that only one low-quality trial by Basmajian et al.[205] found no significant effect of diazepam as compared to placebo on muscle spasms in CLBP.

Safety of benzodiazepines

COST B13 [2] mentions adverse effects, with the most common complaints being drowsiness, dizziness and addiction. Schnitzer et al.[187] mentions the study of Salzmann et al. [204] where 7% of the patients withdrew within two weeks, due to adverse events of tetrazepam.

Non-benzodiazepine muscle relaxants

There is conflicting evidence that non-benzodiazepines alleviate pain and that they reduce muscle spasm. COST B13 [2] describes the results of two high-quality RCTs on the effectiveness of non-benzodiazepine muscle relaxants. The first one by Worz et al. [206] showed that flupirtin is more effective than placebo in patients with CLBP at short term (7 days) in terms of pain relief and overall improvement, but not in terms of

reduction of muscle spasm. The second one by Pratzel et al.[207] showed that tolperisone is more effective than placebo for short-term (21 days) overall improvement, but not for pain relief or reduction of muscle spasm.

Safety of non-benzodiazepine muscle relaxant

According to COST B13[2], central nervous events are also reported for non-benzodiazepines muscle relaxants. However, the two high-quality trials mentioned above showed that neither flupirtin nor tolperisone were associated with a higher incidence of adverse events compared with placebo [207, 206]. It is known that tolperisone can have severe allergic side effects and that flupirtin can induce reversible reduction of liver function. For gastrointestinal events, the common complaint is nausea but the difference between muscle relaxants and placebo seems not significant [208].

2.3.2.4 Antidepressants

Evidence about the effectiveness of antidepressant drugs to treat patients with CLBP is conflicting. Recent guidelines and systematic reviews conclude that noradrenergic and noradrenergic-serotoninergic antidepressants are moderately effective. Former guidelines stated that evidence supporting antidepressants in CLBP was conflicting. Selective serotonin reuptake inhibitors (SSRIs) do not appear to be beneficial for patients with CLBP.

Evidence

COST B13 [2] concludes that "There is strong evidence that noradrenergic and noradrenergic-serotonergic antidepressants are effectives in relieving pain in patients with CLBP (level A). There is moderate-quality evidence that activities of daily living (function, disability) are not improved by antidepressants (level B). The benefit appears to be independent of depression status". COST B13 [2] also concludes that noradrenergic-serotoninergic and noradrenergic antidepressants are more effective than SSRIs, which seem to have no effect. All these conclusions are based on three good-quality systematic reviews [209, 210, 186] and on a RCT by Schreiber et al. [211].

In the systematic review by Schnitzer et al.[187] on antidepressants in CLBP, 7 RCTs of varying methodological quality were included. In five of them antidepressants were more effective than placebo in reducing pain and depression.

Former reviews and guidelines reported conflicting evidence on the effectiveness of antidepressants in CLBP. SBU [100] concluded that there is moderate evidence against the effectiveness of antidepressants in CLBP. The ANAES 2000 [3] concluded that inhibitors of noradrenalin reuptake have a modest effect on LBP (level C) but SSRIs are not effective on pain in patients with LBP. Two other reviews are based on the systematic review by van Tulder et al. [98], which assessed the effectiveness of antidepressants in CLBP [102,97]. According to these authors, there was conflicting evidence that antidepressants are effective in relieving pain in CLBP.

Safety of antidepressants

The review of Schnitzer et al [187] estimated that withdrawals due to adverse effects ranged from 20% for fluoxetine (6-weeks long study) to 44% for amitriptyline/atropine (16-weeks long study).

According to COST B13 [2], "20% on the patients undergoing antidepressant therapy experienced an adverse reaction (placebo 14%), mainly drowsiness, dry mouth, dizziness and constipation [210]. In many trials, the reporting of side effects was insufficient, so this percentage probably underestimates the degree to which they occurred. Patients with renal disease, glaucoma, pregnancy, chronic obstructive pulmonary disease and cardiac failure should not be treated with antidepressants".

2.3.2.5 *Anti-epileptic medications*

COST B13 [2] identified one high-quality RCT on the effectiveness of gabapentin (1200 mg, daily) versus placebo for the treatment on CLBP [212]. Gabapentin failed to improve pain significantly in the CLBP compared with placebo. It must however be noted that, in that study, patients with neuropathic radicular pain were excluded.

2.3.2.6 *Herbal medicine*

COST B13 [2] included a high-quality RCT by Chrubasik et al.[213] on the effectiveness of doloteffin (an extract of harpagophytum) as compared to very low doses of rofecoxib. There was no difference in pain relief between the doloteffin group and the rofecoxib group. A few years before, ANAES [3] identified only one trial [214] that failed to identify any significant effect of harpagophytum versus placebo.

The recent Cochrane systematic review concludes that "Harpagophytum procumbens (50 to 100 mg/day), Salix alba (White willow bark: 120 to 240mg/day) and capsicum frutescens (topical) seem to reduce pain more than placebo. Additional trials testing these herbal medicines against treatments are needed. The quality of reporting in this trial was generally poor"[215].

2.3.2.7 *Topical administration of drugs*

The authors of COST 13 [2] state that topical capsaicin has a positive short-term (3 weeks) effect on pain (level A). These conclusions are based on two references: one systematic review by Mason et al. [216] including only one good quality RCT [217] and one moderate-quality RCT[218].

No evidence was found about the effectiveness of topical NSAIDs in the selected references.

Key points: medications for CLBP

- **Pain medications are commonly prescribed for CLBP; particularly NSAID's, muscle relaxants and narcotic analgesics. However, few of them have been studied in well-conducted trials. The effectiveness of most prescribed medications is not supported by studies (e.g. paracetamol, benzodiazepines other than tetrazepam) and the available studies seldom used a placebo as a comparator;**
- **No conclusion can be drawn about paracetamol (acetaminophen) and cetylsalicylic acid due to a lack of evidence,**
- **In the literature, there is a consensus that NSAIDs are more effective than paracetamol or placebo but no reference showing a superior effect of any specific NSAID has been found. Moreover, the secondary effects of such drugs are known to be relatively frequent and harmful.**
- **Weak opioids are effective to treat CLBP but 4 to 35% of the patients interrupt such a treatment,**
- **The effectiveness of strong opioids (morphine, oxycodone, hydromorphone, fentanyl, buprernorphine) to treat CLBP has not been established. Potential adverse effects of such medications are important including physical addiction,**
- **Tetrazepam has a positive short-term effect on CLBP and muscle spasms but the side effects are significant. No evidence supporting the effectiveness of other benzodiazepines in CLBP is available.**
- **Evidence about the effectiveness on non-benzodiazepines myorelaxants on CLBP is conflicting. Adverse effects of muscle relaxants drugs are far from being negligible,**
- **Evidence about the effectiveness of antidepressant drugs to treat patients with CLBP is conflicting. Noradrenergic and noradrenergic-serotoninergic antidepressants seem moderately effective. Selective serotonin reuptake inhibitors (SSRIs) do not appear to be beneficial,**
- **Gabapentin is not effective in patients with CLBP without neuropathic radicular pain. No evidence was found on the effectiveness of gabapentin in CLBP with neuropathic radicular pain.**

2.3.3 Invasive treatments for chronic low back pain

Invasive treatments are considered when conservative treatments for CLBP fail. These invasive procedures encompass a wide variety of techniques, such as injections, acupuncture, radiofrequency denervation, adhesiolysis, surgery and spinal cord stimulation for failed back surgery syndrome.

Safety of invasive treatments for CLBP is often a concern. Most of them are minor and transient but also rare major adverse effects and complications of such procedures have been described in case reports and non-randomized trials. However, the search strategy described in the appendices of this report focuses on efficacy evaluation based on guidelines, HTAs, systematic reviews and RCT's. These publications seldom register side effects in a uniform way and they do not allow determining neither precise incidences nor the clinical importance. Hence, the comments on possible adverse effects and complications that are available in the selected references are included in the safety sections of this report, when relevant. Those safety sections should not be considered as an exhaustive list of all possible adverse effects and complications. They are just mentioned as complementary information but the precise incidences can not be determined for each procedure. The most exhaustive reports of complications are

found in the guideline from Boswell et al. where all cases described in the literature are listed [61].

2.3.3.1 Non-surgical invasive treatments: injections

Many injection procedures have been developed for the treatment of CLBP: epidural steroid injections (with or without local anesthetics), spinal nerve root blocks, facet blocks (intra-particular or block of the ramous dorsalis of the spinal nerves), sacro-iliac joint blocks (injections into the sacro-iliac joint or into the sacro-iliac ligaments), trigger points injections, intradiscal injections, sympathetic blocks (at the lumbar sympathetic chain) and local injections (into muscles and/or into ligaments).

Injection procedures for CLBP with or without sciatica are addressed in the following guidelines: SBU [100], ANAES[3], CBO [97], COST 13 [2], Boswell [61]. An additional search for systematic reviews identified two Cochrane reviews: the review by Nelemans [219] on injection therapy and the review by Yelland [220] on prolotherapy. This literature search also identified one 2004 ICSI Health Technology Assessment [221]and one good-quality systematic review [222] on the subject.

Epidural corticosteroids injections

Epidural injections of corticosteroids to treat CLBP consist in the injection of corticosteroids in the epidural space at the lumbar level. This invasive technique commonly used aims at alleviating radicular pain of lumbosacral origin. COST B13 [2] describes the technique as injections *"by caudal, sacral, sacral transforaminal, lumbar midline, paralumbar (lateral) and lumbar transforaminal approaches. They can be given "blindly" or with x-ray guidance (either by fluoroscopy or CT). Various glucocorticoids can be used, alone or in combination with a local anesthetic or saline..."*

There is no evidence for the effectiveness of epidural steroids injections in non-specific, non radicular CLBP.

The results of the studies are conflicting for CLBP patients with radicular pain. Most guidelines and systematic reviews conclude that evidence is lacking to establish the effectiveness of conventional steroids epidural injections to treat CLBP with sciatica.

Evidence of low-quality can be found for the effectiveness of transforaminal epidural steroid injections for sciatica (except in extruded disc herniations). However, the study populations were mixed groups of patients suffering chronic and sub-acute low back pain with sciatica.

Safety of epidural steroid administration remains largely unknown. Minor side effects seem frequent but mostly transient. Major side effects or complications seem very uncommon but can potentially be dramatic.

Evidence

Epidural steroids injections for non-specific, non-radicular CLBP

COST B13 concludes that there is no evidence on the effectiveness of epidural steroids injection for non-specific, non-radicular CLBP. Consecutively, it concludes that such procedures should only be considered in CLBP with radicular pain, if the cause of pain is identified (a contained disc prolapse).

The SBU [100] report found moderate evidence against epidural steroid injections if there is no nerve root pain.

Epidural steroids injections for CLBP with radicular pain (without description of the procedure of injection; possible inclusion of transforaminal injections in the results)

Although COST B13[2] mainly focuses on non-specific, non-radicular CLBP, this reference also briefly addresses and summarizes the evidences available on epidural corticosteroids injection for radicular pain. The conclusions of COST B13 are based on

one good-quality meta-analysis [223], three good-quality systematic reviews [224, 225, 219], three low-quality systematic reviews [226-228]. COST B13 concludes that there is conflicting evidence for the effectiveness of conventional epidural/perineural corticosteroid injections versus sham procedure for radicular pain in the context of CLBP. However, COST B13 underlines that although three high-quality systematic reviews are available, many of the RCTs they are based on present with numerous methodological limitations. Among them, the fact that injections are performed without any X-ray guidance in many studies may be a concern, as it is well known that many unguided injections do not reach their target. Hence, COST B13[2] also comments that such injection procedures should be X-ray guided, and that the steroids should be injected close to the target.

The SBU [100] report found moderate evidence against epidural steroid injections if there is no nerve root pain, and limited evidence in case of nerve root pain.

CBO [97] concludes that there is not enough evidence supporting the effectiveness of epidural injections of steroids. These conclusions are based on the systematic review by Koes et al.[229] and on the Cochrane review by Nelemans et al. [219]. Most studies included in these references are of low-quality except for one RCT.

The Cochrane systematic review by Nelemans et al. [219] concludes that *"convincing evidence is lacking on the effects of injection therapies for low back pain.* Unfortunately, since our search, the review has been withdrawn from the Cochrane site in relation with an updating process (searching period of this review being 10 years old).

Our additional search identified one recent multicenter RCT on the effectiveness of epidural corticosteroid injections for sciatica as compared to a sham procedure (interligamentous saline injection) [230]. In this study, epidural steroids were administered "blindly" (with no X-ray guidance) in patients presenting sciatica (± 33% of patients with acute sciatica and 66% of sciatica of more than 1 month duration). This pragmatic study shows that benefit, in terms of a 75% improvement of Oswestry scores, was present but transient as only observed at the 3-weeks follow-up. No benefit was demonstrated from 6 to 52 weeks and no benefit was demonstrated for repeated epidural injections over single injection. It must be pointed out that the inclusion criteria for sciatica in this paper do not correspond with the criteria for chronic low back pain as defined in this report.

Transforaminal epidural or selective nerve root steroids injections for CLBP with radicular pain (transforaminal injection specified in the literature)

The ICSI [221] drew up a HTA on fluoroscopically guided transforaminal epidural steroid injections for lumbar and radicular pain in CLBP patients. Based on two high-quality RCTs, the authors conclude that although the results appear promising, there is still insufficient evidence to establish the efficacy of epidural steroids injections.

The American Society of Interventional Pain Physicians guideline [61] included high– and low-quality studies (prospective, non-randomized studies, no double blinding): *"The evidence for caudal and transforaminal epidural steroid injections was strong for short-term relief (< 6 weeks) and moderate for long term relief, in managing chronic low back and radicular pain."* Abdi et al. [222], co-authors of the American Society of Interventional Pain Physicians guideline mentioned above, drew the same conclusions from their review including not only randomized trials but also all other available trials.

The transforaminal epidural steroid injection, always performed under fluoroscopic guidance, was investigated in three high-quality RCTs (as ranked by Cost B13, in which these studies were included). The first study comparing transforaminal epidural steroid with local anesthetic shows a short effect for the steroid group but a rebound effect at 3 and 6 months, where the control group performed better [231]. A consequent sub-group analysis of those patients, based on the MRI classification of the disc herniation, shows a positive and cost-effective result in the steroid group for the patients with a contained herniation, the opposite was found for patients with an extruded herniation [232]. Riew et al. compared epidural steroid plus local anesthetic compared with local anesthetic alone, transforaminally injected into the epidural space, in patients who had MRI or CT confirmed disc herniation or foraminal spinal stenosis and were judged eligible for surgery. There was a significant higher operation rate in the local anesthetic

group [233]. In the 5-year follow-up study it was shown that patients who avoided surgery for at least one year, with steroid and local anesthetic or with local anesthetic alone, continued to avoid surgery for a minimum of 5 years [234]. The third unblinded study compared transforaminal steroid injections with saline trigger point injections and found a significant higher success rate in the transforaminally injected patients after a follow-up of 1,4 years [235].

It must be pointed out that in these three RCTs, the effectiveness of transforaminal epidural steroid injections has been studied and observed in mixed groups of patients suffering chronic and sub-acute low back pain with sciatica. In one study [233], acute patients with intractable pain and patients who had had previous unsuccessful back surgery were included. Moreover, these studies present with clear methodological limitations, such as possible selection bias, debatable blinding process and outcomes, confounding interventions… Hence, more studies focusing on the effectiveness of transforaminal epidural steroid injections should be conducted specifically in chronic LBP with radicular pain before concluding to its effectiveness in such patients.

Safety of epidural injections of steroids

Different adverse effects of epidural injections of steroids have been reported. They are relatively rare when the procedure is carried out under aseptic conditions and after the exclusion of contra-indications [2]. However their severity warrants special attention.

High doses or too frequent steroids injections can entail a suppression of the adrenocorticotropic hormone (ACTH) with Cushingoid symptoms [236, 237].

Dural puncture is a potential complication of conventional epidural injections with a mean incidence of about 5 %. The prevalence of headache following epidural steroid administration is about 1 % [238]. Epidural haematoma seems exceptional as well as cases of epidural abscess after epidural steroid injections. This last adverse effect has been mostly reported in diabetic patients.

Arachnoiditis after epidural injection of steroids seems exceptional[237].

Finally, major accidents as paraplegia after transforaminal epidural injections are extremely rare. Abdi et al. [222] found case reports of 3 patients who had previously undergone back surgery.

Facet (zygapophyseal joint) injections

Facet, or zygapophyseal joint, therapeutic injections consist in the injection of corticosteroids (or an association of an anesthetic and corticosteroid drugs) either in the intra-articular joint space or in the vicinity of the joint around its nerve supply (facet nerve block). Such therapeutic interventions are performed when it is hypothesized that the facet joint(s) is (are) the pain generator(s) of CLBP ("facet syndrome"). One or more facet(s) can be injected during the same procedure that is generally performed under radiological guidance (fluoroscopic or CT guidance).

European guidelines based on Cochrane reviews conclude that evidence is lacking to establish the effectiveness of facet injections in CLBP. Noteworthy, such references do not distinguish true intra-articular injections from peri-articular facet nerve injections. Safety of facet joints injections remains largely unknown.

Evidence

The SBU [100] and ANAES [3] reports found no evidence supporting injections of facet joints to treat CLBP. This statement is in agreement with the conclusions of the more recent CBO [97] guideline (based on one Cochrane systematic review [219] and on several low- to moderate-quality RCTs).

The COST B13 [2] guideline is mainly based on the Cochrane review by Nelemans et al.[219] and on several RCTs of good-quality [239] and low- to medium-quality (including Carette [240] and Carette., [241]). Overall, COST B13 [2] concludes that "*There is moderate*

evidence that intra-articular corticosteroids are not effective in patients with pain of facet joint origin (level B). There is no evidence for the effectiveness of intra-articular injections of steroids or facet nerve blocks in patients with non-specific low back pain" (level D: no RCTs).

On the contrary, the interventional pain management guideline of the American Society of Interventional Pain Physicians [61] concludes that *"For intra-articular injections of local anesthetic and steroids, there was moderate evidence for short term (< 6 weeks) and limited evidence for long term improvement in managing low back pain".* Again, such conclusions contrast with all other guidelines and Cochrane reviews conclusions. They are based on 6 trials including only one RCT from 1991 [240], having methodological limitations. Another reference used by Boswell et al. [61] is the study by Manchikanti et al. [242] who is also co-author of the same guideline. In this last study, an association of an anesthetic drug and sarapin is compared to the same association plus methylprednisolone, both associations being injected to obtain facet nerve blocks. Hence, although significant improvement was documented in both groups, improvements were not compared to placebo and/or sham intervention group. The conclusions of Boswell et al. have therefore to be interpreted with caution.

The Cochrane review by Nelemans et al. [219] concluded that "Convincing evidence is lacking on the effects of injection therapies for low back pain. Within the 6 subcategories of explanatory studies the pooled RRs with 95% confidence intervals were: facet joint, short term: RR=0.89 (0.65-1,21); facet joint, long term: RR=0.90 (0.69-1.17)." However, as stated above, the review has been withdrawn for updating process.

Safety of facet joint injections

Safety of facet joints injections remains largely unknown. Septic facet arthritis has been exceptionally reported [2].

Boswell et al. [61] mentioned all possible adverse effects reported in the literature: dural puncture, spinal cord trauma, infection, intraarterial or intravenous injection, spinal anesthesia, chemical meningitis, neural trauma, radiation exposure, facet capsule rupture, haematoma formation, and steroid side effects.

Sacro-iliac joint injections

Sacro-iliac injections consist in intra-articular injections of anesthetic and/or corticosteroids. They may be considered to differentiate lumbo-radicular pain localized in the buttock from sacro-iliac joint pain. Sacro-iliac injections are performed with or without radiographic guidance. However, in the absence of radiographic guidance, true intra-articular approach is only obtained in a minority of cases [243].

There is very limited evidence that injections of the sacro-iliac joint with corticosteroids are effective at a short term.

Evidence

COST B13 [2], considered the results of one low-quality RCT [244] and concluded that there is limited evidence that sacro-iliac joint injections with corticosteroids are effective to alleviate non-specific sacro-iliac pain for a short time (level C). Boswell [61] concluded that there is moderate evidence supporting short-term effectiveness and limited evidence supporting long term effectiveness of intra-articular corticosteroids injections for sacro-iliac pain. However they based their conclusions on one low-quality RCT discarded by COST 13 [2] (the patients' inclusion criterion was sacro-iliitis).

Safety of sacro-iliac injections

Safety of sacro-iliac injections remains largely unknown [2]. General side effects in relation with corticosteroids have been mentioned above (suppression of the adrenocorticotropic hormone (ACTH) and development of Cushingoid symptoms). According to Boswell et al. [61] other possible side effects are e.g. infection, haematoma, neural damage, trauma to the sciatic nerve, gas embolism and leakage of the drug from the joint.

Intradiscal injection

Intra-discal injections with contrast solutions are traditionally used to diagnose discogenic pain (discography). However, intra-discal corticosteroids or other substances injections are sometimes used to treat so-called "discogenic" pain. It is hypothesized that it may reduce disc inflammation (steroids) or denervate intra-discal nerve fibers (glycerol). Those procedures are usually performed with the help of radiographic guidance.

Evidence of the effectiveness of therapeutic intra-discal injections is not established.

Safety of the procedure is a concern as important adverse effects (including adverse effects of diagnostic discography as sepsis, anaphylaxis) are possible.

Evidence

Therapeutic intra-discal injections have only been addressed by COST B13 [2], based on the Cochrane review by Neleman et al. [219] and on three additional RCTS (two of low-quality and one of high quality). The authors of COST B13 [2] conclude that *"There is moderate evidence that local intradiscal injections (glucocorticoid or glycerol) are not effective for chronic low back pain"* (level B).

Safety of therapeutic intra-discal injections

Adverse effects of therapeutic intra-discal injections remain largely understudied. Most often cited adverse effects of intra-discal injections are: septic discitis or spondylodiscitis[2]. A progressive degeneration of the disc related to corticosteroids has also been described [245]. The addition of radio-opaque solutions can be responsible of anaphylaxis.

Intramuscular injections of Botulinum Toxin

Intramuscular injections of Botulinum Toxin are a treatment of dystonia or spasticity in the context of central neurological disorders. The rationale for the treatment of CLBP is that Botulinum Toxin may interfere in pain generation by inhibiting substance P release. Botulimun Toxin is administered through intra-muscular injections in the spastic or painful muscles. In the context of CLBP, Botulinum Toxin is injected in the paravertebral muscles.

No evidence can be found for supporting the effectiveness of Botulinum Toxin injections to treat CLBP. Safety of the procedure is unknown.

Evidence

Only the COST B13 guideline addresses this therapeutic modality and found it ineffective. Its conclusions are based on only one low-quality RCT [246] that found no statistically significant effect of Botulinum Toxin versus saline injected at five paravertebral intramuscular levels on the side of most discomfort.

Safety of Botulinum Toxin injections

According to COST 13 2004, "Botulinum Toxin can weaken the muscles if repeated injections are given over a long period of time [246] cited in COST B13)".

Prolotherapy (sclerosant injections)

COST B13 [2] defines prolotherapy as follows: "Prolotherapy consists of injecting sclerosing substances into the ligaments of the lumbar spine (such as the supraspinous, intraspinous, posterior iliosacral and iliolumbar ligaments) and lumbodorsal fascia and apophyseal joint capsules. Today, the most commonly used solution for these injections is a mixture of glucose, glycerine and phenol. The rationale for their use is based on two premises: firstly, that laxity of the ligaments and fascia supporting the lumbar motion

segments may be responsible for some cases of chronic low back pain and secondly, that the injection of substances which initiate an inflammatory response will strengthen these ligaments and consequently reduce back pain."

Evidence about the effectiveness of prolotherapy to treat CLBP is conflicting. Until more good-quality conclusive studies become available, prolotherapy should not be used to treat CLBP. Safety of prolotherapy remains unknown.

Evidence

CBO [97] states that there is insufficient evidence to support prolotherapy through injecting phenol in lumbar ligaments of CLBP patients (based on two systematic reviews[98, 219] and on two RCTS [247, 248].

COST B13 [2] concluded that « there is strong evidence that local injections with sclerosants (prolotherapy) in the ligaments of the back are not effective for non-specific CLBP (level A)». These conclusions are based on a Cochrane review [219], two good-quality RCTs [249, 248] and on the low-quality study by Ongley et al.[247].

A recent Cochrane review by Yelland et al. [220] on prolotherapy for CLBP included four high-quality RCTs with a total of 344 patients. It concluded that there is conflicting evidence that prolotherapy is effective in reducing pain and disability in patients with CLBP: the studies present with clinical heterogeneity and confounding co-interventions.

Safety of prolotherapy

The safety of prolotherapy is unknown.

Trigger Point injections (muscle or fascia) or ligaments injections

According to COST B13 [2], "Myofascial trigger points are defined as hyperirritable loci within a taut band of skeletal muscle. Trigger points are located in the muscle or its associated fascia. They are painful on compression and can evoke a reliable, characteristic referred pain with or without autonomic response. The rationale or hypothetical mechanism for injection in the trigger points is the selective destruction of mature myocytes by local anesthetic, saline infiltration or dry needling, or the "breaking of the reflex mechanism" of the pain, probably mainly by muscle relaxation."

No evidence can be found about the effectiveness of trigger point or ligament injections to treat CLBP. The safety of the procedure remains unknown.

Evidence

SBU [100], CBO [97] guideline and COST B 13 [2] found no or conflicting evidence for trigger injections: these reviews are based on a few studies from the eighties.

SBU [100] found no evidence for ligaments injections in CLBP.

CBO [97] authors state that a short-term effect in terms of pain reduction may be obtained by an injection of lidocaine and/or corticosteroids on the insertion of the ilio-lumbar ligament. Their conclusions are based on the trials by Sonne et al. [250]) and by Collée et al.[251]. The latter study specifically focused on patients with so-called « painful iliac crest syndrome ».,

COST B13 [2] concluded that there is conflicting evidence for a short-term effectiveness of local ilio-lumbar ligament injections with anesthetics in CLBP (level C) on the basis of the same trials (evaluated as low quality studies by the authors of COST B13 [2]

The recently updated Cochrane review [219] on injections procedures for CLBP concludes that "Convincing evidence is lacking on the effects of local injection therapies for low back pain. The pooled RRs with 95% confidence intervals were for local injections, short term: RR=0.80 (0.40-1,59), long term: RR=0.79 (0.65-0.96)".

Safety on Trigger points and ligament injections

Safety of Trigger points and ligament injections to treat CLBP remains understudied. CBO[97] describes those injections as invasive and painful. Local infection rate is estimated to range from 1/15.000 to 1/50.000. Neuro-vegetative reactions and anaphylaxis are possible.

Key messages on injections to treat CLBP

- **Evidence is lacking to establish the effectiveness of epidural corticosteroid injections to treat non-specific, non-radicular CLBP,**
- **There is very low-quality evidence for the effectiveness of conventional epidural injections (lumbar midline, caudal, sacral) of steroids to treat CLBP with radicular pain.**
- **There is low-quality evidence for the effectiveness of transforaminal epidural steroid injections to treat CLBP with radicular pain,**
- **There is low-quality evidence to establish the effectiveness of facet injections in CLBP (strictly intra-articular or peri-articular),**
- **There is very low-quality evidence that injection of the sacro-iliac joint with corticosteroids might be effective at a short term,**
- **There is an obvious need for good-quality studies on the effects of injections: the available studies show large clinical heterogeneity (patients selection, injection techniques, outcome variables…) and numerous confounding co-interventions,**
- **Evidence of the effectiveness of therapeutic intra-discal, intra-muscular Botulinum Toxin, trigger points and ilio-lumbar ligaments injections and prolotherapy are not established in CLBP,**
- **Safety of all invasive injections procedures has not been specifically studied and remains largely unknown. Reported side effects are far from being negligible and include major complications such as infection, anaphylaxis and nerve/nerve root damages.**

2.3.4 Non-surgical, non-injection invasive treatments for CLBP

2.3.4.1 Acupuncture

Acupuncture is a therapeutic technique originating from traditional Chinese medicine in which specific parts of the body are pierced by fine needle to alleviate pain.

Dry-needling is a therapeutic technique for myofascial pain and dysfunction. According to the promoters of this technique, insertion of needles in so-called « trigger points » allows alleviation of myofascial pain and dysfunction.

Evidence about the effectiveness of acupuncture and dry-needling is of moderate quality and the results are conflicting for treating CLBP. Some references conclude that evidence exists for a short-term positive effect. Acupuncture is not more effective than other treatments such as trigger point injection, TENS, self-care education and seems less effective than massage and spinal manipulations. The effectiveness of acupuncture might be slightly improved if combined with other treatments

Evidence

In a recent meta-analysis by Manheimer et al. [252], acupuncture was found more effective than sham treatment to relieve CLBP (standardized mean difference, 0.54 [95% CI, 0.35 to 0.73]; 7 trials) and than no additional treatment (standardized mean difference, 0.69

[95% CI, 0.40 to 0.98]; 8 trials). However they also conclude that there is no evidence available suggesting that acupuncture could be superior to any other treatment.

The recently updated Cochrane review on acupuncture and dry-needling in sub-acute and chronic LBP or myofascial syndrome in the lower back included 35 RCTs [253]. The conclusion is that *"For chronic low back pain, there is evidence of pain relief and functional improvement for acupuncture, compared to no treatment or sham therapy. These effects were only observed immediately after the end of the sessions, and at short-term follow-up".*

Our additional search identified one recent good-quality RCT [254] in which acupuncture in patients with CLBP was compared to minimal acupuncture (sham intervention) and to no acupuncture (waiting list) at week 8, 26 and 52. When no significant difference between acupuncture and sham acupuncture (minimal acupuncture) was noted at week 8, acupuncture was significantly more effective than no treatment at week 8. No more significant differences between groups were observed at weeks 26 and 52.

SBU 2000 [100] also concluded to a limited evidence for acupuncture.

ANAES [3], the NHS Centre for Reviews and Dissemination report [102] and COST B13 [2] concluded that evidence of the effectiveness of acupuncture is conflicting. The ANAES conclusions were based on the systematic review by van Tulder et al. [160] and on the SBU [100] guideline. The CRD conclusions are based on van Tulder [103] The conclusions of COST B13 [2] are based on two very high-quality systematic reviews by van Tulder[160, 184], on another low-quality one by Ernst et al. [255] and on additional studies (level C).

Moreover, COST B13 [2] concluded that "There is moderate evidence that acupuncture is not more effective than trigger point injection or TENS for the treatment of LBP (level B) and limited evidence that acupuncture is less effective than massage and spinal manipulation (level C). There is limited evidence in each case that acupuncture is similar to self-care education and better than training of proper posture and motion in accordance with Bruegger concepts (level C)".

Acupuncture (and dry-needling) as an adjunctive therapy

COST B13 [2] concluded that there is limited evidence (level C) that acupuncture improves general outcome when combined with standard treatment traditionally implemented by family physicians (exercise, NSAIDs, aspirin and/or non-opioid analgesics). The same conclusions apply for acupuncture combined to more extensive conventional treatment (physiotherapy, diclofenac, varied physical therapy modalities, exercise, back school…).

The Cochrane review by Furlan [253] agreed that there is evidence that acupuncture, combined to other traditional therapies, alleviates pain and improves function better than the traditional therapies alone. However, the positive effects are modest. Dry-needling appears to be an effective adjunct to conventional therapies for CLBP. No evidence exists that allows defining the most effective type of acupuncture

Safety

No study was found about the safety of acupuncture techniques

2.3.4.2 *Radiofrequency and electrothermal denervation procedures*

Radiofrequency and electrothermal denervation are invasive techniques that are implemented in patients with CLBP for whom less invasive treatments have failed and for whom a specific pain generator (disc, facet joint) has hypothetically been identified by a preliminary diagnostic test.

COST B13 [2], Boswell [61] guidelines, two Health Technology Assessment reports [256, 257] and two RCT [258, 259] evaluated these procedures.

Intradiscal electrothermal therapy (IDET)

Intradiscal electrothermal therapy is a percutaneous procedure consisting in heating up to 60 to 70 degrees centigrade the outer annulus of an intervertebral disc using a catheter with a temperature controlled thermal resistive coil. The underlying

(uncertain) hypothesis is that internal disc disruption (IDD) as seen in degenerative discs would act as a pain generator is some patients with CLBP. This procedure is sometimes proposed as an alternative to spinal fusion although much controversy about the reality of IDD still exists [260, 261, 7] cited in COST B13).

There is low-quality conflicting evidence for IDET. One study suggests positive short-term effect on CLBP. A recent RCT finds no significant changes in outcome measures with IDET at 6 months. Safety of IDET remains largely unknown.

Evidence

Cost B13 [2] concluded that evidence is conflicting that IDET is more effective than sham treatment in patients with discogenic pain (one high-quality RCT [262], level C). Half of the patients reported no benefit after IDET.

The « Agence d'Evaluation des Technologies et des Modes d'Intervention en Santé » [256] reviewed six HTA reports on IDET. The authors of this review found different levels of evidence according to the HTA studied but none of them supported the effectiveness of IDET. Levels of evidence were respectively low [263-265], limited for a short-term effect [266] and insufficient for Washington States Departement of Labor and Industries [267] .

NICE 2004[268] also states that effectiveness of IDET remains unknown.

On the opposite, the American Society of Interventional Pain Physicians guideline [61] concludes that there is a strong evidence of effectiveness of IDET at short term and moderate evidence at long term on chronic discogenic LBP (based on Pauza et al [262] and other cohort studies).

A recent RCT [258]} tests the safety and efficacy of IDET versus sham treatment. No subject in either arm met criteria for successful outcome. This study demonstrates no significant benefit form IDET over placebo.

Safety of IDET

Safety of IDET and other similar procedures (IRFT, PDD: see below) has not been specifically evaluated. However, major adverse effects have been reported including burning sensations in the legs during several weeks, disc prolapse and development of radicular pain, numbness and paresis resolving after several weeks [269]; and septic discitis [270]. Boswell et al. [61] report other significant complications including catheter breakage, nerve root injuries, cauda equina syndrome, epidural abscess, and spinal cord damage.

The recent RCT [258] concludes that the IDET procedure appeared safe with no permanent complications (38 subjects with IDET intervention).

Intradiscal radiofrequency thermocoagulation (IRFT)

IRFT is an invasive percutaneous procedure similar to IDET. A radiofrequency cannula is placed under radiographic guidance in the center of the disc that is heated at temperatures up to 80°C. The rationale for IRFT is the same as for IDET.

One single low-quality study suggests that IRFT might have a modest positive effect and two other ones found that IRFT is not more effective that sham IRFT. Safety of IRFT remains largely unstudied but possible major adverse effects are similar to IDET.

Evidence IRFT

IRFT versus sham IRFT

COST B13 [2] addressed IRFT together with IDET and makes the same conclusions about both procedures: evidence is conflicting that IDET and IRFT are more effective than sham treatment in patients with discogenic pain (level C). These conclusions are based on two RCTs that evaluated IRFT: Barendse et al [271]. (13 patients IRFT denervation

versus 15 sham procedure: no difference) and Ercelen et al.,[272] (120 patients IRFT denervation versus 360 sham procedure: no difference).

On the basis of a third low-quality RCT [273], COST B13 [2] states that limited evidence (level C) is available to support effectiveness of IRFT in CLBP versus a lidocaïne injection at the same site) In this study [273] intervention group (IRFT) and controls were failed IDET patients.

Safety of IRFT : see safety of IDET

Percutaneous disc decompression (PDD)

Percutaneous Disc Decompression (PDD) through nucleoplasty using a technique named "coblation" is an invasive procedure similar to IDET and IRFT. PDD is performed percutaneously in patients with CLBP as an alternative to surgical fusion. A probe-like device is inserted into the disc under radiographic guidance. The device is heated up to 40-70°C, ablating the centre part of the disc and creating a channel. After stopping at a pre-determined depth, the probe is withdrawn, coagulating the tissue as it is removed. Several channels are created during this coblation procedure, the number of channels depending on the desired amount of disc decompression

Effectiveness of PDD using the coblation technique is not established and the safety remains unknown.

Evidence PDD

On the basis of three low-quality studies, Boswell et al. [61] conclude that the evidence supporting this technique is limited.

Safety of PDD: see safety of IDET

Radiofrequency facet denervation

Radiofrequency facet denervation is an invasive procedure consisting in applying a radiofrequency probe to the facet (zygapophyseal) joint to destroy the nerves (ramus medialis of the ramus dorsalis) that supply it. This procedure is performed percutaneously under radiographic guidance. The underlying hypothesis is that the facet joint(s) to be denervated is (are) thought to be the pain generator(s) of the CLBP ("facet syndrome", see facet injections). Such procedures are generally performed after a positive preliminary facet injection test.

Evidence about the effectiveness of radiofrequency facet-denervation is conflicting. More good-quality studies should be conducted to establish its effectiveness.

Evidence

Cost B13 [2] evaluated the effectiveness of the procedure on the basis of one Cochrane review [274] and one systematic review [275]. The Cochrane review by Niemisto included two good-quality RCTs [276, 277] and one low-quality RCT [278]. COST B13 [2] concluded that there is conflicting evidence that radiofrequency facet denervation is more effective in terms of pain alleviation and functional disability reduction than placebo at short and long term (level C). Proper selection of patients and optimal techniques are probably determinant factors to obtain better results. Finally, a comparison between two denervations comes to the following conclusion: *"there is limited evidence that intra-articular denervation of the facet joints is more effective than extra-articular denervation (level C, based on one low quality study* [279]).

A HTA by the Institute for Clinical Systems Improvement [257] included the same RCTs as the ones considered in the COST B13 [2] guideline. Noteworthy, the RCT by Gallagher et al. [278] was here described as a good-quality study. This ICSI HTA is also based on case series study [280]. Overall the HTA report concludes that effectiveness of radiofrequency denervation is unknown to date (evidence level not assignable).

Noteworthy, the guidelines that conclude to the effectiveness of the procedure are based on only one RCT by Van Kleef et al. [276] (and some other low-quality studies). ANAES 2000 [3] and the guideline by the American Society of Interventional Pain Physicians [61] concluded that evidence supporting the effectiveness of the procedure was strong to moderate at short term (<3 months) and long term.

Our additional search identified one good-quality RCT [259] that studies the effects of radiofrequency denervation of lumbar facet joints versus sham procedure. In this study, the combined outcome measures including a pain score on a Visual Analog Scale showed no difference between radiofrequency and sham, though in both groups, significant VAS improvement occurred. The global perceived effect improve after radiofrequency facet joint denervation. Noteworthy, the difference in outcome between the positive evaluation in the van Kleef study and other RCTs may be also related to the technique used as prognostic blocks for patient selection. The positive results obtained in the van Kleef [276] study correspond to the use of medial branch prognostic blocks in contrast to the intra articular blocks used in the other RCT's.

Safety of radiofrequency facet-denervation

According to COST B13 [2], safety of the procedure is unknown as no study that specifically addressed this issue was found.

Boswell et al describe adverse effects such as painful dysesthesias, increased pain due to neuritis or neurogenic inflammation, anesthesia dolorosa, cutaneous hyperesthesia and deafferentation pain [61].

According to the ICSI HTA [257], few major complications of the procedure are reported: 1.0% incidence of minor complications per lesion site, such as localized pain lasting more than 2 weeks and neuritic pain lasting less than 2 weeks. No sensory-motor deficits and no infection in a series of 616 lumbar facet joint radiofrequency lesions performed in 92 patients.

Radiofrequency lesioning of dorsal root ganglia

Radiofrequency lesioning of dorsal root ganglia is an invasive procedure consisting in partial lesioning of one or several dorsal root ganglia. It can be performed percutaneously under radiographic guidance. The rationale for this procedure is that partial lesion of the dorsal root ganglion may reduce nociceptive input at the level of the primary sensory neuron without causing any sensory deficit. This procedure may thus be considered as an alternative to surgical rhizotomy for chronic refractory radicular pain.

Radiofrequency lesioning of dorsal root ganglia seems not effective: one good-quality study demonstrated that it was not superior to sham procedure. The safety of the procedure is unknown.

Evidence

On the basis of one good-quality RCT [281] COST B13 [2] concluded that "There is limited evidence that radiofrequency lesions of the DRG are not effective in the treatment of chronic LBP (level C)".

Safety lesioning of dorsal root ganglia

According to COST B13 [2], the safety is unknown. However, the authors of the RCT [281] included in the COST B13 [2] guideline suggest that the procedure may lead to aggravation of pain in the presence of deafferentation symptoms if radiofrequency lesioning has been too extended.

Radiofrequency neurotomy of sacroiliac joints

Radiofrequency neurotomy of sacro-iliac joints is a procedure consisting in denervating the sacro-iliac joint through radiofrequency. It can be performed percutaneously through radiographic guidance (usually CT guidance). The rationale for this technique is

that the sacro-iliac joint may acts as a pain generator in chronic refractory LBP. Such a hypothesis is evoked when pain relief has been obtained through preliminary sacro-iliac diagnostic blocks with anesthetics or corticoids as described above.

Effectiveness of radiofrequency neurotomy of sacro-iliac joints has not been established and its safety is unknown.

Evidence

Only the guideline of the American Society of Interventional Pain Physicians [61] addresses this procedure. No good-quality RCT was identified by the authors of this guide line who conclude that effectiveness of the procedure could not be established on the basis of few retrospective trials with small number of patients.

The safety of radiofrequency neurotomy of sacro-iliac joints is unknown

2.3.4.3 Neuroreflexotherapy

Neuroreflexotherapy (NRT) consists of the temporary implantation of epidermal devices (surgical staples and/or small metallic burins) in trigger points in the back and referred tender points in the ear. The rationale for this procedure is to inhibit neurons assumed to be involved in the persistence of pain, neurogenic inflammation, muscle dysfunction and contracture [282-285]. This therapy is administered without anesthesia and can be performed on an outpatient basis. Noteworthy, trigger points of NRT are different from ones evoked previously in this report in the section on injections (trigger points injection techniques). Likewise, NRT trigger points do not coincide with traditional Chinese medicine acupuncture points.

According to one group of Spanish authors, neuroreflexotherapy seems an effective and safe therapeutic procedure for patients with CLBP. However, more good-quality studies should be conducted to reproduce the encouraging results obtained by this team.

The safety of the procedure seems good as only minor side effects have been reported.

Evidence

Three RCTs by the same author are the basis for the evidence on NRT with a total of 125 subjects randomized to the control groups and 148 subjects receiving active NRT (patients with sub acute and chronic LBP) [282-284] cited in COST B13 [2]..

ANAES 2000 [3] concludes that NRT is effective at short term on the basis of one of these RCTs only [283].

COST B13 [2] mentions one Cochrane review [285] based on these trials and the RCTs themselves. It concludes that there is "strong evidence that neuroreflexotherapy is more effective than a sham procedure in providing pain relief up to 30-45 days (level A), that there is limited evidence that NRT is more effective than a sham procedure in improving return to work (level C) and that there is limited evidence that the addition of NRT to standard medical care provides better outcomes than standard care alone with respect to short-term (up to 60 days) pain relief and disability, and for subsequent drug treatment, healthcare utilization and sick leave up to 1 year later (level C)".

In the Cochrane review [285] analyzing the three RCTs, the authors concluded that "neuroreflexotherapy appears to be a safe and effective intervention for the treatment of chronic non-specific low back pain. However, these results are limited to three trials conducted by a small number of specially trained and experienced clinicians, in a limited geographical location".

Safety

According to COST B13 [2], only minor and rare adverse events have been reported.

2.3.4.4 *Percutaneous electrical nerve stimulation (PENS)*

PENS therapy utilizes acupuncture-like needle probes positioned in the soft tissues to stimulate peripheral sensory nerves at the dermatome levels corresponding to the local pathology. TENS, in contrast, is a procedure that involves electrical stimulation of cutaneous electrode pads placed in a standard dermatome pattern.

Only one good quality study demonstrated that this new therapy was superior to sham procedure in elderly patients (>65 years) with CLBP. Safety of PENS as a treatment for CLBP has not been specifically studied although relatively minor adverse effects have been reported.

Evidence

The authors of COST B13 [2] identified only one good-quality RCT among elderly above 65 years with CLBP [286]. The other references were six low-quality studies. On this basis, COST B13 [2] authors concluded that evidence was moderate (level B) for a superior effectiveness of PENS compared to sham procedure and conflicting (level C) for the superiority of PENS as compared to other more traditional treatments. The authors of COST B13 [2] also concluded that there is conflicting evidence (level C) that one specific PENS technique is more effective than other regimens.

Safety of PENS

Hsieh and Lee [287] cited in COST B13 [2] reported adverse effects such as fainting, bleeding, wound infection, or even pneumothorax for thoracic PENS. Unfortunately, the frequency of such complications is unknown as no study has specifically addressed this issue.

2.3.4.5 *Epidural adhesiolysis, epiduroscopy*

Epidural adhesiolysis is an invasive procedure consisting in lysing adhesions that may be present in the epidural space. This procedure is performed percutaneously or using a spinal endoscope (myeloscope). The rationale for epidural adhesiolysis is to eliminate scar formation, which can prevent direct epidural application of drugs to nerves and other tissues. Hence, instillation of anesthetic drugs, corticosteroids or other substances (hyaluronidase…) is often included in the procedure. Epidural adhesiolysis is generally considered as a technique that should be applied to patients with chronic intractable radicular pain such as the so-called « failed back surgery syndromes ».

Effectiveness of epidural adhesiolysis is still debated as evidence about this invasive procedure is very low and conflicting.

Safety of the procedure remains unknown: important and frequent complications have been mentioned in case reports.

Evidence

One HTA report by the National Institute for Clinical Excellence [268] on the endoscopic division of epidural adhesions could only identify three small and uncontrolled studies. The results of such low-quality studies showed that less than half of the patients reported pain relief after such a procedure. It must be noted that in one of the studies 15% of the patients developed pain aggravation after adhesiolysis.

Other references rely on reviews of members of the American Society of American Society of Interventional Pain Physicians. In particular, Boswell [61] distinguishes percutaneous lysis of lumbar epidural adhesions (neurolysis) and endoscopic adhesiolysis (combined with target delivery of steroids).

For percutaneous lysis of lumbar epidural adhesions and hypertonic saline neurolysis, the guideline of American Society of Interventional Pain Physicians [61] refers to two "high-quality" RCTs as labeled by the guideline [288, 289] cited in Boswell [61]). They added one low-quality RCT and two retrospective studies. All RCTs had positive results.

According to Boswell [61], evidence of the effectiveness of percutaneous lysis of lumbar epidural adhesions and hypertonic saline neurolysis is strong in patients with CLBP with radicular pain.

For endoscopic adhesiolysis combined with target delivery of corticosteroids, the guideline of the American Society of Interventional Pain Physicians [61] refer to one "high-quality" RCT (Manchikanti et al [289], also member of the American Society of Interventional Pain Physicians), 3 prospective studies and 2 retrospective studies. The RCT by Machikanti et al.[289] observed a positive effect on pain of such a technique. The majority of the remaining studies analyzed heterogeneous groups of patients, most of them with epidural fibrosis consecutive to back surgery. Nevertheless, Boswell et al. [61] concluded that "The evidence for spinal endoscopy was strong for short term (< 3 months) relief and moderate for long term relief in managing chronic refractory low back pain and lower extremity in pain".

Our additional search identified a systematic review by Chopra et al. [290] based on two "high-quality" RCTs [288, 289], one low-quality RCT [242] and five non-RCTs studies. Most of these studies were cited by Boswell [61]. Chopra et al [290]. concluded that "there was strong evidence to indicate effectiveness of percutaneous epidural adhesiolysis neurolysis with administration of epidural steroids for short term (< 3 months) and long term in chronic refractory low back pain and radicular pain; there was moderate evidence for effectiveness of addition of hypertonic saline; the evidence of the effectiveness of hyaluronidase was negative"

A more recent RCT [291]) concluded that for patients with chronic refractory low back pain and lower extremity pain, spinal endoscopic adhesiolysis with targeted delivery of local anesthetic and steroid is an effective treatment (improvement in 80% of patients at 3 months, 56% at 6 months, 48% at 12 months versus 33% at one month and none thereafter) without major adverse effects.

Safety of epidural adhesiolysis

The HTA report of the National Institute for Clinical Excellence [268] on the endoscopic division of epidural adhesions reported several important and frequent complications: 21% of severe during the procedure, 13% of puncture of the dural sac, 5% of saline leak from the sacral hiatus, 5% of unnoticed vein perforation leading to subcutaneous extravasation of fluid and 4-5% of transient paresthesia.

According to Boswell [61], "The most common and worrisome complications of adhesiolysis and spinal endoscopy with lysis of adhesions are related to dural puncture, spinal cord compression, catheter shearing, infections, steroids, hypertonic saline, hyaluronidase, instrumentation with endoscope, and administration of high volumes of fluids potentially resulting in excessive epidural hydrostatic pressures. This may cause spinal cord compression, excessive intraspinal and intracranial pressures, epidural hematoma, bleeding, infection, increased intraocular pressures with resultant visual deficiencies and even blindness and dural puncture. Unintended subarachnoid or subdural puncture with injection of local anesthetic or hypertonic saline is one of the major complications of the procedure with catheter adhesiolysis. Hypertonic saline injected into the subarachnoid space has been reported to cause cardiac arrhythmias, myelopathy, paralysis, and loss of sphincter control."

2.3.4.6 Spinal cord stimulation (SCS)

Spinal cord stimulation (SCS) is an invasive procedure that consists in a permanent or intermittent stimulation of the large diameter afferent fibers of the dorsal columns of the spinal cord by an electrode connected to a programmable generator. The procedure is generally performed in two phases. First the electrode is implanted transcutaneously and connected to the generator that remains external for a testing period. If the test is successful, a generator is implanted, that can be started and stopped by the patient.

The rationale for SCS is that it is believed to alleviate chronic radicular pain by stimulation of large diameter afferent fibers in the dorsal columns of the spinal cord according to the « Gate control » theory [125]. SCS is most often implemented in CLBP

patients with radicular pain due to "failed back surgery syndrome" (FBSS). It is however also implemented in other medical conditions such as complex regional pain syndrome of type I or II, ischemic leg pain and intractable angina.

The evidence underlying the use of spinal cord stimulation to treat patients with radicular pain due to FBSS is low. Many minor complications have been reported. Safety of this costly procedure should be further studied.

Evidence

The authors of COST B13 [2] concluded that evidence supporting the effectiveness of SCS for CLBP is lacking: more good-quality studies are needed to evaluate its effectiveness in comparison with modern multidisciplinary pain management or other treatment modalities in patients with non-specific CLBP due to FBSS (one good-quality systematic review [292] and three cases series).

The guideline of the American Society of Interventional Pain Physicians [61] concludes that the evidence of effectiveness of SCS in FBSS is strong for short-term relief and moderate for long-term relief (based on two systematic reviews [292] [293], two RCTs [294, 295] and four other reports or trials).

The systematic review mentioned by both references [292] on chronic regional pain syndrome and FBSS included only three uncontrolled case series on FBSS and two case series on mixed diagnosis (chronic regional pain syndrome and FBSS). The authors concluded that it is unclear whether SCS has a positive effect on pain and functioning (return to work) over time. The authors also reported that, in case of any effect of SCS, pain relief obtained by this procedure seems to decrease with time.

A Cochrane systematic review [296] included two RCTs (81 patients with chronic pain). It concluded that there is only limited evidence of effectiveness of SCS in patients with FBSS. More studies are needed to better establish the effectiveness of such a technique in CLBP and in other conditions as well.

The authors of a HTA [297] also concluded that there is insufficient evidence that spinal cord stimulation improves functional disability, work status, or healthcare and medication use compared with other treatments or placebo in people with FBSS or other chronic back pain.

A systematic review by Taylor et al. [293] focused on radicular leg pain in patients with FBSS. The authors included one RCT, one cohort study and 72 case studies. In the only RCT included, about one third of the patients reported 50% or more pain relief with SCS which was statistically significant. Overall, Taylor et al. conclude that the evidence of effectiveness of SCS in patients with chronic leg pain due to FBSS is moderate.

Safety of SCS

According to Boswell et al. [61] possible complications of SCS are infection, hematoma, nerve damage, lack of appropriate paresthesia coverage, paralysis and death.

In the review by Turner et al. [292], the authors list all complications reported in the references included in their review (with a mean rate of complications across the studies) : superficial infection (4.5%), deep infection (0.1%), pain in the region of the stimulator components (5.8%), biological complications other than infection or local pain (2.5%), equipment failure (10.2%), stimulator revision other than programmed battery change (23.1%), stimulator removal (11%). The overall rate of complications was 34.3 % in this review. The authors underline that life-threatening complications are rather exceptional but that other minor adverse effects are common, raising the high cost of this expensive procedure.

Key messages for non-surgical, non-injection, invasive procedures

- **Evidence about the effectiveness of acupuncture and dry-needling is of moderate quality but conflicting. Safety of this procedure has not been specifically studied.**
- **Evidence about the effectiveness of IDET and IRFT is of very low quality. Safety of this procedure has not been specifically studied and possible adverse effects may be important,**
- **Evidence about the effectiveness of percutaneous disc decompression using the coblation technique and about the effectiveness of neurotomy of the sacro-iliac joint is very low. Safety of these procedure has not been specifically studied although possible adverse effects may be important,**
- **The low-quality evidence about the effectiveness of radiofrequency facet-denervation is conflicting and may be due to differences in the use of prognostic blocks for patient selection. Safety of this procedure has not been specifically studied. Mostly minor complications may occur in about 1% per lesion site.**
- **Only one good quality study showed that radiofrequency lesioning of dorsal root ganglia was not superior to sham procedure. Safety of this procedure remains understudied,**
- **There is low-quality evidence for the effectiveness of NRT and PENS for patients with CLBP. Only minor side effects have been reported for NRT and PENS but further studies are needed,**
- **The conflicting evidence underlying the effectiveness of epidural adhesiolysis is of very low quality. Frequent and important complications are possible. The safety of this procedure should be further studied.**
- **Low-quality evidence is available for the effectiveness of spinal cord stimulation in patients with CLBP and radicular pain due to "failed back surgery syndrome". An overall rate of 34.3 % of relatively minor complications has been reported. Safety of this procedure should be further studied.**

2.3.5 Surgery

Surgery techniques for degenerative disc disorder without radicular pain include e.g. fusion, nucleus prosthesis, disc prosthesis, facet joint replacement. In case of radiating pain a decompressive procedure (discectomy, laminectomy) sometimes in combination with one of the above mentioned procedures can be proposed. This chapter analyses the evidence underlying these techniques.

The guidelines SBU[100], ANAES[3], COSTB13[2] address surgery. Our additional research found two Cochrane systematic reviews by Gibson [298, 299] : one on surgery for lumbar disc prolapse and one on surgery for degenerative lumbar spondylosis, one systematic review by Nordin et al. [300] and a guideline for the performance of fusion procedure for degenerative disease of the lumbar spine by Resnick [301-308] .

Complications after surgery for CLBP is often a concern but no specific guidelines were found dealing with the incidence and severity of such complications. Minor and major complications after surgery are largely understudied. Therefore comparison of safety with reports of complications of other treatment modalities should not be carried on. Likewise, the safety sections included in this section should not be considered as an exhaustive list of all possible adverse effects and complications with precise incidences for each procedure.

2.3.5.1 Surgery for herniated disc without or with radicular pain

In patients who present with CLBP with radicular pain (sciatica), the need for disc surgery may be considered: it is hypothesized that disc prolapse may compress lumbar nerve root and generate pain and inflammation. Disc surgery generally consists in resecting the herniated disc fragment. There are no guidelines on how much disc removal is needed to obtain the best results. There is no correlation between the amount of disc removal and the postoperative results, nor recurrence rate. Traditional surgical discectomy is sometimes named "open discectomy". Several other discectomy techniques have been described and are still used (laser- or microscope-aided surgery, minimal-invasive surgery…). Noteworthy, several percutaneous non-surgical alternatives have also been developed with the same goal. However, they can only be proposed in case of disc bulging, where the annular ring is still intact, therefore in a small number of patients with radicular symptoms. An illustration is chemonucleolysis, an alternative invasive treatment consisting of injecting chymopapain in the disc under radiographic guidance to dissolve the nucleus pulposus and reduce compression on the nerve root. In some European countries, percutaneus discectomy is widely used. With this technique, the nucleus is mechanically aspirated and/or heated, in order to reduce the intradiscal pressure.

There is no evidence that surgery in the treatment for CLBP without sciatica is of any benefit at all.

The evidence about the effectiveness of surgical discectomy in carefully selected patients with CLBP with sciatica due to lumbar disc herniation that fails to resolve with conservative treatment is of low quality and conflicting. More good-quality studies are needed to establish the effectiveness of surgical discectomy in these patients.

There is no evidence that any of the existing alternative surgical methods is superior or yields fewer complications than conventional "open" discectomy.

Safety of surgical discectomy remains largely unknown.

Evidence

All publications address "carefully selected patients" with sciatica due to lumbar disc prolapse that fails to resolve with conservative management. *"Epidemiological and clinical*

studies show that most lumbar disc prolapses resolve naturally with the passage of time and conservative management without surgery" [298].

The SBU [100] report is the only guideline that specifically addresses surgery in the patient with CLBP (with sciatica). According to SBU [100], there is moderate evidence (level B) that surgical discectomy is effective in carefully selected patients with sciatica due to lumbar disc herniation that was not relieved by conservative treatment. However, this conclusion is only based on one old unblinded RCT [309] with considerable cross-over. Moreover, although surgical discectomy results were positive at one year, no improvement in the outcome was observed at long-term follow-up (4 and 10 years). SBU [100] underlines the paucity of good-quality studies focusing on the effectiveness of surgery versus conservative treatment. However it still states that, overall, 70% to 90% of well-selected patients have good or excellent outcomes in terms of relief of sciatica, at least up to 6 to 24 months. According to SBU [100], there is also strong indirect evidence that herniated disc surgery is effective as surgery was found superior to chemonucleolysis (level A) and as chemonucleolysis was found more effective than placebo (level A). Noteworthy, they underline that the results of surgery are inferior after failed chemonucleolysis. Finally SBU [100] also addresses many other surgical methods (laser- or microscope-aided surgery, minimal-invasive surgery…) used to treat herniated discs. The conclusion is that there is no evidence that any of these methods is superior or yields fewer complications than conventional disc surgery.

A Cochrane review [298] addressed the varied surgical procedures to treat sciatica due to lumbar disc herniation. However, it is not clear whether this reference focuses on acute, sub acute or chronic radicular pain due to disc herniation. On the basis of 27 RCTs or quasi randomized trials with serious methodological limitations, the authors conclude that "Chemonucleolysis is more effective than placebo and it is less invasive, but less effective than surgical discectomy. Surgical discectomy for carefully selected patients with sciatica due to lumbar disc prolapse provides faster relief from the acute attack than conservative management, although any positive or negative effect on the lifetime natural history of the underlying disc disease is unclear". Such conclusions are in agreement with those of SBU [100].

Additional search identified two recent complementary studies with a two-year follow-up by the same team: one RCT and one non-randomized observational cohort study, both comparing surgical discectomy versus traditional non-operative treatment in patients with LBP and radicular pain due to lumbar disk herniation after failure of six weeks of traditional conservative treatment [310, 311] Both studies are part of a multigrain, multicenter research project on lumbar surgery: the Spine Patient Outcome Research Trial (SPORT).

The first RCT [311] included 501 eligible patients who accepted to be randomized either to a surgery (standard open discectomy) or a non-operative individualized treatment. Outcomes improved significantly in both groups. There was a trend towards better improvement in the surgery group. However the difference between groups was not significant for the primary outcomes (SF36-bodily pain, physical function and modified Oswestry Index). The results reached significance level for the secondary outcomes including work status and patient satisfaction…). Noteworthy, the adherence to treatment plan was poor as witnessed by the important cross-over rate in both groups (50% in the surgery group and 30% in the non-operative group). Hence, based on an intent-to-treat analysis, no conclusions can be drawn about the superiority of any treatment.

The second non-randomized cohort observational trial [310] included patients who refused to be randomized in the first trial. Primary and secondary outcomes improved substantially (statistically and clinically) in both groups. Surgery patients reported significantly greater improvements although the differences between both groups seemed to narrow at two years. However, several limitations were present in this observational non-randomized study, inherent to the design. Moreover, patients included in this study (>6 weeks of LBP and radicular pain) did not strictly correspond to the definition of CLBP as defined in this report. Hence, extrapolating the results and

conclusions of this study to patients with CLBP with radicular pain should be done cautiously.

Safety of surgery for herniated disc

In the first study by Weinstein et al. [311] among 243 patients who underwent surgical discectomy, complications were the followings: transfusions (2%), dural tears (4%), vascular injury (<1%), superficial wound infection (2%), need for reoperation (4% at one year and 5% at two years, mostly due to recurrent herniation at the same level). Noteworthy, 230 patients did not experience any complication.

In the second study by Weinstein et al.[310] among 501 patients, reported complications were the followings: two patients required transfusions (<1%), dural tears (2%), need for reoperation (7% at one year and 9% at two years).

The Cochrane review [298] states that "Many trials provided limited information on selected complications, but these were not comparable between trials. Moreover, relatively small RCTs do not have sufficient statistical power to produce any meaningful conclusions about complications of low incidence".

2.3.5.2 Surgery for degenerative disc disorders

In patients who present with predominant CLBP without radicular pain (sciatica), the surgery for degenerative disc disorders may be considered. The surgery procedures consist of fusion (arthrodesis) between two or more vertebral bodies. Numerous fusion techniques are performed using anterior (ALIF), posterior (PLIF), lateral (TLIF) approaches or a combination of them, the so-called 360° fusion. Surgeons use different implants (plates, pedicles screws, hooks and rods, cages…). Bone allografts or homografts are also used to obtain fusion between the vertebral bodies. More recently disc arthroplasty has been developed for replacing the degenerative disc by an artificial intervertebral joint. This technique has been the topic of a recent KCE report [312]

There is moderate-quality evidence that surgery for degenerative disc disorders is not superior to non-invasive methods with a higher cost and possible serious complications.

No significant differences in outcomes were found among the different surgical techniques: the posterolateral fusion without internal fixation consumed significantly less resources in terms of operation time, blood transfusions and length of stay after surgery.

Safety of surgical fusion for degenerative disc disorders remains largely understudied. The complication rate would range between 6 and 31% according to the technique. Those adverse effects should not be overlooked, as they may be extremely severe.

Evidence

All recent high-quality references that address surgery for degenerative disc disorders conclude that there is limited evidence for the effectiveness of fusion surgery in CLBP (COST B13 [2], Resnick 2005 guideline [301-308], Gibson 2006 Cochrane review[298] Nordin [300] systematic review). Three recent RCTs [313, 176, 314] are also of interest.

The authors of COST B13 [2] examined evidence available on fusion surgery as compared to traditional conservative treatments in patients with severe CLBP and degenerative changes at L4-L5 and/or L5-S1 levels who have failed to improve after traditional non-surgical treatment. They emphasize that, on the basis of the available evidence, fusion surgery should only be performed in carefully selected patients with severe pain and with maximum 2 affected levels: there is limited evidence that, in selected patients, intervertebral fusion is effective in terms of pain reduction and functional improvement (Oswestry scale) up to two years as compared to traditional treatment (level C). Their conclusion was based on the results of a high quality study, the Swedish Lumbar Spine Study [313].

More precisely, on the basis of high-quality studies [176, 314], the COST B13 [2] authors concluded that there is moderate evidence (level B) that results of fusion surgery in terms of reduction of functional disability (Oswestry scale) are similar to that of a combined program of cognitive intervention and exercises. In the previously cited study by Fairbank et al. [314], surgery and an intensive 3-week multidisciplinary program (general exercise, spine stabilization exercises, education using cognitive-behavioral approach) had similar results in terms of pain and quality of life (Oswestry scale, SF-36 QOL scale) at two years follow-up. Other studies also led to similar conclusions [313, 176].

Finally, COST B13 [2] also addresses the cost-effectiveness of fusion surgery in CLBP on the basis of the UK [314] and Swedish [176] trials cited previously and states that there is conflicting evidence on the cost-effectiveness of surgery: it appears to be slightly more cost effective than traditional non-specific conservative treatment in Sweden but twice as expensive in the UK. The conclusions of Resnick et al. [302-308 301] were very similar to those of COST B13 [2]. This report stats that fusion surgery is recommended (Class I evidence) in carefully selected patients with disabling low back pain due to one- or two-level degenerative disease without stenosis or spondylolisthesis. However, the authors state that an intensive cognitive and physical therapy may be an effective option (Class III evidence).

The Cochrane systematic review of Gibson [299] on surgery for degenerative lumbar spondylosis concludes that "There is now limited evidence available to support some aspects of surgical practice. Surgeons should be encouraged to perform further RCTs in this field." According to Gibson et al. [299], "Two new trials on the effectiveness of fusion showed conflicting results. One [313], cited by Gibson [299] showed that fusion gave better clinical outcomes than conventional physiotherapy, while the other [176, 315] cited by Gibson [299] showed that fusion was not better than a modern exercise and rehabilitation programme." The Fairbank [314] study is not yet included in this review (study awaiting assessment in this Cochrane review).

One more recent RCT [316] compared lumbar instrumental fusion with cognitive intervention and exercises in patients with chronic low back pain after previous surgery for disc herniation. Lumbar fusion failed to show any benefit over cognitive intervention and exercises.

The systematic review of Nordin [300] compares the surgical versus non surgical treatment and concludes that "a variety of treatments are available with limited and similar efficacy on pain and disability reduction. There is moderate evidence that surgery in chronic non-specific lower-back pain is as effective as cognitive behavioral treatment with regard to pain, function, mood and return to work". The review included the three recent studies by Fairbank [314], Fritzell[313] and Brox.[176]

Comparison between surgical fusion techniques

No significant differences in outcomes were found among the different techniques (ALIF, PLIF, TLIF and posterolateral fusion) [299, 2]. According to COST B13, there is strong evidence that posterolateral fusion without internal fixation consumed significantly less resources in terms of operation time, blood transfusions, and days in hospital after surgery. Cost B13 [2] bases its conclusions on the Swedish Lumbar Spine Study [317, 318]. In this high-quality study three fusion techniques were studied: posterolateral fusion, posterolateral fusion combined with variable screw placement and internal fixation device, posterolateral fusion combined with variable screw placement and interbody fusion. All three techniques led to comparable effectiveness in terms of pain and disability reduction. However the last two techniques were more demanding technically and consumed more resources (operation duration, blood transfusions, length of hospital stay).

According to the Cochrane systematic review by Gibson [299], "eight trials showed that instrumented fusion may produce a higher fusion rate but any improvement in clinical outcomes is probably marginal, while there is evidence that it may be associated with higher complications rates". Three trials did not permit any conclusion about the relative effectiveness of the techniques.

Safety of surgical fusion for CLBP

According to COST B13 [2], "the complication rate after surgery has been reported to be around 17-18% (6 to 31% depending on technique) with a 6-22% re-intervention rate. In the trials examined, 4-22% of patients allocated to the non-surgical treatment arms also underwent surgery. As an illustration, in the Swedish Lumbar Spine Study ([313], the early complication rate in the surgical group was 17%. Seven patients (10%) in the conservative group subsequently underwent surgical treatment before the 2-year follow-up. In the analysis of the three surgical subgroups, the early complication rate was 6% in Group 1, 16% in Group 2, and 31% in Group 3 (for group definitions see the definition of the techniques above).

No information regarding clinically relevant complications was provided in the Cochrane review by Gibson[299].

2.3.5.3 Disc prosthesis

See KCE report [312]

2.3.5.4 Percutaneous nucleotom

See KCE report [312]

Key points on surgery

- **The evidence about the effectiveness of surgical discectomy in carefully selected patients with CLBP with sciatica due to lumbar disc herniation that fails to resolve with conservative treatment is of low quality and conflicting.**
- **There is no evidence that any other surgical method is superior or yields less complications than conventional discectomy,**
- **The complications of surgery for disc prolapse have not been specifically studied,**
- **There is no evidence that surgery of herniation in the treatment for CLBP without sciatica is of any benefit at all,**
- **There is moderate-quality evidence that surgery for degenerative disc disorders is not superior to non-invasive methods such as well-conducted rehabilitation, exercises or behavioral treatment, with a higher cost and possible serious complications,**
- **No significant differences in outcomes were found among the different surgical fusion techniques but the complication rate is elevated and varies according to the techniques,**
- **There is an obvious need for good-quality studies on the outcomes of surgery: the available studies show large clinical heterogeneity (patients' selection, injection techniques, outcome variables…) and numerous limitations (cross-over, confounding co-interventions…).**

2.4 DISCUSSION

Most diagnostic procedures to assess CLB are supported by low-quality evidence. Moderate quality evidence can be found against the validity of other ones (Waddell non organic signs, spinal palpation and pre-manipulative tests, most imaging procedures…). This finding clearly contrasts with the amount of publications available on CLBP and with the large number of diagnostic procedures (imagery…) traditionally performed in patients with CLBP (see Part II). It may partly be explained by the fact that very few diagnostic procedures have been validated specifically in the context of CLBP. Moreover, the validity of most tests is difficult to establish as no "gold standard" is available in the context of CLBP and/or chronic radicular pain. Whatsoever there is a clear need for more studies to help defining the valid and reliable components of CLBP evaluation, with and without any radicular involvement. In the absence of "red flag" (including radicular pain), diagnostic procedures such as biology testing, imaging and electrophysiological testing are not useful and should not be recommended.

Evidence of effectiveness of several conservative multidisciplinary therapeutic programs based on physical reactivation (exercise) and cognitive-behavioral interventions is well established. However, the precise composition of such programs must still be defined. On the other hand, it is also well established that several therapeutic modalities (tractions, EMG-biofeedback) are not effective. In general, evidence supporting medications and invasive therapeutic procedures (injections, surgery…) is of low quality or lacking. This lack of evidence may be explained by the difficulty to set up RCTs with randomization and control (placebo) group. For the effectiveness of surgery for instance, conducting high-quality randomized placebo-controlled trials is hardly conceivable in relation with obvious ethical concerns. Finally, it must be emphasized that any absence of evidence about the effectiveness of a procedure should not be confounded with evidence against its effectiveness.

Nevertheless, non-invasive treatments should always be implemented before any invasive therapeutic procedure is considered.

2.5 SUMMARY OF FINDINGS: EVIDENCE TABLES

(Based on GRADE levels of evidence[I])

2.5.1 Evidence for the diagnosis of non-specific chronic low back pain

INTERVENTION	QUALITY OF EVIDENCE
HISTORY TAKING	
Red flags	Very low
Yellow flags (for occupational settings, see part 3)	Moderate
Waddell non organic signs	Moderate (against)
Functional state and disability assessment tools use	Very low
Pain evaluation tools use	Very low
PHYSICAL EXAMINATION	
Information given to the patient during examination to shift patients beliefs	High
Orthopaedic examination and mobility	Very low
Neurological examination	Very low
Passive straight leg raise test validity (Lasègue)	No evidence
Spinal palpation and motion pre-manipulative tests accuracy	Moderate (against)
BIOLOGY	Very low
IMAGING (CLBP without redflags)	
Conventional radiography	Moderate (against)
MRI	Moderate (against)
CT	Very low (against)
Discography (selected subgroup of patients)	Moderate (against)
ELECTROPHYSIOLOGICAL TESTS	
Traditional EMG	Very low
Surface EMG	Very low
INTERVENTIONAL DIAGNOSIS TECHNIQUES	
Facet (zygapophyseal) joint blocks (selected subgroup of patients)	Moderate but conflicting
Selective nerve root blocks (selected subgroup of patients)	Very low
PHYSICAL CAPACITY AND FITNESS EVALUATION	
Cardio respiratory endurance	Very low
Trunk muscle strength evaluation	Very low

2.5.2 Evidence for the treatment of non-specific chronic low back pain

Intervention	Quality of evidence
Non invasive therapeutics	
Information given to the patient during examination to shift patients beliefs	High
Bed rest	No evidence for CLBP (high-quality evidence against in acute / subacute LBP)
Lumbar supports	Very low
Rehabilitation	
Massage	Low
Heat and cold therapy	No evidence
Conventional physical therapy modalities (electrotherapy, ultrasound, laser)	Low
TENS	Low
Balneotherapy, health resorts (> 60 years)	Moderate
Hydrotherapy	Low
Tractions	High against
EMG biofeedback	High against
Exercise and physical reconditioning	High
Back schools (except occupational setting)	Low
Brief educational interventions by different care providers	Moderate
Multidisciplinary programs (intensive interventions)	High
Spinal manipulative therapy	Moderate (short-term effect)
Psychotherapeutic cognitivo-behavioral interventions	Moderate
Medications	
Paracetamol (acetaminophen)	No evidence
NSAIDs	Low
Acetyl salicylic acid	No evidence
Weak opioids: codeine or tramadol	Moderate
Strong opioids	Very low
Tetrazepam (10 days)	Low
Myorelaxants	Very low
Antidepressants	Moderate but conflicting
Antiepileptic drugs	Low
Herbal medicine	Low quality
Topical AINS	No evidence

Non surgical invasive treatment	
Injections	
Epidural corticoid injections without sciatica	No evidence
Epidural corticoid injections without sciatica	Very low
Transforaminal epidural injections for sciatica	Low
Other injections (facets, trigger points, prolotherapy…)	Very low
other non surgical invasive treatments	
Acupuncture	Moderate but conflicting
Intradiscal techniques	Very low
Radiofrequency facet denervation	Low
Radiofrequency lesioning of dorsal root ganglia	Very low
Radiofrequency neurotomy of sacro-iliac joints	No evidence
Neuro-reflexotherapy (NRT)	Low
Percutaneous electrical nerve stimulation (PENS)	Low
Epidural adhesiolysis, epiduroscopy	Very low
Spinal cord stimulation for failed back surgery syndrome	Low

Surgery	
Surgery for disc prolapse without sciatica	No evidence
Surgery for disc prolapse with sciatica	Low
Surgery for degenerative disc disorders (fusion)	Low against

3 PART II: HOW ARE CHRONIC LOW BACK PAIN PATIENTS ASSESSED AND TREATED IN BELGIUM?

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3.1 INTRODUCTION

3.1.1 Background

Low back pain is one of the most common symptoms prompting adults to seek health care. The cost of low back pain, both in terms of health care and loss of productivity is enormous [319]. Based on the best available evidence, the selection of a management scheme should also consider the economic aspect. Burden of illness studies analyse the economic and health impacts of a disease or condition including cost of health care, workplace/employer and household costs, morbidity and mortality. The direct costs related to the pathology are those costs for diagnosis and treatment. The indirect costs are loss of productivity and a variety of costs such as transport to and from the health care provider and support of the patient in his daily activities that can be provided by professionals or by relatives.

Several economic studies on the burden of low back pain have been published but the comparison of the results is often difficult given the differences in methodology. A literature review of studies published between 1996 and 2001 learns that the cost of low back pain is high and comparable to other chronic disorders (such as headache, heart disease, depression or diabetes) but the actual cost estimates vary depending on the costing methodology used. A small percentage of the patients suffering chronic low back pain accounts for a large fraction of the costs [320]. In a Dutch cost of illness study [321] the direct medical costs were estimated at US$ 367.6 million or less than 10 % of the total indirect costs (US$ 4.6 billion) for the entire labor force. A Swedish study [322] measured direct and indirect costs of low back pain. The authors found that lost productivity accounted for 84 % of the total cost. The UK prevalence-based study on this topic revealed that only 15 % of the total cost of low back pain are direct medical costs that relate to physiotherapy (37%), 31 % is incurred in the hospital sector, 14 % relate to primary care, 7 % to medication, 6% to community care and 5 % to radiology and imaging [323]. In Germany the total cost of low back pain was estimated around 17 billion €and about 30 % are direct costs for physician visits, diagnostic procedures, hospital treatment, rehabilitation, physical therapy and medication [324]. The authors of this study conclude that savings through restrictive prescriptions for medications have no great impact on total costs. Only a more efficient therapy, which reduces sick days, number of recurrences and development of chronic illness as well as a more effective prevention, is able to limit the costs of back pain in the long-run. In the ranking of the economic burden of diseases, low back pain figures among the most expensive pathologies, regardless of the study methodology. Only a part of the costs are linked to the medical care, suggesting that "readiness to work" or "return to work" should be an important evaluation criterion for measuring the efficacy of treatment.

In an earlier study, the direct cost of managing low back pain in Belgium was estimated and its magnitude was compared to the estimated cost of care in The Netherlands [325]. It was found that the cost pro capita of managing low back pain was in Belgium significantly higher than in the Netherlands. The higher costs were mainly incurred by the higher frequency of surgery and consequently the higher need for treating failed back surgery syndrome. Both surgery and the neuromodulation techniques cost significantly more than the minimal invasive pain management techniques that are more frequently used in The Netherlands. It was hypothesized that this difference could be attributed to the difference in available health care settings. In the Netherlands, there is a longer tradition with multidisciplinary pain centers whereas in Belgium this approach only started recently.

This part analyzes the direct medical costs of low back pain: the indirect costs are beyond the scope of the study but an estimation of the minimal global cost is calculated at the end of this part. The potential sources of information for identifying the cost of care for low back pain were selected if they provided information relative to the medical care and related costs i.e., the epidemiology, the frequency of use and costs of the different diagnostic and treatment options.

The main focus of this study is "chronic" low back pain: the available information does not always allow making the difference. Therefore the term "low back pain" will be handled in the rest of this section. The target population to be studied is ideally described as patients suffering "common" low back pain for more than 3 months that is pain not attributable to specific diseases such as tumor, infection, osteoporosis and vertebral fractures. In Belgium the general practitioner is frequently the first health care provider consulted. When more specialized diagnostic or therapeutic interventions are indicated, care can be given ambulatory, in classic hospitalization or in one-day clinics.

3.1.2 Selection of data sources

Three projects are specifically designed for the analysis of the consultations in general practice in Belgium, i.e., Intego, Resoprim and the sentinel GPs project (pilot practices). Unfortunately, data collection through the sentinel practices (Scientific Institute of Public Health) was not feasible within the time frame of this study and the Resoprim project (Scientific Institute of Public Health and the French and Flemish scientific association of GP's) is still in a testing phase.

The Intego project (Department of General Practice of the KU Leuven) was selected for further analysis. It collects information from general practices, via the electronic medical record. These data will be used for analyzing the incidence and management of low back pain in primary care.

Two administrative databases were consulted to analyse the procedures performed in hospital, i.e. the minimal clinical data (MCD or MKG/RCM) and the RIZIV/INAMI nomenclature databases. The minimal clinical data (MCD) assembles administrative and clinical information concerning the hospital stay of patients including patients treated in one-day clinics. The encoding of MCD is based on the ICD-9-CM codes that classify diagnoses and procedures. The RIZIV/INAMI nomenclature allows physicians to register each specific medical act in order to get a fee-for-service from the national health insurance.

The cost of medication used for the management of low back pain could rely on the Farmanet system but the registration only cover the reimbursed medications and it is not pathology specific. Another potential data source is the Institute for Medical Statistics (IMS), a private market research institute collecting information from pharmacies on the number of packs sold for all drugs (prescription and over the counter, reimbursed or not). However this data source was dismissed given the high price of this source of information coupled with an absence of precise diagnosis.

The Socialist Mutuality published in 2006 a study on the cost of medical imaging and subsequent care for low back pain for the year 2004 [326]. The longitudinally collected data are used to study the frequency of use of the different types of medical imaging, the use of reimbursed prescription drugs and physical therapy and rehabilitation.

Another potential source of information about the treatment of chronic low back pain could be the data from the nine new pain reference centers certified in May 2005. These centers are considered as third line referral centers for patients suffering chronic pain refractory to conventional treatment in first and second line care. The multidisciplinary team of pain centers is composed of a pain specialist (mostly anesthesiologist with specialization in chronic pain management), pain nurse, psychologist/psychiatrist, physiotherapist and rehabilitation specialist working together to establish a treatment plan. This treatment plan may include rehabilitation programs, cognitive behavioral therapy, pharmacological treatment and/or minimal invasive interventional treatment options; depending on the patient's condition. A patient referred to a multidisciplinary reference

center is followed there during maximum 6 months and he is then referred back to the treating physician. The coordinators of the 9 centers are working together with the representatives from the health authorities and the health insurers to establish a standardized registration scheme of the patients consulting the centers. The data collection will only start in January 2007 and therefore this information is not available for this study.

3.1.3 Goals and objectives of this study

The objective of this study is to analyze the care of chronic low back pain patients in Belgium in terms of diagnosis and treatment. The databases and information sources described above will be first assessed for their validity and usefulness. The study uses the data relative to the year 2004, which is the most recent and complete registration period.

3.1.4 Summary of the information and the sources used in this study

Table 1. Type and source of information

Health care setting / **Type of intervention**	**Ambulatory care**		**Hospital care**	
	Community based	Hospital based	One-day	Classic
Diagnosis	Intego Soc. Mut	RIZIV Soc. Mut	MCD Soc Mut	MCD Soc Mut
Non-surgical treatment	Intego Soc Mut	RIZIV Soc. Mut	MCD RIZIV Soc Mut	MCD RIZIV Soc Mut
Surgical treatment			MCD RIZIV Soc Mut	MCD RIZIV Soc Mut

3.2 PRIMARY CARE: INTEGO PROJECT

3.2.1 Description of the Intego project

The Intego project started in 1990 in the Department of General Practice of the Katholieke Universiteit Leuven. Its objective is to develop a database with information about morbidity in the first line care. The Intego database provides information on the incidence and prevalence of diseases in Flanders, but also on their diagnostic procedures and management in family practice. The data are collected via an automated system using the structured information of the electronic medical record. This was achieved in collaboration with the producers of the software Medidoc®. After an evaluation study, the project received support of the authorities because of the need for morbidity data in view of policy decisions. The first registrations performed in 1994 proved to be a workable system [327].

The data are encoded in the electronic medical record (Medidoc® software). This program uses keywords and codes for diagnosis, prescription of medication, laboratory results, allergies and medical imaging. The keywords are converted into a classification system in the central Intego-database. All diagnoses are also classified according to the second version of the International Classification of Primary Care (ICPC-2) [328]. There is a remarkable stability of the relative percentage of diagnoses in each chapter of the ICPC-2 classification as seen in appendix 2.2.1. Data are collected by a group of general practitioners, selected for their quality of registration. The number of participating GPs is increasing every year with almost no loss in the practices/GPs who participate (see appendix 2.2.2). In 2005, 67 GPs were collecting data from 52 cooperating practices spread over Flanders. The GPs who provided valid information during the last three years

go on to provide their information. The population studied in the Intego project is representative in terms of age and gender distribution for the population of Flanders [329].

Definition of the population

The knowledge of the source population is a prerequisite for computing epidemiological data and drawing conclusions. In Belgium the general practitioner (GP) has no patient list and consequently does not know precisely his practice population. However, it is possible to know the number of patients that contacted the GP during one year i.e., the yearly contact group (YCG). The Intego group developed a method [330] to calculate the practice population based on a stratified combination of the YCG and the data of the Intermutualistic Agency (IMA). The IMA has information on the percentage of the population by age group, sex and district that contacted a GP during a one year period. By dividing the yearly contact group by this percentage, the practice population can be calculated. Additional standardization to the Flemish population or a standard population is possible. In 2005, the Intego database contained data on approximately 850 000 patient years. The population studied represented approximately 1.5 % of the population of Flanders. The evolution of the Yearly Contact group and the Intego Practice Population in comparison with the Flanders population is illustrated in appendix 2.2.3.

Data collected in the Intego project

The following data are collected in the Intego project: patient sex, and year of birth, the years when the patient consulted, patient medical history, diagnoses, laboratory results, medical imaging (when the results were recorded), and the medication prescribed. The incidences are calculated as the number of new diagnoses per 1000 patient years with the yearly contact group or the practice population as denominator. The prevalence can only be calculated for chronic diseases (e.g. diabetes, dementia) because the diagnoses are not known to be active or non active. The number of patients with a diagnosis of chronic disease is therefore estimated as the number of patients with a reported diagnosis of a disease in the past and who are included in the contact group of a given year (for instance which patients had a diagnosis of chronic low back pain and are now included in the YCG).

The registration in Intego does not focus on disease episodes. So it is possible to determine on which date for which patient a specific diagnosis was recorded and a drug prescribed but one can not conclude if the drug was prescribed for that specific diagnosis. For example in the case of a patient with low back pain and headache, it is impossible to know if paracetamol was prescribed for the back pain, for the headache or for both.

3.2.2 Intego: methodology of the study "low back pain"

3.2.2.1 Aim and scope of the study of the Intego database

The primary aim is to estimate the incidence of low back pain as a reason for encounter in general practice in 2004. The use of medication and laboratory investigations as well as the co-morbidity for the patient population suffering low back pain will be compared with the group without low back pain. The 10-years data will be used to define the number of patients with the symptom in the past and the evolution of incidence over a longer period.

3.2.2.2 Research methodology

Incidence and proportion of patients having ever had low back pain

The following ICPC-2 codes refer to an episode of low back pain: L03 (Low back symptom/complaint), L84 (Back syndrome without radiating pain) and L86 (Back syndrome with radiating pain). The proportion of patients diagnosed at least once with low back pain over a 10-years registration period was calculated. Incidence figures and further detailed analyses were computed for the year 2004.

Co-morbidity

For all patients identified with low back pain during the 10-years registration period, the 10 most frequently occurring co-morbidities were retrieved and listed according to the WONCA age groups. The incidence of co-morbidity was compared for the group with and the group without low back pain. It was however impossible to state if the co-morbidity was a cause or a consequence or was independent from low back pain.

Pharmacological treatment of low backache

As described above there is no direct relation in the database between the diagnosis and the prescribed medication. It is impossible to state if a drug was specifically prescribed for the complaint under study within a specific period after the diagnosis. The prescription of medication listed in appendix 2.2.4 during the year 2004 was studied for the population with and without low back pain.

Laboratory investigations

The percentage of patients having had at least one test of the 100 most frequently requested laboratory investigations was compared for the groups with and without low back pain. Additional subgroup analyses concentrated on specific groups of tests.

Medical imaging

The number of medical imaging investigations was computed but the accuracy of these data depends on the systematic encoding of the report from the radiologist.

Data presentation

The data were analyzed and presented by gender and age groups: 18-24; 25-45; 45-49; 50-54; 55-59; 60-64; 65-74; >75. If numbers in the age groups were too small, larger age groups were used.

Statistics

For the calculation of the 95 % confidence intervals of the ratios of co-morbidity and laboratory tests for patients with and without low back pain the following formula were used $e^{\ln RR \pm 1.96\sqrt{1/A_1 + 1/A_0}}$, where A1 and A0 are the number of patients with and without low back pain respectively.

3.2.3 Intego: results for low back pain

3.2.3.1 Incidence of low back pain in 2004

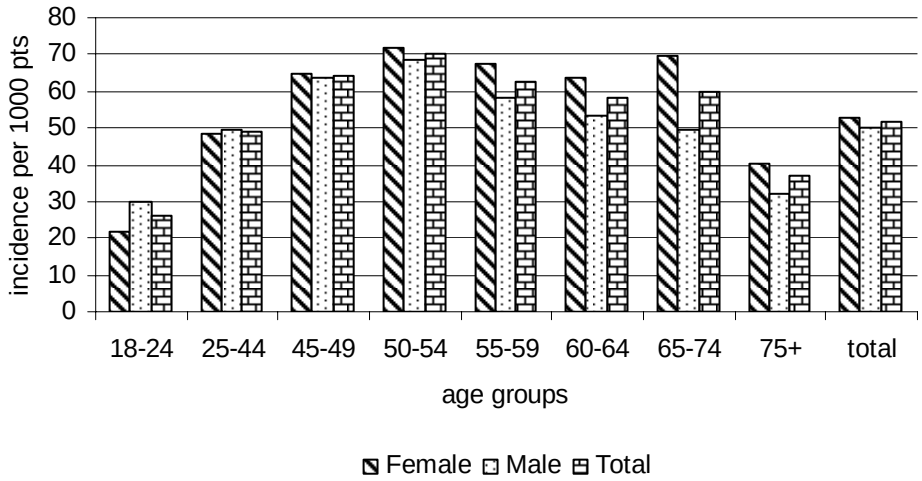
The incidence figures presented here are calculated using the practice population as the denominator. The incidence of the ICPC-2-codes L03 'Low back symptom/complaint), L84 (Back syndrome without radiating pain) and L86 (Back syndrome with radiating pain) was calculated per 1000 patients in the practice population of the year 2004 (74,863 patients ≥ 18 year). The three codes were also counted together as 'low back pain' whereby the patient is unique in the year 2004. The incidence was calculated by gender for eight age groups. The total crude incidence is 51.44 per 1000 patients in the practice population and per year. The incidence is higher in females than in males and the peak incidence is in the age group 50-54 years. The overall incidence of low back pain in general practices is illustrated in table 2 and figure 1.

Table 2. Incidence of low back pain in general practice

Age group	Female		Male		Total	
	number patients	incidence per 1000 pty	number patients	Incidence per 1000 pty	number patients	incidence per 1000 pty
18-24	83	21.77	122	30.11	205	26.07
25-44	611	48.55	672	49.43	1283	49.01
45-49	225	64.88	246	63.90	471	64.36
50-54	219	71.92	226	68.65	445	70.22
55-59	190	67.47	174	57.96	364	62.56
60-64	142	63.42	128	53.51	270	58.30
65-74	305	69.51	206	49.50	511	59.77
75+	197	40.34	105	31.98	302	36.98
total	1972	52.96	1879	49.94	3851	51.44

1000 pty: per 1000 patient years

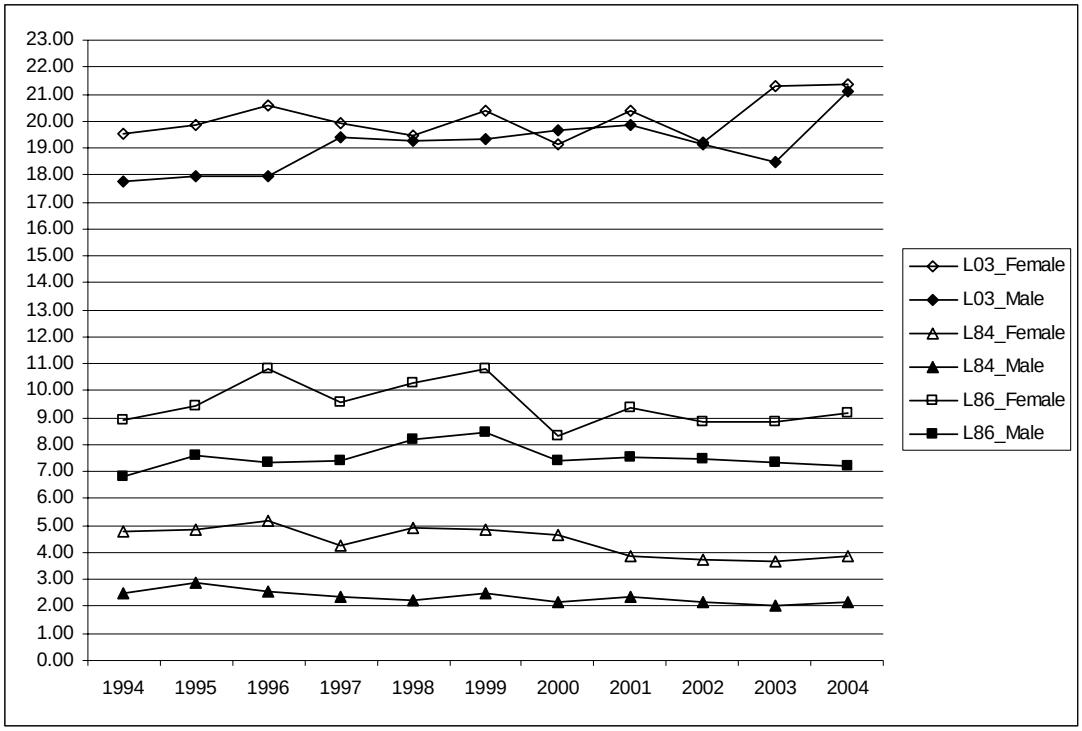
Figure1: Distribution of the incidence of low back in general practice



L03 (Low back symptom/complaint) and L86 (Back syndrome with radiating pain) were the most frequent diagnoses with 3,028 and 1,122 cases respectively, followed by L84 (Back syndrome without radiating pain) with 416 cases. The incidence of L03 (Low back symptom/complaint) is about two times the incidence of L86 (Back syndrome with radiating pain) in all age groups. Low back pain is rather seldom beneath the age of 25. The incidence of low back pain L03 is similar in both sexes in all age groups. L84 and L86 are more frequent in females above the age of 45.

In 2004 there were 3,851 different patients with 4,566 diagnoses of low back pain (L03 or L84 or L86). The incidence of LBP in females is 52.96‰, in males 49.94‰ and total 51.44‰. Incidences are stable during the period 1994 – 2004 as illustrated in figure 2.

Figure 2. Incidence of low back pain over the 10 years registration period (‰ PP)



To evaluate the time trend of the total incidences of LBP while taking into account the ageing of the population, the results are standardized to the Flemish population of 1/01/2000. L03 (Low back symptom/complaint) remains stable in the period 1994-2004 around 20‰ and there is no difference between both genders. The incidence of L84 (Back syndrome without radiating pain) in women is twice the incidence in men and diminishes in females with 1‰ in the year 2000. The incidence of L86 (back syndrome with radiating pain) remains stable in the studied period and is somewhat higher in women.

3.2.3.2 Percentage of patients who ever had the diagnosis low back pain

The percentage of patients with at least one diagnosis of low back pain in the past and seen in the practice in the year 2004 is 24.9 % for women and 21.3 % for men.

3.2.3.3 Co-morbidity

The co-morbidities of patients with low back pain were analysed by studying the ICPC-2 codes diagnosed at least once in 2004 in patients with a diagnosis of low back pain in the same year. The 10 most frequent co-morbidities were stratified by age group and by gender. The top 10 diagnoses in patients with low back pain did not differ from the top 10 diagnoses of patients without low back pain. Most of them were infections (appendix 2.2.5). The percentage of patients with at least one diagnosis was higher in the group with low back pain. Most of the ratios were significant but the confidence intervals for the highest ratios were very large as for example for the co-diagnoses depression, coxarthrosis and osteoporosis in older men (> 65 years).

3.2.3.4 Use of medication

The proportion of patients with at least one prescription of a drug out of a predefined list of drugs that may be used for pain relief in 2004 was compared for patients with and without a diagnosis of low back pain in 2004. In the age groups of patients younger than 75 years, more than 70% with low back pain received a prescription for a NSAID. The

frequency was about three times higher than in patients without low back pain (appendix 2.2.6). The ATC-rubric "Other analgesics and antipyretics", which contains salicylic acid and acetaminophen and the rubric "Opioids" which contains codeine, were each prescribed for about 20% of patients with low back pain in the year 2004. Both classes were prescribed more frequently in the age group older than 75. In most age groups the proportion of patients with a prescription of a drug belonging to one of those two rubrics was about three times higher for low back pain patients than for patients without low back pain. The difference between patients with and without low back pain was greatest in the medication rubric "Muscle relaxants, centrally acting agents". These drugs were most frequently used under the age of 65 years. For the rubrics "Topical products for joint and muscular pain", "Antidepressants", "Antiepileptics" and "Psycholeptics and psychoanaleptics in combination" the absolute numbers of patients with low back pain with a prescription were rather small.

3.2.3.5 Laboratory investigations

The proportion of patients with at least one laboratory test was compared between patients with and without a diagnosis of low back pain in the year 2004. The tests were grouped in clusters (e.g. liver function, renal function) because most of these tests were prescribed together. The proportions of patients without low back pain were standardized to the population of patients with low back pain in the year 2004. Patients with low back pain had more frequently prescribed laboratory tests than those without low back pain. Only a few ratios were not significant and all confidence intervals were very small (appendix 2.2.7).

3.2.3.6 Medical imaging

The proportion of patients with an imaging of the lumbar spine as percentage of the practice population has been calculated. However, the coding was optional and the results could not be interpreted. Other data sources (i.e. data from the Socialist Mutuality) contain more accurate data on this topic.

3.2.4 Intego: Discussion

The incidence of low back pain in of the Intego database is 51.44 per 1000 practice population for the year 2004. This means that low back pain constitutes an important part of the GP consultation i.e., a GP with a practice of 1000 patients sees one patient with a new diagnosis every week. A quarter of the women and one fifth of the men who had a diagnosis of low back pain in 2004 ever suffered low back pain during the ten previous years. This is in accordance with yearly incidence figures reported in the literature: the life time prevalence has been reported to be over 70 % and the one-year prevalence from 15% to 45 % [331].

There is obviously a lack of data on low back pain in Belgium, in particular for the first line of care. The Intego database was the only available data source that could give information on the importance of this problem among patients consulting their general practitioner. However, some limitations have to be pointed out in the interpretation of these results.

Limits of the Intego database for this study

General practitioners participating in the Intego project are only active in Flanders and they are not a representative sample of the Belgian GPs. Their patient population is a representative sample of the patient population of Flanders but extrapolation to the whole Belgian population may result in errors.

The Belgian GP has no patient list and the definition of the reference population can be done in three different ways: Yearly Contact Group, Practice Population and Population from Flanders. Each GP has at least one contact with approximately 80 % of his/her patient pool during one year, a finding that was validated and discussed in a recent publication [330]. The data are presented in function of the patient population, allowing further comparison with data from the literature.

The diagnosis of chronic low back pain is difficult to retrieve from the Intego database. Firstly, the registration system does not identify the distinction between acute and chronic low back pain. After a first consultation, it is not possible to determine which patients have still or do no longer have back pain at the subsequent consultations. This results in misclassification biases, especially for any project on a chronic disease. Most complaints disappear spontaneously and the patient does not consult again (episode of acute low back pain). Secondly, a patient with recurrent low back pain can either be classified as a sum of "new" diagnoses or his complaint might be registered for the first time only. Finally, a patient with chronic low back pain may not always consult his GP for each burst but may sometimes proceed to auto medication. As a consequence he may be labeled as "acute" low back pain rather than chronic low back pain.

Another drawback is the absence of link between use of medication and laboratory tests and a specific diagnosis. However it is possible to approximate the period between the diagnosis and the prescription and make hypotheses on the link between both. Finally, the record system leads to an under registration of drug prescriptions and imaging. Repeated prescriptions are not always noted and prescriptions for a drug of the same therapeutic class can be made for another disease. Imaging is recorded only when the protocol of the radiologist is encoded, leading to an underestimation of the imaging effectively performed. No information on referrals and incapacity to work is available in the Intego database.

The Intego coding system is coupled to the ICPC-2 classification [332]. The conversion from keywords to ICPC-2 codes is based on a well-elaborated system. However the comparison of this information with other sources (e.g. minimal clinical data that rely on ICD-9-CM codes) is difficult. The ICD-9-CM codes relate to the second line care and register procedures and diagnosis, whereas ICPC-2 codes also register the reason for encounter. Therefore the comparison of the results of the Intego analysis based on ICPC-2 codes with other information (such as the data retrieved from the MCD) with a registration based on ICD-9-CM codes must take those differences in consideration.

Comparison with first line registration systems in The Netherlands

In The Netherlands, two registration systems allow a comparison with the Intego project: the Continue Morbiditeitsregistratie (CMR) [333] in Nijmegen and the Registration Network of Maastricht (RNH) [334].

The Continue Morbiditeitsregistratie (CMR) [333] in Nijmegen is a registration network based on four general practices with about 13,000 patients. This network uses its own classification system. The yearly incidence of low back pain in the period 1985-2001 in females was 62.4‰ and in males 59.1‰. The prevalence was similar i.e. in females 60.6‰ and in males 65.2‰. The incidence was stable from the year 1994 until 2001 and there was no significant difference between genders.

The Registration Network of Maastricht (RNH) [334] is the largest network in the Netherlands with about 83,000 patients. GPs only register diseases with an impact on the functional status of the patient. So only those problems are recorded that are permanent, chronic or had at least three recurrences within six months. These figures give an idea about chronic or recurrent low back pain. This study found for the period 1999-2003 a total incidence of low back symptom/complaint (L03) of 0.67‰; back syndrome without radiating pain (L84) of 0.53‰ and for back syndrome with radiating pain (L86) 2.55‰. At the end of 2003, the prevalence of L03 was 32.9‰, L84 22.5‰ and L86 56.9‰. These figures are lower than these from the CMR discussed above and Intego because only recurrent or chronic problems are recorded.

Additionally, the Second National Study [335] in the Netherlands collected data from 104 general practices with 400,912 patients in the period 1999-2001. L03 had an incidence of 26.6‰ and the incidence of L86 was 9.3‰. The prevalence for L03 was 39.7% and for L86 was 15.4%. The prevalence of serious and chronic low back pain including hernia was 13.9% when reported by the patient and 9.6% consulted a GP.

From a methodological point of view the figures of Intego can best be compared with those of the CMR. The difference between the incidences of low back pain in Intego and the CMR are about 10‰ in a year.

Comparison with surveys on incidence of low back pain in Belgium

Intego is the only available database that provides figures from the first line of care to assess the incidence and prevalence of low back pain in Belgium. Other figures come from population surveys. The Belgian Health Interview Survey (HIS) found a yearly prevalence of back problems of 9.5% for men and 10.4% for women [336]. It must however be stressed that this last one is an interview on the self perceived health status. The Second National study from the Netherlands provides an explanation for the higher yearly occurrence registered in the Belgian HIS: only 60 % of the population suffering from low back pain reported to have consulted a physician (40 % mentioned their general practitioner). (see appendix 3.2.4-1)

The results of an older study[337] reported that one third of the Belgian population suffered at the time of the interview from low back pain, including 5 % having their first episode. A quarter of the respondents had past but not current low back pain and 41 % never suffered from low back pain. In this study, all types of low back pain were considered whilst in the national HIS it was stressed that only health care problems of long duration should be reported. This older study [337] also suggested that living in an urban center and in the southern part of the country was associated with a higher risk of low back pain. This tendency, especially for the southern part of the country, was also found in the National HIS (see appendix 3.2.4-2). This survey found a higher frequency of low back pain, more medical consultations, medication and other treatment use in the French speaking part and in the Brussels region than in Flanders. For those reasons the extrapolation of the data found from the Intego project carries risks of biases.

In a follow-up study on social cultural influences on low back pain, factors influencing medical consumption were evaluated [338]. Two thirds of the sample (63%) said they had seen a health professional for the current or previous episode. One out of ten (11 %) had been on bed rest; 33 % had taken medication; 44 % had undergone an X-ray for the low back pain and 3.5% had surgery. This study found contradictory results with the previous one: respondents living in larger population centers were less likely than rural inhabitants to have been on bed rest and residents of metropolitan centers were less likely to have seen a health care professional. The respondents' health beliefs were however important determinants of health care behaviors. The belief that low back pain would be a lifelong problem was associated with an increased likelihood of consulting a health professional, having bed rest and taking medication. The radiographic investigation was more frequently used in elderly, which can be partly explained by the number of years those patients have been at risk of having radiography.

3.2.5 Conclusions: added value of the Intego database for this project

The Intego database was the only database providing figures for low back pain in the first line of care. The registration system did not allow making any distinction between acute and chronic low back pain. The incidence and prevalence data found in this database are in-line with findings from other studies using a comparable methodology. The lower figures noted in the Intego database in comparison with those obtained through active questioning of the population can be explained by the percentage of the respondents in the surveys who did not seek medical assistance for their symptoms. One drawback of the Intego project is its geographical coverage: the data can only be extrapolated to the Flemish population. Therefore a similar registration system should be extended at a national level. The RESOPRIM project currently studies the conditions to be fulfilled by such a registration system to collect data from primary care at the national level.

Key points Intego project: low back pain in the first line of care

- **Intego is currently the only database in Belgium that provides figures on the incidence of low back pain in the first line of care.**
- **The data registered are the first complaint, i.e. there is no information on the whole disease episode. This is a major drawback for the study of the epidemiology of chronic diseases as chronic low back pain.**
- **The incidence of new episodes of low back pain was 51.44 per 1000 practice population in 2004. The symptom L03 (low back symptom/complaint) was the most frequent for all age groups studied. The highest incidence was recorded in the age group 50-54 years.**
- **The incidence of CLBP remained stable over the studied period (1994-2004)**
- **Patients with low back pain present more frequently co-morbidities than the other patients but their nature is similar to those from the group without low back pain.**
- **The most frequently prescribed drugs are the NSAID's: 79% of the patients in the group 55-59 years received this treatment. The frequency of use decreases considerable after the age of 75 years. In the elderly there is a more frequent use of other analgesics, antipyretics and opioids.**
- **Low back pain patients had more laboratory tests than patients without low back pain but those laboratory tests were not specific for low back pain.**

3.3 HOSPITAL DATA: MINIMAL CLINICAL DATA (MCD/RCM/MKG)

The registration of diagnoses and procedures per hospital stay in the Minimal Clinical Data (MCD), allows calculating the number of hospital stays related to a particular diagnosis and/or procedure in classic hospitalization and in one-day clinic.

3.3.1 Description of the Minimal Clinical Data database

The minimal clinical data (MCD or Résumé Clinique Minimal/Minimale Klinische Gegevens RCM/MKG) is a compulsory registration of information concerning each hospital stay, whether in classic hospitalization or in one-day clinic. All information is transferred to the Ministry of Social Affairs, Public Health and Environment (SPF/FOD), where the information is compiled into one registration year. The data are validated internally and compared with reference lists (on the hospital level and by the Ministry) but the clinical coherency of recorded diagnoses and procedures are not validated. The KCE report on Clinical Quality Indicators [339] provides more details about biases and flaws linked to MCD analysis.

The main objectives are epidemiological, organizational and financial. The MCD contains different sections:

General data concerning the institution and services;

- Patient information (e.g. patient code is unique for a given hospital and a registration period);
- Information regarding the patient's hospital stay (such as length of stay in different bed indexes);
- Diagnoses coded per stay according to the ICD-9-CM codes (diagnoses are coded as "principal diagnosis" and "secondary diagnoses");

- Interventions coded per stay according the RIZIV/INAMI nomenclature codes and according the ICD-9-CM codes along with indication on the location of the intervention (on site or in another institution).

Since ICD-9-CM codes are registered for each hospital stay, the number of stays and related length of stay can be retrieved by diagnosis or procedure coded in ICD-9-CM. To use the MCD data for "episode" specific studies, the information should be retrieved on an individual patient basis. This is however protected by the law on the privacy and the necessary procedure could not be done in the time frame of this study.

3.3.2 Minimal clinical data: methodology of the study "low back pain'

Aim and scope

The first objective of the study of the MCD data is to evaluate the frequency of hospitalizations for low back pain: "classical hospitalization" and "hospitalization in the one-day clinic", in 2004. The mean length of stay, the type of secondary diagnoses as well as the procedures codes (therapeutic and diagnostic codes) were identified by principal diagnosis. Secondly, for the most frequent principal diagnoses, differences of diagnoses or process care between provinces were studied. Thirdly, the MCD data were validated by two hospitals: Ziekenhuis Oost-Limburg, Genk and Cliniques Universitaires, St. Luc, UCL Brussels.

Identification of the ICD-9-CM codes to be studied

A careful selection of the codes to be studied was essential because of the complexity of chronic low back symptoms and their multiple potential causes not specifically registered in the ICD-9-CM classification. Cherkin et al [340] established and validated an algorithm for the selection of a set of diagnostic and therapeutic ICD-9-CM codes that allowed a study of the incidence of "mechanical low back pain". The authors also classified the codes in clinical categories. The selection of the ICD-9-CM codes for this project is based on the selection proposed by Cherkin et al. [340] and extended with other codes, probably related to low back pain and classified in the clinical categories proposed by Cherkin (herniated disc (HD), probably degenerative diseases (PDD), spinal stenosis (SS), possible instability (PI), fractures (F), sequel of previous back surgery (FBSS) and miscellaneous (M)). The appendix 2.3.1 lists the codes recommended by Cherkin and the codes added for this study (indicated with *). The selected codes for which no data were retrieved are indicated with ° in the list. The appendix 2.3.2 gives the selection of the codes for analysis of diagnostic or therapeutic procedures in low back pain. Some procedure codes were only introduced after 2004. Consequently no stays were found for those codes. Information relative to interventions described in those codes was probably encoded under another number i.e. the codes: 84.60; 84.64; 84.65; 84.68; 84.69 (discectomy) and 81.61-64 (fusion).

Data selection and allocation to the lumbar spine

Hospital stays were retrieved according to their principal diagnosis only in order to avoid double counting. A hospital stay relative to procedure codes was selected if the principal diagnosis belonged to one of the selected diagnostic codes.

The diagnostic codes can either relate to lumbar pathology or to spinal pathology in general. The reallocation of raw results for non-specific spinal principal diagnosis to the lumbar region was based on the registration in the RIZIV/INAMI database of the plain radiography of the spine. This information shows that 63 % of all radiographies of the spine are performed for the lumbar region. Therefore, in further analysis, 63% of the data relative to codes not specific for the lumbar spine will be used.

Data analysis

The number of stays retrieved based on the extended selection of ICD-9-CM codes was compared with the 1992 Cherkin selection [340]. Data were also grouped following the

clinical diagnostic and procedure categories developed by Cherkin. Data from classic hospitalization were compared with data from one-day clinic. The repartition between principal diagnoses was studied by code and by diagnostic clinical category. A mean length of stay was calculated by principal diagnosis in days (no standard deviation was computable on the data because of their aggregation). The secondary diagnoses, grouped as "diagnostic clinical category", were crossed with the principal diagnosis when stays also had secondary diagnoses falling into the selected codes. Therapeutic and/or diagnostic procedures were studied per principal diagnosis and per category on principal diagnosis.

Per province, the study focused on the most frequently assigned diagnoses in each type of hospitalization, listed in appendix 3.3.3 (accounting for more than 65% of the stays).

3.3.3 Minimal clinical data: results

The results for diagnostic and procedure codes for classic and one-day hospitalization are given in table 3. The selection of diagnostic and therapeutic codes was based on the algorithm published of Cherkin et al. [340]. However, the 63% correction factor was applied here to the number of stays of nonspecific codes, in order to approximate the part allocated to the lumbar region.

Table3. Weighted number of stays selected per type of codes

		Classic hospitalization	**One-day hospitalisation**
Selected Diagnostic codes	Cherkin codes	40,623	45,861
	Additional codes	83	106
	Total	40,706	45,967
Selected procedure codes	Cherkin codes	23,136	4,881
	Additional codes	14,801	47,504
	Total	37,936 (*)	52,385 (*)

(*) For a same principal diagnosis, stays can be counted several times for different procedure codes. This total can therefore exceed the number of stays selected in the study.

The 6 codes added to the diagnostic codes proposed by Cherkin [340] had no major impact on the total hospital stays (additional codes are indicated with * in appendix 2.3.1). On the contrary, the additional procedure codes in the management of low back pain (injection therapy, percutaneous pain management techniques and neurostimulation) represented an important number of stays; especially in one-day hospitalization. These findings suggest the continuous evolution in availability and use of therapeutic modalities between 1992 and 2004 (additional codes are indicated with * in appendix 2.3.2).

3.3.3.1 Diagnoses

The total number of hospital stays in classic hospitalization and one-day hospital retrieved for the diagnostic codes relative to low back pain were 43 756 in classic hospitalization and 48 111 in one-day hospitalization without correction for the lumbar region. After weighting the number of stays with a non-specific principal diagnosis by 0.63, the total number of stays was then 40 706 classic hospitalization stays and 45 967 one-day stays. Appendix 3.3.4 shows the number of stays per principal diagnosis, in classic hospitalization and in one-day hospitalization. The percentage of principal diagnoses admitted in classic or one-day hospitalization is given for the ten most frequent principal diagnoses in figure 3. It is important to note that the severity of illness, which was absent from the aggregated data, could differ between both types of hospitalizations.

Figure 3. Number of stays by principal diagnosis (classic and one-day hospitalization)

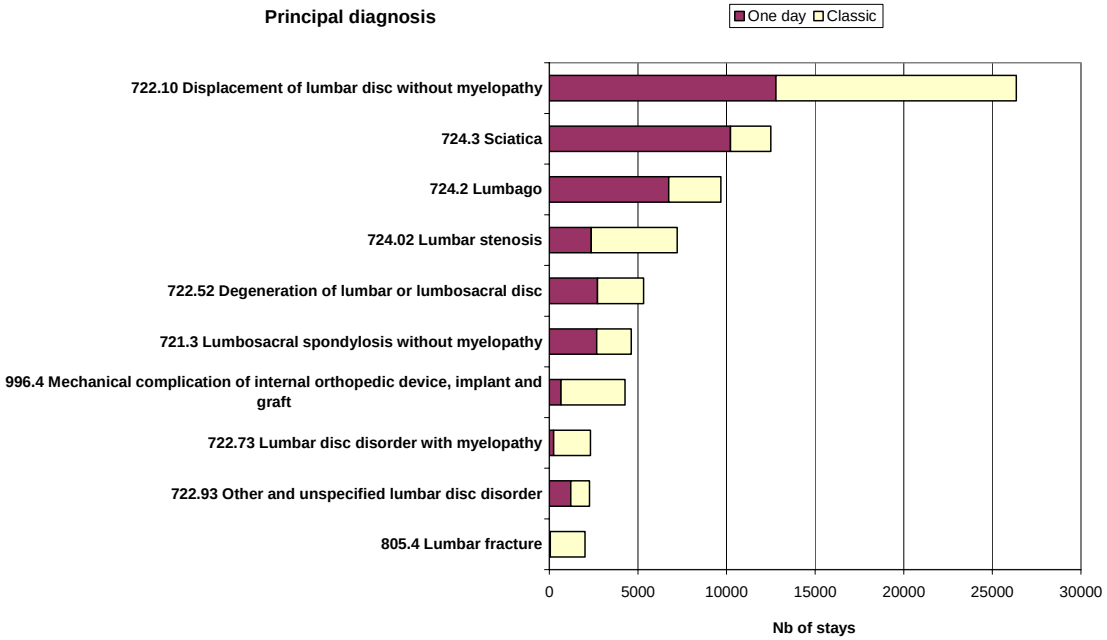


Table 4 lists the ten most frequent principal diagnoses per type of hospitalization accounting for 90.6% of the classic hospitalization stays and for 91% of the one-day care. A third of the stays in classic hospitalization had "Displacement of lumbar disc without myelopathy" as principal diagnosis, and the mean length of stay was 6.3 days. The second and third most frequent diagnoses were "Lumbar stenosis" and "Mechanical complication of internal orthopedic device, implant and graft". The 3 612 stays admitted for this last diagnosis stayed on average 13.5 days in the hospital. The mean length of stay of all stays for low back pain was 8.5 days.

In one-day care setting, almost 28% of the stays had "Displacement of lumbar disc without myelopathy" as principal diagnosis. The second and third most frequent diagnoses were "Sciatica" and "Lumbago" with respectively 22.2% and 14.6% of the stays in one-day clinic.

Table 4. Number of stays and mean length of stay for the 10 most frequent principal diagnoses in each type of hospitalization: (classic and one-day)

ICD-9-CM	Principal diagnosis	Number of stays	% of total number of stays	Mean length of stay
CLASSIC HOSPITALIZATION				
72210	Displacement of lumbar disc without myelopathy	13,555	33.3%	6.3
72402	Lumbar stenosis	4,852	11.9%	9.9
9964	Mechanical complication of internal orthopaedic device, implant and graft	3,612*	8.9%	13.5
7242	Lumbago	2,946	7.2%	6.1
72252	Degeneration of lumbar or lumbosacral disc	2,605	6.4%	8.2
7243	Sciatica	2,269	5.6%	6.8
72273	Lumbar disc disorder with myelopathy	2,074	5.1%	7.8
8054	Lumbar fracture	1,965	4.8%	13.0
7213	Lumbosacral spondylosis without myelopathy	1,948	4.8%	10.1
72293	Other and unspecified lumbar disc disorder	1,063	2.6%	9.5
…..	…..other principal diagnoses…..	3,817*	9.4%	9.9
	TOTAL number of stays	40,706*	100%	**8.5**

ICD-9-CM	Principal diagnosis	Number of stays	% of total number of stays	Mean length of stay
ONE-DAY HOSPITALIZATION				
72210	Displacement of lumbar disc without myelopathy	12,790	27.8%	
7243	Sciatica	10,221	22.2%	
7242	Lumbago	6,731	14.6%	
72252	Degeneration of lumbar or lumbosacral disc	2,717	5.9%	
7213	Lumbosacral spondylosis without myelopathy	2,676	5.8%	
72402	Lumbar stenosis	2,360	5.1%	
72283	Postlaminectomy syndrome, lumbar	1,336	2.9%	
72293	Other and unspecified lumbar disc disorder	1,205	2.6%	
7244	Thoracic or lumbosacral neuritis or radiculitis, unspecified (radicular syndrome)	937	2.0%	
7248	Other symptoms referable to back	873	1.9%	
…..	…..other principal diagnoses…..	4,121	9%	
	TOTAL number of stays	**45,967**	**100%**	

* all not specific codes weighted by 0.63

Inside one diagnostic category, the length of stay varied according to the principal diagnosis due to the heterogeneity of the categorization.

When the principal diagnoses are grouped in clinical categories as shown in appendix, the group "herniated disc" was the most assigned in classic hospitalization (38.6% of the stays with a mean length of stay of 6.5 days), followed by "probably degenerative diseases" (14.4% with a mean of 9.1 days) and "spinal stenosis" (13.6% with a mean of 10 days). The first clinical categories together represented more than 50% of the total number of classic hospitalization stays for low back pain. As seen in figure 4, the category "herniated disc"

was also the most frequent reason of admission in the one-day clinic. Together with the second most frequent category, "miscellaneous", those diagnostic categories represented more than 50% of all hospital stays in the one-day clinic. Amongst the 26.6% of stays belonging to the category "miscellaneous", most of the stays received the principal diagnosis "724.3 sciatica" (22.2% out of 26.6%).

Figure 4. Number of stays by principal diagnostic category (classic hospitalization)

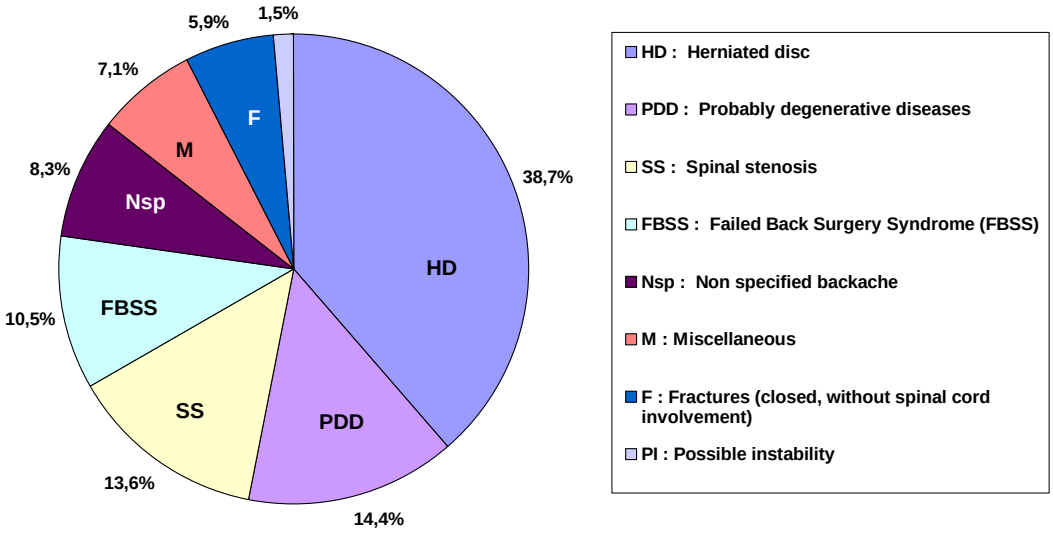
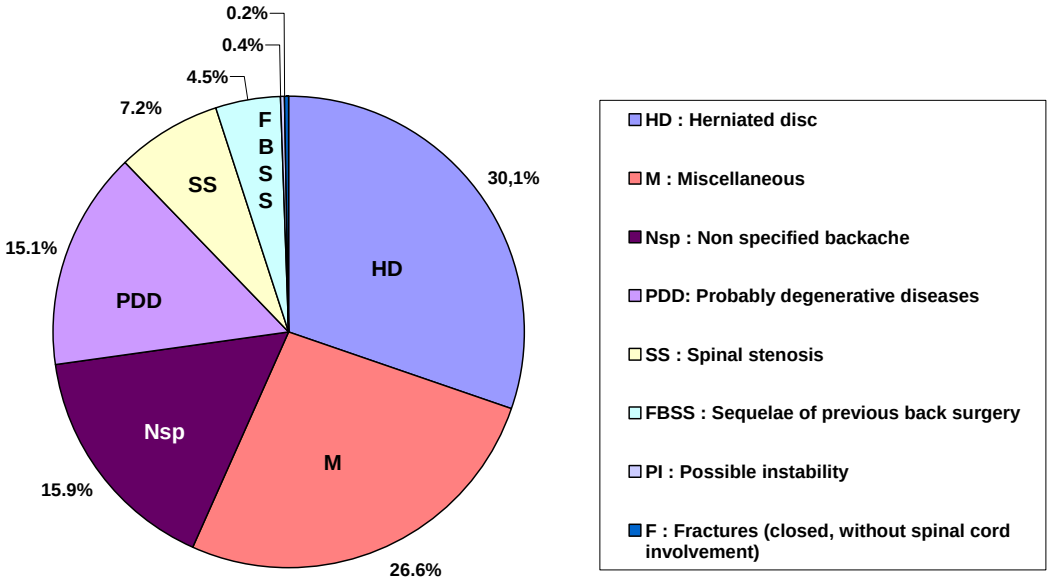


Figure 5. Number of stays by principal diagnostic category (one-day hospitalization)



The secondary diagnoses can also be grouped into diagnostic categories. Patients may have diagnoses from one or more other categories than the category of their principal diagnosis. The table with the percentage of stays per secondary diagnoses per diagnostic category is located in appendix 2.3.5. For example, amongst the stays with a principal diagnosis "displacement of lumbar disc without myelopathy", 12.5% of the patients also presented at least one diagnosis from the category "probably degenerative diseases", 4.6% of them had one or more diagnoses from the "miscellaneous" category and 2.9% of them had one or more diagnoses from the category "spinal stenosis". Amongst the patients with a principal diagnosis of "lumbar stenosis", 11.6% also had at least one "miscellaneous" diagnosis and 9.5% had also at least one diagnosis belonging to the "probably degenerative diseases".

For the first principal diagnosis in one-day hospitalization (displacement of lumbar disc without myelopathy), the most frequent category of secondary diagnoses other than "herniated disc" was "probably degenerative diseases", with 10% of the stays. Fifty-two percent of the stays admitted for lumbago in one-day hospitalization had one or more "miscellaneous" secondary diagnoses.

3.3.3.2 Management

The different procedure codes are classified in procedure clinical categories. The number of patients who received a procedure and the relative percentage of patients in classic and one-day hospitalization are illustrated in table5. Patients may have received different types of injection coded in several ICD-9-CM codes as well as different procedures from the category "Diagnostic procedures". Therefore, the total number of stays for these categories is not given in the table. For the other procedure categories, stays were considered as distinctly counted with the assumption that no more than one invasive code from the same category was used during the same stay.

Table 5. Percentage of procedures administered in classic and one-day hospitalization.

Procedure Category	CD-9-CM	Procedure	Total nr of stays (100%)	% One-day	% Classic
Discectomies	8051	Excision of intervertebral disc	12,197	0.4	99.6
	8050	Excision or destruction of intervertebral disc unspecified	361	0.6	99.4
	8059	Other destruction of intervertebral disc	134	9.0	91.0
	8052	Intervertebral chemonucleolysis	94	68.1	31.9
Total discectomies			**12,786**	**1.0**	**99.0**
Diagnostics	8724	X-ray of lumbosacral spine/sacrococcygeal	3,167	10.2	89.8
	8838	CAT-scan NOS	2,623	7.2	92.8
	8893	MRI of spinal canal	1,204	7.0	93.0
	8721	Contrast myelogram	1,105	42.3	57.7
	9218	Total body scan	779	2.7	97.3
	8729	Other X-ray of spine NOS	352	12.8	87.2
	0331	Spinal tap	154	7.8	92.2
	0339	Other diagnostic procedures on spinal cord and spinal canal structures	10		100.0
Total Diagnostics			(*)		
Fusions	8108	Lumbar and lumbosacral fusion, posterior technique	3,633	0.1	99.9

Procedure Category	CD-9-CM	Procedure	Total nr of stays (100%)	% One-day	% Classic
	8106	Lumbar spinal fusion, anterior technique	1,337	0.1	99.9
	8107	Lumbar & lumbosacral spinal fusion, lateral transverse process technique	154		100.0
	8100	Spinal fusion, NOS	141		100.0
	8138	Refusion of lumbar & lumbosacral spine, posterior technique	90		100.0
	8136	Refusion of lumbar & lumbosacral spine, anterior technique	19		100.0
	8137	Refusion of lumbar & lumbosacral spine, lateral transverse process technique	4		100.0
	8139	Refusion of spine NEC	3		100.0
	8130	Refusion of spine NOS	3		100.0
Total Fusions			5,384	0.1	99.9
Laminectomies	0309	Other exploration and decompression of spinal canal	4,767		100.0
	0301	Removal of foreign body from spinal canal	3	33.3	66.7
Total Laminectomies			4,770	0.1	99.9
Injections	0391	Injection of anesthetic into spinal canal for analgesia (LEI)	21,187	87.8	12.2
	0392	Injection of other substance into spinal canal	21,041	91.0	9.0
	9923	Injection of steroid	8,369	90.9	9.1
	8192	Injection of therapeutic substance into joint or ligament	1,612	79.7	20.3
	038	Injection of destructive agent into spinal canal	573	93.4	6.6
	0531	Injection of anesthetic into sympathetic nerve	286	89.5	10.5
	0532	Injection of neurolytic agent into sympathetic nerve	59	76.3	23.7
	0523	Lumbar sympathectomy	38	89.5	10.5
	0395	Spinal blood patch	33	15.2	84.8
Total Injections			(*)		
Neurostimula-tion	0393	Implantation or replacement of spinal neurostimulator (leads)	513	2.3	97.7
	0394	Removal of spinal neurostimulator lead(s)	24	25.0	75.0
Total Neurostimulation			**537**	**3.4%**	**96.6%**
Percutaneous pain management techniques	0396	Percutaneous denervation of facet	2,187	96.1	3.9
	042	Destruction of cranial and peripheral nerves	1,217	95.2	4.8
	036	Lysis of adhesions of cord or nerve roots	335	86.0	14.0
Total Percutaneous pain management techniques			**3,739**	**94.9**	**5.1**
Other surgery	7869	Removal of internal fixation device	270	18.9	81.1
	0302	Reopening of laminectomy site	119		100.0
Total Other surgery			**389**	**13.1**	**86.9**

(*) : different codes and number of procedures probable per stay => no total has been calculated

The number of individual patients treated by one procedure is not known: it is therefore difficult to compare treatment volumes. Nevertheless, if we do not take injections into account, discectomies were the most frequently performed treatment in Belgium with 12 786 stays, from which 99% have been performed in classic hospitalization. The chemonucleolysis in this category was an exception (only 32% in classic hospitalization) but this code is not compulsory and the number of stays can thus be underestimated. Fusions (5 384 stays) and laminectomies (4 770 stays) were also performed during classic hospitalizations. The other surgery techniques performed during a classic hospitalization were 100% of the reopening of laminectomy sites and 81.1% of the removals of internal fixation device. Neurostimulator leads were mostly implanted or replaced during a classic hospitalization (96.6% of the stays) whereas their removal was performed for 25% of the cases in one-day hospitalization. Percutaneous techniques were mostly used in one-day setting (94.9% of the stays). Injection therapies were generally performed during one-day hospitalization (except the seldom recorded spinal blood patches). It is difficult to interpret further the figures as different injection codes can be recorded during a same stay. Appendix 2.3.6 gives the number of stays during which at least one injection was performed, per injection code.

Appendix 2.3.7 gives the number of stays per principal diagnostic category during which at least one injection procedure was performed. In one-day hospitalization as well as in classic hospitalization, the most frequently used code for injection therapy was the "injection of other substances in the spinal canal", respectively in 41.6% (62.9% in case of herniated disc as principal diagnosis) and 4.7% of the stays. The second technique used was the "injection of anesthetic into the spinal canal", respectively in 40.5% and in 6.4% of the cases. The non- specific code 9923 "injection of steroids" was only recorded in 16.5% of the one-day cases, especially for possible instability (27.1% of the stays), herniated disc (25.5%).

The information relative to the procedure codes for diagnostic interventions were not reported because encoding this information is facultative.

Appendix 2.3.9 lists the procedures (with their ICD-9-CM codes), that were administered in minimum 10% of the stays having a same principal diagnosis. The first part of the appendix gives the results for classic hospitalization. The excision of intervertebral disc was performed during 66.5% of the stays for displacement of the lumbar disc without myelopathy and 62.5% when the principal diagnosis was a lumbar disc disorder with myelopathy. Other procedures were administered during less than 10% of the stays (fusion, injections …). The patients suffering from a lumbar stenosis were treated with "other" exploration and decompression of the spinal canal (56.2%) or to a lesser extent via a lumbar/lumbosacral fusion by posterior technique (12.7%). Lumbago and sciatica were most frequently treated with injections of anesthetic into the spinal canal (during respectively 10% and 15.8% of the stays). The first treatment for degeneration of lumbar or lumbosacral disc and lumbosacral spondylosis with myelopathy was a fusion by posterior approach (respectively 28.1% and 13.7%). In the case of degeneration of disc, the intervertebral disc was also excised during 26.3% of the stays. The first treatment procedure does not appear in the appendix in the case of a lumbar fracture because the fusion by posterior approach was only performed in 3.6% of the stays.

The patients admitted in one-day hospitalization received mostly injections, most frequently "injection of non specified substances" for the following principal diagnoses: displacement of lumbar disc without myelopathy (66.3%), lumbago (40.6%), degeneration of lumbar or lumbosacral disc (37.2%), lumbosacral spondylosis without myelopathy (32.7%), lumbar stenosis (45.5% closely followed by injection of local anesthetic in 42.4 % of the cases) and unspecified lumbosacral neuritis or radiculitis (21.1%). Besides injections, percutaneous facet denervation was also performed, mostly in the principal diagnoses of "other" symptoms referable to back (24.7%), lumbosacral spondylosis without myelopathy (24.3%), and unspecified lumbosacral neuritis or radiculitis (11.5%).

3.3.3.3 *Validation of the minimal clinical data by two hospitals*

Ziekenhuis Oost-Limburg (Genk) and Cliniques Universitaires Saint-Luc (Bruxelles) compared the MCD data extraction related to their hospital with the information available at the hospital.

The procedures codes performed for the selected stays were in agreement with the content of the hospital database. It must be noted that the link between a procedure and the diagnosis that justified the specific procedure is recorded in the MCD but was not requested due to its unreliability. As noted during the validation, the hospital MCD service staff admitted indeed that the information available from physicians was not always clear enough to establish and record this link. Furthermore, one procedure could be related to different diagnoses.

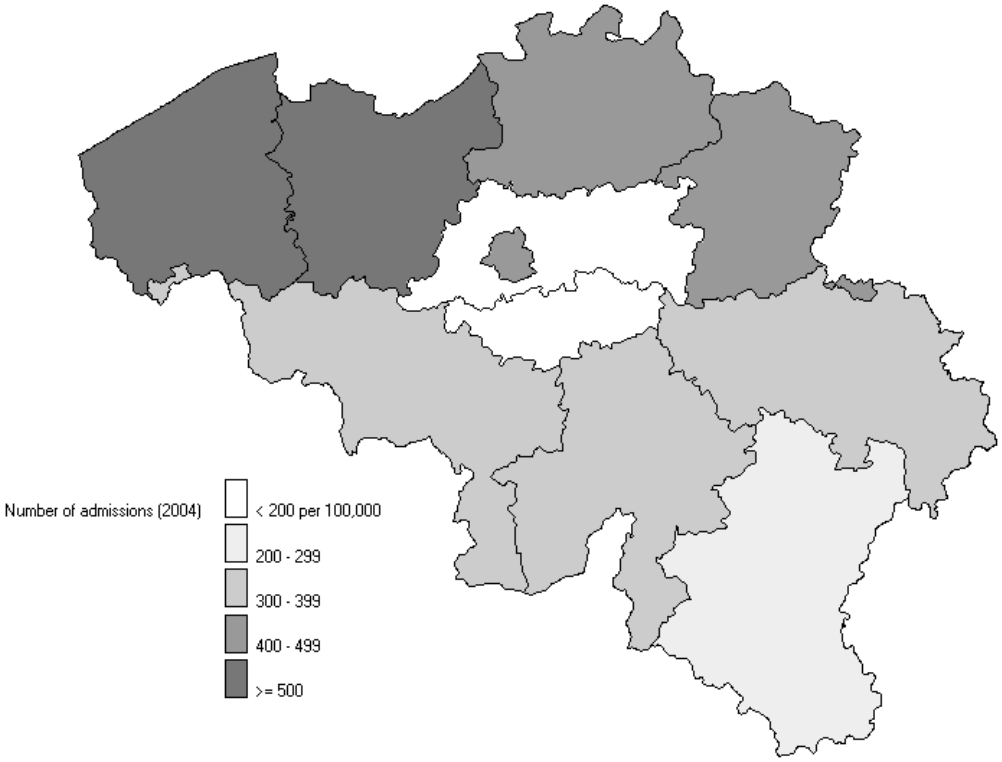
3.3.3.4 *Minimal clinical data per province*

Hospital admissions

The following map compares the number of classic hospital admissions per province per 100,000 inhabitants for all principal diagnoses of low back pain identified by this study. Classic and one-day stays were not pooled for two reasons. Firstly, as patients treated in one-day hospitalization may return several times to follow their treatment, in which case they would be counted several times. Secondly, according to the hospital invoicing policy, one-day treatments may be either invoiced in a one-day hospitalization lump-sum or invoiced via an ambulatory consultancy honorarium fee. In this last case, patients are not recorded in the MCD one-day hospitalization.

Figure 6

Number of patients admitted for Low Back Pain per 100,000 inhabitants in classic hospitalization 2004



Hospital stays per principal diagnosis

The principal diagnostic codes accounting for most of the admissions were chosen to study possible differences between provinces in diagnostic management or care practice of low back pain. Five principal diagnoses in classic hospitalization and 4 principal diagnoses in one-day hospitalization were chosen to study further the treatment of low back pain. The codes studied per province are listed in appendix. Those codes represent approximately 65% of all originally selected stays in each type of hospitalization.

Table 6 : Percentage of hospital stays per province per selected principal diagnosis (classic hospitalization)

Province	BELGIUM	Antwerpen	Vlaams Brabant	Brabant Wallon	Brussels	West-Vlaanderen	Oost-Vlaanderen	Hainaut	Liège	Limburg	Luxembourg	Namur
722.10 *	54.2	55.7	48.9	48.4	54.3	54.0	53.9	52.7	53.4	64.1	56.3	35.2
722.52 **	10.4	17.6	7.2	8.6	6.7	13.4	9.8	6.0	6.2	9.3	2.0	2.6
724.2 Lumbago	11.8	11.1	15.8	8.2	10.5	13.6	11.0	11.7	7.9	13.4	10.0	19.3
724.3 Sciatica	9.1	5.4	4.2	11.5	6.2	9.9	13.7	10.7	10.8	6.5	6.3	16.6
996.4 ***	14.5	10.2	23.9	23.3	22.3	9.1	11.6	18.9	21.7	6.7	25.5	26.3
Total number of stays (100%)	24,987	4,960	974	279	2,557	4,017	4,258	2,763	2,049	2,093	351	685

* 722.10: Displacement of lumbar disc w/o myelopathy
**722.52: Degeneration of lumbar of sacrolumbar disc
*** 996.4: Mechanical complication of internal orthopedic device, implant & graft

It must be underlined that the hospital coding behavior may introduce a bias in the results. In all provinces, the first diagnosis for admission in classic hospitalization was "displacement of lumbar disc without myelopathy" (from 35.2% in Namur to 64.1% in Limburg). The provinces of Luxembourg and Namur showed a larger percentage of mechanical complications (respectively 26.3% and 25.5%). The opposite situation was observed for the provinces of Antwerpen and West-Vlaanderen (respectively 10.2% and 9.1%) where the proportion of degeneration of lumbar disc was larger (17.6% and 13.4%) (cf. figure 7).

Figure 7. Percentage of hospital stays per province per selected principal diagnosis (classic hospitalization)

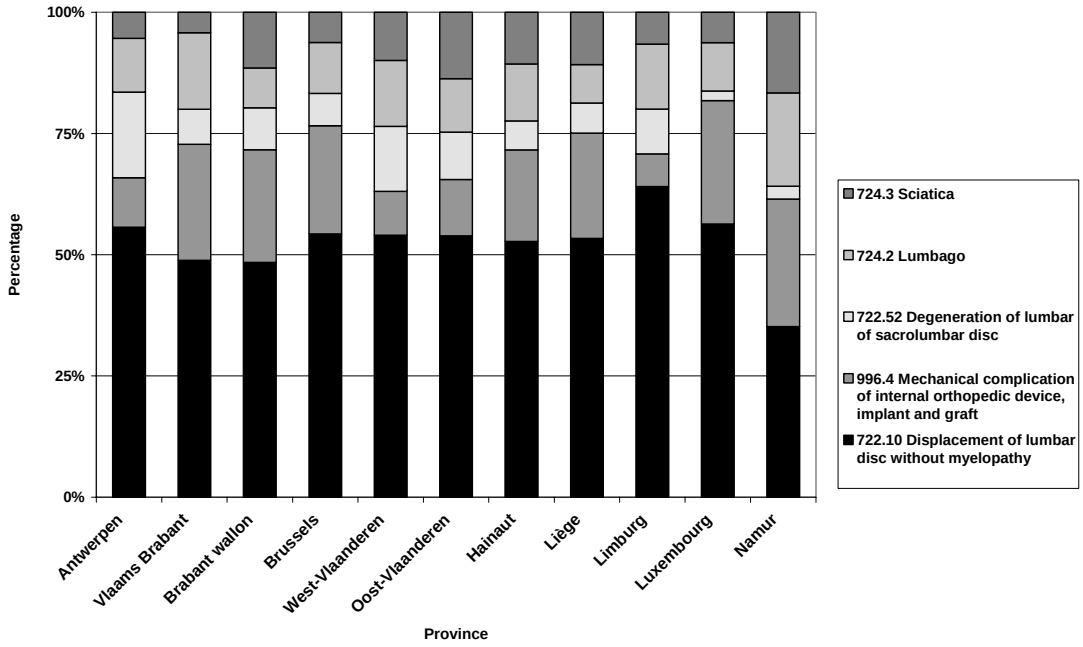


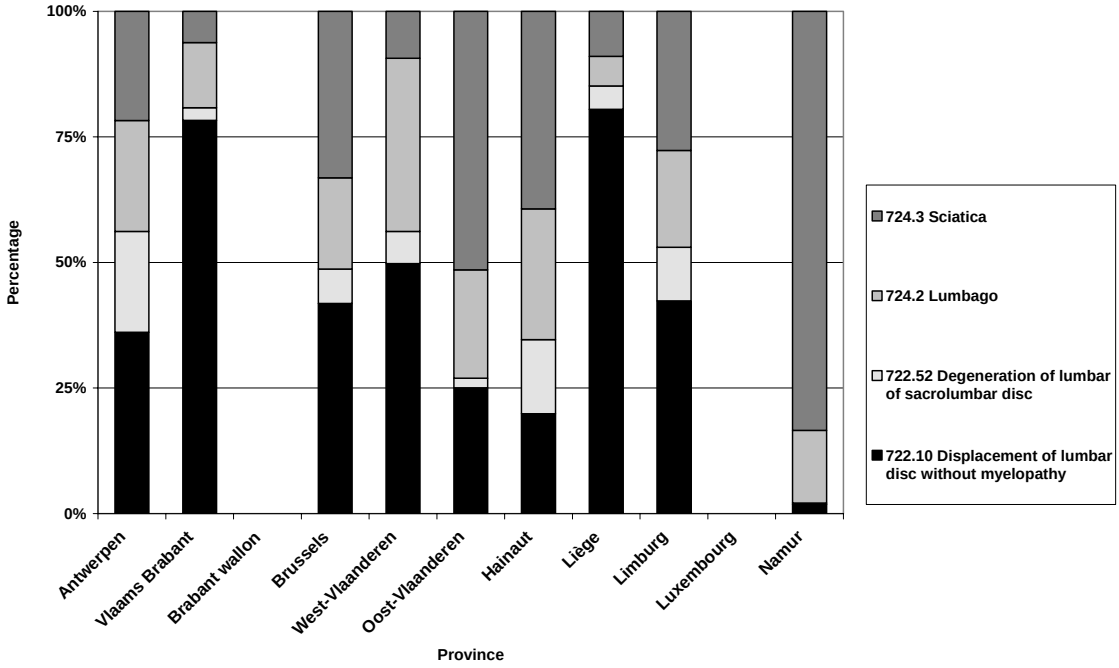
Table 7. Percentage of hospital stays per selected principal diagnosis per province (one-day hospitalization)

Province	BELGIUM	Antwerpen	Vlaams Brabant	Brabant Wallon	Brussels	West-Vlaanderen	Oost-Vlaanderen	Hainaut	Liège	Limburg	Luxembourg	Namur
722.10 *	39.4	36.1	78.3		41.9	49.8	25.0	19.9	80.5	42.3		1.8
722.52 **	8.4	20.1	2.5		6.9	6.4	1.9	14.7	4.7	10.7		0.3
724.2 Lumbago	20.7	22.1	13.0		18.1	34.5	21.5	26.1	5.9	19.3		14.4
724.3 Sciatica	31.5	21.8	6.2		33.1	9.3	51.5	39.3	9.0	27.7	100	83.4
Total number of stays (100%)	32,457	6,733	1,303	0	2,332	3,851	8,354	1,040	2,775	4,456	2	1,613

* 722.10: Displacement of lumbar disc w/o myelopathy
** 722.52: Degeneration of lumbar of sacrolumbar disc

In Brabant Wallon, no stay was retrieved for any of these diagnoses in a one-day care unit and only two stays for sciatica were found in Luxembourg. No explanation can be suggested for this finding as those provinces have both day care units. The interpretation of the results for other provinces should then be done with caution. Vlaams-Brabant and Liège had the majority of one-day stays recorded for "Displacement of lumbar disc without myelopathy". This diagnosis was indeed the most assigned except in three provinces: 1.8% in Namur where the majority of stays (83.4%) had a principal diagnosis of sciatica, in Oost-Vlaanderen (25% against 51.5% stays for sciatica) and Hainaut (19.9% against 39.3% for sciatica). Sciatica was the second diagnosis treated in one-day in Brussels (33.1%) and Limburg (27.7%). Figure 8 shows the percentage of stays per principal diagnosis per province (one-day hospitalization).

Figure 8. Percentage of hospital stays per selected principal diagnosis per province (one-day hospitalization)



The distribution of classic hospitalization and one-day hospitalization for each principal diagnosis per province is illustrated in table 8 as percentage one-day hospitalization of the total hospital stays

Table 8. Percentage of one-day hospitalization per province

Province	BELGIUM	Antwerpen	Vlaams Brabant	Brabant Wallon	Brussels	West-Vlaanderen	Oost-Vlaanderen	Hainaut	Liège	Limburg	Luxembourg	Namur
722.10 *	49	47	68	0	41	47	48	12	67	58	0	11
722.52 **	51	61	32	0	48	31	28	48	50	71	0	22
724.2 Lumbago	70	73	52	0	61	71	79	46	50	75	0	64
724.3 Sciatica	82	85	66	0	83	47	88	58	53	90	0	92

*722.10: Displacement of lumbar disc without myelopathy

**722.52: Degeneration of lumbar of sacrolumbar disc

The percentage of stays with the same principal diagnosis treated in one-day varied between provinces as well as from one diagnosis to another. If Brabant Wallon and Luxembourg are set aside, the range of one-day percentage for "displacement of lumbar disc without myelopathy" was 11% to 68%; "degeneration of lumbar or lumbo-sacral disc" was 22% to 71%. Sciatica was mostly treated in one-day (range: 47% to 92%), followed by lumbago (range: 50% to 79%). Again the validity of the absence of one-day stays in Brabant Wallon and Luxembourg is questionable.

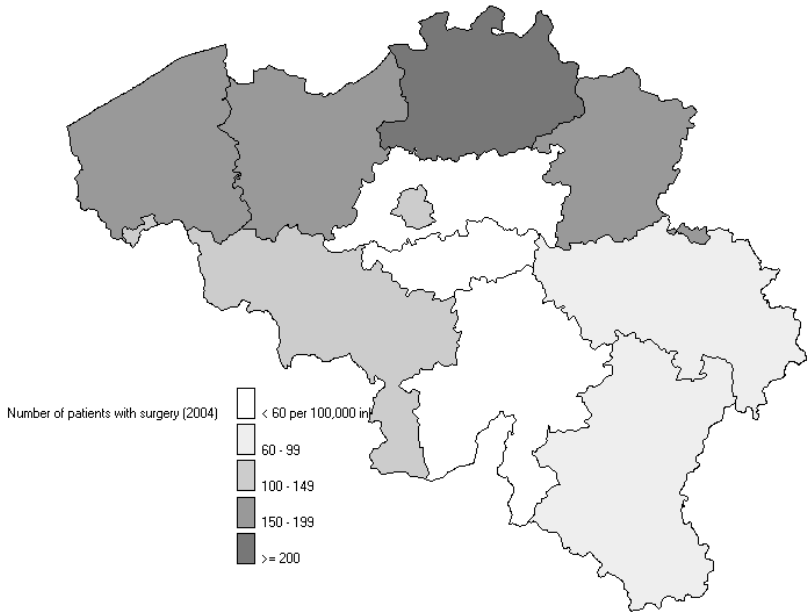
Surgical procedures used for a specific principal diagnosis

Surgical procedures can be compared between provinces for the five most frequent principal diagnoses in classic hospitalization (mentioned above). The number of surgically operated patients standardized per number of inhabitants varied between provinces. The map below illustrates the number of patients having had surgery for one of the five most

frequent principal diagnoses in classic hospitalization. Surgical procedures covered mainly discectomies, fusions, and laminectomies.

Figure 9

Number of surgically operated patients (5 most frequent principal diagnoses) in classic hospitalization per 100,000 inhabitants - 2004



3.3.4 Minimal clinical data: discussion

This is the first study using the MCD data to analyze not only the surgical management but also the use of minimal invasive treatment options for low back pain. Based on a selection of ICD-9-CM codes relative to the diagnosis, approximately 85 000 (40 000 classic hospitalizations and 45 000 one-day hospitalizations) hospital stays with a primary diagnosis with one selected code, were retrieved in Belgium for the year 2004.

The most frequent principal diagnosis was displacement of the lumbar disc without myelopathy. Thirty percent of the hospital stays for the principal diagnosis "lumbago" stay in the hospital for a mean period of 6.1 days. This observation is not in-line with the recommendations formulated in the systematic literature review, where the need to stay active and the value of exercise therapy have been highlighted.

In 66 % of those stays, the procedure code "excision of the intervertebral disc" was noted. Failed back surgery syndrome, as clinical category, was the primary diagnosis in 10.5% of the classic hospital stays. Also the high surgery rate is not supported by the literature, given the lack of evidence for surgical treatment in low back pain.

The careful selection of the diagnostic and procedure codes was based on an algorithm proposed by Cherkin et al.[340]. They validated an algorithm for the selection of ICD-9-CM codes to study mechanical low back pain. Since the publication of Cherkin in 1992, ICD-9-CM codes have been introduced. In this study, diagnostic and procedure codes were added for injection therapy, percutaneous techniques and neurostimulation in order to reflect better the current treatment practices. The additional diagnostic codes did not substantially influence the number of hospital stays retrieved. The supplementary procedure codes however, were responsible for more than half of the hospital stays in classic hospitalization and for 90 % of the hospital stays in one-day hospitalization. It must also be mentioned that the use of procedure codes relative to the diagnostic procedures is facultative. Grouping the codes into clinical categories presented several drawbacks. From a diagnostic point of view for example the group defined by Cherkin as "miscellaneous" contains the codes for "sciatica" and for "lumbago". The distinction

between those two diagnoses is important for a study on low back pain as this one. For the procedures, grouping the surgical procedures performed in classic hospitalization seems to provide an accurate picture of the treatment practices. The procedure codes for minimal invasive treatment options are however less specific and it is unclear which code is used for which type of therapy. Moreover, in some indications, more than one code can be used to describe a given therapy. Some codes are not obligatory recorded and the results can therefore be underestimated.

Finally, it should be underlined that the study of the MCD does not provide an accurate picture of all minimal invasive techniques. Some practitioners perform injections during consultations while other ones do it in the context of day hospitalizations. This heterogeneity in the practices makes it impossible to compare accurately the practices between provinces for example.

For this study the data retrieved by the FOD were controlled for two hospitals with the data provided by the hospital. Both sources of data provide similar information. The conclusions of this study are in line with those of a previous KCE report on Clinical quality indicators [339] i.e., one major limitation of the MCD is the use of ICD-9-CM coding which can be imprecise or non-specific for certain conditions or procedures. This leaves room for free interpretation and non-standardized use of the codes, which can result in non-valid or imprecise information.

The aggregated study of the MCD data per province accentuates the problem of free interpretation described above. It is surprising to see the large variation of incidence of specific clinical diagnoses between provinces. Studying the frequency of fusion surgery shows that there is one outlier, namely Vlaams-Brabant, where approximately 25% of all hospital stays for the diagnosis "displacement of lumbar disc without myelopathy" were coupled with a code relative to fusion surgery.

MCD data are internationally considered as a potential tool for epidemiologic studies in the second line of care but the reality is far from being so simple. The algorithm proposed by Cherkin was also used for comparing trends in hospital use for mechanical neck and back problems in Ontario and the United States [341]. The design of this latter study does not allow any comparison with the data found in the current study. The authors found that between 1982 and 1992 the admission rate for medically treated cases decreased by 52% in Ontario and by 75% in the US ("medically" was defined as those who had a hospital stay for one of the principal diagnoses listed). On the opposite, the admission rate for surgically treated cases increased by 14% and by 35% respectively.

In conclusion, a high hospitalization rate and an extensive use of surgery are recorded for low back pain: these practices are not supported by evidence.

Key points: analysis of the minimal clinical data for low back pain

- **Approximately 85,000 hospital stays (40,000 classic hospitalizations and 45,000 in one-day hospital) for low back pain were recorded in the 2004 MCD database.**
- **The high surgery rate and consequently the high rate of failed back surgery syndrome contribute to the high direct medical cost of low back pain, a practice that is not supported by the evidence outlined in part I.**
- **The most frequently diagnosis was displacement of the lumbar disc without myelopathy. In 66 % of those stays discectomy was performed. Failed back surgery syndrome is the diagnosis of 10.5 % of the stays in classic hospitalization and responsible for 4.5 % of the admissions in one-day hospital.**
- **Lumbago is the 4th most frequent reason for classic hospitalization. The mean length of stay for this diagnostic code is 6.1 days, which contrasts with the recommendations to stay active.**
- **The algorithms proposed in the literature for the study of low back pain focus on mechanical low back pain and mainly surgical treatment. This is the first study also analyzing the minimal invasive pain management options.**
- **The major limitation of the MCD database is the use of ICD-9-CM coding which can be imprecise or non-specific, resulting in non-valid and imprecise information.**
- **The aggregated study of the MCD data per province show large variation in incidence of specific clinical diagnoses and the frequency of use of procedure codes.**
- **In the literature no study using a comparable methodology has been found, thus precluding any comparison of the results.**

3.4 RIZIV/INAMI NOMENCLATURE

3.4.1 Description of the Belgian nomenclature

The RIZIV/INAMI nomenclature allows physicians to register each specific medical act in order to get a fee-for-service from the national health insurance. The registration allows retrieving the number of times a given code is used and the cost for the social security (the refundable part). Besides, refundable implants are also registered with a nomenclature code. This information source will be used as a basis for estimating the cost of care of low back pain in Belgium.

3.4.2 Use of RIZIV/INAMI database for the study "low back pain"

3.4.2.1 Methodology

The diagnosis based on the history, clinical examination and the prescription of pharmacological and exercise treatment are done during a consultation with a non-specific code. The codes considered here for further study refer to medical imaging, percutaneous pain management techniques, surgery, implants used for back surgery, neuromodulation, rehabilitation therapy and physiotherapy (see appendixes 2.4.1 to 2.4.6). An initial retrieval of all codes potentially related to surgical interventions for the management of low back pain learned that the codes finally selected for further study represent 85% of the total number. Codes withheld for further study are indicated with * in appendix 2.4.3.

3.4.2.2 *RIZIV/INAMI nomenclature data: results*

Medical imaging

The RIZIV/INAMI nomenclature codes for plain radiography are specific for the lumbar spine, whereas the codes for CT-scan and MRI provide information on procedures performed on the total spine. Therefore the part of CT-scan and MRI allocated to the lumbar spine is 63% (see above for the allocation to the lumbar spine). The use of different imaging techniques is illustrated in table 9.

Table 9. Use of medical imaging for the lumbar spine

	Ambulatory		Hospitalized	
	Number	**Cost in €**	**Number**	**Cost in €**
RX	395,738	14,923,115	53,726	2,132,571
CT-scan	144,852	11,094,822	18,518	1,449,684
MRI	77,462	6,330,232	8,463	709,864
Total	618,052	32,348,169	80,706	4,292,120

The calculated number of medical imaging procedures performed for the lumbar spine is 698 757 and the global cost is € 36,640,289. Eleven percent (80 706 procedures) is performed on hospitalized patients and 89% on ambulatory basis. The exact part of these diagnostic techniques allocated to low back pain cannot be established.

Percutaneous interventional pain management techniques

Two RIZV/INAMI codes reflect the use of percutaneous techniques. The frequency of use and the related cost are indicated in table 10.

Table10. Use of codes relative to percutaneous pain management techniques.

	Ambulatory		Hospitalized	
	Number	**Cost**	**Number**	**Cost**
Destruction of a nerve or ganglion (excluding facial nerves) with alcohol, electrocoagulation, section or another method	13,136	390,435	274	7,846
Partial rhizolysis with high frequency current	9,114	456,499	422	21,250
Total	22,250	846,933	696	29,096

These techniques are used for the management of spinal pain but also for other pathologies. Moreover, these techniques may be used at different levels during one session. There were 22 946 interventions registered under these codes for a cost of € 876 029. Only 3% of these interventions were performed on hospitalized patients.

Surgery

Surgical interventions are subdivided into surgery with and without arthrodesis. For surgery with arthrodesis the cost of implants are added to the cost of the intervention.

Table 11. Surgical interventions and implant material for low back pain

	Number	**Cost in €**
Surgery without arthrodesis	10,142	3,816,488
Surgery with arthrodesis	7,462	4,446,519
Implants (material only)	51,865	14,537,640
Total		22,800,647

The RIZIV/INAMI nomenclature codes for back surgery are relatively precise. For those codes potentially covering the total spine the 63 % rule has been applied. The implants used for back surgery with arthrodesis have also RIZIV/INAMI nomenclature codes and the same 63% rule has been applied for materials that are used for the cervical and the lumbar regions. An important compound of the total cost of surgery is the cost of the hospital stay that is directly related to the length of stay. At the end of 2006 it was impossible to obtain the mean duration of hospitalization per nomenclature code for the year 2004.

Spinal cord stimulation

Spinal cord stimulation consists of the percutaneous implantation of an electrode, which is connected to an external stimulator during the obligatory test period. When the results of the test stimulation are positive, the electrode is connected to an implantable stimulator. In case of insufficient pain relief the electrode is removed. The latter is encoded as "negative test electrode". There are 4 double RIZIV/INAMI nomenclature codes relative to the placement of a neurostimulator and the electrodes, two of them are of application for newly installed neurostimulators, while the other two groups can be used for the replacement of a neurostimulator. The data presented in table 12 are adjusted for the lumbar spine. The majority (67%) of the medical interventions are done for hospitalized patients, while only 3 % of the electrodes are encoded as being placed in an ambulatory setting. The duration of hospitalization could not be taken into account as 2004 data were not available, as stated above.

Table 12. Number and cost of the different components for spinal cord stimulation

Description	Number	Cost in €
Electrodes	1,120	695,581
Negative test electrodes	81	89,505
Neurostimulator	392	2,278,777
Placement or replacement	1,382	237,416
Total		3,301,278

Rehabilitation therapy

Most of the codes for rehabilitation therapy are used for different pathologies. There is no indication to attribute a part to the management of low back pain. The total number of interventions for these non-specific codes is € 2 761 384 with a total cost of € 71,529,162. The codes for traction are more specific to low back pain. Less then 1 % of these interventions are performed for hospitalized patients. Thecodes for vertebral manipulation are specific to the spine and 63% were attributed to the lumbar spine. The number and cost are indicated in table 13. Since August 2004 a new code (558972) has been introduced for multidisciplinary, ambulatory rehabilitation of diseases of the vertebral column: this code was however replaced in December 2004 by another code (558994) covering the same treatment: 63% were attributed to low back pain. The results listed in table 14 must be interpreted in the perspective of the relatively short period of usage during the year studied in this report. The codes for traction were used 3 907 times and the cost was € 14 790. The codes for vertebral manipulation resulted in 59 357 interventions with a cost of € 458,401.

Table 13. Number and cost of codes for rehabilitation therapy specific for spinal problems

	Number	Costs in €
Traction	3,907	14,790
Vertebral manipulation	59,357	458,401
Total	63,264	473,191

Table 14. Use of the "new" RIZIV/INAMI codes for rehabilitation therapy

Code	Total number	Total costs in €	Number LBP	Cost LBP in €
558972 (5 months)	80,006	170,2611	50,404	1,072,645
558994 (1month)	3,448	190,454	2,172	119,986
Total	83,454	1,893,066	52,576	1,192,631

Physiotherapy

Outpatient physiotherapy is reimbursed with a maximum of 18 sessions a year in contrast with care provided in the hospital or in a rehabilitation centre. There is no indication allowing allocating part of these interventions to low back pain. All retrieved codes for physiotherapy resulted in 12 456 215 interventions costing € 128,750,768.

3.4.3 RIZIV/INAMI: discussion

3.4.3.1 Limits inherent to the use of RIZIV/INAMI nomenclature data

RIZIV/INAMI nomenclature codes are not pathology specific, and the description of the medical intervention may concern different body parts. Moreover, some of the newer techniques do not yet have any corresponding RIZIV/INAMI nomenclature code and are not reimbursed; some of those interventions are therefore using another code, providing a wrong image of the treatment. This may lead to overestimation of the use of an older technique and underestimation of the use of newer techniques. Another possibility for invoicing a medical intervention that has no corresponding RIZIV/INAMI nomenclature code is the use of pseudo codes; in this case the medical intervention is not reimbursed and thus not encoded in the RIZIV/INAMI database.

The majority of the nomenclature codes relative to interventional pain management techniques can be used for interventions done to treat back pain, without specification of lumbar or cervical region. As for the information from the MCD, 63% of the figures relative to the entire spine (lumbar and cervical) were allocated to the lumbar region.

The nomenclature codes used by physiotherapists and rehabilitation specialists do not provide any indication on the body part treated. For rehabilitation and physiotherapy, attributing part of those interventions to the management of low back pain is difficult.

RIZIV/INAMI nomenclature data only provide information on the reimbursed interventions and reflects only the part of the costs reimbursed by the social security. Furthermore, RIZIV/INAMI data allow retrieving information relative to specific interventions, but do not give information on the auxiliary costs as for example the consultation with the physician before and after the intervention, referral to physical therapy for rehabilitation programs, consultation with psychologist, and costs of materials and medication.

3.4.3.2 Summary of the findings

Table 15. Summary of the findings based on the analysis of the nomenclature data

Intervention	Number	Cost	Comment
Consultation for diagnosis	?	?	Registration not pathology linked
Pharmacological treatment	?	?	Only reimbursed prescription drugs can be retrieved on a patient name base
Medical imaging	698,757	36,640,289	No certainty that imaging is performed for the "chronic" low back pain
Physiotherapy	12,465,125	128,750,768	Not specific for low back pain
Rehabilitation			
General codes	2,761,384	71,529,162	Not specific for low back pain
Traction and vertebral manipulation	63,264	473,191	Specific for low back
Multidisciplinary codes	52,576	1,192,631	Adjusted for low back: only since August 2004
Percutaneous pain management	22,946	876,029	Not specific for low back pain and used in series
Surgery without arthrodesis	10,142	3,816,488	Specific for low back pain
Surgery with arthrodesis	7,462	18,984,159	Interventions specific for low back pain Implants?
Spinal cord stimulation	392	3,301,278	Implants adjusted, Interventions adjusted

Key points: analysis of the INAMI/RIZIV database

- **RIZIV/INAMI nomenclature data allow retrieving the number of particular interventions and the related costs for social security.**
- **The majority of the RIZIV/INAMI nomenclature codes are not pathology specific thus their use for the calculation of frequency and cost of treatment of low back pain must rely on extrapolation**
- **The RIZIV/INAMI codes relative to surgical interventions are more specific, except data for the implants used for surgery with arthrodesis that are less specific.**
- **The frequency of use of the highly specific spinal cord stimulation can best be estimated based on the number of reimbursed stimulators.**
- **Ideally the RIZIV/INAMI nomenclature data should be used for calculating the cost of a given intervention, and coupled with information from other data sources that allow defining the frequency of use of each specific technique.**

3.5 HEALTH CARE CONSUMPTION FOR LOW BACK PAIN PROBLEMS: DATA FROM THE SOCIALIST SICKNESS FUNDS

3.5.1 Background

In the study 'De medische beeldvorming van de lumbale wervelzuil' [326] performed by the Socialist Mutuality the longitudinal data from the sickness funds were used to analyze the treatments and procedures that the patients receive before and after the first ambulatory performed plain radiography of the lumbar spine. The same study methodology was also used to try defining the medical consumption of patients suffering chronic low back pain.

3.5.2 Methodology for this study

All members of the Socialist Mutuality that received a radiography of the lumbar spine (ambulatory setting) followed by a CT-scan or MRI of the spine performed on the same day or within one year (during hospitalization or ambulatory) were selected. The RIZIV/INAMI nomenclature codes used for selecting the study population are presented in appendix 2.5.1. In order to exclude medical consumption incurred by specific diseases, patients with cancer (use of chemo and/or radiotherapy), osteoporosis (use of biphosphonates) and diabetes (anti-diabetic medication) were excluded. The members subjected to an independent insurance regimen were also excluded because of the lack of data on medication use and on physical and rehabilitation medicine. Finally, to enable comparisons with the findings from Intego, patients younger than 18 years and older than 75 years were excluded. The study population consisted of 23,447 patients supposedly suffering from chronic low back pain. The distribution and size of the different excluded groups is illustrated in appendix 2.5.2.

For this patient population, the expenditures for medical imaging, pain medication, rehabilitation, physiotherapy and surgery of the thoraco-lumbar spine were retrieved for the period of 365 days following the first radiography of the lumbar spine. Because pharmacological treatment usually starts prior to the radiography, this information was also retrieved for the month prior to radiography. In this study the epidural steroid administration was not considered as there is no specific nomenclature code for this intervention. The use of neurostimulation was not studied either because the follow-up period of 1 year is too short for this type of treatment.

The health care insurers have two types of information:

- invoice data for health care concerning hospital stays, medication delivered through the hospital pharmacy, implants and medical acts.
- invoice data Farmanet concerning prescribed and reimbursed medication delivered through the public pharmacies.

It must be stressed that Farmanet does not provide any information relative to non reimbursed medications (including Over The Counter medications). The selected codes used for this study are listed in appendixes 2.5.3 to 2.5.8.

3.5.3 Results

Age and gender distribution of chronic low back pain patients

Appendix 2.5.9 illustrates the gender distribution of chronic low back pain patients. One third of the patients belong to the age group 18 to 39 years. Approximately half of the patients are between 40 and 59 years and one fifth are older than 60 and younger than 76 years. Except for the youngest group, where more 51.8% of the patients are male, the majority of the patients are female.

Interval between the use of radiography and other imaging techniques

39.2% of the CT-scans and MR-imaging were performed the same day as the radiography. Half of the patients received the CT or MRI within one week of the radiography. One month after the first radiography 73.4% of the patients had this additional medical imaging.

Table 16: Interval between the first radiography of the lumbar spine and the consecutive imaging (NVSM 2004)

Interval between RX and CT or MRI	number of patients	% of study population	cumulative % of study population
same day	9,194	39.2%	39.2 %
1-7 days	3,192	13.6%	52.8%
8-30 days	4,820	20.6%	73.4%
1-3 months	3,274	14.0 %	87.3%
3-12 months	2,967	12.7 %	100.0 %
Total	23,447	100.0 %	

Chronic low back pain and therapeutic interventions

In total 91% of the patient population received at least one of the following therapeutic interventions: medication, physiotherapy, rehabilitation or surgery. The distribution of the use according to the age is illustrated in table 17.

Table 17. Use of treatment options according to the age

Treatment	18 to 39 years		40 to 59 years		60 to 75 years		Total	
	N	%	N	%	N	%	N	%
Pain medication	5,982	78.0%	9,344	83.0%	3,900	86.3%	19,226	82.0%
Physiotherapy	3,326	43.3%	4,776	42.4%	2,119	46.9%	10,221	43.6%
Rehabilitation	2,218	28.9%	3,806	33.8%	1,620	35.8%	7,644	32.6%
Surgery	581	7.6%	843	7.5%	256	5.7%	1,680	7.2%
N patients with >= 1 treatment	6,807	88.7%	10,288	91.4%	4,232	93.6%	21,327	91.0%

The interval between the first radiography and the start of the treatment with one of the studied options is illustrated in table 18.

Table 18. Interval between first radiography of the lumbar spine and start of treatment

		Pain treatment*	Physiotherapy	Rehabilitation	Surgery
N patients		19,226	10,221	7,644	1,680
Mean		38	83	77	117
Median		0	35	33	91
Minimum		-30	0	0	0
Maximum		365	365	365	365
Percentiles	5	-25	1	0	8
	10	-20	3	0	15
	25	-8	10	8	34
	75	44	132	116	176
	90	168	250	237	268
	95	251	305	298	317

* The negative counting for pain medication is explained by the medication delivered up to one month before the first radiography

The duration of the treatments is illustrated in the appendix 2.5.10. The duration of pharmacological treatment was estimated using the number of days between the first and last delivery dates. It was assumed that one pack of pain medication lasted minimum one week; therefore the minimum duration of treatment is 7 days. For the duration of physiotherapy and rehabilitation the time between the first and the last date of medical act was used.

82.0 % of the patients with chronic low back pain purchase at least one pack of reimbursed **pain medication**. This percentage is significantly higher in patients over 60 than in the younger ones.

The duration of the pain therapy varies: 27.1% of the patients only purchase one pack of reimbursed pain medication. On the other hand almost half (45.5%) of the patients who bought at least one pack of pain medication go on with this medication for over 6 months.

Another, probably more accurate approach to calculate the duration of pharmacological treatment is based on the Defined Daily Dose (DDD) which stands for the mean maintenance dose of a drug used for its main indication in adults [342]. Table 19 illustrates the distribution of the costs for the social security and of the DDD of pain medication used by patients suffering chronic low back pain. The reimbursed pain medication costs the health insurance € 1.3 million. The mean cost is € 68 for 102 DDD.

Table 19. Cost for social security and number DDD of pain medication for chronic low back pain patients

			Pain medication			(N = 19,226)	
			Cost for social security			Number DDD	
Total			1,308,719	€		1,968,095	
Mean			68	€		102	
Median			26	€		60	
Minimum			0	€		0	
Maximum			6,262	€		3,896	
Percentiles	5		5	€		10	
	10		7	€		15	
	25		12	€		30	
	75		56	€		113	
	90		137	€		222	
	95		250	€		338	

Table 20 illustrates the distribution of the pain medication used according to the age groups. As also noted in the Intego database analysis, the use of NSAIDs alone diminishes with increasing age while the use of narcotic analgesics, alone or in combination with NSAIDs, increases with age.

Table 20. Pain medication in the age groups

Treatment	18 to 39 y Number	%	40 to 59 y Number	%	60 to 75 y Number	%	Total Number	%
NSAID's alone	3,792	63.4	4,866	52.1	1651	42.3	10,309	53.6
Narcotic analgesics alone	303	5.1	757	8.1	400	10.3	1,460	7.6
NSAID's and narcotic analgesics	1,887	31.5	3,721	39.8	1,849	47.4	7,457	38.8
Total number of patients with pain medication	5,982	100	9,344	100	3,900	100	19,226	100

As illustrated in table 17, 43.6 % of the CLBP patients receive **physiotherapy**. This percentage is significantly higher in patients over 60 than in the younger ones. One out of ten (12.1%) patients only have one session of physiotherapy. Nearly half (43.8%) of the patients have maximum one-month treatment, while 23.3% continue the treatment for more than 6 months.

One third (32.6%) of CLBP patients have **rehabilitation** sessions (table 17), a percentage that significantly increases with age. Almost half (48.8%) of the patients have one consultation only with a specialist in physical and rehabilitation medicine. In these cases

the 'rehabilitation' concerns mainly diagnostic examinations (measurement of motor and/or sensory nerve conduction velocity, electromyography) and therapeutic interventions such as vertebral manipulations. One third (33.6%) of the patients receive rehabilitation therapy for more than one month and 12.2% for more than 6 months.

The 10 221 chronic low back pain patients receiving physiotherapy generate a cost of € 2.4 million for the social security, with a mean of € 236 for 21 sessions.

A patient suffering chronic low back pain receives a mean of 8 sessions with a specialist in physical and rehabilitation medicine at a cost of € 247. The total cost for physical and rehabilitation therapy is € 1.9 million. The distribution of the costs and the number of sessions for physiotherapy and rehabilitation are illustrated in appendix 2.5.13.

Physiotherapy is more frequently used for patients who underwent back surgery than for those who are treated conservatively, with 30 sessions of ambulatory physiotherapy for surgically treated patients versus 20 sessions for conservatively treated patients. There is no difference in the mean number of ambulatory rehabilitation sessions, i.e. eight for both groups of patients. The cost for rehabilitation of surgery patients is slightly higher than for conservatively treated patients (€ 276 versus € 226 respectively). Appendix 2.5.14 illustrates the mean and median costs for physiotherapy and rehabilitation for patients treated conservatively and with surgery.

When CLBP patients receive physiotherapy or rehabilitation, more than one quarter (27.1%) of them receive both therapies simultaneously; 45.6% only have physiotherapy and the remaining 27.3% only benefit rehabilitation. The type of therapy per age category is illustrated in appendix 2.5.15.

As indicated in table 17, 1 680 patients (7.2%) were treated surgically within the year following the first radiography of the lumbar spine. The costs were studied for the 1 201 patients having had surgery in 2004. Patients undergoing back surgery have a mean age of 46.1 years (range 18 – 76 years). The mean length of hospital stay is 7.0 days. The total hospitalization cost, paid by the health care insurance for the 1 201 studied patients with back surgery in 2004, is € 5.6 million. Accordingly, the mean cost is € 4,632 per stay. The distribution of patients' age, length of hospital stay and costs is represented in table 21.

Table 21. Patients undergoing back surgery: age, length of hospital stay and cost for social security

	Patient age (years)	Length of hospital stay (days)	Cost of hospitalization for social security (€)
Total		8413	5 563 443 €
Mean	46.1	7.0	4 632 €
Median	45	6	3 456 €
Minimum	18	1	1 087 €
Maximum	76	46	31 814 €
P5	27	2	1 526 €
P10	31	3	1 804 €
P25	37	4	2 357 €
P75	55	8	6 378 €
P90	64	11	8 404 €
P95	69	15	9 998 €

As indicated in table 22, the costs of hospitalization represent 43.0% of the total costs for surgery, at a mean cost of € 1 993 (range € 248 – 15 028). Although only 415 patients (39.5%) received an implant during surgery, the implants represent € 1.24 million or 22.3% of the total cost. The mean cost for implants is € 2 611 (range € 22 - 15761). The doctor's fees for surgery and anesthesia represent € 1.17 million (21.0% of the total cost) with an average of € 975 per stay (range € 258 – 5758).

Table 22. Costs for patients undergoing back surgery

Group of costs	Costs for social security in €	Percentage representing group of costs in total social security cost
Honoraria for surgery and anesthesia	1,170,783	21.0 %
Other honoraria	155,537	2.8 %
Implants	1,240,219	22.3 %
Hospitalization	2,393,237	43.0 %
Physiotherapy	31,991	0.6 %
Medication	196,853	3.5 %
Clinical biology	218,221	3.9 %
Total costs for social security	5,563,443	100.0%

Chronic low back pain and medical imaging

Medical imaging of the study population of 23 447 chronic low back pain patients costs € 10.4 million. This represents a mean of € 445 for 7 examinations in the year following the first radiography. The list of the most frequently prescribed medical imaging techniques is given in appendix 3.5.3-3: radiography of the lumbar spine, CT of the spine and radiography of the pelvis. Together they represent 41.3% of the examinations. On the other hand, there is a list of investigations probably not linked to the back pain: chest X-ray (6.1%), echocardiography (1.7%), echo abdomen (6%), CT skull, neck, thorax and abdomen (3%) and gynecological investigations (6%). One fifth (22.9%) of the radiographies of the lumbar spine are repeated radiographies. Approximately 12% of the CT scans and MRI of the spine are repeated examinations. 41.7% of medical imaging is prescribed by the general practitioner and 58.3% by specialists: the orthopedic surgeons are responsible for 17.6% of the prescriptions, neurosurgeons 5.9%, specialists in physical and rehabilitation medicine 5.1%, rheumatologists 4.7% the rest being prescribed by other specialists.

3.5.4 Discussion : longitudinal data from the Socialist Mutuality

The longitudinal follow-up of patients who received a plain radiography of the lumbar spine gives the frequency and costs of medical consumption incurred by those patients within one year. The study population of CLBP patients has been defined arbitrarily as those patients who received a second medical imaging within the 365 days after the first radiography. In this group of patients, 91% received one of the studied treatment options: medication, rehabilitation, physiotherapy or surgery. Surprisingly, the most important cost factor appears to be the medical imaging performed in these patients.

Limits of this study

Studying low back pain patients, who already received radiography of the lumbar spine, may point toward a patient group with a more serious degree of low back pain. A previous survey evaluating the health care utilization in Belgium found that 44% of the patients suffering low back pain had undergone radiography [338].

The database of the health care insurers can only provide information on reimbursed drugs and medical interventions. Moreover the reimbursement system relies on the RIZIV/INAMI nomenclature, which is not sufficiently specific for minimal invasive pain management procedures. The latter could thus not be studied.

The Socialist Mutuality has 28.13% market share, but extrapolation of this information to the total Belgian population may induce biases because there is no information allowing to state that the members of the Socialist Mutuality are a representative sample of the Belgian population.

Health care consumption compared to other countries

Several burden-of-illness studies identify direct medical costs and indirect costs, most of these studies use the top-down methodology, whereby a proportion of the total costs are attributed to low back pain. One of the recently published most comprehensive studies performed in the UK [323] provided information on three of the cost factors also studied in this part. In the UK about 9% of the low back pain patients visit a physiotherapist. About 10 % have radiography and 64% of the consultations with a general practitioner result in a prescription. These figures are considerably lower than those found in the current study.

In the previous study [326] regarding the health care consumption of patients who had received an ambulatory performed radiography of the lumbar spine, without any further restriction, 107,714 patients were studied. Only 34.3% purchased reimbursed medication, 48.7% had revalidation and/or physiotherapy and 2.1% had back surgery.

These findings suggest that the population studied consists of high medical consumers. This is in-line with the finding from the Intego database that indicated that low back pain patients tend to have a higher number of laboratory investigations and higher consumption of medication than the patients with other complaints.

Summary: total direct costs estimated for chronic low back pain patients

The patient population of 23 447 chronic low back pain patients generates a total direct cost of € 21.6 million within the first year following the first radiography of the lumbar spine. These costs consists of € 10.4 million for medical imaging, € 1.3 million for pain medication,€ 2.4 million for physiotherapy, € 1.9 million for physical and rehabilitation medicine and € 5.6 million for back surgery. In this way a chronic low back pain patient generates a mean cost of € 922 for the social security.

3.6 DISCUSSION: MANAGEMENT OF LOW BACK PAIN IN BELGIUM

3.6.1 Introduction

As outlined in Part I of this report, the management of chronic low back pain consist of the diagnostic evaluation, conservative treatment including pharmacological management, physical therapy and rehabilitation, minimal invasive percutaneous pain management techniques, surgical treatment and neuromodulation techniques. In this section we compare the information relative to the diagnosis and management of low back pain obtained from the different Belgian data sources analyzed.

3.6.2 Diagnosis

History taking and follow-up

The history taking and clinical examination are performed during medical consultation. Two of the studied information sources could potentially provide information on this topic: Intego and the RIZIV/INAMI nomenclature.

The Intego database uses the electronic medical record and allows retrieving the number of patients who had a diagnosis “low back pain” in a selected population of GPs in Flanders. This study found that the yearly incidence in general practice in 51.44 per 1000 practice population, which means that a GP with a practice of 1000 patients sees one new case every week. It is, however, impossible to discriminate between acute/sub-acute and chronic disease. Neither does the Intego database allow identifying the number of encounters required to establish this diagnosis.

The RIZIV/INAMI nomenclature number for a consultation with a medical doctor is not pathology linked. Therefore it is currently impossible to identify the number of consultations needed to establish the diagnosis of chronic low back pain.

Medical imaging

For medical imaging, RIZIV/INAMI data allow retrieving the number of radiographs requested for the lumbar spine. For CT and MRI there is no specification for the anatomic region.

In the longitudinal analysis of the database of the Socialist Mutuality the study population for chronic low back pain was defined as those patients who received a plain radiography of the lumbar spine and had subsequently an additional medical imaging (CT-Scan or MRI of the spine) within the year following the first radiography. It was assumed that patients who received an additional CT-scan or MRI suffered chronic low back pain. Preliminary analysis of the patient population indicated that the second imaging could be performed as early as the same day of the radiography or up to one year later.

The Intego database could not provide any information relative to medical imaging because the protocol from the radiologist was not systematically recorded.

The study population of the Socialist Mutuality was restricted to patients > 18 years and ≤ 75 years to be in-line with the population studied in the Intego database. The cut-off ages for the latter study were selected because chronic non-specific low back pain is rarely occurring under the age of 18 years, and patients older than 75 years may have multiple co-morbidities and thus influence the global image on medical consumption.

A number of 698,757 medical imaging procedures were performed for the lumbar spine based on the RIZIV/INAMI nomenclature data with a global cost equal to € 36,640,289.

The longitudinal study of members of the Socialist Mutuality indicates a global cost for medical imaging of € 10.4 million. The costs calculated in this study also include the consultation fees and the fee for technical equipment. In the year following the first radiography of the lumbar spine a patient receives a mean number of 7 medical imaging investigations. Most of these examinations seem to be related to the lumbar problem with the radiography of the lumbar spine, the CT scan of the spine and radiography of the pelvis representing already 41,3% of the total amount of examinations.

Efforts could be made to have one single electronic medical record that contains all information and that can be consulted by any health care providers when a patient seeks their help. The latter would also improve the transfer of information between the different health care providers and thus preventing multiplication of the same investigational procedure.

3.6.3 Treatment

Pharmacological treatment

Pharmacological treatment of chronic low back pain consists of drugs either prescribed or freely bought as over the counter (OTC) drugs. Within the prescription drugs there are reimbursed and non-reimbursed drugs. There is no information relative to the reason for purchasing (OTC) medication.

Information could be obtained from two sources: Intego and the longitudinal study of the Socialist Mutuality.

The Intego database provided information relative to the prescription of drugs for LBP patients. This study did not allow identifying if the medication was prescribed for low back pain or for a concomitant disease. NSAID's are the most frequently prescribed medication for patients suffering low back pain. The highest percentage of usage is found in the age group 55-59 years. After this age the use of these drugs decreases and the frequency of opioids consumption increases. The highest frequency of usage of topical products for joint and muscular pain is found in the group between 18 and 24 years.

Farmanet contains information on prescribed and reimbursed drugs. The longitudinal study of the Socialist Mutuality found that 82% of the patients, defined as chronic low back pain patients, received reimbursed pain medication. Half of them (53.6%) received a NSAID and 7.6% received only opioid analgesics while 38.8 % received a combination of NSAID's and opioids.

The frequency of consumption of those medications differs according to the age groups studied. The longitudinal study of the Socialist Mutuality noticed a reduction in the frequency of NSAID use with increasing age and an increase in frequency of opioid use and combination of NSAID and opioids that confirms the conclusion from the Intego database.

The information found in both studies only provides a global view on the medication consumption for low back pain. 27.1% of the patients purchase only one pack of reimbursed medication while 45.5 % continues for more than 6 months to use this type of treatment.

Exercise and rehabilitation

According to part I of this work, exercise and pain rehabilitation have strong evidence for their efficacy in the management of chronic low back pain. We identified two information sources on physiotherapy and rehabilitation: the RIZIV/INAMI nomenclature and the longitudinal study from the Socialist Mutuality. As additional information, a study performed in 2003 at the University of Leuven regarding the use of physiotherapy was consulted [343]. The latter found that of all consecutive prescriptions for physiotherapy delivered to the Christian Mutuality of the Leuven region, approximately 15 % can be allocated to low back pain. In this study no specification was given with regard to the chronicity of the pain problem.

In the RIZIV/INAMI database we found 12,456,215 interventions of physiotherapy in 2004. Based on the findings of the study performed in Leuven, 15 % of those interventions attributed to the management of low back pain means that approximately 1,868,000 physiotherapy sessions were performed in 2004 for low back pain.

In the future, the new RIZIV/INAMI nomenclature codes for multidisciplinary rehabilitation of diseases of the vertebral column will allow further extrapolation of the rehabilitation of the lumbar column in chronic low back pain.

The longitudinal study of the Socialist Mutuality identified 10,221 patients receiving physiotherapy and 7,644 receiving rehabilitation therapy. More than half of the patients receiving physiotherapy did so for more than one month.

Of all patients having had at least one session with the specialist in physical and rehabilitation medicine, 48.8 % had one consultation only, mainly for diagnostic procedures. One third of the patients, had rehabilitation therapy for more than one month.

In conclusion, it can be stated that rehabilitation and physical therapy is frequently used for low back pain patients in Belgium. The high usage of the code for multidisciplinary, ambulatory rehabilitation may suggest that this treatment option, that has a high level of evidence for efficacy gains in interest in Belgium.

Minimal invasive percutaneous pain management techniques

Epidural steroid administration is a frequently used treatment for the management of sub-acute low back pain, radiating into the leg. From the information sources analyzed for this study only the analysis of the MCD may provide an idea of the use of injection therapy. The RIZIV/INAMI nomenclature does not allowing to identify the medical act of injecting a substance into the epidural space of the lumbar region with therapeutic objectives.

The ICD-9-CM codes used to analyze the MCD are somewhat more specific, when coupled to a principal diagnosis indicative for low back pain. The information retrieved from the MCD database for this study has however several draw backs. First, it provides

data relative to a number of hospital stays, classic or one-day hospitalization, which means that ambulatory performed injections are not registered. Secondly, for those procedures listed during a classic hospitalization it is not clear if this procedure is performed once or several times. Thirdly, the description "Injection of steroid" with the ICD-9-CM code 99.23 is non-specific and will be used for intra-articular injections as well as for injections into the epidural space. Moreover, other ICD-9-CM codes may be used for encoding the medical act of injecting a substance into the epidural space, such as 0391 "injection of anesthetic into spinal canal for analgesia" and 0392 "injection of other substance into spinal canal". The information obtained from the MCD database does not allow drawing conclusions on the way these codes have been used.

The other percutaneous minimal invasive pain management techniques can be subdivided into: injection of a neurolytic solution and the use of a cryo probe or radiofrequency current to destroy (partially) a nerve. Though the 3 types of denervation techniques differ significantly, there is only one RIZIV/INAMI nomenclature code for the destruction of a nerve or ganglion. The second RIZIV/INAMI code that can be used for interventional pain management techniques, especially for radiofrequency treatment has as description "partial rhizolysis with high frequency current". Both codes may be used for treatment of different nerves and is not specific for the spine and certainly not for the lumbar spine.

The MCD data use the ICD-9-CM codes. One is specific with regard to the target structure: facet denervation, whereas the other covers a wide range of nerve structures (cranial and peripheral nerves) and the various types of denervation techniques.

The analysis of the MCD database relative to the use of the code for percutaneous facet denervation linked with the principal diagnosis learns that of the one-day hospital stays for lumbosacral spondylosis without myelopathy 24.3 % receives this procedure, and 24.7 % of the one-day hospital stays for the diagnostic code "other symptoms referable to back". These findings seem logical from a clinical point of view. On the opposite, the observation that 13.2% of the one-day hospital stays for thoracic or lumbosacral neuritis or radiculitis (radicular syndrome) receive a percutaneous facet denervation is questionable from a clinical point of view.

Surgery, with and without arthrodesis

Information on surgical interventions could be retrieved from the RIZIV/INAMI nomenclature, the MCD database and the longitudinal study from the Socialist Mutuality. Additionally information was obtained from UNAMEC (Association of producers, importers and distributors of medical devices).

In the MCD database 22,940 hospital stays were probably in relation with the surgical management of low back pain. "Fusion" (surgery with use of implants) accounted for 5,384 hospital stays.

Based on the RIZIV/INAMI nomenclature data we found a total number of surgical interventions performed in 2004 of 17,604; (10,142 without arthrodesis and 7,462 with arthrodesis).

In the longitudinal study from the Socialist Mutuality it was found that of the population of 23,447 patients who received radiography of the lumbar spine and a second medical imaging technique within the 365 days thereafter, 1,680 patients (7.2 %) underwent surgery within the year following the first radiography and 475 implants were used. The mean length of hospital stay was 7 days accounting for a cost of € 2.4 million. The total hospitalization cost, paid by the health insurance for the 1,201 studied patients, who underwent surgery in 2004 amounts to € 5.6 million.

The UNAMEC group calculated the number of surgical interventions with arthrodesis, based on the number of bars. The assumption they start with is that 2 bars are used. In 2005; 9,328 bars were reimbursed, 20% is used for other indications. The calculation yields a result of 3,731 interventions with arthrodesis in 2005.

The data obtained through the different databases show a very large variation.

The low number identified in the longitudinal study from the Socialist Mutuality may be explained by the fact that only those patients are included who have undergone surgery in 2004.. It was calculated that the mean duration between radiography and surgery is 117 days with a maximum of 365 days. This means that a large number of patients who will eventually undergo surgery are not included in this study.

It is intriguing to note that the number of hospital stays for spinal surgery retrieved from the MCD database is 23% higher compared with the number of times a RIZIV/INAMI nomenclature code for surgery is used. In the study of the RIZIV/INAMI nomenclature codes the number of codes finally studied was limited to those codes representing 85 % of the total number, so we could expect to find 15 % difference instead of 23 %.

The analysis from UNAMEC found 3,731 surgical interventions with arthrodesis. This is about half the number of times the RIZIV/INAMI nomenclature codes are used for surgery with arthrodesis and 1/4th of the number of hospital stays for "fusion" retrieved in the MCD database.

The MCD database is the only information source that allows estimating the proportion of hospital stays attributed to a given procedure. Surgery represents 60 % of the number of stays in classic hospitalization for procedures linked to a principal diagnosis of low back pain.

Spinal cord stimulation

Spinal cord stimulation is mainly used for the management of failed back/neck surgery syndrome. This is also the indication reimbursed by the social security.

Spinal cord stimulation requires the placement of one or more electrodes in the epidural space, a test period with an external generator and when the test is positive, definitive implantation of the stimulator can be done. The RIZIV/INAMI codes for implants are relatively precise with regard to the number of definitive implanted stimulators and electrodes.

In 2004, 392 neurostimulators were reimbursed for low back pain. There were 1,120 electrodes, or a mean of 2.9 electrodes per neurostimulator. Currently most neurostimulators are connected to two electrodes. The excess of electrodes compared to the neurostimulators can be explained by the fact that electrodes may break or present another defect and must be replaced without replacing the stimulator.

The numbers found in the RIZIV/INAMI nomenclature database for spinal cord stimulation do not exactly match, for example 1,120 electrodes and 81 negative electrodes reimbursed while 1,382 medical acts for placement or replacement are reimbursed.

The MCD database shows that 537 hospital stays are for placement or replacement or removal of spinal stimulators or leads. There were 37% more hospital stays for neurostimulation than number of stimulators implanted. This difference may be attributed to hospital stays for replacement of electrodes.

The information relative to spinal cord stimulation is more precise than any other information retrieved in this study. This is mainly due to the precise description of the nomenclature and ICD-9-CM codes.

3.6.4 Cost estimation of low back pain in Belgium

The literature indicate that the direct medical costs of low back pain account for 10% to 30 % of the total cost [321, 324, 323, 320, 322]. Those studies mainly used a top-down approach based on incidence and prevalence data. Several assumptions are made to estimate the medical and global costs for Belgium, based on the medical costs calculated in this study.

History taking and follow-up

In the age group older than 18 years and younger than 74, 51.44 per 1000 patients consult at least once a year their general practitioner for low back pain (Intego). Social security pays € 11.66 or € 9.01 per consult (according to the status of the person insured). There are 3 450 879 males and 3 389 565 females between 15 and 64 years (Wikipedia).

This means that 351 872 patients would consult the general practitioner at least once a year. Considering that 45.5 % of those patients take prescription medication for over 6 months, it can safely be stated that this group consults minimally an extra 5 times their general practitioner. The result is 160 000 patients x 5 x € 10 = € 8 million

The cost for consultation is thus minimally estimated at

€ 3 518 771+ € 8 000 000= € 11 518 771

Medical imaging

The calculated cost for medical imaging for low back pain patients, members of the Socialist mutuality is € 10.4 million. Socialist Mutuality has 28.13 % market share.

The extrapolated cost for medical imaging in Belgium is € 36 971 205.

Pharmacological treatment

The calculated cost for prescribed and reimbursed pain medication (NSAIDs and narcotic analgesics only) is € 1 308 719 for the Socialist Mutuality. The analysis of the Intego database learns a frequent use of muscle relaxants, topical products, antidepressants, antiepileptics and psycholeptics. Most of those drugs are not reimbursed and were not studied by the Socialist Mutuality.

Extrapolation to the Belgian population is € 4 652 396.

Physiotherapy en rehabilitation

Extrapolation from the information from the Socialist Mutuality gives €8 531 817 for physiotherapy and € 6 754 355 for rehabilitation

For physiotherapy however the survey of Prof. Stappaerts learns that 15 % of all physiotherapy referrals are for low back pain. Applying this extrapolation to the data retrieved from the RIZIV/INAMI nomenclature brings the costs for physiotherapy at € 19 312 615.

Minimal invasive percutaneous pain management techniques

According to the MCD database there are 7 604 hospital stays in one-day hospitalization where the procedure code 9923 (injection of steroids) is linked with a principal diagnostic code for low back pain. There is no uniform method of invoicing this technique. Therefore only the cost for the consultation with a specialist is taken into account (€ 10.69 for the Social security).

This is a serious underestimation of the reality because the costs for one-day hospitalization or hospital forfait are not considered. Moreover, the price of the drugs used is not included. The minimum cost for epidural steroid injection in Belgium is € 81 286.

In the MCD database 3493 hospital stays in one-day hospitalization were found with the two procedure codes that can be used for percutaneous radiofrequency treatment of low back pain (0396: percutaneous facet denervation and 042: destruction of cranial and peripheral nerves).

In the RIZIV/INAMI nomenclature database the codes that may be used for those techniques are 22,946 times used with a cost of € 876 029 or a mean cost of € 38.2 per treatment.

The ambulatory performed interventions are not taken into consideration.

A minimal estimation of the cost for percutaneous radiofrequency treatment is € 133 433.

Surgery

The cost for surgery is composed of several factors described in the longitudinal study of the Socialist Mutuality. The global cost for the population studied is estimated at € 5.6 million. This figure includes all costs incurred in the hospital, but does not count the costs for medical care before and after surgery. Moreover, the population studied is limited to those patients who received radiography of the lumbar spine followed by a CT or MRI. Only the costs for the year 2004 were considered for this specific population. From the 1,680 patients of the selection who underwent surgery within the 365 days following the first radiography only 70 % did so during 2004.

Extrapolation of the costs calculated in de longitudinal study of the Socialist Mutuality to the Belgian population results in € 19 907 572.

The total number of interventions for back surgery in the RIZIV/INAMI nomenclature is 17 604. The multiplication of this figure by the mean cost for back surgery (€ 4 632) gives a completely different result i.e, €81 541 728.

Spinal cord stimulation

The costs for spinal cord stimulation retrieved from the RIZIV/INAMI database is € 3 301 278. Most of the implantations are performed in classic hospitalization. At least 4 days hospitalization per implanted pump must be considered in the cost (392 x 4 x €284 = € 445 312).

A patient returns regularly to the pain clinic for the adjustment of the generator. Each visit costs at least the price of one consultation.

The global medical costs are illustrated in the table below.

Summary of medical cost estimation of low back pain in Belgium

Intervention	Comments	Minimal Cost in €	Adapted costs based on nomenclature
History taking and follow-up	Largely underestimated	3,518,771	11,518,771
Medical imaging	Only for specific population with repeated imaging examinations	36,971,205	
Pharmacological treatment	Only prescribed and reimbursed (no co-analgesics)	4,652,396	
Physiotherapy	Only for specific population with repeated imaging examinations	8,531,817	19,312,615
Rehabilitation	Only for specific population with repeated imaging examinations	6,754,355	
Epidural steroids	Only cost for consultation for the number of hospital stays in one-day clinic, ambulatory performed injections not counted No cost of medication	81,286	
Percutaneous radiofrequency	Only cost for consultation for the number of hospital stays in one-day clinic, ambulatory performed injections not counted, ambulatory performed interventions not counted	133,433	
Surgery	Only costs incurred during hospital stay. Heavily underestimated because of the studied follow-up period	19,907,572	81,541,728
Spinal Cord Stimulation	Only cost for implantation and material, no consultations for / after the intervention and no hospitalization cost, no follow-up costs	3,301,278	3,746,590
		83,852,133	

The costs listed above cannot be considered as exact figures but rather as estimation. It is however obvious that medical imaging, surgery and the management of failed back surgery syndrome with spinal cord stimulation constitute approximately 70 % of the global direct medical cost of low back pain.

The global cost of € 83.8 million is probably largely underestimated. Moreover, based on the published information, this should be considered to be maximum 30 % of the burden of low back pain for society, which brings the rough estimate to € 272 million for the global cost.

When using however the highest direct cost (€ 164,712,379) and using the assumption that medical costs only represent 10 % of the global burden of low back pain (as found in a

Dutch cost of illness study [321] mentioned in introduction) the cost could be as high as € 1.6 billion.

3.6.5 Summary: added value and shortcomings of the databases

This study aimed at identifying and analyzing the available data sources to estimate the burden of chronic low back pain in Belgium.

The first line of care was studied using the Intego database, based on the electronic medical records of a sample of GPs in Flanders. The database provided figures on the incidence of low back pain and its management. However, it did not allow isolating chronic from acute low back pain. The data related to the management of low back pain in general practice were also difficult to interpret because diagnostic and therapeutic interventions were not linked to the diagnosis.

The second line of care was studied through the Minimal Clinical Data (MCD). The registration of diagnoses and procedures per hospital stay in the MCD, based on the ICD-9-CM classification, allows calculating the number of hospital stays related to a particular diagnosis and/or procedure in classic hospitalization and in one-day clinic. The complexity of chronic low back pain, its multiple potential causes and the wide range of therapeutic options made the analysis of the MCD database complicated. Cherkin et al.[340] proposed and validated an algorithm for the study of the incidence of mechanical low back pain and mainly focused on surgical treatment. The main drawback of this algorithm is the fact that minimal invasive percutaneous treatment options are not studied. Therefore the current study extended the number of codes with those reflecting injection therapy, percutaneous pain management techniques and neurostimulation. Additionally, information relative to the codes used for diagnostic procedures was retrieved. In 2004, 40 706 hospital stays with a principal diagnosis of low back pain were registered in classic hospitalization and 45 697 hospital stays in one-day hospitalization. Herniated disc is the most frequent principal diagnosis in classic and in one-day hospitalization. The most frequently listed procedure codes in classic hospitalization are surgery procedures. The ranking according to the frequency of use is: discectomy, fusion and laminectomy. In one-day hospitalizations, the procedure codes relative to injection therapies are the most frequently used. It should be noted that some practitioners perform them during consultations: those procedures are not registered in MCD and their cost differs from the same procedure performed in one-day hospitalization.

Differences in treatment were observed between provinces. It is unclear if they must be attributed to different coding behaviors or if there are really the indication of different management approaches. The information should be retrieved on an individual patient basis to answer to this question.

The RIZIV/INAMI nomenclature is the only database that provides information on reimbursed procedures with the subsequent costs for the social security. The analysis of this database yielded relatively precise information on medical imaging and neuromodulation. Moreover, the number of surgical acts is assumed to be relatively accurate. There is however a confusion with regard to the implants. No indication can be found to attribute a number of implants to low back surgery. The most important cost factor for surgery is the cost of hospitalization. At the time of this study, end 2006, it was impossible to obtain the length of hospital stay per nomenclature number for the year 2004.

Finally, the Socialist Mutuality performed a study on the medical consumption of patients having had an outpatient plain radiography of the lumbar spine followed by a CT and/or MRI within one year (defined as a patient population suffering chronic low back pain). This study provides information relative to the consumption of medical imaging, the use of pain medication, rehabilitation and physiotherapy, and surgery within one year after the first radiography. This study showed the importance of the data sources from the sickness funds, as they have access to data at the patient level and can thus perform a longitudinal analysis.

This study confirms that chronic low back pain patients in Belgium have a very high medical consumption. This is in-line with the findings of an earlier work that estimated the cost of the management of (chronic) low back pain [325]. As an illustration, the comparison between Belgium and The Netherlands revealed that back surgery and the treatment of failed back surgery syndrome with spinal cord simulation were approximately 4 times more frequent in Belgium, with significantly higher costs.

In conclusion, all weaknesses identified in the databases do not allow calculating exactly the total direct cost of low back pain in Belgium. From this analysis, it becomes however clear that there is a high medical consumption incurred by low back pain patients. The high surgery rate and consequent high rate of failed back surgery syndrome is an important part of the high direct medical cost, even if these practices are not supported by evidence in the literature review above.

The analysis of the databases and the difficulties for validating and extrapolating the data underline the complexity of assessing the management of chronic low back pain, as reported in the literature. The currently available registration systems should be improved to include "the reason" for encounter and linking this information to the diagnostic and therapeutic interventions. Direct costs represent however only a small part of the global costs[321, 322]. Therefore the registration should also include information on the incapacity to work.

4 PART III: CHRONIC LOW BACK PAIN AND OCCUPATIONAL HEALTH IN BELGIUM

D. Mazina, D. Paulus, Ph. Mairiaux.

4.1 BACKGROUND

4.1.1 Scope and definitions

Occupational low back pain is a terminology frequently used in publications but its meaning can be manifold. "Occupational" is often understood as equivalent to "work-related" and many epidemiological data show indeed that the physical demands of working activities may influence the prevalence of symptoms reported [331]. There is still however some controversies concerning the size of this effect and the nature of the risk factors explaining this relationship [344, 345].

In this study, "occupational" will be considered as indicating that low back pain is a very common health problem among adults of working age, frequently affecting their capacity for work, causing loss of work time, putting sometimes in jeopardy the worker's employability and requesting from the occupational medicine services and professionals early recognition, adapted prevention and management strategies. The impact of LBP and more specifically chronic low back pain (CLBP) in the occupational setting will be examined as well for back problems usually ascribed to the working conditions (compensated "back injuries") than for back complaints without a known origin or originating in a non-working life event. In practice it is often impossible to distinguish back pain "caused" by work from back pain episodes of uncertain origin that makes the patient's work impossible to carry out.

This part is thus limited to low back pain and back injuries occurring in working populations.

4.1.2 Occupational consequences of chronic low back pain

Literature reviews[344, 346, 347] suggest that between 51% and 84% of people will suffer from low back disorders at some point in their life. Fifteen (15%) to 45% of the population report complaints in the previous 12 months (depending on the study population and the definition of back pain). Data from the European survey on working conditions reveal that for 60% of European workers their job has an impact on their health status: back pain tops the list of all reported work-related disorders, being mentioned by 33% of the sample.

In most cases patients make a full recovery from an episode of low back pain: 60-70% recover within 6 weeks and 70-90% within 12 weeks. However 2 to 8% develop chronic pain and may experience long periods of sick leave. In addition, the recurrence rate for low back disorders is very high: it may concern two-thirds of people within one year. The relapse in work absences varies between 20% and 44% depending on the study.

Low back disorders are very common across all types of industries. Some studies demonstrated that the prevalence is particularly high in specific occupations or types of industries. High prevalence rates are found for example among agricultural workers, construction workers, carpenters, drivers (including truck and tractor operators), nurses and nursing assistants, cleaners, orderlies, domestic assistants.

Precise figures do not exist but approximations of the economic costs of *all* work-related ill health have been estimated to range from 2.6 to 3.8% of Gross National Product in Member States. A study from the Netherlands estimated the total cost of back pain to society to be 1.7% of the gross national product in 1991 [321].

4.1.3 Aims

This part of the project aims at assessing consequences of chronic low back pain in occupational health and describing relevant interventions to prevent and/or manage chronic low back pain in Belgian work settings.

To achieve these aims, two tasks have been performed:

- a literature review to identify relevant guidelines for the management of CLBP in occupational health;
- an analysis of Belgian databases in charge of occupational health, in order to measure CLBP incidence and its consequences in working populations;

The use of those information sources will allow formulating recommendations applicable to the Belgian situation for preventing the transition of sub acute low back pain to chronicity and for promoting a better management of CLBP workers in the enterprises.

4.2 LITERATURE REVIEW ON MANAGEMENT OF CHRONIC LOW BACK PAIN IN OCCUPATIONAL SETTINGS

4.2.1 Objective of the literature review

The objective of this review is to analyze the scientific literature on the consequences of chronic low back pain for the workers' status and employment and on the workplace-based interventions aiming to prevent the transition to chronic low back pain.

4.2.1.1 Definition of the PICO and criteria for selecting the literature

The scope of the literature search and the criteria for inclusion/exclusion of the references are presented the following ones:

PICO and criteria for inclusion and exclusion of references

Type	Inclusion	Exclusion
Population	• Adults subjects (15-65 years) • Working under contract in the public or private sector, suffering from "low back pain" or presenting a "back injury".	• Workers without low back pain • Temporary workers (interim)
Interventions	• Information or education programs for workplace staff: back school, leaflets, etc. • Physical exercises at the workplace • Ergonomics interventions on physical and/or organizational factors • Lumbar supports and/or back belts • Modified working conditions for facilitating return to work after sick leave • Return to work programs • Worker's rehabilitation programs (functional restoration, graded activity, work hardening, ...) • Multidimensional interventions at work specifically aimed at improving RTW	• Clinical interventions provided outside the workplace • Primary health care • Primary prevention ergonomic measures
Outcomes	• Return to work rate, • Absenteeism, sick leave rate and duration, • Disability, disability pension, • Early retirement, • Job change, job loss, • Light duty, • employment	• Global incidence or prevalence of LBP; • Absenteeism unrelated to LBP
Scope of the guideline	• Occupational or clinical practice guidelines on low back pain or concerning one of the above mentioned outcome • Systematic reviews related to occupational LBP or/and one of the above mentioned outcome	• Purely clinical guidelines • Non occupational guidelines • Narrative reviews
Other criteria	• Language: French, English, Dutch • Year of publication (> 1996 for guidelines and > 2000 for systematic reviews)	• Other languages

4.2.1.2 Search methodology

An electronic search was performed for relevant publications from 1996 to 2006 for guidelines and from 2000-2006 for systematic reviews on the following databases: EMBASE, OVID Medline, OVID Cochrane Controlled Trials Register, NHS guidelines Finder, National Guidelines Clearing House, New Zealand Guidelines Group Search and Pedro search database.

The search strategy combined 3 groups of terms, using the "OR strategy" inside the group and the "AND strategy" between groups. The 3 groups were: the disease (low back pain), the field of research (occupational medicine) and the type of reference (practice guideline or systematic review). The search strategy and the results (selected guidelines and systematic reviews) are presented in appendix.

The guidelines identified were appraised using AGREE method, while systematic reviews were appraised using the Cochrane Collaboration grid (Va form for SR). The guidelines and Systematic reviews appraisal is also detailed in appendix 3.2.2-2. The search history for both guidelines and systematic reviews is also detailed in appendix 3.2.2-3

The levels of evidence mentioned in the text belong to the original references. The levels of evidence in the keypoints were indicated according to the classification of Guyatt [1].

4.2.2 Synthesis of evidence

4.2.2.1 Introduction

Limited applicability of international guidelines to the Belgian situation

Only two guidelines, the Dutch[348] and the British ones [349] have been specifically issued to promote a better management of low back pain in occupational settings. The other selected guidelines were issued to promote a better management of low back pain in a broader perspective but included significant developments devoted to the occupational dimension.

It must be stressed that guidelines issued in other countries cannot necessarily be strictly applied in Belgium due to differences in regulations and practices within the health care system. This limitation applies e.g. to the Dutch and British guidelines which give advice concerning occupational health services and the roles of occupational health physicians (OP's).

In the Netherlands, the OP's have access to the information regarding the cause of sick leave and they are requested by the law to play an active role in promoting the worker's return to work. That means that the content of the Dutch guideline also concerns in Belgium the medical adviser of the sickness fund. In the UK, occupational health is mainly under the responsibility of occupational health nurses, while a few occupational health physicians are employed in large companies. Both the Dutch and British situations differ therefore from the Belgian one.

The prevention of long term disability in Belgium in relation with work and employment

In Belgium, the medical advisers (MA) of the sickness funds have legally an important role in the assessment of working capacity and in the medical rehabilitation measures for employees whose fitness for working is diminished for health reasons. The measures are laid down in the sickness and invalidity legislation. They are in accordance with the principle of preventing long-term disability. However these measures are not adopted consistently in the practice: most medical advisers focus purely on evaluation of corporal damage, leaving little or no time for rehabilitation efforts [350].

On the other hand, in the Belgian health system, the occupational health physician is in charge of the health surveillance of a large proportion of the workforce i.e., all workers being exposed to one or several of the occupational risks defined in the law. Depending on the enterprise activities, this proportion may vary from almost nihil to almost 100%. The statistics of the Ministry of Employment and Labor estimate that 61 % of the Belgian workforce under contract are submitted to regular health surveillance by the OP (and about 50 % on a yearly basis). The occupational physician is thus in a unique position to identify low back pain workers who can meet increasing difficulties for performing their job. The OP has also the task to assess the worker's fitness for his/her particular job when he/she comes back at the workplace to resume work after a sick leave period of 28 days or more. The worker may return to work on a voluntary basis or after a medical decision (of the treating physician or of the sickness insurance medical advisor). This examination is called "return to work examination" (**RTW examination** in this synthesis).

The missions of the occupational physician and the sickness fund adviser

Scientific evidence from the 7 selected guidelines and from the 27 SR's was organized according to the main missions of the occupational physicians (Ops) and medical advisers and according to the stage of a low back pain problem.

The OP's missions as defined by the Belgian law can be summarized as follows:

The OP basic mission is being an **adviser** for both the employer and the employees. In practical terms, that means that the OP may be asked to provide information about low back pain. This information can take place **in a collective context** when the OP is asked to do so by the Prevention and Protection at Work committee (a committee where representatives of the employer and the employees (trade unions) are meeting together regularly in all companies with more than 50 employees). More often, the OP gives information about low back pain **at the individual level** either during the periodic health examination or during a visit at the worker's request. In such circumstances, it may be of value to disseminate scientifically sound information as it is well known that wrong beliefs about low back pain are widespread in the population. The first part of the evidence synthesis is thus devoted to a set of « background information » that could be used by OP's in those circumstances.

A second important OP mission is to help the enterprise in assessing risks and defining risk control strategies, in other words, he has **to promote prevention policies**. The second part of the evidence synthesis deals with primary prevention (strategies for preventing the occurrence of LBP) and secondary prevention (strategies aiming at preventing the transition from a sub acute low back pain episode to the chronic stage).

A third mission refers to the **health surveillance** of the workers in order to optimize the man-system interactions, to promote the employability of each worker whatever are his/her abilities and limitations, and to detect as early as possible any work-related disease or health problem.

- A first circumstance is the periodic health surveillance of a worker known to suffer from LBP. This surveillance might occur on a recurrent basis. When encountering such a situation, the OP might have to suggest or to decide a work adaptation, or change.
- A related circumstance is the medical visit spontaneously requested by a worker suffering from LBP problems and experiencing difficulties for facing his job's physical constraints.
- Another circumstance for health surveillance of a LBP worker is the RTW examination.

In addition to the existing regulation a recent adaptation of the law does allow the worker to be examined by the OP during a sick leave period (if this lasts more than 28 days) but at his own request. In this "pre-RTW examination", the OP will **discuss the return to usual work activities**, the time needed to reach this aim, and temporary measures to take at the workplace to help the worker in resuming work. The last part of the evidence synthesis describes the available scientific information regarding programs and strategies that could be implemented in the workplace context to promote return to work among low back pain workers and their effectiveness.

Contrary to the OP, the **medical adviser** (MA) of the sickness fund is entitled to call for a medical examination any worker being absent from work on the basis of the medical certificate given by the treating physician. This medical examination occurs when the social insurance pays sickness benefits. For that reason, most examinations do not occur before 6 to 8 weeks of sick leave.

In the Belgian health care system, many physicians care for low back pain patients and have a role to play either for prevention, compensation of sick leave or invalidity or reintegration at work. Primary prevention of LBP can be promoted by the general practitioner (GP) for lifestyle factors and by the OP for occupational factors. Compensation benefits depend on the GP sickness certificate and its validation by the sickness fund MA (the OP has no role in this matter). For the reintegration of the LBP patient at work, the system gives explicit responsibilities to the GP and MA who both may decide to stop the sickness period. The OP is then in charge to assess the patient fitness for work and to find, if needed, provisional work adaptations to allow an effective resumption of work activities.

4.2.2.2 *OP and MA's mission as advisers: which background information to propose?*

Two of the 7 guidelines analyzed [349, 347] and 7 systematic reviews [351-357] have been used to determine the background information that would be useful to disseminate either at the collective level by the OP or at the individual level for workers suffering from LBP by the OP and the MA.

The employers and workers should be aware of the following statements [349]:

Low back pain is common and frequently recurrent but acute episodes of LBP are usually brief and self-limiting.

Acoording to COST B13, "the lifetime prevalence of low back pain is reported as over 70% in industrialized countries (one-year prevalence 15% to 45%, adult incidence 5% per year). Peak prevalence occurs between ages 35 and 55. Symptoms, pathology and radiological appearances are poorly correlated. Pain is not attributable to pathology or neurological encroachment in about 85% of people… Acute low back pain is usually self-limiting (recovery rate 90% within 6 weeks) but 2%-7% of people develop chronic pain. Recurrent and chronic pain accounts for 75% to 85% of total workers' absenteeism" [347].

Physical demands at work are one factor influencing LBP incidence but they are often not the most important.

The most frequently reported risk factors for LPB occurrence are heavy physical work, frequent bending, twisting, lifting, pulling and pushing, repetitive work, static postures and vibrations [347].

Psychosocial risk factors include stress, distress, anxiety, depression, cognitive dysfunction, pain behavior, job dissatisfaction, and mental stress at work. However, there is limited evidence for these risk factors and those that are well documented have small effect-sizes [347].

The conclusions of Hartvigsen et al [354] support those from COST B13. They conclude that there is moderate-quality evidence for no association between LBP and perception of work, organizational aspects of work or support at work. There is insufficient evidence for a positive association between stress at work and LBP.

Prevention and case management need to be directed at both physical and psychosocial factors.

The British guideline recommends that the occupational health practitioner would support the worker with LBP, whether or not occupational factors play any causal role. The same perspective should apply in Belgium to the MA of the sickness fund.

"There is considerable scope, in principle, for prevention of the *consequences* of LBP – e.g. episodes (recurrence), care seeking, disability, and work loss" [347]. Those statements are not clearly supported by evidence. For the British guideline, [349], care seeking and disability due to LBP depend more on complex individual and worker-related psychosocial factors than on clinical features or physical demands of work (strong evidence). A recent review [357] is in line with this conclusion. Its results suggest that changes in behavioral variables and reductions of disability could be more important than physical performance factors for a successful treatment of CLBP.

When considering the consequences of LBP and their prevention, it is worth making a distinction between the prediction of recurrences and the predictive factors of care seeking, sickness absence, disability and work loss.

The British and COST B13 guidelines and the systematic review of Fayad [353] all concluded that the most powerful risk factor for a new episode of back pain is a previous history (including e.g. the frequency and duration of episodes, radiating leg pain, previous surgery). In addition the review of Fayad showed that physical demands at work (manual handling duration, non-neutral postures) seem also to play a role (moderate-quality evidence).

The prognostic factors of care seeking, disability and sickness absence when suffering from LBP are discussed in the section 4.2.2.5.

4.2.2.3 Is information provision at a collective level useful for prevention purposes?

In the literature, there is a considerable overlap and unfortunately also confusion between information or education strategies on the one hand, and back school or back school programs on the other hand. A back school includes by definition an important educational component, together with other modalities like physical exercises.

As underlined by the COST B13 expert group, most reviews have been "lumping" information/advice/instruction interventions into one group, mostly named "educational interventions" and most studies evaluated the effects of interventions referred to as "back schools". For these reasons, until very recently (see below), there was no clear scientific evidence regarding the usefulness of purely informative strategies, like distributing pamphlets to the whole workforce in enterprises, or to patients populations.

The COST B13 group concluded that there is insufficient evidence to recommend for or against psychosocial information delivered at worksite, but that information oriented towards promoting activity and improving coping may promote a positive shift in beliefs. They stated that the evidence is not sufficiently consistent to recommend education in the prevention of recurrence of sick leave due to LBP.

Henrotin's systematic review [25] on the role of "Information in LBP management" states that there is strong evidence that a booklet increases the knowledge, and moderate-quality evidence that physician-related cues (i.e. a physician photograph) increase the confidence in a booklet and the adherence to exercises. There is limited evidence that a biopsychosocial booklet is more efficient than a biomedical one in shifting patient's beliefs about physical activity, pain and consequences of low back trouble. For these authors, there is strong evidence that booklets have no effect on absenteeism and conflicting evidence that they are efficient on healthcare use. There is no evidence that e-mail discussion or video programs alone are effective to reduce low back pain, disability, and health costs.

In brief they conclude that information based on the biopsychosocial model is recommended in primary prevention to shift patient's (or workers) beliefs on low back pain (moderate-quality evidence). Nevertheless, information delivery alone is not sufficient to prevent absenteeism and to reduce healthcare costs.

Key points: background information to be given by the occupational physician or the medical adviser of the sickness fund.

- **The occupational physicians and the medical advisers of the sickness funds have to play a role in making workers and employers aware that:**
- **LBP is a frequent problem in people of working age. The lifetime prevalence is around 70 %, the one year prevalence varies from 15 to 45% and the adult incidence is 5 % per year. Higher yearly prevalence figures have been consistently reported in occupations where the tasks involved repeated manual material handling or awkward postures or whole body vibration : typical examples are nursing aids and various occupations in the building sector**
  (High-quality evidence)
- **Acute episodes of low back pain are usually self-limiting (recovery rate 90 % within 6 weeks) but 2 to 7 % of people may develop chronic pain (Moderate-quality evidence).**
- **Low back pain is common in all occupations. Physical demands at work are one factor influencing LBP incidence but are often not the most important (Moderate-quality evidence).**
- **Prevention strategies must make a distinction between etiologic and prognostic factors. As the primary causative mechanisms of low back pain remain largely undetermined, risk factors reduction (primary prevention) will not necessarily be effective in reducing the incidence of LBP episodes (Low-quality evidence).**
- **Prognostic factors of LBP consequences, especially care seeking and disability, are more often complex individual and worker-related psychosocial factors than clinical features or physical demands of work (High-quality evidence). Prevention of the transition of back pain to chronicity should thus address preferably work-related psychosocial factors.**
- **The most consistent predictor of LBP recurrence is a previous history of LBP (High-quality evidence); physical demands at work play also some role (Low-quality evidence).**
- **Incorporating the main messages drawn from current clinical guidelines addressing the general population into workplace information is encouraged.**
- **Information oriented towards promoting activity and improving coping may promote a positive shift in beliefs (moderate-quality evidence); disseminating at the work site information based on the biopsychosocial model may be useful (Very low-quality evidence).**

4.2.2.4 OP's mission to promote prevention strategies in work settings

Back schools

This type of intervention has been analyzed and described in the first part of this study. In practice, back schools differ widely in duration, intensity and content, those differences making difficult an assessment of their effectiveness.

In the present literature review, three guidelines [3, 349, 347] and three systematic reviews [100, 147, 358] have been identified to assess the evidence of "Back school".

COST B13 guideline and both Nachemson and Heymans SR's concluded, with a strong evidence, that "Back Schools" only based on traditional biomedical/biomechanical information, advice and instruction are not recommended for the prevention of low back pain.

In the occupational health context however, a recent Cochrane Systematic Review [147] based on 19 RCT's concluded that there is moderate-quality evidence suggesting that back schools for CLBP in an occupational setting, are more effective than other treatments and placebo or waiting list controls on pain, functional status and return to work during short and intermediate-term follow-up.

Lumbar supports and back belts

Back belts, lumbar supports and braces cover a variety of devices used by workers. Their rationale is that they reduce mechanical constraints on the lumbar spine leading to pain and inflammation reduction.

Back belts are often used in combination with other interventions and it is difficult to determine if a possible benefit comes from the back support or from other components of the intervention [347]. Furthermore, the compliance with wearing lumbar support varies substantially and the information on compliance is often neglected in some original studies [359].

The British and COST B13 guidelines concluded that there is strong evidence of no effect of lumbar supports in the primary prevention of low back pain.

The Tveito [360] and van Poppel [361] SR's reached respectively the conclusion of "evidence of no effect", and "no evidence of effect" of back belts. The Canadian Task Force on Preventive Health Care [362] concluded that the existing evidence is conflicting and does not allow making any recommendation for or against the use of back belts either to prevent occupational LBP or to reduce lost work time due to occupational LBP; an update [359] confirmed the conflicting evidence.

A former Cochrane systematic review [101] concluded (about lumbar supports) on moderate-quality evidence in primary prevention of LBP. There is no evidence on the effectiveness of lumbar supports in secondary prevention and limited evidence in the treatment of LBP.

Regarding RTW, van Tulder [101] concluded that there is conflicting evidence that patients wearing a lumbar support return to their work more quickly than patients who use another type of treatment. Finally, evidence is conflicting on the effectiveness of lumbar supports improving the back pain specific functional status compared to other types of treatment.

In summary, there is moderate-quality evidence of the non-effectiveness of lumbar supports in prevention of LBP occurrence or in promoting early return to work. For this reason, they cannot be recommended.

Shoes in-soles, soft shoes, soft flooring or antifatigue mats and shoe inserts/orthoses

Only the COST B13 guideline addresses specifically this issue in the prevention of LBP occurrence. The authors analyzed 2 RCTs [363, 364] devoted to the use of shoe inserts/orthoses among military personnel and concluded that there is evidence of no effect; shoe inserts/orthoses are thus not recommended. No scientific evidence is available to recommend for or against in-soles, soft shoes, soft flooring or antifatigue mats.

Physical and organizational ergonomics interventions

Two guidelines [349, 347] and one SR [360] analyze the effect of physical ergonomics interventions.

The authors of COST B13 focused their review first on the prevalence and severity of LBP and secondly on back injuries and occupational LBP.

The results of the five (good-quality) studies on prevalence and severity of LBP were conflicting. Three of them concluded that physical ergonomic interventions reduced the

prevalence and severity of LBP. Two other ones did not report any improvement following the changes intended to reduce exposure to physical risk factors.

In respect of reducing (reported) back injuries, most studies reported physical ergonomics intervention to be successful. One study did not find any lower injury rates in the intervention group.

COST B13 conclusions were that there is insufficient evidence to recommend physical ergonomics interventions alone for the prevention of LBP occurrence. There is moderate-quality evidence that, to be successful, a physical ergonomics program would need an organizational dimension and involvement of the workers but there is insufficient evidence to specify the content of such interventions.

Multidimensional interventions at the workplace

Multidimensional interventions may involve a combination, in a variable extent, of several prevention measures such as worker education and training, ergonomics assessment and modification, or physical fitness training. Two guidelines [349, 347] and one systematic review [360] discuss specifically the effect of multidimensional interventions.

Based on two SRs [365, 360], COST B13 authors stated that multidimensional interventions at the workplace can be recommended (strong evidence). However it is not possible to state which dimensions are the best ones and in what balance. The size of any effect may be modest.

The British guideline also underlined the importance of a multidimensional approach. The prevention and case management need to be directed at both physical and psychosocial factors (no evidence level given).

Key points: Promoting prevention strategies in the work setting, a task of the occupational physician

- **Encouraging workers to take part to back school programs if only involving traditional biomedical/biomechanical information, advice and instruction is not recommended for the prevention of LBP (Moderate-quality evidence).**
- **A back school including an exercise component and organized in occupational settings (or in a close relationship with it) may reduce pain, improve function and return to work status at the short and intermediate term compared to other treatment modalities (Moderate-quality evidence).**
- **Lumbar supports or back belts have no effect in preventing LBP occurrence or LBP recurrence and are thus not recommended (Low-quality evidence).**
- **Shoes inserts or orthoses have no effect in preventing LBP occurrence (Very low-quality evidence).**
- **Shoes insoles, soft shoes, soft flooring or antifatigue mats are not recommended for preventing LBP (Very low-quality or no evidence).**
- **Physical ergonomics interventions alone cannot be recommended. To be successful in LBP primary prevention, a physical ergonomics program would need an organizational dimension and the involvement of the workers (Low-quality evidence).**
- **Multidimensional interventions at the workplace (involving educational component, ergonomic intervention or task modification and/or physical activity), are recommended to prevent LBP (Moderate-quality evidence).**

4.2.2.5 *Management of workers off work with low back pain - tasks of the medical adviser of the sickness fund and of the OP*

Background

The MA has a legal responsibility in assessing workers with a prolonged sick leave while the role of the OP remains optional, depending of the worker own request for a "pre-RTW examination".

The objectives of an adequate management of sick listed workers are to prevent or reduce the consequences of LBP: delayed return to work, health care seeking behaviors, taking on a sick role, entering social isolation. A key element in this assessment is the search for "yellow flags" (see below). The physician will also suggest to the worker one of the following interventions: exercise therapy, light duty and/or ergonomic workplace adaptations, participation to multidisciplinary treatment programs or return to work programs.

Assessment of work related factors and "yellow flags"

The definition of the "yellow flags " has been detailed in the first part of this study.

Psychosocial "Yellow Flags" are important to identify workers at particular risk of developing chronic pain and disability [348, 349, 366, 347]. The guidelines vary however in recommendations as to when an explicit screening of those factors should be performed. The COST B13 suggests doing it for patients with recurrent LBP episodes or no improvement with time in the current episode. When some yellow flags are identified in a LBP worker, the New Zealand Guideline advises to provide a positive message that seems to reduce disability and workers compensation costs related to back pain (moderate-quality evidence).

The assessment of a worker who suffers frequently (or continuously) from LBP should include other prognostic factors of chronicity than "yellow flags" [366, 347]. Those prognostic factors of chronicity are however still controversial.

When sick leave is considered as a specific outcome, conclusions drawn from the available literature can be summarized as follows:

- No or inconsistent evidence for the influence of occupation (job title), occupational types (blue collar versus white-collar), self reported and observed work demands strength and postures, and perception of work [351, 354-356]. An effect of occupation could be seen when fine gradation of occupational categories are considered (i.e. transportation, construction workers)[351].

  - In non CLBP populations, two SRs show a strong evidence for longer sick leave among workers doing heavy work or occupied in heavy occupations with no available modified duty [351, 355].
  - In acute LBP patients a strong influence of age and gender is found in Steenstra's review [355]. This relation is not found in Kuijer's review [356] that deals with sub acute and chronic patients populations.
  - Strong evidence for the role of psychological distress /depressive mood [352] and for social isolation and social dysfunction [355]. These results are in line with the moderate-quality evidence found in Fayad review [353] for psychological status and depression. Pincus' review also found a moderate-quality evidence for the role of somatization, scarce evidence for fear/anxiety, limited evidence for the role of cognitive factors, limited evidence for the role of dysfunctional personality[352].
  - Conflicting evidence for the influence of job satisfaction: strong evidence [353, 367], moderate-quality evidence [358], no evidence [356] and evidence of no association with sick leave duration [355] were found. The conclusion of previous guidelines (the British one and COST B13) are thus put into question by more recent reviews. They considered job satisfaction as either an important predictive

factor of long duration sick leave or as one of the most important organizational characteristic associated with sickness absence rates,

- The influence of stress at work and the Job Strain model components is questioned by the most recent reviews: significant influence of low workplace support [351], moderate-quality evidence for no association with stress and social support at work [354], more evidence needed [355], no evidence for psychological demands and co-worker support [356]. Hence more recent SR's do not fully support the conclusion of COST B13 (strong evidence) regarding the influence of workplace social support as a predictor of chronicity in patients with acute LBP.

In summary, this synthesis shows that it is more important to assess psychological factors like distress/depressive mood and to identify tasks with a high physical loading than to look at organizational aspects or social support at work.

Physical exercises

Exercise therapy encompasses a heterogeneous group of interventions ranging from general physical fitness or aerobic exercise to muscle-strengthening and various types of flexibility and stretching exercises [138].

Four guidelines [348, 349, 105, 347] and 6 systematic reviews [100, 143, 139, 360, 361, 138] were found to analyze the effectiveness of exercises.

A summary of evidence has been described in Part I of this study, under section "Rehabilitation/Exercise therapy". In the occupational context, only the conclusions addressing populations of sub acute or chronic LBP workers could be meaningful:

- There is a moderate level of evidence that exercise is more effective than general practitioner usual care;
- The positive short term modest effect observed on pain intensity and function may not be superior to the effects of more conventional treatments (as physiotherapy);
- There is a low to moderate quality of evidence supporting a significant reduction in days lost in the year following treatment among workers with symptoms lasting more than 4 weeks [139];
- No evidence for the superiority of any type of exercise.

Modified work and ergonomic workplace adaptations

Four guidelines [348, 349, 366, 347] and one systematic review [367] deal with modified work.

Irrespective of the evidence on physical and organizational ergonomics that specifically influence outcomes, COST B13 [347] experts endorsed the pragmatic view from Hadler [368] that "*Work should be comfortable when we are well and accommodating when we are ill"*. They recognized that ergonomics has a role in formulating modified work to facilitate early return to work[331].

The COST B13 review combined several types of modified work interventions into one group. First of all, they recognized that modified work is often part of a multidimensional intervention. So the separate effects of modified work and the other components of the intervention cannot be disentangled. Secondly, there is substantial variation in the content of a "modified work". The three predominant categories are (1) light duty or work restriction or adapted job tasks; (2) reduction in the working hours/day and/or working days/week and (3) ergonomic changes to the workplace. Depending on the social system in different countries, modified work can also involve 'therapeutic return to work' (as in Quebec) or 'work trial'. It is difficult to separate what could be effective in these different scenarios. Hence, there is no evidence that any type of modified work is superior to another, but based on two studies [369, 370] COST B13 concluded that there is evidence (no level specified) to support ergonomic work place adaptations in respect of facilitating

return to work. In conclusion, they found moderate-quality evidence that temporary modified work and ergonomic workplace adaptations facilitate earlier return to work for LBP workers.

The authors of NVAB 1999 and RCP 2000 concluded that some modifications might facilitate a return to work at an early stage (moderate-quality evidence). The SBU 2004 systematic review concluded that high quality evidence shows that a gradual reactivation of patients suffering from sub acute low back pain, in combination with treatment of pain behavior, helps to reduce chronic functional problems and sick leave from work.

The authors of the New Zealandguideline concluded that if the physical demands of the patient's job are high, workplace modifications may be needed (strong evidence). So, occupational practitioners should advise the employer on how to seek specialist occupational health advice, provide a plan for progressive return to work, encourage ongoing contact with work, support a return to activity with pain relief, if needed give advice on monitoring and managing activities that cause pain, finally provide advice on changes to the rate, duration and nature of work.

In summary, based on this evidence synthesis, the OP should consider temporary adaptations of the job or pattern of work and advises employers on ways in which the physical demands of the job can be temporarily modified.

Multidisciplinary treatment programs and other interventions in occupational settings

Multimodal treatment programs are based on the bio-psycho-social model of pain, which suggests that physical, psychological and social factors may play a role in decreasing pain and disability and influence positively the return to work [152]. To be considered as "multidisciplinary", those programs should include the physical component and at least one of the two other basic components, psychological or social.

- Physical component: program of exercises aiming at the physical reconditioning of the patient; this part of the program could follow if needed the model of "functional restoration", meaning an intensive training under supervision with repeated measurements of performance (muscular strength, aerobic power, ….); this component frequently includes also an educational component (back school) aiming at giving the patient a better understanding of his health problem and to train him, in a practical way, on the safe techniques and postures for protecting the back exposed to mechanical constraints during work activities and daily life.
- Psychological component: this consists in an evaluation of the emotional component of the pain, including kinesiophobia, and to propose, with the participation of a psychologist an intervention that could take various forms as for example behavioral approach with operant conditioning, cognitive approach, relaxation.
- Social component: this component, often less well described, may include an evaluation of the patient family situation, his social situation particularly in terms of employment; it can also involve an ergonomic intervention at the workplace.

The multidisciplinary treatment programs are analyzed in one guideline [347] and 7 SR's [371, 155, 372, 373, 153, 360 367].

The review of Schonstein et al [153], based on 18 RCT's (to May 2000), concluded that for workers with LBP, there is evidence that physical conditioning - work oriented (functional restoration/work conditioning/hardening) programs that include a cognitive-behavioral approach and that are implemented either in the work setting or in collaboration with the enterprise are more effective than the general practitioner usual care or advice in reducing the number of sick days lost at 12 months follow-up (on average minus 45 days; IC: 3- 88). The review of Tveito et al [360] reached similar conclusions with moderate-quality evidence. Those authors added that no documented effect was found regarding the

intervention costs. They observed also a positive effect (low-quality evidence) for the prevention of new LBP episodes.

In a less recent systematic review, Karjalainen et al. [373] selected trials conducted in working age adults and aiming at preventing the transition from sub acute to chronic LBP; only the two trials carried out in a Volvo company assembly plant on the one hand and in Sherbrooke (Quebec) on the other hand corresponded to those criteria. Due to some shortcomings in the trials, they concluded that there was only moderate-quality evidence that multidisciplinary rehabilitation, which includes a workplace visit or more comprehensive occupational health care intervention, helps patients to return to work faster, results in fewer sick leaves and alleviates subjective disability. Concordant conclusions were formulated in the Nielson et al [371] systematic review. For those authors, multimodal biopsychosocial treatments that include cognitive-behavioral and/or behavioral components are effective for chronic low back pain and other musculoskeletal pain for up to 12 months (moderate-quality evidence). The Swedish review [367] concluded also to strong evidence that multidisciplinary treatment is effective in pain relief and functional improvement for patients with long term and severe CLBP.

The SR of Guzman et al [152, 155] needs to be commented: These authors selected RCT's including a dominant component of physical reconditioning and directed to adults patients with disabling LBP for more than 3 months. For these reasons, only 3 out of the 10 RCT's analyzed have also been studied in the Schonstein's systematic review [153]. The 10 RCT's provide moderate to strong evidence that intensive revalidation (> 100 hr) and multidisciplinary bio-psychosocial rehabilitation with functional restoration reduces pain and improves function in CLBP patients. Less intensive (< 30 hr) interventions did not result in improvements for the clinically relevant outcomes. This review includes some conflicting results in terms of sick leave. The authors insisted also on the lack of sufficient data on the cost-effectiveness of the mentioned interventions.

The Ostelo et al [372] systematic review brings an original contribution in analyzing the impact of multidisciplinary treatment programs in subjects having undergone disc surgery. The authors conclude that there is a strong evidence for a short term effect of intensive exercise programs (at least if started about 4-6 weeks post-operative) on functional status and faster return to work; at medium term (12 months) however, an intensive program is not better than a moderate one regarding the global clinical improvement of the patients. The same SR found no evidence that such programs increase the re-operation rate. Also there was no evidence that patients need to have their activities restricted after lumbar disc surgery. It is unclear nevertheless what the exact content of post-surgery rehabilitation should be and the optimal delay before starting it.

The COST B13 guideline, stated based on the Karjalainen SR, that multidisciplinary treatment programs in occupational settings may be an option for workers with sub acute low back pain and sick leave for more than 4–8 weeks. They concluded that there is strong evidence that intensive multidisciplinary biopsychosocial interventions are effective in terms of return to work, and work-readiness. For chronic low back pain, the guideline recommendations are based on the two SR's of Schonstein and Guzman described above. After seeing that there is a strong evidence for the effectiveness of those programs on pain, functional status, RTW and sick leave, the group of experts recommend those multidisciplinary psychosocial programs for patients with CLBP when the mono-disciplinary treatment is not effective.

Advice to stay active and continuing ordinary activities

Prolonged inactivity, like bed rest for more than two days, leads to the deterioration of many body functions, and may therefore inhibit the healing of LBP (see part I). When the MA or OP has to examine a worker in the prospect of a future return to work, it is of value to identify the use of such passive treatment modalities so that the physician should advise the worker to stay active.

This issue had been examined by most of the retrieved guidelines [374, 348, 349, 105, 366, 347]). Except the Cochrane SR discarded because of the methodological problem identified by the Cochrane Back Review Group [148], no other SR has been identified treating this issue.

The guidelines recommend to encourage workers to stay active and to return to work for continuing normal duties (strong evidence in COST B 13, RCP 2000, and Philadelphia Panel 2001) and without evidence level for NVAB 1999, ACC 2004 and FMH 1997. The authors of ACC 2004 concluded moreover that it is necessary to keep the individual active and at work if possible, even for a small part of the day; this will help to maintain work habits and work relationships.

Key points: Management of workers off work with low back pain to prevent chronicity and disability

The physician (MA or OP) examining a worker off work due to low back pain should consider the following interventions:

For diagnosis:

To assess "Yellow Flags" in order to identify workers at risk of developing chronic pain and disability;

To assess work-related prognostic factors of chronicity and disability: the duration of sick leave in sub acute LBP workers is increased among workers doing heavy work or occupied in heavy occupations without any possibility of modified duty (low-quality evidence). It is also influenced by psychological distress / depressive mood or social isolation of the worker (moderate-quality evidence)

There is low-quality evidence for a possible influence of job satisfaction, stress at work and the various components of the Job Strain model (demands, control, and support).

For treatment:

The OP should advice the LBP worker to increase progressively his level of activity and to enter an exercise program under supervision if a fear of movement or an excessive resting behavior is identified (moderate-quality evidence). No particular type of exercise can be advised (low-quality evidence).

The OP should consider temporary modified work (light duty, adapted job task, reduction in the working hours or days, and ergonomic workplace adaptations) to facilitate an earlier return to work (moderate-quality evidence).

The OP should encourage the worker to participate to multidisciplinary treatment programs including intensive physical reconditioning (high-quality evidence). However their cost effectiveness has still to be studied.

For workers with sub acute low back pain and sick leave for more than 4–8 weeks, multidisciplinary treatment programs in occupational settings may be an option (moderate-quality evidence).

The OP and MA should encourage workers to stay active and to continue their usual activities (high-quality evidence).

4.2.2.6 Managing workers considering return to work after more than 4 weeks sick leave

Five guidelines [374, 348, 349, 366, 347] and six systematic reviews [375, 178, 376-378, 356] are considering return to work concepts and some of them are reviewing the effectiveness of interventions aiming at an earlier return to work.

RCP 2000 is giving a very interesting background to the RTW concept. As underlined by these authors, concern about return to work with residual symptoms is often expressed by the workers themselves, their representatives, primary care health professionals, medical advisers and occupational health professionals as well as supervisors and management, particularly if the LBP is attributed to work and if there is thought to be a risk of 're-injury'. This concern is natural but illogical. Studies of the natural history show that LBP is commonly a persistent or recurrent problem, and most workers do continue working or return to work while symptoms are still present (RCP citing Carey et al. [379]): if

nobody returned to work till they were 100% symptom free only a minority would ever return to work. Epidemiological and clinical follow-up studies show that early return to work (or continuing to work) with some persisting symptoms does not increase the risk of "re-injury" but actually reduces recurrences and sickness absence over the following year. Conversely, the longer someone is off work the *lower* the chance of recovery. Undue caution will form an obstacle to return to work and lead to protracted sickness absence, which then aggravates and perpetuates chronic pain and disability.

Well designed interventions having definite target population, precise time frames for intervention, and a set of predetermined components are called "return to work (RTW) programs". Most RTW interventions or programs have been designed in reference to the biopsychosocial model of low back pain [178]. They do include to a variable extent; educational components, physical conditioning, some cognitive behavioral components and, for some of them, a structured intervention at the work place or some form of close interrelationship with some partners in the enterprise. Based on this description, it must be pointed out that there may be some overlap between multidisciplinary rehabilitation programs and RTW programs in terms of content.

While ACC 2004 and NVAB 1999 guidelines promote return to work policies in general terms, RCP 2000 and COST B13 strongly underline the need for an early intervention in the sub acute phase of low back pain.

As stated by COST B13, "the longer a worker is off work with LBP, the lower the chances of ever returning to work". Most clinical interventions are quite ineffective for a RTW once the workers have been off work for a protracted period with LBP.

Conversely, the review of Elders[375] underlines that a RTW intervention should not be carried out too early in the evolution of LBP but preferably after 60 days. This review also stresses that the outcome in terms of return to work is better in interventions combining exercises, functional conditioning and training in lifting techniques with an educational, back school type intervention.

The review of Meijer[378] shows that evidence for RTW effectiveness is mainly restricted to low back pain population and much less for other non specific musculoskeletal disorders. In their review the authors concluded that 12 programs have no effect on RTW, seven a positive effect and three a positive effect in some subgroups.

The two most recent reviews [376, 377] show the best quality of evidence in favor of workplace based RTW interventions. In Hlobil's review[377] interventions for sub acute LBP workers were compared to usual care. This review concluded to a high-quality evidence for the effectiveness on return to work rate at 6 months follow up but the results are conflicting at 12 months. High-quality evidence was also found for the reduction of the number of days of absence from work at 12 months and further between 2 years and 6.4 years of follow up. Evidence was conflicting as regard improvements in functional status or pain.

In the Franche's review[376], 10 high quality studies were included and the authors concluded that work disability duration is significantly reduced by work accommodation offers and contact between the health care provider and the workplace (strong evidence). Disability duration was also reduced by interventions which included an early contact with the worker by the work place, an ergonomic work site visit, and the presence of a RTW coordinator (moderate-quality evidence). Like in Hlobil's review [377], there was a weak evidence for a positive impact of RTW intervention on pain and functional status. Insufficient evidence was observed regarding the impact of supernumerary replacement.

A last point of interest within an occupational context is provided by Kuijer[356] review which shows a consistent evidence for the worker's own expectation of recovery as being a predictor of return to work decision; similar observations are underlined in COST B13 review. These results suggest that the OP should, on a systematic basis, ask such a question to the worker when return to work is considered in the future or near future.

Key points: Management of workers having difficulties to return to work after more than 4 weeks sick leave

The OP (or the MA) should always ask the worker, when planning RTW, what his/her own expectations are; such a self assessment is an excellent predictor of the actual decision to be taken by the worker (moderate-quality evidence).

The workplace components of "return to work" programs (work accommodation offers, contact between health care provider and the workplace, contact with the worker by the supervisor, ergonomic worksite visits) have been shown to be effective in increasing RTW rates in the intermediate term (High-quality evidence), in reducing lost work days at medium and long terms (High-quality evidence); they may however not have an impact on pain and functional status (Low-quality evidence).

The OP is thus encouraged to promote in his company, in his occupational health service or in collaboration with other health providers the setting up of "return to work programs" for helping workers resuming their usual duties

4.2.3 Summary of evidence for occupational settings

Intervention	Quality of evidence
Background information at the individual or collective level	Moderate-quality evidence
Advice to stay active	High-quality evidence
Work related yellow flags	High-quality evidence
Back school programs	Moderate-quality evidence
Lumbar supports	Low-quality evidence
Shoes inserts or orthoses	Very low-quality evidence
Shoes in soles	Very low-quality evidence
Physical ergonomic interventions	Low-quality evidence
Multidimensional intervention at the workplace	Moderate-quality evidence
Modified work (light duty)	Moderate-quality evidence
Multidisciplinary treatment programs	High-quality evidence
Discussing worker's expectations for return to work	Moderate-quality evidence
Return to work programs	High-quality evidence

4.3 ANALYSIS OF BELGIAN DATABASES FOR ASSESSING CONSEQUENCES OF CHRONIC LOW BACK PAIN

4.3.1 Introduction

The first step was to identify all institutions that could have a database of interest for this study on CLBP.

The Belgian National Institute for Sickness and Invalidity Insurance (INAMI– RIZIV) is obviously the most interesting institution: this body deals on the one hand with medical costs and on the other hand with benefits paid to the workers when they are off work. Unfortunately, the current INAMI/RIZIV databases do not allow linking the sick leave compensation benefits to the ICD codes for diagnosis (e.g. low back pain). Only some sickness funds ("mutuelle/"mutualiteit") would have specific databases with this link but these were not available for this study.

The INAMI-RIZIV does also publish an annual report for long invalidity periods, i.e. more than 365 days. Those invalidity data are classified by broad disease categories. The data related to chronic low back pain are thus included within a larger category dealing with all locomotor system diseases. A recent study shows that the locomotor system diseases are the first cause of invalidity among male workers (28%) and the second one, after mental disorders, in female workers (27%). Among employees, the first cause of invalidity is mental disorders among both men and women. In women the locomotor system diseases are the second cause (19%), while among men they are the third cause (16%) just after cardio vascular diseases.

Other Belgian institutions were also considered as having possible data of interest: the institutions dealing with work accidents, those in charge of handicapped people and finally the occupational health services. In particular, a postal survey was carried out among 19 external prevention and protection at work services (SEPP/EDPB - see results in appendix) in order to check for the availability of computerized medical data. A personal contact was furthermore taken with the two services known by the authors as having a medical (and not only administrative) database.

The detailed results of the survey are presented in appendix. Twelve of the 19 services contacted (63.2%) answered the questionnaire. Out of those, 9 services (75.0%) have a computerized system for encoding medical data, but only 3 of the 12 services (27.0%) who responded to the question use currently the ICD-9-CM system for codification of diseases. Four of those who do not use it currently are planning to use it in the future. Regarding the scientific use of data, 7 of the 10 responders agreed that their databases could be used for scientific purposes, 5 services are planning to have a computerized database for their medical data and 3 of them plan to do so within the next 12 months.

A request for collaboration was introduced to the following institutions who answered positively to this demand:

- Fonds des Accidents de Travail – Fonds voor Arbeidsongevallen (FAT-FAO), the institution in charge of processing work accidents statistics at the national level,
- Agence Wallonne pour l'Intégration des Personnes Handicapées (AWIPH), the institution dealing with disabled people in Wallonia.
- Intermédicale prevention and protection at work service (now called Attentia),
- IDEWE prevention and protection at work service.

The research team organized a meeting with each institution in order to evaluate the possibility to analyze their database based on the following criteria: potential completeness, rigorous data recording and use of ICD-9-CM codes. Only two institutions, FAT/FAO and Intermedicale, were finally selected for this analysis.

The FAT-FAO database was selected because of its potential completeness, the effective and rigorous recording of data since 1995 and the excellent collaboration with the resource persons. This database allowed to evaluate the frequency of occupational accidents inducing a "back injury" and to assess their consequences in terms of sickness absence duration or permanent disability.

The INTERMEDICALE database was also selected because of its potential completeness, precision in the record of data and the use of ICD-9-CM codes. It was thus possible to identify the low back problems among the medical examinations carried out when returning to work (after at least 28 days sick leave).

It must be underlined that the FAT-FAO and the INTERMEDICALE databases involve data collected in different social and regulatory contexts. In the Belgian health system, compensations benefits after work injury are more advantageous than sickness benefits. In the work accident context, the attribution of benefits depends on the decision of the work compensation (private) insurer, while sickness benefits are attributed on the basis of the decision taken by the treating physician: the attribution is automatic and can only be suspended by the medical adviser from the sickness fund.

The computerized databases of AWIPH and IDEWE were considered as not adequate for this study. They are nevertheless briefly described hereafter, in order to show their level of validity, usefulness and completeness.

4.3.2 Databases not selected

4.3.2.1 AWIPH database description

The Walloon Agency for Integration and Protection of Disabled Persons, AWIPH, is a public organization created in 1995 by a Walloon's Council decree, in order to manage the Walloon policy for the integration of disabled people. The AWIPH aims to supply a support for job, training and financial assistance to disabled people. It certifies and supports all Walloon institutions which deal with employment, training, and counseling for disabled people.

4.3.2.2 Reasons for non inclusion

The AWIPH contact person agreed to collaborate on the project but unfortunately, it became soon clear that AWIPH does not have specific statistics for low back pain, as the location of the disability origin is not recorded (see appendix for the list of pathologies recorded in this database).

4.3.2.3 IDEWE database description

IDEWE is the largest Belgian Prevention and protection at work service. Its mission is to offer the employers a good quality service in terms of training and promoting well being at work for their staff. It involves various departments including "risk management, medical follow-up, publication and documentation, research and development".

IDEWE provides an efficient medical follow-up and risks management with more than 450 qualified staff members (physicians, nurses, administrative, engineers, ergonomists, occupational psychologists ...) to more than 33.000 affiliated employers (from private and public sectors).

It covers an overall population of 574.000 workers (mainly in Flanders and Brussels) whom 307.000 (53.5 %) are submitted to a regular health examination by the occupational physician (OP).

4.3.2.4 Reasons for non inclusion

For each medical encounter, the OP fills in a standardized A4 paper sheet designed such as to allow a subsequent optic reading by the IDEWE computer system and the corresponding variables incorporation in a centralized database. Within this database,

available years for analysis are 1987 to 1992 and (with slightly different form) 1993 to 2005.

Potential variables susceptible to be analyzed are the following:

- Enterprise region: Flanders, Brussels, Wallonia,
- Workers age, height, weight and gender,
- Workers smoking status,
- Workers employment status (blue-collar, white-collar …),
- Profession (NVA or RVA code),
- Occupational risk categories like manual handling, or whole-body vibrations,
- Type of return to work examination (RTW): (after work accident/after sick leave),
- Decision taken by the OP at the return to work examination (ability for work, definitive or temporary inability for the specific job, transfer to another function…),
- Musculoskeletal system : complaints or diagnoses at the time of the examination,
- Duration of sick leave during the last 12 months.

In the context of the present study aims, some characteristics of the database have however to be considered as important limitations for the analysis of low back pain cases:

- Health complaints are coded in ICD-9-CM codes using the written information on the form (encoded in the database as string variable). Any analysis would thus imply that a researcher would have to access each selected file (for instance all return to work examinations) on a terminal and encode the described complaint or "problem". Such a procedure was not feasible within the framework of this study.
- For the analysis of sick leave duration before the RTW examination, sick leave data are available on the form but following the registration rules, on a "last 12 months" basis (on the RTW examination, the doctor fills in normally information on sick leave for RTW). Such information would be of little value to answer the KCE study questions.
- Health data reliability: the collected data are based on an anamnesis of the worker by the physician. This means a likely underreporting of minor complaints (with no incidence on the present research) or of major complaints if fear of consequences for the employment and because of recall bias. The underreporting bias has been estimated at about 40%. Such a limitation is however not specific to IDEWE database, but is common to the data collected by OP's whatever the service they belong to.

The IDEWE management is well aware of these limitations. A new data collecting system will start in 2007 and involve the use of ICD-9-CM codes for describing health problems.

IDEWE also performed specific prevalence studies on low back pain (from 1990 to 1996) using the Nordic questionnaires, mostly in the health care sector (among about 14.000 workers). These data contain information on total duration of sick leave due to LBP during the past year, but no specific question on RTW has been included.

In conclusion, the analysis of this database, despite the large population source available, was deemed not adequate for the present study.

4.3.3 FAT - FAO database

4.3.3.1 Background

The FAT – FAO, – the Belgian Fund for Work Accidents, is a public institution in charge among other things of collecting and processing the occupational accidents statistics sent by the private insurance companies. It has been institutionalized by the Royal Decree n° 66, November 10th 1967, as a result of the merging of various institutions having similar roles.

An occupational accident is defined as an accident that occurs *during* and *is related to* the execution of the employment contract and results in a given body injury (Law on occupational accidents April 10th 1971, Belgian Official Journal). The FAT – FAO defines its general mission as to actively contribute to the optimal functioning of this occupational sector within the social security system.

Its specific missions are:

- Control of the occupational accident domain:
  - -to control employers with regard to the respect of insurance and occupational accidents declaration
  - -to control insurance companies on technical and medical aspects
  - -to ratify agreements between insurance companies and claimants
- Payment of the allocations for workers having an accident which leads to a permanent disability grade lower than or equal to 19%.
- Perception of employer's contributions in the case of non insured employer affiliations
- Transfer of information towards the Ministry of Labor and Employment (in charge of occupational accidents).

This institution is an interface between the Social Security and the insurance companies, but it supplies also social assistance to the victims of occupational accidents and other beneficiaries.

The FAT-FAO covers a wide population of people under a job contract, between 15 and 69 years of age, who report an occupational accident, including those refused by the insurance companies. Their population covers the whole Belgian territory in terms of location of the enterprise (10 provinces); some accidents that occur outside Belgium are also recorded when the victim is employed by an enterprise located in Belgium.

The present project analyses injuries among people from the private sector only because the public sector is poorly represented in the database; public sector data are constituted by a sample of public institutions collected by the FAT (FAT report 2003). On the contrary, all accidents from the private sector are fully recorded in the database (100 % of private enterprises), even for workers without insurance (because in such situation FAT become their insurance company) and for workers from fishing sector who are directly insured by FAT-FAO and are not represented in the SPF-Employment database.

FAT statistics reports began in 1995, but the computed system of record exists since 2000. For validity reasons this study used the data recorded from 2001 onwards. The analysis has been restricted to the accidents that occurred at the workplace because they are occupation specific. Those occurring on the way to (or from) work (5% of all occupational accidents on average) have been excluded.

4.3.3.2 Objectives of the FAT-FAO database analysis

A first objective is to evaluate the consequences of occupational accidents inducing a back injury in terms of sick leave (temporary incapacity: IT), disability (permanent partial

incapacity: IP) and to identify factors correlated with those outcomes variables in the population of workers who declared an occupational accident in the period under study.

A second objective is to analyze the outcome of back injuries depending on the precipitating event. The literature [347] suggested that back injuries resulting from a true traumatic event (like a fall) have a worse outcome than back injuries resulting from an "overexertion" where the only work disruption is the sudden appearance of pain in the back.

This last group of accidents is likely close to the non occupational injuries which occur in the private life and are most often taken in charge by first-line health professionals.

4.3.3.3 Population and methods

Population study

The design of this study is a "retrospective cohort study" based on a three-year period (01/01/2001 to 31/12/2003). The inclusion criteria were:

- to be a private sector worker under job contract at the time of the accident
- to have declared an occupational accident between Jan 1st 2001 and Dec 31st 2003
- the accident occurred at the work place
- the accident was accepted by the insurer

According to these criteria, 558,276 declared accidents were considered as eligible to the study. During this period, the total number of workers employed in Belgium was 3,183,572 persons in 2001; 3,182,515 persons in 2002 and 3,180,687 persons in 2003, out of which respectively 2,434,357 persons; 2 421 744 persons and 2 416 198 persons were employed in the private sector [380].

A total of 666.384 occupational accidents were declared during the aforementioned period, out of which 93.2 % (621 290) were accepted (see table 23).

89.9 % of those accidents *(*558,276) occurred at the workplace. From this last group, a total of 37,031 accidents (6.6 % of the accepted workplace accidents) were extracted as a sub-sample that met the additional criterion "to have induced a back injury".

Table 23. Incidence of back injuries among the workplace accidents recorded in the Belgian private sector, during the 2001-2003 period.

Years	Private sector workers	Full time equiv.	Declared accid.	Accepted acc.	Workplace accidents		Accid. with back injury		*I. R. per 1000*
	N1	N2	N3	N4	N5	%*	n	%**	n/N2***
2001	2,434,357	2,009,735	242,394	226,164	203,171	89.8	13,427	6.6	6.7
2002	2,421,744	1,990,968	220,041	204,879	184,252	89.9	12,180	6.6	6.1
2003	2,416,198	1,990,190	203,949	190,247	170,853	89.8	11,424	6.7	5.7
Total	7,272,299	5,990,893	666,384	621,290	558,276	89.9	37,031	6.6	6.2

* Proportion of workplace accidents among those accepted by the insurance companies (N4/N3)
** Proportion of accidents with back injuries among workplace accidents (n/N4)
*** I.R.= Incidence Rate of accidents with a back injury per 1000 FTE workers

Population of interest: "back injuries"

The sample selected for this study was constituted by the group of workers who declared an occupational accident with the back as "location of injury" (Code n°31). The extraction was based on the Belgian classification codes of injury's location for occupational accidents [381]

The sampling method was exhaustive for all workers declaring occupational accident with back injuries. All accidents recorded in the public sector were excluded, those refused by the insurance company, those who occurred on the way to work and those who had another location of injury than the back.

It can be seen in table 23 that the percentage of accidents with a "back" injury remains fairly stable during the three years analyzed (according to workplace accidents), but according to the reference population (all workers in private sector) a slight decrease of the incidence rate can be observed. So the analysis was performed on the whole period using the mean population of the period as reference for calculating an average annual incidence rate.

The following variables were analyzed:

- Outcome variables:
  - -no sick leave (NSL),
  - -temporary incapacity (IT): frequency and duration (only days lost during the calendar year when the accident occurred),
  - -permanent (partial) incapacity (IP): frequency and grade (estimate provided by the insurer when transferring data to the FAT-FAO).
- Explanatory variables:
  - -Worker's age (10 yr classes),
  - -Gender (M/F),
  - -Regions (enterprise location: in one of the 3 regions of Belgium),
  - -Worker status (blue collar, white collar...),
  - -Seniority in the enterprise where the accident occurred,
  - -Precipitating circumstances,
  - -Nature of injury (from a medical point of view),
  - -Economic sector of the enterprise (NACE – B codes),
  - -Size of the enterprise (classes of employed staff),
  - -Incidence rate for sector of activity.

Methodology

All data used in this part are drawn from the FAT-FAO database. The analyses have been performed by the FAT contact person. All classes used in this report have been established by FAT itself, and some of them are derived from the Belgian labor regulations. So it was not possible for the principal researcher to change the cut-off points of the classes or to conduct any further analysis (e.g. multivariate analysis) to control for potential confounding factors.

The statistic tests used were the Pearson Chi square test and the Chi Square test for trend, with a threshold error level α placed at 5 %. In addition to the Excel tables, the statistical analyses were performed with STACALC from EPIINFO version 3.32 (September 2005).

Preliminary analyses

A descriptive analysis of explanatory variables examined their distribution in the sample and those distributions were compared to the ones from the reference population. The relative frequencies of the accident outcomes (temporary incapacity, permanent partial incapacity) as well as the duration of sick leave and the seriousness of injury (based on the awarded percentage of permanent disability) have been analyzed.

After this descriptive analysis, cross tabulations have been done between outcomes and each explanatory variable to identify factors associated with sick leave and/or permanent incapacity. Workers who had temporary incapacity and those with a permanent one were also compared with regards to the explanatory variables.

For the worker status categories, besides blue-collar workers and employees, a third category ("others" category), was established by grouping the other subgroups. The heterogeneity of the third group does not allow any further analysis. Therefore, the analysis was restricted to a comparison between blue-collar and employees.

An annual "incidence rate" has been calculated to evaluate the possible effect of the enterprise sector of activity on the frequency of back injury accidents and a comparison between sectors has been done according to the outcomes.

The incidence rate was defined as the number of declared "back injury" accidents per 1000 workers employed. The numerator was the yearly mean number of "back injuries" accidents for the period (2001-2003) and the denominator was the yearly mean number of employed workers in the sector for the same period[380], while percentages of IT and IP referred to the total number of accidents during the 3 years. In this calculation, the employed workers were all the people employed without taking into consideration their working time, full time or part-time.

In the incidence rate calculations, to strengthen the validity of the data, only sectors with more than 10,000 employed workers were considered.

Finally, the specific subgroup of accidents following "an overexertion" has been compared to those following a fall, and others circumstances, and its distribution has been compared according to the "nature of injury" and to the outcomes. The codes used for describing the accident circumstances can be seen in appendix 4.3.3-4.

Further analyses following the preliminary results.

Firstly, a serious limitation for counting the duration of temporary incapacity is its basis on the calendar year: the counting stops every year on Dec 31st! This system can obviously lead to an important bias towards an underestimation of the actual duration of absences from work. The analysis of this outcome variable has been therefore restricted to the back injuries declared during the two first trimesters of each year (Jan 1st to June 30th).

Secondly, major regional differences in proportions of back injuries were observed in preliminary results, it was deemed necessary to check the hypothesis that those regional differences could be influenced by a heterogeneous distribution across regions of some sectors at high risk for occupational accidents. In order to exclude such a confounding factor, the regional distribution of occupational back accidents incidence was analyzed in two sectors which are known to have approximately a homogeneous geographical distribution: the building industry and the health sector. The year 2003 data were used for this analysis, mainly because in the ONSS publications (for reference populations), public sector and private sector data geographical distributions were not separated for 2001 and 2002.

4.3.3.4 Results

Description of the sample

A total of 37,031 accidents (6.6 % of the accepted workplace accidents) were extracted as a sub-sample and used for this analysis

The socio-demographic and socio-professional characteristics of the sample are shown in table 24. These data show that back injuries are mostly recorded in the 20-49 age group (64.9%), among males (78.2 %) and among blue collar workers (77.6 %). More than half of the workers who declared a back injury accident had less than 5 years of seniority in the enterprise (62.9 %); about half of them came from small enterprises of less than 100 workers (52.6 %) and worked mainly in Flanders (51.1 %).

Comparing the with the reference population, the proportion of young workers (15-39 years) is higher in the sample than in the reference population, but from 40 years onwards, those proportions become lower in the sample than in the reference population.

The proportion of females with back injuries is two times lower than the proportions of female workers employed in the private sector (21.8 % against 40.6 %). Also the proportion of blue collar workers is markedly higher in the sample than in the reference population (77.6 % versus 48.21 %), and conversely so for the employees.

Major differences are also observed in the regional distribution: Flanders involves 61.8 % of the workers employed in the private sector, but only 51.06 % of the back injuries. Wallonia involves 22.7% of the workers from the private sector but 38.1 % of the back injuries recorded at the national level. Brussels which involved 15.5 % of the workers recorded only 10.4% of the back injuries.

Incidence rate of accidents with a back injury according to workers characteristics

The average incidence rate of accidents with a back injury for the whole period is 6.2 per 1000 workers (FTE) per year with an annual decreasing trend (table 23).

According to the socio-demographic and socio-professional factors, it can be seen from the table 24 that the risk of having a back injury decreases with age (from 7.5 per 1000 in the youngest group (15-19 years) to 2.3 per 1000 in the oldest group (60-69 years). It is two times higher in males than in females, three times higher in blue collar than in employees. The differences observed for the size of enterprise is difficult to interpret, a higher incidence rate being observed in the big enterprises (≥ 500 persons) and in the middle category of enterprises (20-99 persons).

The risk of having an accident with a back injury is the highest in Wallonia, where the incidence rate is more than two times higher in comparison to Flanders or in Brussels.

Table 24. Incidence rate of back injury accidents declared in 2001-2003 according to different explanatory variables (n = 37,031).

VARIABLES	Exposed workers		Back injury accidents			Incidence rate **	p-value
	Person Year *	%	Total	%	Yearly mean		
Age (missing:45)							
15-19 years	43,591	**1.80**	979	**2.65**	326	7.49	
20-29 years	629,653	**26.03**	11,398	**30.82**	3,799	6.03	
30-39 years	791,910	**32.73**	12,621	**34.12**	4,207	5.31	
40-49 years	617,545	**25.53**	8,764	**23.70**	2,921	4.73	
50-59 years	314,827	**13.01**	3,077	**8.32**	1,026	3.26	
60-69 years	21,796	**0.90**	147	**0.40**	49	2.25	**< 0.000**
Total	2,419,322	**100.00**	36,986	**100.00**	12,329	5.10	
Gender (missing:7)							
Females	985,041	**40.64**	8,077	**21.82**	2,692	2.73	
Male	1,439,052	**59.36**	28,947	**78.18**	9,649	6.71	**< 0.000**
Total	2,424,093	**100.00**	37,024	**100.00**	12,341	5.09	
Professional cat. (Others: 2034)							
Blue collar	1,168,616	**48.21**	27,145	**77.56**	9,048	7.74	
Employees	1,255,476	**51.79**	7,852	**22.44**	2,617	2.08	**< 0.000**
Total	2,424,092	**100.00**	34,997	**100.00**	11,666	4.81	
Seniority: (missing:2209)							
< 1 year	-	-	9,681	**27.80**	3,227	-	
1 - 4 years	-	-	12,213	**35.07**	4,071	-	
5 - 10 years	-	-	5,626	**16.16**	1,875	-	
11 - 20 years	-	-	4,749	**13.64**	1,583	-	
≥ 21 years	-	-	2,553	**7.33**	851	-	
Total	-	-	34,822	**100.00**	11,607	-	
Size of enterprise: (missing: 7005)							
< 20 persons	787,539	**32.48**	6,295	**17.47**	2,098	2.66	
20-99 persons	675,130	**27.84**	10,564	**35.18**	3,521	5.22	
100-499 persons	574,022	**23.67**	6,498	**21.64**	2,166	3.77	
≥ 500 persons	387,938	**16.00**	6,669	**22.21**	2,223	5.73	**< 0.000**
Total	2,424,629	**100.00**	30,026	**100.00**	10,009	4.13	
Regions (missing: 989)							
Flanders	1,503,137	**61.82**	18,404	**51.06**	6,135	4.08	
Wallonia	551,163	**22.67**	13,728	**38.09**	4,576	8.30	
Brussels	377,096	**15.51**	3,910	**10.85**	1,303	3.46	**< 0.000**
Total	2,431,395	**100.00**	36,042	**100.00**	12,014	4.94	

* Total of employed workers in the period divided by three
** Annual incidence rate per 1000 workers employed

Distribution of back injuries in two specific sectors of activity

Table 25 describes the incidence rates of back injuries in two sectors of activity employing large numbers of workers, "the building and health sectors". The difference observed between Flanders and Wallonia remains large. In the building sector, Flanders has the lowest incidence rate, while Wallonia and Brussels have higher and similar rates. In the health and social sector, Wallonia has also the highest incidence rate, followed by Brussels. These results do not confirm any influence of a heterogeneous distribution of accidents prone sectors across the three regions.

Table 25. Incidence rate of back injury accidents within two sectors of activity for the year 2003

Regions	Building sector				
	Exposed workers Person-years	%	Back injury Person-years	%	Incidence rate per 1000
Flanders	120,742	63.81	736	48.68	6.10
Wallonia	51,039	26097	572	37.83	11.21
Brussels	17,454	9.22	204	13.49	11.69
Total	189,235	100.00	1,512	100.00	7.99
Missing			50		
	Health and social sector				
Flanders	180,277	60.88	660	49.18	3.66
Wallonia	83,039	28.04	514	38.30	6.19
Brussels	32,811	11.08	168	12.52	5.12
Total	296,127	100.00	1,342	100.00	4.53
Missing			18		

Outcomes of back injuries

The proportion of temporary incapacity for the whole period was 62.42 % and 9.53 % for a permanent (partial) incapacity, while about 28.0 % of the back injury accidents did not need any sick leave (see table 26).

On an annual basis, the data suggest a rising trend with time (respectively 8.92 %, 9.66 % and 10.11 % of the sample in 2001, 2002, and 2003) for injuries associated with a permanent disability. This should be checked on a longer time span however. There is no specific trend for injuries associated with a temporary incapacity.

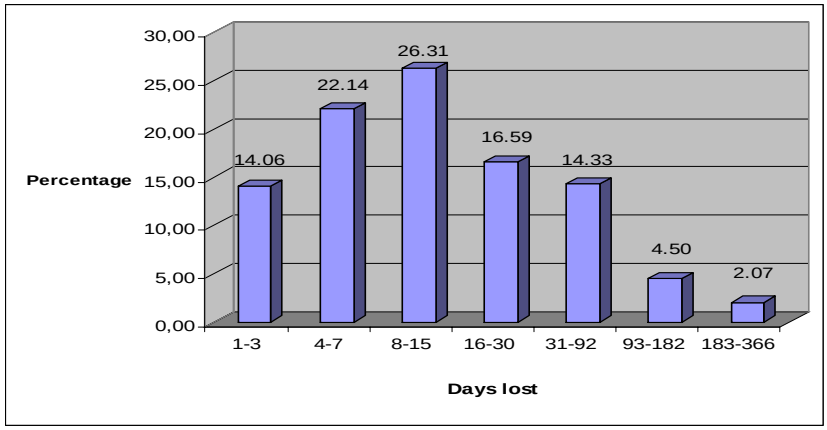
Table 26. Temporary (IT) and permanent partial incapacity (IP) among workers who declared a "back" injury accident in 2001-2003 (n = 37,031)

Years	Back injury	No Sick Leave (NSL)		IT		IP	
	N	n	%	n	%	N	%
2001	13,427	3,744	**27.88**	8,485	**63.19**	1,198	**8.92**
2002	12,180	3,305	**27.13**	7,698	**63.20**	1,176	**9.66**
2003	11,424	3,336	**29.20**	6,932	**60.68**	1,155	**10.11**
Total	**37,031**	**10,385**	**28.04**	**23,115**	**62.42**	**3,529**	**9.53**

When analyzing the duration of sick leave among those temporary incapacitated (see figure 10), it can be seen that 36.2 % did return to work by the end of a week, while 79.1 % did return to work by the end of the first month (< 30 days sick leave); 6.6 % of the cases could be considered as chronic back pain cases as they remained off work for more than 3 months. Here, it is worth stressing that the definition of a "chronic" case is based

on the duration of sick leave and not the duration of pain symptoms. Some workers may have returned to work despite the fact that they were still suffering from LBP.

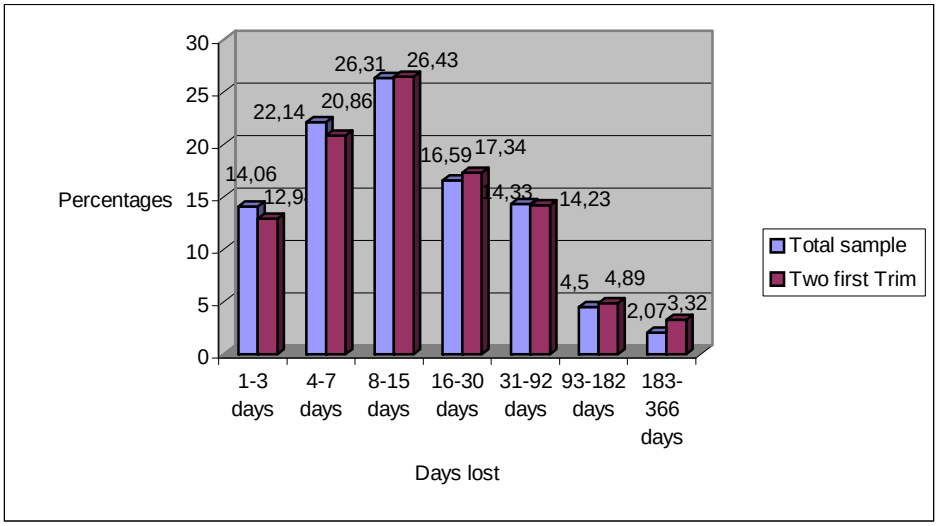
Figure 10. Duration of temporary incapacity (IT) among workers who declared a "back" injury accident in 2001-2003 and were off work for at least 1 day (n= 26.124)



(Removed= Unknown 1; no sick leave 10.898 and > 366 days: 8).

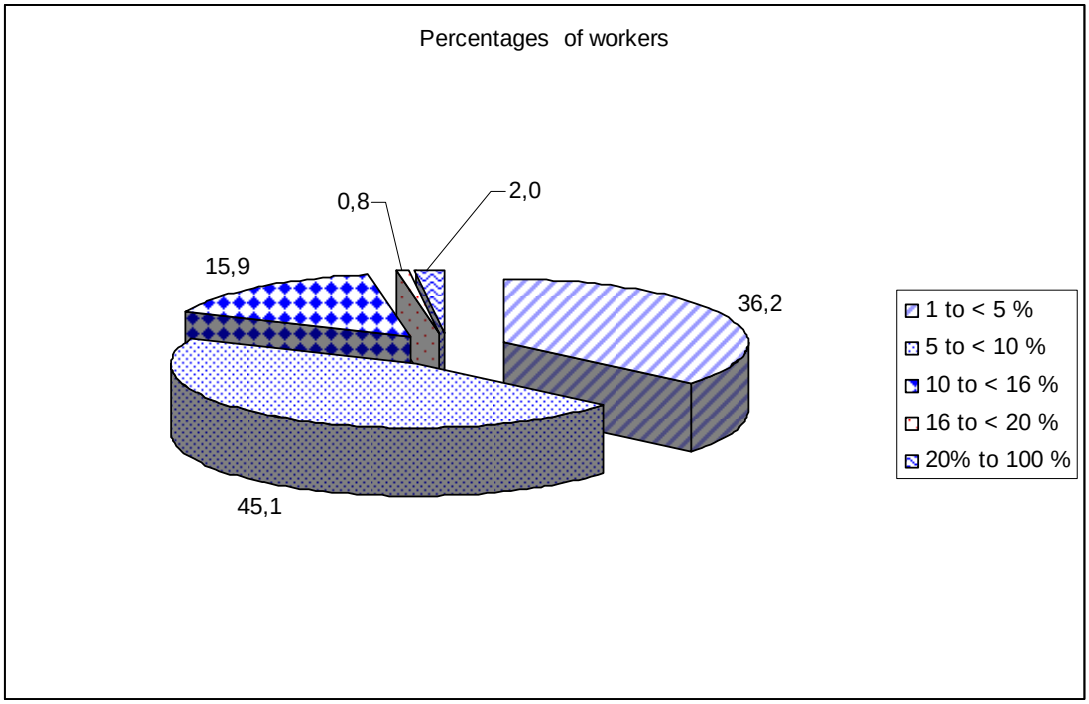
Analyzing only the accidents occurring during the two first trimesters of each year (Figure 11), resulted in an increase of the proportion of cases to be considered as chronic cases. It can be seen that only 33.8 % did return to work by the end of a week, while 77.6 % did return to work by the end of the first month (< 30 days sick leave). Eight percent (8.21%) of the cases could be considered as chronic back pain cases as they remained off work for more than 3 months.

Figure 11. Comparison of the duration of temporary incapacity (IT) among workers who declared a "back" injury accident at whatever time of the year (n= 26,124) and during the two 1st trimesters of 2001-2003 (n= 15591)



The analysis of the other health outcome, permanent partial disability, is summarized in Figure 12 for the 3,522 workers (9.5 %on average of the study sample) with a partial permanent incapacity grade. This graph shows that in about 36.20 % of those cases a light permanent partial disability (less than 5 % of IP) is attributed, while in about 81.34% of the cases the grade of permanent partial disability (IP) was less than 10%; overall less than 2 % of the workers were attributed an IP higher than 20%.

Figure 12. Permanent partial incapacity (IP) grade among workers who declared a "back" injury accident during 2001-2003 (n= 3.522)



(Removed= death cases 2; Unknown 2; IP=0 % 33.498; supported by 1/3 person: 7

The variations in the outcomes incidence according to the various explanatory variables are analyzed in table 27.

First, the characteristics of the workers exhibiting some incapacity after the accident are compared to the group of those without one day of sick leave. A higher proportion of injured workers with incapacity (sick leave or permanent disability) is observed among male workers, blue collar workers, and workers from enterprises in Flanders. Conversely, this proportion is significantly lower among workers with a long seniority and among workers belonging to large companies (> 500 staff). However when taking into account the size of the working population in each region, the probability in exposed workers to develop incapacity (IT+IP) following a back injury is nearly two times higher in Wallonia than in Flanders (5.9 against 3.0 cases per 1000 annually exposed workers) and nearly three times higher than in Brussels (5.9 against 2.4 cases per 1000 workers).

The comparison between workers who developed only temporary incapacity and those whose back injury resulted in a permanent partial incapacity brings additional information.

First, there is neither a gender effect nor a status (blue/white collar) effect when considering the probability of getting an IP when on sick leave following a back injury. This suggests that serious injuries have a similar prognosis independently of the worker's gender or the professional category.

On the other hand, table 27 shows a quite significant increase with age, of the probability of getting a permanent incapacity after a back injury ($p<0.000$). This trend, could be expected as similar observations have been reported for all types of accidents. The significant effect of seniority in the enterprise is likely to be linked to this age effect and the Chi square of trend is statistically significant ($p=0.002$); IP probability is higher among very senior workers than among less senior people.

In small enterprises (< 20 staff), there is a higher proportion of injuries leading to permanent incapacity. The proportion of workers getting a permanent partial incapacity decreases when the enterprise size increases but starts to increase again beyond 500

workers. With regard to regional differences, another striking difference concerns in Wallonia/Brussels the higher proportion of permanent disability cases among those injuries associated with a sick leave period.

Table 27. Distribution of the various outcomes (no sick leave, sick leave and permanent partial incapacity) according to various factors among workers who declared a "back" injury accident in the 2001-2003 period

VARIABLES	Total	NSL (%)	IT (%)*	IP (%)**	IT+IP (%)	Comparison			
						NSL vs (IT+IP) p-val	IT vs IP p-val	IT vs IP trend	
								OR **	p-val ***
Gender (n=37.022)									
Females	8,077	34.13	57.11	8.75	65.87				
Males	28,945	26.35	63.90	9.75	73.65	< 0.000	0.92		
Age (n=36984)									
15-19 years	979	29.01	67.52	3.47	70.99			1.00	
20-29 years	11,397	28.11	65.01	6.88	71.89			2.06	
30-39 years	12,620	27.32	62.57	10.11	72.68			3.14	
40-49 years	8,764	28.12	60.20	11.68	71.88			3.77	
50-59 years	3,077	29.83	57.59	12.58	70.17			4.25	
60-69 years	147	34.69	50.34	14.97	65.31	0.041	<0.000	5.78	0.000
Professional categories (n=34.995)									
Blue collar	27,143	24.89	65.06	10.05	75.11				
Employees	7,852	39.96	51.73	8.30	60.04	<0.000	0.4		
Seniority (n=34.820)									
< 1 year	9,681	27.19	64.01	8.80	72.81			1.00	
1 - 4 years	12,212	27.89	62.75	9.36	72.11			1.08	
5 - 10 years	5,626	27.28	62.21	10.50	72.72			1.23	
11 - 20 years	4,748	28.94	61.82	9.25	71.06			1.09	
≥ 21 years	2,553	31.69	57.74	10.58	68.31	< 0.000	0.002	1.33	0.002
Size of enterprise (n=30.024)									
< 20 pers.	6,294	27.52	60.60	11.88	72.48			1.00	
20-99 pers.	10,563	27.60	62.97	9.43	72.40			0.76	
100-499 pers.	6,498	29.72	62.74	7.54	70.28			0.61	
> 500 pers.	6,669	32.19	58.93	8.88	67.81	< 0.000	< 0.000	0.77	0.05
Regions (n=36.040)									
Flanders	18,404	26.58	65.51	7.91	73.42				
Wallonia	13,726	29.02	60.36	10.62	70.98				
Brussels	3,910	30.64	56.50	12.86	69.36	<0.000	< 0.000		

* Unknown cases, 0 days of sick leave and more than 366 days of sick leave have been removed
** Death cases, unknown, IP=0 % and supported by 1/3 person cases have been removed
*** Chi Square for trend

Relationship between back injury and occupation

A clear relationship with the type of occupation appears when back injury data are analyzed according to the enterprise sector of activity (see table 28). Sectors with less than 10,000 workers (2,624 accidents) have been removed for strengthening the validity of data. The population figures for a given sector always include the interim workers employed in this sector enterprise.

Some sectors of activity like the wood industries, the building and the metal industries are more at risk to cause back injury accidents than others, with the incidence rate respectively of 12.9, 9.5, and 9.3 back injuries per year and per 1000 employed workers. In other sectors like finance and insurance, hotels and restaurants, distribution of electricity and gas, the risk of having an accident with a back injury is much lower (2.3, 2.4, and 0.7 back injuries per year and per 1000 employed workers).

However, any control strategy should also take into account the absolute number of accidents observed within a given sector: building sector, trade workers, health and social workers had the highest number of accidents, and those three sectors provided 46 % of the back injury accidents recorded during the three years studied.

On the other hand, the building sector (14.0 %), the health and social sector (12.4 %) and the agriculture and forest sector (11. 2 %) were the sectors with the highest proportions of back injuries giving the right to a permanent disability pension. It is worth underlining that some high risk sectors for back injury occurrence like metal or steel industries exhibit much lower risk for permanent disability. On the contrary, the health sector which ranks at the 11th place for back injury occurrence is the second high risk sector for permanent disability due to back pain.

Table 28. Yearly incidence rate of back injury accidents per 1000 workers at risk and outcomes according to the sector of activity in 2001-2003 (n = 34.407)

Nace-BEL	Sector	Reference population (Person	Mean of back injury per	Incid. Rate per	NSL (%)	IT (%)	IP (%)
01-02	Agric., hunting & forestry	28,740	104	**3.6**	21.2	67.6	11.2
15-16	Manufacture of food prods.	90,620	491	**5.4**	23.8	68.5	7.7
17	Manufacture of textile	37,185	181	**4.9**	22.1	72.6	5.3
20	Manufacture of wood prod.	11,634	150	**12.9**	18.7	71.3	10.0
21	Manufact. of pulp & paper	15,677	98	**6.3**	28.6	65.7	5.8
22	Publishing, print. & reprod.	30,853	87	**2.8**	25.8	64.2	10.0
24	Manufact of chemical prod.	72,190	230	**3.2**	34.9	58.1	7.0
25	Manuf. of rubber & plastics	25,113	114	**4.5**	24.0	69.3	6.7
26	Manuf. of other non-met. m	32,614	253	**7.8**	25.0	68.0	7.0
27	Manufact. of basic metal	37,733	285	**7.6**	46.1	45.3	8.6
28	Manuf. of fabricated metal	60,259	558	**9.3**	24.1	68.1	7.8
29	Manuf. of machin. & equip.	42,321	302	**7.1**	24.4	70.4	5.2
30-33	Manuf. of comp. electr. m, radio, TV & med equip.	43,225	213	**4.9**	28.9	62.2	8.9
34	Manuf. of motor veh., trials	54,418	224	**4.1**	25.2	68.01	6.8
35	Manuf. of other trans equip	9,678	67	**6.9**	25.4	64.2	10.4
36	Manuf. of furniture & oth eq	23,599	142	**6.0**	20.9	72.5	6.6
40-41	Elect., gas, steam & water	15,292	35	**2.3**	40.4	53.9	5.8
45	Building	186,529	1,778	**9.5**	21.3	64.7	14.0
50-52	Wholesale, and retail trade; repair of motor vehicles	449,130	1,971	**4.4**	28.6	62.7	8.7
55	Hotels & restaurants	113,954	278	**2.4**	31.8	59.0	9.2
60-64	Transp. storage & comm.	137,398	1,089	**7.9**	24.6	65.8	9.7
65-67	Finances & insurance	127,842	89	**0.7**	46.2	45.1	8.6
70-74	Real estate, renting & business activities	358,575	837	**2.3**	26.4	63.7	9.9
85	Health & social work	280,914	1,530	**5.4**	31.9	55.7	12.4

91-92	Social, recreat & cult. activ	66,335	324	**4.9**	34.8	56.6	8.6
93	Other service activities	24,501	40	**1.6**	39.8	53.9	6.3
	TOTAL	2,376,328	11,469	4.8	27.71	62.9	9.31

Another way to estimate the risk of a severe back injury in relation to occupation consists of selecting only those accidents having a sick leave outcome and to analyze in this sub-sample the proportions of injuries leading to a permanent partial incapacity. On this basis the top ten list of the most risky sectors is presented in table 29.

The results obtained in this way are in several respects different from those presented in table 28. They would be more valid as the proportions given in table 28 are influenced by the declaration rate of minor accidents (no day off). An example is high proportion of no sick leave accidents found in the steel industries (Nace 27), a sector that can hardly be considered as a low risk sector.

In the table 29, the risk of getting a permanent incapacity is clearly the highest in two sectors: health and social sector (18.22 %) and building industry (17.77 %). Intriguingly, the sector of finance and insurance, a sector traditionally considered at low risk for the back, has also a very high rate of IP (16.08 %) before the metal or steel industries (16.05 %). This may be due to the small numbers of injuries recorded.

Table 29. Top ten list of sectors at high risk for injuries with permanent partial incapacity in the 2001-2003 period

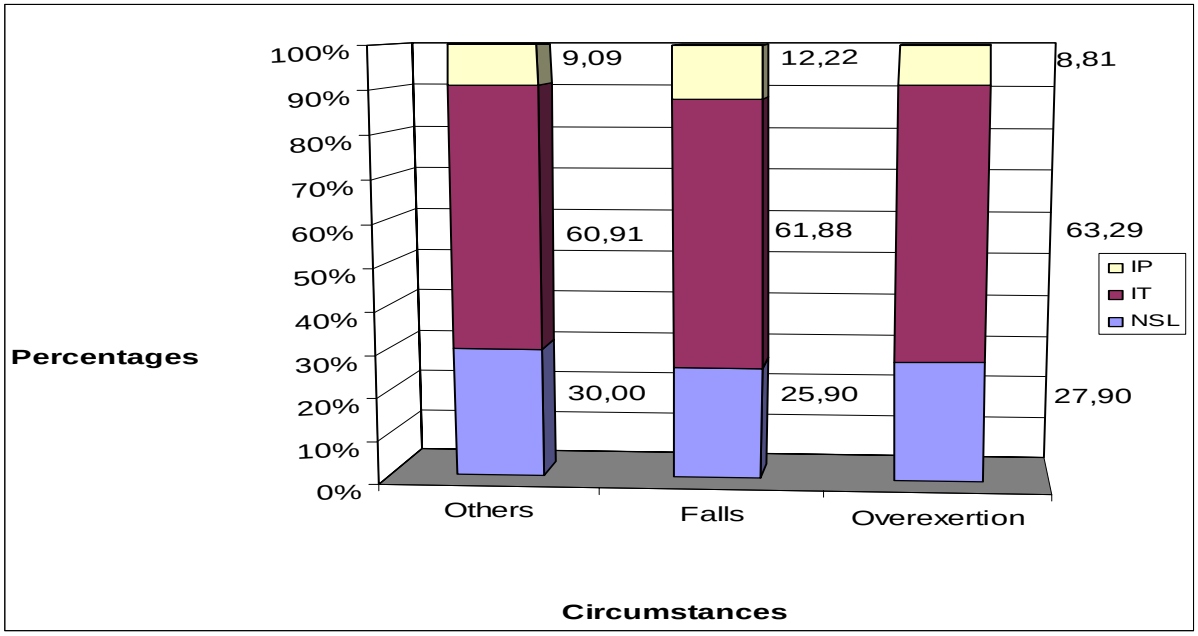
Nace - bel 03	Sector	N injuries	IT		IP	
			n	%	n	%
85	Health & social work	258	211	81.78	47	18.22
45	Building	41,98	3,452	82.23	746	17.77
65 .. 67	Finances and insurance	143	120	83.92	23	16.08
27	Manufacture of basic metal	461	387	83.95	74	16.05
01 .. 02	Agric., hunting & forestry	246	211	85.77	35	14.23
35	Manuf. of other trans. equip.	150	129	86.00	21	14.00
55	Hotels & restaurants	569	492	86.47	77	13.53
22	Publishing, print. & reprod.	193	167	86.53	26	13.47
70 .. 74	Real estate, renting & business activities	1,847	1,599	86.57	248	13.43
91 .. 92	Social, recreat & cult. activities	2,993	2,599	86.84	394	13.16

Comparison of back injuries resulting from overexertion and those resulting from other circumstances

Within the full sample of back injury accidents (n=37031), 20710 accidents (55.93 %) had as circumstance of occurrence an "overexertion or false movement" either during manual handling or in other circumstances (type of accident codes n°51 and 52; see appendix 3.2.3-1); 7039 accidents (19.01 %) resulted from falls (codes n° 11 and n° 12), and 9281 accidents (25.06 %) from other circumstances. The overexertion type of back injury represents 3.71 % of the whole population study. As in the whole group, no specific time trend was observed (56.6 % in 2001; 55.7 % in 2002 and 55.4 % in 2003).

Figure 13 shows the distribution of the three outcomes analyzed for back injuries resulting from overexertion, from falls and from other circumstances. The percentage of permanent incapacity is the highest one for falls (12.22 %), and the lowest one (8.81 %) for overexertion accidents.

Figure 13. Comparison of percentages of outcomes from back injuries resulting from overexertion, falls or other circumstances (n=37,029)



Were removed: Death cases 2

According to the list of "nature of injury" codes (Table 30), 25.97 % of back injuries were of the sprain type and 20.30 % of the contusions/crushing type. The other important type of back injury is the commotions/internal traumatism (18.59 %).

The comparison between back injuries following overexertion, falls and other circumstances shows that "Sprains" (74.04 %), but also "Dislocations" (69.13 %), and "Commotions" (65.26 %) are "nature of injury" codes more often observed following "Overexertion circumstances" than following falls or others circumstances. On the other hand, fractures are mostly observed in injuries following "Falls" (64.94 % against 23.38 % in other circumstances and 11.69 % after overexertion).

Even if the accuracy of the "nature of injury" codes selected by the enterprise administrative staff is not guaranteed, these data suggest that falls result in more serious trauma than the other type of accident circumstances.

Table 30. Distribution of nature of injury codes in the whole sample of back injury accidents and in the three subgroups of precipitating circumstances (n= 36,905)

	Total		Overexertion		Falls		Others	
	N	%	n	%	n	%	N	%
10 Fractures	693	1.88	81	11.69	450	64.94	162	23.38
20 Dislocations	2,459	6.66	1,700	69.13	222	9.03	537	21.84
25 Sprains	9,583	25.97	7,095	74.04	1,124	11.73	1,364	14.23
30 Commotions & other intern. Trauma.	6,859	18.59	4,476	65.26	1,025	14.94	1,358	19.80
41 Other wounds	4,326	11.72	2,299	53.14	688	15.90	1,339	30.95
50 Superficial Traumatisms:	1,509	4.09	655	43.41	233	15.44	621	41.15
55 Contusions and crushing	7,492	20.30	2,289	30.55	2,796	37.32	2,407	32.13
90 Multiple lesions from various natures	290	0.79	107	36.90	70	24.14	113	38.97
99 Other traumatisms	3,694	10.01	1,979	53.57	422	11.42	1,293	35.00
Total	36,905	100.00	20,681	56.04	7,030	19.05	9,194	24.91

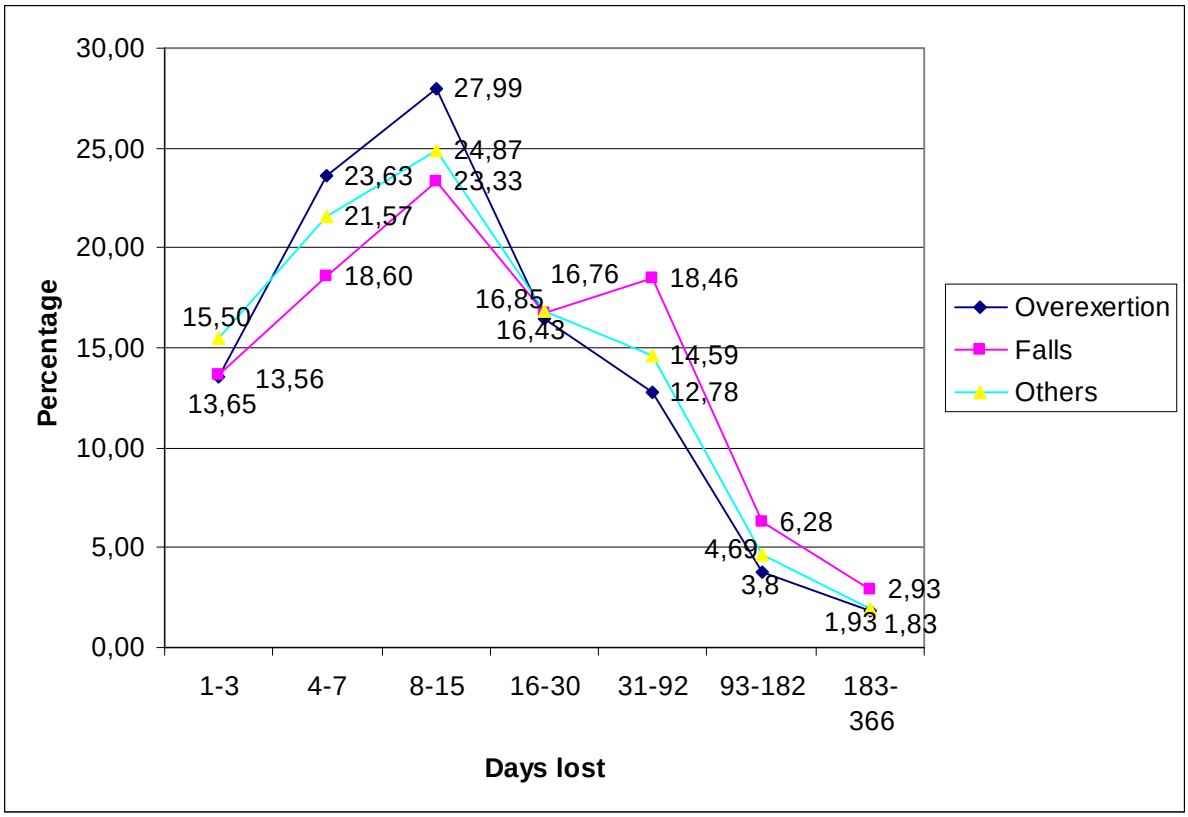
Were removed: Death cases 2, unknown 40; burn 71; poisoning 2; and electricity effect 1; amputation & emulations 10.

Comparison of back injuries outcome severity according to the accident circumstances

The figure 14 shows the comparison of sick leave durations between workers with back injury from overexertion, from falls and from other circumstances. The distribution of IT duration is skewed to the left for the three circumstances but injuries resulting from an overexertion are predominant among injuries with less than 1 month sick leave. Most workers (81.61 %) with the overexertion type of accident did return to work by the end of the first month when this proportion was 78.79 % in the group whose back injury followed other precipitating circumstances and only 72.33 % for those resulting from falls.

After 30 days sick leave, accidents resulting from falls are predominant with 9.21 % of cases which could be considered as chronic back pain cases (more than 92 days sick leave) while proportions are lower for other circumstances (6.62 %) and overexertion circumstances (4.91 %).

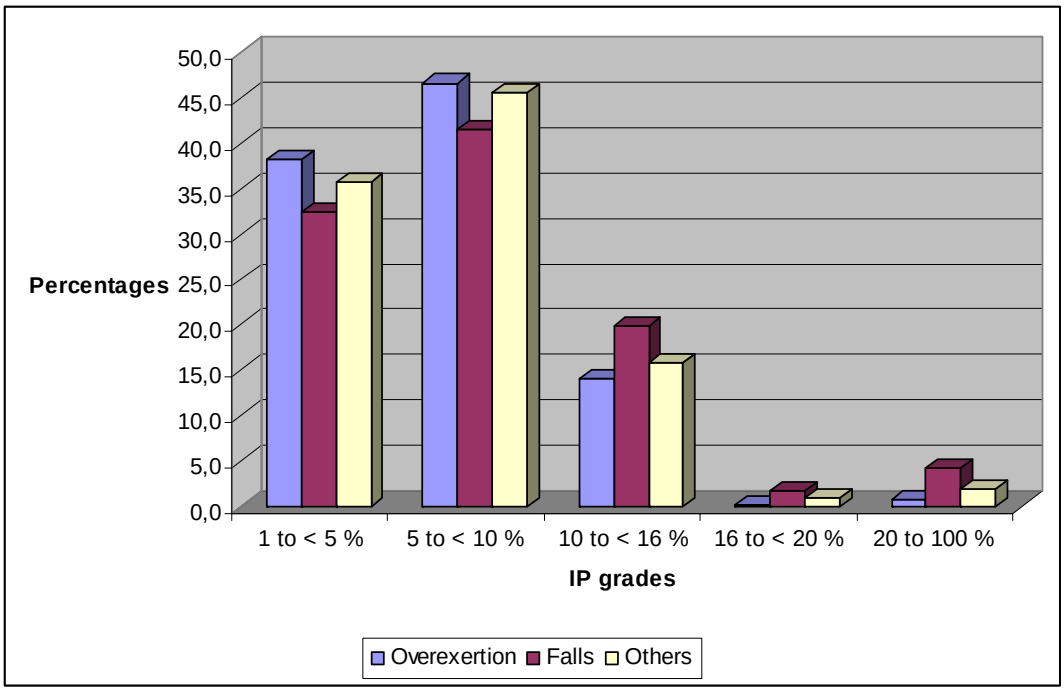
Figure 14. Comparison of duration of temporary incapacity in back injuries resulting from overexertion, from falls or from other circumstances (n=26124)



Removed: unknown case: 1, no sick leave: 10898 and more than 366 days (8)

Figure 15 shows the comparison of IP grades between workers with back injuries from overexertion, from falls and from other circumstances. The figure shows that in the group with a back injury following an overexertion and those following other circumstances, the grade of permanent incapacity was less than 10 % in respectively 84.81 % and 81.28 % of cases; conversely in the group of back injuries following falls, the proportion of injuries leading to an IP grade higher than 20 % is the highest (4.33 % against 1.89 % for other circumstances and 0.88 % for overexertion injuries). Thus higher IP grades are attributed more often in the "falls" subgroup of back injuries.

Figure 15. Comparison of permanent incapacity (IP) grade from back injuries resulting from overexertion, falls or other circumstances (n=3522).



Removed: Death cases: 2, unknown cases: 2, disabled (supported by 1/3 person): 7 and no disability (0%): 33498

4.3.3.5 *Summary*

In this FAT-FAO database, occupational accidents having induced a back injury have been analyzed to assess their impact on the injured workers. This analysis shows that back injuries amount to 6.6 % of the workplace occupational accidents declared in the private sector and accepted by the insurers during the 2001-2003 period and corresponds to an average incidence rate of 6.2 injuries per 1000 FTE workers. Back injuries were mostly recorded in young, male, blue-collar workers, working with little seniority in small enterprises located mainly in Flanders. Wallonia appears to be at higher risk both for the incidence of back injuries and for the incidence of a partial disability outcome. However, no further analysis could be performed for adjusting for potential confounding factors.

The incidence of back injuries is also clearly related to occupation. In absolute terms, trading, building, health and transport sectors had the highest number of back injuries. However, in terms of incidence rate, wood, building and metal industries were identified as more susceptible to cause back injuries, while in terms of permanent incapacity, building, health, agriculture and forest sectors are at high risk to lead to a partial disability.

4.3.3.6 *Discussion*

Some features of the FAT-FAO database emerge from this analysis.

FAT-FAO database strengths and weaknesses

The strengths of the FAT database have been stressed before i.e., national coverage, recordings using a uniform coding scheme determined by law, accident data completeness for workers in the private sector. However, this database has also some limitations detailed below:

- The code n°31 of location of injury is related to the back in general and not specifically to the low back area. A new and more accurate coding system is now applied in Belgium based on a European coding system.
- The worker seniority is related to the present job contract and not to the whole career.
- Some important variables are missing:

  Education level,

  Type of contract (CDI, CDD, etc),

  Employment situation after the accident (definitively stop working, return to work in the same department or mutation in another service, transfer in another job in another enterprise…),

  Cost of the injury: since 1988, the cost of treatment and other expenses are in charge of insurance companies except for a few workers' categories directly covered by FAT (i.e. workers without insurance, sea workers).
- The IP (Permanent Partial Incapacity) figure is only an estimate given by the insurance company when informing the FAT-FAO about the accident. Some insurers are updating later the initial figure but others not. This procedure might result in an underestimation of actual IP grades.
- The temporary total incapacity corresponds to the days lost during the calendar year when the accident occurred: it is not easy to determine whether this sick leave has been of a continuous or discontinuous nature.
- The acceptance of a back pain episode as a work accident can differ from an insurance company to another one and within a same company sometimes from a medical adviser to another one. This is likely to result in an underestimation of the number of back pain episodes occurring during work activities. According to the FAT report, the yearly mean of rejected occupational accidents (all types of injury included) was 6.8 % (6.7 % in 2001, 6.9 % in 2002 and 6.7 % in 2003). Out of the rejected claims, 26.1% are back injuries. This proportion is the highest found among the various types of injury. Table 31 illustrates that about 21.7% of all declared back injuries were rejected in 2001-2003.

Table 31. Proportion of occupational accidents yearly rejected by insurers (all types of injury and those with a back injury) (FAT 2001-2003).

	N rejected accidents (all types of injury)	N rejected back injuries	Rejected back injuries/total rejected accidents	N accepted back injuries	N declared back injuries	Rejected back injuries/total declared back injuries
	n1	n2	%	n3	n4	%
2 001	14,054	3,588	25.5	13,427	17,015	21.1
2 002	13,276	3,531	26.6	12,180	15,711	22.5
2 003	11,983	3,159	26.4	11,424	14,583	21.7
Total	39,313	10,278	26.1	37,031	47,309	21.7

- Finally, these analyses are based on the tables provided by the FAT-FAO: iit was not possible to conduct any further analyses to control for potential confounding factors.

Low back pain and the back injury concept

For these reasons, caution is needed when interpreting the results of the FAT-FAO database for the following reasons.

In work accident compensation systems, the relationship between a sudden generally unexpected event or work disruption and a bodily injury is the key element that the insurance is assessing when examining a worker claim for a work accident. Such a causal relationship cannot by definition be applied easily to the sudden appearance of a painful sensation in the low back when carrying out a given work task. There is still much debate as to whether an acute back pain is the final stage of a long process of disc degeneration, a given movement or effort prior to the pain being only an accessory revealing phenomenon, or could also be caused in a more direct way by some excessive mechanical stress.

That question cannot be solved by the medical advisor of the insurer who relies instead on the legal definition of a work accident: when a "sudden" event cannot be established before the pain occurrence, most insurers are thus prone to reject the claim; rejection is more likely also when the worker is injured while doing a physically non-demanding task. As shown in the table above, more than one fifth of back pain claims in a work accident context are rejected. In addition, spontaneous claim rates are likely to be influenced among the workers by the likelihood of their claim being susceptible to be accepted. The data presented cannot thus be considered as representative of the true incidence of acute low back pain episodes occurring during work.

The reasons why some claims are rejected may conversely be considered as possible confounding factors for the interpretation of the risk factors of the accepted claims. Due to their differences in physical loading of the back, tasks in blue-collar jobs are more likely to be considered as possible causes of a LBP "injury" than tasks in white-collar jobs.

In that context, it must be noticed that the "overexertion" category of accident is by far based on the assumption that the movement or effort having preceded the back pain appearance had exceeded the normal physiological limits of the vertebral anatomical structures; such assumption is almost never based on force measurements or biomechanical calculations but inferred from the accident circumstances description. This category of accidents likely involves a large range of physical constraints.

Similarity between back injuries and "all types" injuries

Before commenting the factors that seem to influence the incidence rate of back injuries in the working population, it must be checked whether their distribution differs from the one of the occupational accidents as a whole. To this end, "back injury" specific data have been compared to the overall accident statistics available on the FAT web site [382] (table 24).

An identical pattern is observed for gender (77% of all accidents occurring in males), and professional status (75.5 % among blue collar workers). This pattern reflects the gender distribution in the sectors most exposed to accidents: for instance the workforce in the building sector is essentially male. Moreover, it is well known that white collar jobs are less exposed to various hazardous factors.

Slight differences are observed for age: back injuries are more frequent between 30 and 49 years than all other accidents (58.1 % against 53.5 %) and less frequent in younger age classes (32.4 % against 36.9 %). Whereas many work accidents are attributed to a lack of experience in young workers, it is likely that back injuries are related more to the spine aging process and to the cumulative effect with time of biomechanical stresses associated with working activities.

For the regional factor, trends are similar but far more marked for back injuries. Flanders employs 61.6 % of the private sector workforce (2003 figures), records 58.9 % of all accidents, but only 51.1 % of the back injuries. Conversely, Wallonia, which employs 22.9

% of the private sectors workers, records 29.1 % of all accidents, but 38.1 % of the back injuries registered at the national level.

When accident outcomes are taken into consideration, permanent (partial) incapacity prevalence figures are higher for back injuries than the corresponding figures for all types of accident (8.8 % against 5.9% in females, 9.8 % against 7.8% in males).

In summary, "back injury" accidents seem to have specific age and regional distributions. Those injuries have also on average a worse outcome than other types of accidents.

The regional factor in back injuries incidence

The results showed that the regional differences in incidence cannot be ascribed to variations in the distribution of accident prone sectors between regions. Similarly large differences in back injury incidence between regions have indeed been observed in two sectors of activity, the building and the health sectors known to have an homogeneous distribution of employed people across the whole country.

In order to check for regional differences in back-related problems, and not specifically occupational back injuries, the results of the Belgian Health survey, conducted by The Belgian Scientific Institute of Public Health (ISP) have been reviewed. For back complaints of long duration (3 months or more during the last 12 months), this survey shows trends in the same direction but with smaller differences. The Flemish region had the lowest prevalence of complaints, 9.7 % in women and 11.2 % in men, while Wallonia had the highest one (10.9 % in women and 12.0 % in men) ; an intermediate rate was observed in Brussels (11.9 % in women and 10.0 in men)[336]. Such regional differences may tentatively be ascribed to cultural differences (between Flemish and French-speaking citizens) in complaints rate as previously shown in a Belgian epidemiological study [337, 338].

Enterprise's sector of activity and back injuries incidence

In the incidence ratio calculation, sectors with less than 10.000 workers employed were excluded. This allowed us to compare our results with those found by Prevent in their report because they used the same criterion [383].

In this analysis, the building sector and the metal industries were at high risk to cause occupational accidents in general and "back injury" accidents in particular; similar findings have been described in the Prevent report. One explanation put forward refers to the fact that the building industry employs a lot of workers (180.000 workers in Belgium) and mainly in small or very small enterprises. However, it is likely that "the kind of work" typically observed on building works plays a major role.

When considering prevention policies, a particular attention should be paid also to the Health and Social sector, which contributes to a large number of back accidents, but also ranks at the second place for a permanent disability outcome.

Natural history of back injuries

The Belgian data summarized in figure 10 allow a comparison with the data published in other countries for similar compensated cases of back injuries. In this data set, 77.6 % of the workers absent from work because of a back injury did return to work within 1 month. This figure is slightly higher than the average 75 % described in the literature [384-386, 99] but slightly lower than the figures observed in general patient populations [387, 388]. After 6 months, only 3.32 % of the Belgian workers were still off work, a much lower proportion than the 7.4 % found in a cohort of Quebec workers[99].

Factors influencing the outcome of back injuries

Caution is needed when analyzing the outcome of work accidents. Depending on the social environment they are working in, people may be more or less prone to file in an accident claim even if there is no day off needed.

In this respect, social influences on the work accident declaration may have their origin in the enterprise's culture. In some industrial sectors, trade unions have been successful in informing the workers that an accident claim, even for a minor injury, offers a legal protection against an unexpected and delayed health effect. The high claim rate with no sick leave recorded in these sectors cannot necessarily be interpreted as a proof of a high risk situation. Some management policies may also play a role. Some enterprises use various incentives to lessen as far as possible the rate of sick leave accidents, using for instance "light duty" policies to avoid an injured worker being sick listed. In other enterprises, the management of safety includes a systematic declaration of occupational accident, even for the minor ones.

These aspects are noticed in the analyses taking into account the effect of the enterprise's size on the relative proportion of "no sick leave" claims. In large companies (>500 staff), a higher proportion of accidents with no sick leave are noticed while in very small enterprises (< 20 staff); the data show a higher proportion of accidents resulting in a permanent incapacity. The explanations could be on one hand the aforementioned social influences (declartion policy). On the orther hand, prevention strategies might be more efficient in large enterprises, while tougher working conditions and less prevention might be more common in small settings.

Table 27 shows that in Flanders fewer workers are declaring a back injury with no sick leave than in the two other regions. Another striking regional difference is the higher proportion of accidents associated with a sick leave period in Wallonia and more so in Brussels. Those regional differences in outcomes would deserve further studies.

Age and gender influences on outcomes are more easily explained. With age, a growing proportion of the accidents inducing a sick leave results in a permanent incapacity being awarded to the victim, but such a trend is observed for all types of accidents [384, 389]. It probably reflects the higher difficulty of an aging subject to restore the functional capacities after an injury.

The distribution between males and females in hazardous occupations has been already stressed: this explains the lower incidence of temporary incapacity following an accident among female workers than among male workers (table 27). However, the probability of getting a permanent incapacity after a back injury is not influenced by gender.

Effect of the accident circumstances on the injury prognosis

The data do not allow distinguishing between back pain resulting from an acute trauma and back pain occurring in the course of usual work. Nevertheless, the analysis gave a proxy categorization of the back injuries following an "overexertion". The data presented in table 30 and in figures 14 and 15 support the hypothesis that back injuries resulting from overexertion have a better prognosis than those following a true traumatic event, like a fall [390]. Overexertion resulted in shorter sick leave periods and less incapacity (grade and length). This better prognosis could be ascribed to a less severe injury: more often a "sprain" or an "internal traumatism" or a "dislocation" and less often a "fracture", a "crushing" or "multiple lesions".

This difference is of some interest as back injuries following an overexertion are generally attributed to the cumulative effect of the mechanical stresses supported by the intervertebral disc in the daily life. These back injuries occurring in the occupational context are probably similar to most private life injuries for which the patient, when asked by the physician, cannot remember a clear precipitating event.

Guidelines for management of CLBP cases should thus distinguish between the back pain episodes resulting from a traumatic event and those occurring without any precipitating factor, close to those occurring in the daily life.

Recurrence evaluation

In this study, it would have been interesting to evaluate the recurrence of low back pain following a back injury as recommended by recent guidelines [347]. The data available did not allow conducting this analysis.

Key points

- **About 12,000 back injuries are recorded every year in Belgium; this figure amounts to 6.63% of the workplace accidents declared annually in the private sector and accepted by the insurance companies.**
- **The average incidence rate of accidents involving a back injury for the studied period is 6.2 cases per 1000 full time equivalent workers per year, and a decreasing trend is observed over the 3 years studied period (2001-2003).**
- **Back injuries are mostly recorded in male, blue collar workers, aged between 30 and 49 yrs, working with little seniority in small enterprises, located mainly in the Flanders region.**
- **Among the back injured workers 62.4 % were temporarily incapacitated and 9.5 % permanently incapacitated.**
- **About 8.2 % of the back injured workers remained off work for more than 3 months and could be considered as chronic back pain cases.**
- **The subjects most affected by a permanent partial incapacity following a back injury were males, blue collar workers, employed in Brussels or Wallonia.**
- **The wood, building and metal industries are the sectors where the incidence rate of back injuries is the highest one. For permanent partial incapacity after the injury, the building, the health and social sector, as well as the agriculture and forest sector have the highest rates.**
- **Overexertion is the accident circumstance most often declared when a back injury occurs at the workplace, but is less frequently involved in permanent partial incapacity.**
- **In comparison to back injuries resulting from overexertion, the injuries following a fall involve the highest proportion of chronic back pain cases (9.21 % against 4.91 %) and lead more frequently (12.2 % against 8.81 %) to a permanent partial incapacity.**

4.3.4 Analysis of the Intermedicale database

4.3.4.1 Background

Intermedicale (asbl) is an external service for prevention and protection at work (SEPP/EDPB). It provides "health surveillance of workers" in respect of human dimensions, transparency of services, partnership with workers and employers, prevention policy. Intermedicale service covers the whole Belgian territory with a database of more than 5.000 enterprises representing about 88.000 affiliated workers (statistics available on the website : http://www.intermedicale.be).

Intermedicale supplies three kinds of services:

- Medical surveillance of workers by occupational health physicians (including return to work examinations);
- Risk management (including safety at the workplace, ergonomics, hygiene at work and psycho social aspects);
- Other services: training, check-up, and label's commission (external control of tattooing, piercing, permanent making-up).

Out of the whole population of affiliated workers, approximately 64,293 workers are annually submitted to the health surveillance (65,488 workers in 2003; 63,478 workers in 2004 and 63,911 workers in 2005 (see statistics on the website mentioned above).

For those workers, medical data are recorded by the occupational health physicians during the examinations and centralized in a main database. The health complaints are coded using ICD-9-CM codes, allowing to identify among the medical examinations performed those related to a back problem. The computer program used by Intermedicale is MEDIDOS, compatible with ACCESS program.

4.3.4.2 Objectives of the Intermedicale database analysis

The first objective of this analysis is to evaluate the proportion of prolonged sick leaves caused by a back problem among the Intermedicale affiliated workers, using the "return to work" (RTW) examinations as selection criterion, and to identify the main factors associated to this sick leave. Belgian labor regulations make the RTW examination compulsory after an absence of at least 28 days in workers submitted to the periodical health surveillance. In this analysis, the reference of a work absence of 28 days or more has thus been used instead of minimal 90 days period defining a "chronic" low back pain. It was indeed the only consistent information available in the database.

The second objective is to evaluate the impact of a back problem on the decision taken by the physician after the sick leave, in terms of fitness or unfitness to return to the usual and specific job.

The sickness data analyzed in the Intermedicale database are related to the general health care system and could thus theoretically be compared to those analyzed in the Intego database (see Part II). On the opposite, the accident data from the FAT-FAO database were influenced by the legal definition of a work accident,

4.3.4.3 Population and methods

Database population

This "retrospective cohort study" is based on a three year period (Jan 1st 2003 to Dec 31st 2005). The study population is constituted by 111,350 affiliated workers recorded at a given moment during the above mentioned period. The number of examinations recorded (n=200,325) is higher than the number of affiliated workers (n=111,350). Some workers have been examined every year. Other ones were examined on a two or three year basis, while some workers have been examined only once for the recruitment.

The population is distributed as follows in the different enterprise's categories (based on the number of workers and the nature of activity : hazard level associated to the enterprise's economic activity, Arrêté Royal 10 Aug 1978 and 05 Déc 1980):

- 24,697 (22.2 %) are from enterprise category A,
- 14,647 (13.2 %) from category B,
- 49,627 (44.6 %) from category C,
- and 22,379 (20.1 %) from category D (< 20 salaried staff).

In this population, 59.5 % were males and 40.5 % were females (for 634, the information is not available). More than half of them (55.1 %) are Flemish-speaking and 44.9 % are French speaking. A few German and English speakers (385 workers) were also recorded but were not analyzed as a specific group.

Within the 111,350 affiliated workers, 48,621 (43.6 %) have been exposed to "manual handling" as occupational risk category.

Study population

The database population selected by Intermedicale concerns a total of 71,740 medical contacts recorded among the affiliated members exposed to the "manual handling" risk. Manual handling is indeed a risk factor for low back pain and the objective was to select a homogeneous population of workers possibly prone to occupational back pain. It must be stressed however that this risk is seldom the only occupational risk to which workers are exposed. The sample amounts to an average to 35.8 % of all recorded medical contacts during that period (n=200,325).

The various reasons that motivated a contact with the occupational physician are listed in the table 32. The two most frequent reasons were the periodical health evaluation (53.6 %) and the recruitment examination (37.1 %). The "Return to Work" (RTW) examination after a sick leave (RTW 1) ranked at the third place (3.59 %).

Table 32. Distribution of medical contacts with the physician according to the reason of contact during the 2003-2005 period (n=71728; Missing = 12)

Reason of contact with physician	N	%
Periodical health examinations	38,480	53.65
Recruitment examination	26,635	37.13
Return to work after sickness (RTW 1)	2,576	3.59
Spontaneous examination	1,239	1.73
Medical selection of drivers	861	1.20
Return to work after accident (RTW 2)	582	0.81
Others	1,335	1.86
Total	**71,728**	**100.00**

Population of interest

The final sample was 3,158 contacts with an occupational physician when returning to work after an absence of 28 days or more due to a sick leave (RTW 1) or an occupational accident (RTW 2). So, the inclusion criteria were:

- To be employed in an enterprise affiliated to Intermedicale (asbl) between January 1st 2003 and December 31st 2005.
- To be submitted to the health surveillance during this period.

- To be listed as exposed to the manual handling occupational risk during this period
- And finally to have had a contact with the physician for returning to work after a sick leave or an occupational accident of at least 28 days duration.

Methods of analysis

A descriptive analysis of the database population, the RTW examinations group and the subgroup of back related RTW has been first performed, presenting the back related RTW proportion and describing the most frequent diagnoses used by occupational physicians in the definition of back problem.

Then, according to the socio-demographical and professional factors, the distribution of medical contacts after an absence due to a back problem (RTW back) has been compared to the distribution of contacts carried out within the periodical health evaluation system, as those are supposed to involve healthier workers and to be more representative of the whole worker population.

Finally the distribution of back problems was analyzed according to the decision taken by the physician at the end of the RTW examination.

The outcome variables analyzed were:

- Proportion of back problems in the RTW group,
- Relative frequency of back diagnosis codes (ICD-9-CM),
- Decision taken by the physician at the end of RTW examination,

The explanatory variables analyzed were:

- Cause of absence,
- Age,
- Gender,
- Language,
- Region (Flanders/Wallonia/Brussels),
- Worker status (blue/white collar),
- Seniority in the enterprise,
- Body Mass Index,
- Smoking status,
- Sector of activity.

For the outcomes, the identification of a RTW examination related to back problem has been made using the ICD-codes related to the back (ICD-9-CM Classification), corresponding to the diagnosis recorded by the physician. The diagnosis is based on the Intermedical physician's clinical judgement. The accuracy of those codes cannot thus be ascertained.

The final list used to identify back problems in the database comes from a main list of all diagnosis recorded by Intermedicale physicians (based on ICD-9-CM). From this list, all back related diagnoses (as identified by during our meeting in the beginning of the project) have been selected and the list was re-sent by the researcher to Intermedicale for data extraction.

For the explanatory variables, the cause of absence to work was originally recorded in various categories, but two of them were interesting for this study and were selected for analysis: the return to work after sickness absence (RTW 1) and the return to work after an occupational accident (RTW 2). The age was ancoded into six classes to allow

comparison with the FAT-FAO database results. Workers older than 65 years or younger than 15 years were excluded from the analysis study. Postal zip-codes have been recoded in region codes (Flanders, Brussels, and Wallonia). Worker status was recorded by Intermedicale in two categories only, "Blue collar" and "Employees". The date of entry in the current job and the date of examination have been used to define the seniority. The BMI was calculated from the height and the weight and grouped in 4 classes according to the CDC classification (http://www.cdc.gov/): underweight (< 18.5), ideal weight (18.5-24.9), overweight (25.0-29.9) and obese (30.0 and above). Smoking habits have been recoded in "Yes" or "Not": those who stopped since more than 1 year have been recoded as non smokers, while those who stopped since less than 1 year have been recoded as smokers.

Only those sectors of activity (NACE-Bel) with more than 10 records of back related RTW were kept for the analysis. Others were lumped together ("others" group).

Original data were received in Access format, cleaned, recoded and analyzed in EPIINFO version 3.32 (September 2005). The statistics test used for proportions was the Pearson Chi square test with the threshold (α level) at 5 %. The ANOVA test was used to compare the means between groups. A multivariate analysis was difficult to perform given the structure of the database: the analysis is thus limited to an univariate analysis without ignoring possible interaction or/and confounding factors.

4.3.4.4 Results

Proportion of back related RTW examinations

From the 3158 RTW examinations recorded by Intermedicale during the 2003-2005 period, 376 (11.9 %) were related to a back problem. The main types of diagnosis found when identifying back problems are shown in table 33.

Table 33. Distribution of "back problems" recorded among the 2003-2005 RTW examinations according to the type of diagnosis (n=376)

ICD-9-CM	Type of diagnoses	N	%
722.1	Displacement of thoracic or lumbar intervertebral disc without myelopathy	146	38.8
724.2	Lumbago	89	23.7
724.5	Backache, unspecified	27	7.2
724.3	Sciatica	26	6.9
724.1	Pain in thoracic spine	12	3.2
805	Fracture of vertebral column without spinal cord injury	12	3.2
721.3	Lumbosacral spondylosis without myelopathy	9	2.4
737.3	Kyphoscoliosis & scoliosis	9	2.4
722.9	Other & unspecified disc disorder	8	2.1
722	Intervertebral disc disorders	7	1.9
738.4	Acquired spondylolisthesis	5	1.3
847.3	Sprain of sacrum	4	1.1
724.7	Disorders of coccyx	4	1.1
724	Other & unspecified disorders of back	3	0.8
721	Spondylosis & allied disorders	3	0.8
724.4	Thoracic or lumbosacral neuritis or radiculitis, unspecified	3	0.8
724.0	Spinal stenosis, other than cervical	3	0.8
806	Fracture of vertebral column with spinal cord injury	2	0.5
724.6	Disorders of sacrum	1	0.3
721.5	Kissing spine	1	0.3
847.2	Lumbar sprain	1	0.3
754.2	Congenital musculoskeletal deformities of spine	1	0.3
	Total	376	100.0

Some types of back diagnoses selected in our list of ICD-9-CM codes did not have any match in the Intermedicale database:

722.8 :	Postlaminectomy syndrome
732.0 :	Juvenile osteochondrosis of spine
737 :	Curvature of spine
737.1 :	Kyphosis (acquired)
737.2 :	Lordosis (acquired)

The most frequent diagnosis used by the physicians for a back complaint is the "Displacement of thoracic or lumbar inter vertebral disc without myelopathy" (ICD-9-CM code 722.1) with 38.8 % of the total cases, followed by the "Lumbago" (ICD-9-CM code 724.2) with 23.7 % of the total cases. Other diagnoses are less represented (< 10 % of the total).

Back problems according to the socio-demographic, biological and professional factors

In this sample (RTW examinations), the cause of absence due to a back problem is most often a sick leave (86.7 %) and less frequently a work accident (13.3 %). Among the 2576 examinations for RTW after a sick leave, a back pain cause was more often recorded (12.7 %) than among the 582 examinations for RTW after an occupational accident (9.1 %), and this difference was strongly significant (p=0.006).

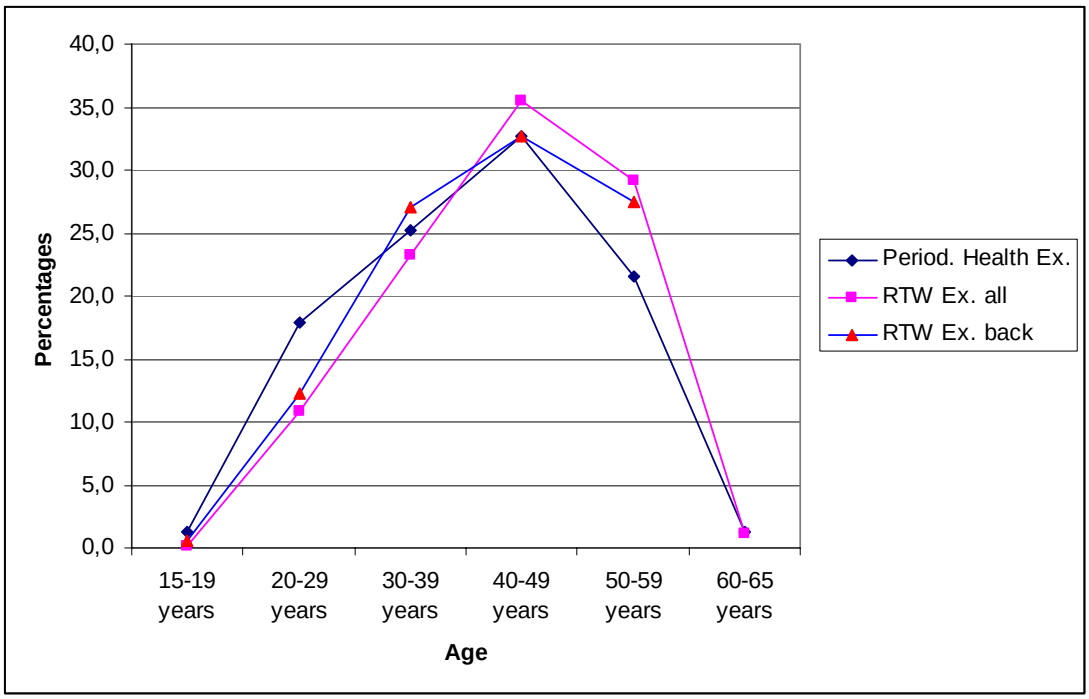
The socio-demographic, individual and socio-professional characteristics of the sample are shown in figure 16 and Table 34.

When comparing age, it can be seen that the mean age in the no back related RTW group higher than in the back related RTW group (p=0.02), and much higher than that observed in the group of workers undergoing periodical health evaluation (supposed to be healthier and to be more representative of the whole worker population).

Table 34. Socio-demographic and socio-professional characteristics of sample

Age	Period. Health Ex. (n=38480)	RTW Ex. all (n=3198)	RTW Ex. related to back problems (n=376)	RTW Ex. not related to back prob. (n=2822)	P-value
Mean ± SD	40.4 years ± 10.7years	42.9 years ± 9.6 years	41.8 years ± 9.6 years	43.0 years ± 9.6 years	0.02

Figure 16. Distribution of age classes for workers with periodical examination, RTW all causes and RTW due to back problems



The highest number of workers undergoing periodical health evaluation is 40-49 year old, males, from Flanders, blue collar and with seniority shorter than 5 years. In the RTW examination group (absence due to back problem), the majority are also aged between 40-49 years, males, from Brussels, blue collar and with a short seniority (< 5 years).

In terms of proportion of back problems within the RTW examination for all causes, a higher proportion of back-related absences is found among younger than among older, but not statistically significant, among male workers than among the female workers ($p<0.01$) who had undergone a RTW examination after a long duration work absence (> 28 days). Similarly, a higher proportion of back-related absences is found in blue collar workers than in employees ($p=0.002$). Differences in back related proportions of RTW are also observed with seniority: the highest proportions are in the groups of 5-10 years and of more than 21 years seniority ($p=0.003$).

The proportion of back-related RTW was not influenced by geographic or language differences, nor smoking habits or BMI value, even though this last factor did reach almost statistical difference (p-value=0.06).

Table 35. Distribution of "back problems" according to socio-demographic and professional factors.

VARIABLES	Period. Health Ex. (n=38,480)		RTW Ex. all (n=31,98)		RTW Ex. Back (n=376)			
	N1	%	N2	%	N	%	(n/N2)	p-val
Age:								
15-19 years	509	1.3	3	0.1	2	0.5	-	
20-29 years	6,881	17.9	344	10.9	46	12.2	13.4	
30-39 years	9,663	25.2	734	23.2	102	27.1	13.9	
40-49 years	12,539	32.7	1,120	35.5	123	32.7	11.0	
50-59 years	8,290	21.6	922	29.2	103	27.4	11.2	0.4
60-65 years	501	1.3	35	1.1	-	-	-	-
Gender								
Males	24,551	63.9	1,549	49.2	233	62.0	15.0	
Females	13,856	36.1	1,605	50.8	143	38.0	8.9	**<0.01**
Missing	156							
Language								
French speakers	17,274	45.3	1,571	50.0	194	51.6	12.3	
Dutch speakers	20,885	54.7	1,571	50.0	182	48.4	11.6	0.5
Missing	321							
Regions								
Flanders	19,086	49.8	1,188	38.0	131	35.5	11.0	
Wallonia	9,544	24.9	721	23.0	97	26.3	13.5	
Brussels	9,676	25.3	1,218	39.0	141	38.2	11.6	0.3
Missing	174							
Worker status								
Blue collar	11,251	53.6	749	46.4	112	57.0	13.6	
Employee	9,732	46.4	864	53.6	77	43.0	8.9	**0.002**
Missing	17,497							
Seniority								
< 1 year	3,902	13.0	321	13.8	20	7.2	6.2	
1- 4 years	16,130	53.8	1,080	46.5	137	49.3	12.7	
5 – 10 years	3,505	11.7	248	10.7	38	13.7	15.3	
11 – 20 years	3,499	11.7	276	11.9	27	9.7	9.8	
≥ 21 years	2,933	9.8	399	17.2	56	20.1	14.0	**0.003**
Missing	8,511							
BMI								
< 18.5	-	-	19	2.5	1	0.9	5.3	
18.5 – 24.9	-	-	305	39.4	35	30.4	11.5	
25.0 – 29.9	-	-	200	25.8	38	30.0	19.0	
30.0 & +	-	-	251	32.4	41	35.7	16,3	0.06
Smoking status								
Smokers	12,409	37.3	384	45.3	39	47.6	10,2	
Non smokers	20,836	62.7	461	54.7	43	52.4	9.1	0.6

Back problems and sectors of activity

Table 36 compares the proportions of back-related RTW in the 10 sectors of activity that had more than 10 records of back related RTW.

In terms of absolute numbers, the finance, the health sector and the food industries had the highest number of back related RTW.

In terms of proportion according to all RTW examinations, the "sanitation, street sweeping and sewage" sector had the highest proportion of back problems, but this conclusion is to be taken with caution because it arises from a small number of examinations (23 back problems/65 RTW examinations).

The building sector which is usually known as a high risk sector for low back pain ranks on the second place with 27.1 %, followed by the food industries (24.9 %). On the contrary, the "real estate and services to enterprises" sector that had the highest number of affiliated and the highest number of medical examinations had a very low amount of RTW examinations with only 9 back problem related cases (data not shown).

Table 36. Proportion of back problems according to the sector of activity (sectors with more than 10 cases of back-related RTW)

NACE-B	Sector of activity	Tot. Health Exam.		RTW all	RTW back	Proport.
			%	N	N	n/N*
90	Sewage and refuse disposal, sanitation and similar activities	598	0.8	65	23	35.4
45	Construction	2,656	3.8	59	16	27.1
15-16	Manufacture of food and tobacco products	2,458	3.5	213	53	24.9
75	Public administration	4,478	6.4	211	29	13.7
80	Education	1,475	2.1	89	11	12.4
55	Hostels & restaurants	4,195	5.9	90	10	11.1
65-67	Finance, Banking & Ins.	3,861	5.5	790	81	10.2
23	Manuf. of coke ; petrol & nucl. Ind.	7,296	10,4	304	29	9.5
83-85	Health & social work	11,027	15.7	638	59	9.2
50-52	Wholesale, retail trade; repair of mot.	5,972	8.5	333	26	7.8
93	Other sectors	26,133	37.2	276	36	0.1

* Ratio calculated for the whole period of 3 years and per 100

Back problems and decision taken by occupational physicians during the examination for returning to work

Figure 17 shows the distribution of the various decisions taken by the occupational physicians during the examination (back and non back) for returning to work.

In 65.1 % of back related RTW examinations after absence of > 28 days, the physician's decision was ability for work without restriction. In 15.2 % of back related RTW examination, the decision of physicians granted permission to return to work but with restriction.

In 5.4 % of the back related RTW examinations (n=20), the decision was "permanent unfitness for specific work" (without precision 4.3 %, total inability 0.8 % or partial inability 0.3 %), while in 12.4 % of back related RTW examinations (n=46), the decision was that those workers had a temporary unfitness for their specific work (without precision 3.8 %, totally 6.2 % and partially 2.4 %).

Figure 17. Distribution of decisions taken by the occupational physicians at the end of examinations in back related RTW (n=373; Missing =3)

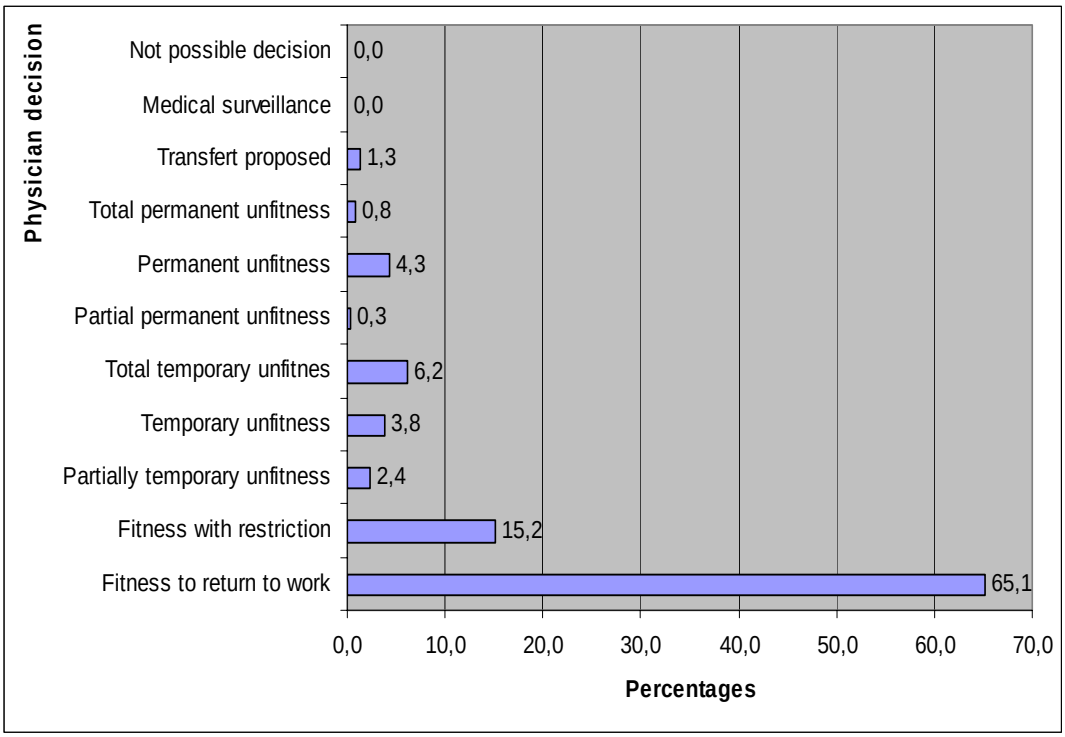
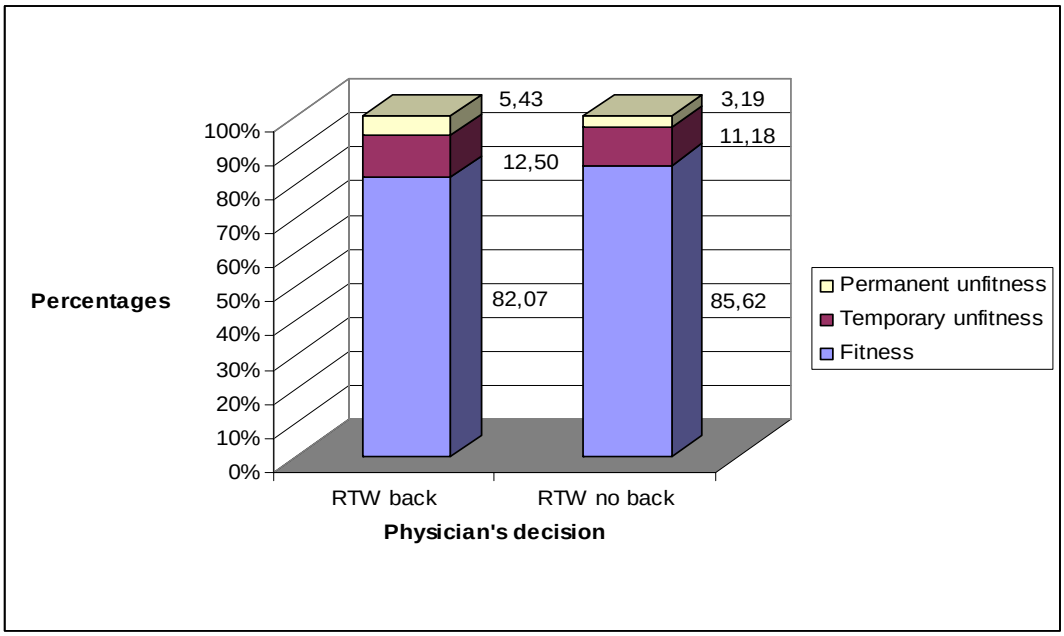


Figure 18 compares the distribution of physician's decisions between the RTW examinations after an absence due to a back problem and the RTW examinations after an absence not due to a back problem. It can be seen that less decisions of ability for work was taken in the group of back-related RTW examinations (82.07 %) than in the other cases (85.62 %).

The decision of "permanent unfitness" for a specific job was more frequently taken by the occupational physician in back-related RTW examinations (5.43%) than in other cases (3.19 %), this difference being statistically significant (p= 0.03).

Figure18. Decisions taken by occupational physicians in the back-related (n=368) and in the non back related RTW examination groups (n=2742)



Missing (8 cases) and others (transfer, medical surveillance and not possible decision = 55) have been removed

4.3.4.5 Discussion: Intermedicale database

Strengths and limitations of the database

One major strength of the Intermedicale database is that health complaints are coded using ICD-9-CM codes, which allow to identify among the medical examinations performed when returning to work (> 28 days sick leave), those specifically caused by a back problem. Another strength is the spread of the affiliated enterprises across the three regions.

However, this database had some limitations for this project:

- Database structure: According to the complex structure of the Intermedicale database (difficulties to combine different variables in the same database), it became complicated to analyze the overall database; the analysis was limited to a sub-sample of medical contacts selected on the basis of the worker exposure to manual handling. The analysis was also limited to a univariate comparison because a multivariate analysis was difficult to perform due to the database. Therefore it was not possible to control for interactions or/and confounding factors (i.e.: gender & status of workers).
- Records validity: Some variables in the database like smoking habits were coded in various ways. So those information had to be recoded in a dichotomous variable but the validity of this recoding may be questioned.
- Database contents: Some variables were not systematically accurately recorded (i.e. sick leave duration). As a result sick leave duration and other interesting variables did not allow a meaningful analysis (for example qualification level, type of contract). Other interesting variables were not available at all in the database like the marital status, the medical history related to low back pain and the cost of the disease or accident.

- Definition of chronic low back pain: the identification of a "chronic low back pain" case has been based on "a work absence of 28 days or more due to back pain" instead of the classical case definition of 90 days pain duration. Within the Belgian occupational health system, this was the only reliable available information.
- Enterprise's organizational performance in referring the worker to the OP: Another source of bias came from the underestimation of the incidence of long term sick leave periods (> 28 days) if based on the number of "return to work" examinations. Since it is the employer who has to send the worker to the occupational physician when resuming work, the ratio between RTW examinations and the actual number of work resumptions will depend on the organizational characteristics of the enterprise and may vary from an employer to another. It is however highly unlikely that this bias influences the relative proportion of RTW examinations caused by a back problem.

Proportion of back problems

This analysis found 376 cases of back problems, corresponding to 11.9 % of all workers undergoing a return to work examination after a sick leave or an occupational accident in the 3-yr period studied. It is likely that most of those 376 cases concern the low back region as ICD-9-CM cases corresponding to the cervical spine (n= 45) were excluded. Only 15 cases (kept in the back list) could be identified as "dorsal" problems. As shown by the data drawn from the GAZEL cohort study, dorsal complaints are about three times less prevalent than lumbar complaints [391].

The 11.9 % figure is much higher than the 6.63 % figure found in the FAT database dealing only with occupational accidents. It is worth noticing however that in the present sample of prolonged (> 28 days) absences from work, the proportion of absences due to a back problem did differ significantly between the disease-related absences (12.7 %) and the work accident related absences (9.1 %). This suggests a consistent pattern, back pain being more often associated to a non-traumatic health problem than to traumatic-related health problems.

On the other hand, it must be stressed that the selection of a return to work criterion as the measure of the proportion of back problems among a workers population could lead to an underestimation of the problem actual size, since some workers with back pain do not ask for a sick leave or have shorter sick leaves than the legal criterion of 28 days.

The figures found in this study seem nevertheless in line with the percentage of the Belgian adult population (between 15 and 64 years of age) saying having suffered from a prolonged (3 months or more) pain syndrome in the back during the preceding year (11.3 % in men; 10,3 % in women)[336].

Evaluation of LBP recurrence

The "European guidelines for management of low back pain" recommend that when analyzing consequences of LBP in workers one should evaluate the occurrence and recurrence phenomenon as one of different outcomes [347]. However, the present database did not allow us to evaluate this phenomenon because no information on the recurrence of low back pain was available.

Key points: Intermedicale database

- **The analyses show that among Intermedicale affiliated workers exposed to manual handling, 11.9 % of the "return to work" examinations carried out during the 2003-2005 period after a sick leave of 28 days or more were related to a back problem.**
- **Male gender, blue collar status, short seniority and a sickness cause of leave are statistically associated to a higher proportion of back problems among people undergoing a "return to work" examination after 28 days or more of absence.**
- **The "sanitation, street sweeping and sewage" sector, the building and the food industries were associated with a higher probability to be off work for 28 days or more due to a back problem.**
- **In 34.9 % of back related RTW examination after a sick leave (> 28 days), the occupational physician decision involved some restriction to the ability for work.**
- **In 5.4 % of those RTW examinations, the worker was assessed as permanently unfit for his usual work; this proportion was higher than among non-back related RTW examinations (3.2 %).**

4.4 CHRONIC LOW BACK PAIN IN OCCUPATIONAL SETTINGS: DISCUSSION OF THE FINDINGS

Low back pain is a major health problem not only at the world wide level, but also in the Belgian population. As shown in the present chapter, it has also important consequences on the Belgian workforce.

The analysis of FAT-FAO database showed that "back injuries" occurring at the workplace are associated with a high percentage of work incapacitation (temporarily and permanently) and are leading to CLBP in about 8 % of the cases. Occupational health surveillance data (Intermedicale database) showed that about 12% of prolonged sick leaves (> 28 days) among workers are caused by a back problem. In those cases, the medical examination carried out by the occupational health physician when the worker returns to work led to a decision of permanent unfitness for the job in 5.4 % of the cases, a significantly higher proportion than for other health problems.

These results have to be interpreted with caution due to the various gaps and possible biases identified in the available Belgian databases. Durations of absence from work due to a work accident are prone to a systematic underestimation due to the counting system for the duration of temporary incapacity based on the calendar year (i.e., the counting of lost days stops every year on Dec 31st). In addition, some insurers do not update the initial estimation of the work absence based on the worker clinical evolution.

Back injuries have also the highest rate of rejection among the various types of injury. Considering that the reason for accepting or rejecting an occupational accident is the circumstances of occurrence (sudden event) and not the type of injury, it would be interesting to analyze why back injuries are so often rejected by insurers.

Occupational health services carry regular, mostly annual, health surveillance on an estimated half of the Belgian workforce, about 1,750,000 people, but as shown in the survey, only 3 OH services out of 19 have in 2006 a medical database using an international coding system for diseases and health problems (ICD-9-CM or ICPC2): it must be added that these OH services are not the largest ones on the Belgian market. Even when such a coding system exists and works effectively (as for the Intermedicale OH service), the database structure makes difficult a scientific analysis of the data. It is thus rather surprising in 2006 that simple information, like the percentage of more than 28 days sick leave due to low back pain cannot be ascertained in a significant sample of the

Belgian working population. For the future, four other OH services are planning to have a medical database using a standardized coding system for diseases. In order to allow for an analysis of these data at the Belgian level, it would be very important that public health authorities in charge of supervising OH determine a standardized encoding procedure with a minimal set of medical information essential for monitoring prevention and management policies.

The INAMI-RIZIV is obviously the main public institution having the most complete database in Belgium, in terms of diseases and incapacity statistics, health care consumption and sick leave benefits. This database should be used as the main source of data to have an accurate picture of the consequences of low back pain on sick leave. However, currently the data related to chronic low back pain are included within a larger category called "diseases of the locomotor system and interstitial tissues". In addition, the statistics only refer to the invalidity period, in other words to sick leave durations of more than 365 days. In the future, the INAMI-RIZIV could adopt a standardized system of coding medical diagnoses using for instance the ICD-9 CM (or ICD-10) codes to allow an identification of specific diseases and their consequences e.g. patients with CLBP. This system should also be used uniformly for work accidents, in occupational health care and in primary care.

In conclusion public health authorities should take measures in order to improve the available databases to analyze the problem of chronic low back pain in patients and workers.

5 GENERAL CONCLUSIONS

Chronic low back pain is a major health problem given its tendency to relapse and to resist to treatments. Their variety ranges from conservative ones to invasive procedures including injections and surgery. Unfortunately, none of those solutions offers any guarantee for permanent relief. The recurrence of the pathology is very high and the prevalence of chronic low back pain in Belgium has major consequences in terms of costs and absenteeism.

This project offers key elements to understand the puzzle of chronic low back pain i.e., an estimation of the costs, of the professional consequences and a review of the evidence-based treatments to care for CLBP patients in the curative and occupational settings.

Chronic low back pain: a major problem in Belgium

The analyses of health care databases and occupational databases reach the same conclusions. Low back pain is important in terms of epidemiology, health care consumption and professional consequences.

In terms of epidemiology, the analysis of the Intego database shows that more than one fifth of the patients ever had at least one episode of low back pain in the past 10 years i.e. a GP with a practice population of thousand patients sees one episode of low back pain every week. Those patients present more frequently co-morbidities that the other patients in the practice population. In the database from the hospitals (Minimal Clinical Data (MCD) 2004), more than 85,000 classic and one-day hospitalizations had a principal diagnosis associated with low back pain. In the database from the Socialistic mutuality (28.13% of all insured patients), 23,447 patients between 18 and 75 years were identified as suffering probably from CLBP (after exclusion of patients with a specific pathology profile). They had indeed a radiograph of the lumbar spine and a CT/MRI imaging within one year

Chronic low back pain predominantly strikes the middle age population. In the Intego database, the highest peak of incidence in the family practice consultations is recorded in the 50-54 year-olds group. Occupational back injury accidents most frequently occur in workers younger than 50 years. In the Intermedicale database the mean age of workers returning to work after more than 28 days of incapacity for LBP was 42 years. These findings confirm the hypothesis that CLBP entails major socio-economic consequences given its peak of incidence during working age.

In terms of health care consumption, the huge number of procedures and their related costs are impressive, as detailed in the data from the INAMI/RIZIV and from the sickness fund. It was estimated that a patient with CLBP generated a mean cost of at least € 922 per year purely in terms of health care consumption. This study concluded that the total direct medical cost was between 81 million € en 167million €. If these sums represent 10 to 30% of the global cost, the rough estimate would be between € 272 million en 1.6 € billion for CLBP per year in Belgium. These percentages come from data in the international literature. Indirect costs are indeed impossible to evaluate on basis of the databases available in Belgium: they cover many expenses including e.g. those from private insurers, from employers, personal costs (mantle care, transportation…).

The size of the indirect costs is approximated by the frequency of absenteeism linked to low back pain. In the handling sector, 11.9% of the "return to work" examinations after a sick leave of at least 28 days were related to back problems. More than one third (34.9%) of those workers had a subsequent restriction to the ability for work and this unfitness was permanent for 5.4% of the workers.

Lack of data on chronic low back pain in Belgium

The researchers were confronted throughout this project with a lack of reliable information in Belgium about the procedures and the related costs for chronic low back pain. Little epidemiological information is available at the population level, except some

estimation from the Belgium health survey (i.e., prevalence of serious back pain problems) and from other older surveys.

Only one database provides estimations in the first line of care, i.e. the Intego project. This network registers new episodes of care in a selected sample of Flemish GPs, using a rigorous methodology. However, only incident cases are recorded and precise estimations on prevalence are impossible for chronic problems as CLBP. Moreover, a systematic record of any prescribed incapacity and complementary procedures would enhance the usefulness of this database to assess the costs and the societal consequences of chronic low back pain. Finally, the extension of the data collection at a national level is necessary to improve the knowledge of such major health problems.

For the second line of care, the analysis of the MCD database gives an estimation of the hospitalizations and procedures performed for CLBP. Major methodological problems were noted e.g. for the selection of the study population (identified by a combination of diagnostic codes). Other problems included diagnostic and therapeutic procedures registered during day care hospitalizations as the same procedures are not registered if performed during ambulatory consultations. The data from the INAMI/RIZIV give general cost estimations but the lack of sufficiently specific nomenclature codes was a serious drawback for identifying procedures linked with low back pain (except for surgical procedures).

The search for information in occupational medicine again proved to be a major challenge. Out of 19 occupational health services, only three have a database where the diagnosis associated to a long-term sick leave (28 days or more) is recorded in a standardized way. Unfortunately, the analysis of one of those databases shows that the duration of sick leave is not systematically recorded.

Only the FAT database gives access to the history of the LBP episode but this registration is limited to complaints caused by occupational accidents. These data records are also biased by the objective of the database, i.e. reimbursement for injured workers. Some accidents may have been refused by the insurance. Back injuries have indeed the highest rejection rate among all types of injuries. In the same way, the cause of accidents (mainly overexertion) can also be influenced by the need for explicating a cause of accident.

The lack of data on CLBP (and other chronic diseases with long term incapacity) could be solved by the identification of the patients in the databases from the sickness funds under condition that the reasons for incapacity would be registered. The longitudinal follow-up of individual CLBP patients across all levels of care would provide accurate information and clarify the current management practices. .In particular, this follow-up could give more insight into the regional disparities observed for the diagnoses, the procedures and related work incapacities.

The treatment of chronic low back pain: not all recommendations can be based on strong evidence

The size of the problem "chronic low back pain" urged for the writing of scientifically based recommendations for all concerned physicians, including the occupational physicians and medical advisers.

Numerous sources of evidence have been analyzed in the first and third parts of this project. The main conclusion is the need for active exercise therapies and for a multidisciplinary approach of the patients. Low evidence was found for the use of most invasive and surgical procedures. Some recommendations for the treatment come from studies on acute low back pain, as for example the evidence against bed rest.

The literature on specific technologies (e.g. epidural adhesiolysis, intradiscal electrothermal therapy, back surgery, spinal cord stimulation for failed back syndrome) illustrates the need for further evidence before applying new procedures out of experimental settings. Some authors advocate for these technologies in the absence of high quality studies necessary for recommending these techniques as non-experimental. As an illustration, a recent rapid assessment of the KCE on total disc replacement for

chronic low back pain (see report 39) concluded that this technique is still highly experimental. Notwithstanding the fact that an added value so far has not been demonstrated and that possibly detrimental adverse events occur, surgeons in several Belgian hospitals are increasingly implanting these devices outside a research setting or a randomized clinical trial.

Treatment of chronic low back pain: what should be recommended?

Moderate to strong evidence was found in the literature for exercise therapy, behavioral interventions, multidisciplinary biopsychosocial rehabilitation and brief educational interventions. Nonetheless, the interventions studied in the literature do not usually allow any definitive statement about the precise components of the interventions to be included to enhance the chance of success. The same problem arises for the effect of back schools. There is moderate-quality evidence that back schools *in occupational settings* may reduce pain, improve function and return to work. However, the underlying studies largely differ in terms of interventions considered. Staying active seems a common denominator to all successful interventions for chronic low back pain patients, including the ones in occupational settings.

Moderate to strong evidence against was found for EMG biofeedback and traction. All other treatments used for treating CLBP are supported by low-quality evidence or no/conflicting evidence was found.

In the occupational setting, an interesting observation concerns the evidence favoring interventions initiated in the sub acute phase of low back pain among working age adults, in order to prevent the transition to chronicity. The present study found that well designed interventions in people having difficulties to return to work after 4 to 8 weeks sick leave are effective on the return to work rate and the number of lost work days, even though they seem to have little impact on pain and functional status.

Gap between available scientific evidence and the management of low back pain in Belgium

According to INAMI/RIZIV data, nearly 450 000 lumbar spine radiographs were performed in 2004. This huge number raises questions when considering the poor evidence underlying this procedure for non-specific CLBP. The large number of various diagnostic procedures performed in Belgium strongly contrasts with the rather limited evidence currently available for most of them in the case of CLBP. For instance, a recent KCE report advocates the use of magnetic resonance imaging only for specific suspicions of diagnoses. It is therefore urgent that evidence-based guidelines supporting a more prudent use of imaging techniques often futile and possibly harmful for the patient would be strictly implemented in the practice of all physicians who care for chronic low back pain patients.

This report concludes that the conservative approach is the first choice for the treatment of CLBP. This assertion contrasts with the number of therapeutic procedures registered for low back pain in 2004. The case of experimental total disc replacement has been mentioned above. Another illustration is the number of surgery performed with arthrodesis (n=7,462, representing more than 4,400,000 euros without hospitalization costs): there is no evidence that this procedure is superior to conservative treatment for low back pain. An invasive procedure as spinal cord stimulation was performed using 392 neurostimulators in 2004 (generating a cost of 3,301,278 euros). The literature review found low-quality evidence to support this procedure, whilst frequent secondary effects have been reported. The literature advocates against the use of traction in CLBP: A total of 3,907 tractions were billed in 2004, generating a cost of 14 790 euros.

Similar findings were found in the use of medications. In 2004, seven out of ten CLBP patients in the first line of care (Intego) received at least one prescription of anti-inflammatory drugs i.e., three times more frequently than the other patients. This percentage rose to more than 90% in the Socialistic sickness fund database. Low-quality

evidence has been found for this painkiller whereas secondary effects are much more frequent than for paracetamol.

Chronic low back pain: final considerations

This study offers practical recommendations based on the available evidence to diagnose and to treat CLBP patients. The key message for CLBP patients is the need for staying active and minimizing the time out of work. Evidence of moderate or high quality is in favor of some conservative treatments for CLBP. One challenge is to avoid hospitalizations and in particular invasive interventions and surgery. Surgery in particular should only be considered after careful multidisciplinary assessment of the patient. These recommendations are relevant for all care settings, including the occupational environment. This project highlighted in particular the possible important roles of the occupational physician and of the medical adviser. These roles should be analyzed and possibly redefined if decision makers want to tackle the chronic low back pain problem and the economic consequences of the related sick leave. An enhanced collaboration between treating physicians and occupational physicians and medical advisors seems mandatory.

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7 APPENDICES

PART I: EVALUATION AND TREATMENT OF PATIENTS WITH CHRONIC LOW BACK PAIN

SEARCH STRATEGY FOR THE LITERATURE SEARCH

Definition of the literature search methodology: the "cascade" principle

A work meeting was held with the clinical experts (L. Plaghki, H. Nielens), the SSMG expert (J. Gailly) and the CEBAM expert (B. Aertgeerts) to discuss and finalize a methodology to be used in this project (Part I). As presented and discussed in the KCE work meetings of December 16, 2005, January, 20, and March 13, 2006, the following methodology has been applied:

- a PICO has been defined,
- in a first phase, only the guidelines, systematic reviews (SR) and health technology assessment reports (HTA) have been searched using adequate search strategies (database selection, period of search and search strategy adapted to each database…),
- references that do not correspond to the PICO will be discarded,
- after a first search, all the retrieved references will be evaluated and discussed by the experts (H. Nielens, J. Gailly, D. Paulus) to obtain a first selection of the most relevant ones according to well defined criteria (see discussion section),
- critical appraisal of the selected guidelines will be conducted using AGREE. However, guidelines that have been elaborated using a methodology comparable to SR will also be evaluated using specific tools to evaluate SR and meta-analyses (Va and Vb forms from the Cochrane Collaboration),
- the content of all selected guidelines will be summarized in a Guideline Evidence Table (one Evidence Table for each reference). Each Guideline Evidence Table will include:
  - identification of the reference,
  - identification of the subheading(s) of the PICO addressed by the reference,
  - quality appraisal of the reference using Va and Vb forms from the Cochrane Collaboration,
  - general comment on the reference made by the reviewers.

Further literature search will be conducted based on the cascade principle: for each PICO subheading, only the literature posterior to guidelines will be searched (only references not included in the guidelines bibliographies will be considered).

The first type of references to be searched will be SR and MA which will also be critical appraised using specific tools (Va and Vb forms from the Cochrane Collaboration). When insufficient good quality SR and/or MA are available for any PICO subheading, further literature (Randomized controlled trials (RCTs)) search will be conducted. Critical appraisal of retrieved RCTs must also be conducted using specific tools.

For all Pico sub headings (example: intervention>evaluation>imaging>discography), an EBM Summary will be elaborated. This summary will present the EBM available on the topic as well as levels of evidences and references.

The redaction of the KCE Guidelines on Evaluation and Treatment of Chronic Low back pain will be based on all EBM Summaries of all PICO subheadings.

Definition of the PICO

The first step of the literature search is to define the PICO (Patients, Intervention, Comparison, Outcome) that guides the search and has to be used to select the materials that have to be retrieved from the literature. The PICO for this part of the project (Evaluation and Treatment of Patients with Chronic Low Back Pain) was elaborated by the SSMG expert (J. Gailly) and the 2 clinician experts (L. Plaghki, H. Nielens). The following PICO (Table I) was presented during the work meeting at KCE on January 20, 2006. Such a PICO may be subjected to changes according to the literature findings and progression of the work.

Table I : PICO for the literature search on evaluation and treatment of chronic low back pain

P. PATIENT **Adult patient (18 to 65 years) susceptible to return to work** **with CHRONIC LOW BACK PAIN (CLBP) : Low back pain persisting more than twelve weeks with or without sciatica** **or with RECURRENT LOW BACK PAIN (RLBP) : Low back pain with or without sciatica recurring one or several times after a first acute episode** **Will be excluded: specific underlying pathologies as fracture, cancer, infections**
I. INTERVENTION **Management of chronic low back pain** **Evaluation: Diagnostic/setting: test information, diagnostic reasoning, disease categorization:** **physical examination** **functional and psychological assessment** **imaging** **other tests** **Treatment: rest, drugs, physiotherapy, exercise, injections, psychotherapy, surgery, alternative therapeutic approaches (osteopathy, acupuncture):** **Non invasive techniques:** **physiotherapy, rehabilitation (including physical evaluation and reconditioning)** **pharmacology treatments** **psychotherapy, psychiatry** **less traditional therapeutic approaches: acupuncture, osteopathy, manipulations** **Interventionals techniques** **Invasive non surgical techniques against pain : injections, thermocoagulation,…** **spine surgery (including disc prothesis)**
C. COMPARISON **Test more effective than no test or than an other test to determine the diagnostic** **Treatment more effective than no treatment or than an other treatment** **Evidence in the guidelines, systematic review, meta-analysis (and RCTs if needed)**
O. OUTCOME **Diagnostic accuracy (accurate diagnostic (if tests))** **Mortality, morbidity, rehabilitation, absence of work, integration in the society, functional capacity, quality of life, pain, spine surgery, patient satisfaction**

Search strategy for the guidelines

The following search strategy has been developed by H. Nielens, L. Plaghki, J. Gailly B. Aertgeerts and D. Paulus. It has been presented, discussed and fine tuned in several work meetings at the KCE on December 16, 2005, January 20, 2006.

Guidelines will be searched in general databases, specific databases, guidelines-oriented sites as well as in several relevant institutional sites (Table II) by two independent researchers (J. Gailly and H. Nielens).

Table II : Databases and websites where the guidelines on evaluation and treatment of chronic low back pain will be searched

Databases	**Medline, Pedro, Embase**
Guidelines-oriented sites	**NHS Guidelines Finder, National Guidelines Clearing House, New Zealand Guidelines Group**
Institutional sites	**SSMG (Bel), WvvH (Bel), ANAES (Fr), NHG (Nl), WHO**

The selected searching period will be from 1996 to 2006. The search method will be adapted to the site that has been searched (see results section below). Whenever necessary the Mesh entry terms « low back pain » and « sciatica » will be used.

All search strategies corresponding to all sites will clearly be described in the results section in order to make it possible for any external validator to reproduce the results of each search.

Search strategy for the Health Technology Assessment reports

HTA will be searched on two databases sites: on the Centre for Reviews and Dissemination (CRD) site of the university of York (UK) and on the NHS Health Technology Assessment Programme site of the department of health (UK).

Search strategy for the SR, MA and RCTs

A first search for SR will be conducted on the Cochrane Collaboration site.

A preliminary search for SR and MA will be conducted in Medline and Embase databases (2000 to 2006) using "low back pain" and "sciatica" as key words in Medline and using "low back pain" and "ischialgia" as key words in Embase. This preliminary search aims at estimating the number of references that can be retrieved from the literature on a topic such as "low back pain".

On the basis of the results of that preliminary search a more defined search strategy will be elaborated.

Further SR and MA selection will be conducted in order to enrich all EBM Summaries (corresponding to all PICO subheadings) that have been constructed using the selected guidelines. Therefore, keywords corresponding to each PICO subheading (and thus to each EBM Summary) will be identified using the Mesh. Only references not used by the previously selected guidelines will be considered.

If for any Pico subheading SR and MA are not found, a search for RCTs will be conducted the same way.

Critical appraisal

As previously stated retrieved references will be critical appraised using specific tools:

Guidelines and HTA reports will be appraised with AGREE,

Guidelines that are structured like SR will also be evaluated using the Va and Vb forms from the Cochrane Collaboration,

SR and MA will be appraised using the Va and Vb forms from the Cochrane Collaboration,

RCTs will be appraised using form II for RCTs from the Cochrane Collaboration.

Levels of evidence

As decided during the KCE work meeting of February 17, 2006, the grading of the levels of evidence will be conducted following the recommendations of an American college of chest physician task force from Guyatt G et al.[a]

APPENDIX 1.2.6-2: REDACTION OF THE "KCE GUIDELINES FOR THE EVALUATION AND TREATMENT OF PATIENTS WITH CHRONIC LOW BACK PAIN V1"

Redaction of the "KCE Guidelines for the evaluation and treatment of patients with chronic low back pain V1" will be based on all EBM Summaries that have been elaborated. Levels of evidences will be included.

Revision of the "KCE guidelines for the evaluation and treatment of chronic low back pain V1" by the clinician experts

"KCE Guidelines for the evaluation and treatment of patients with chronic low back pain V1" will be revised by the following clinician experts:

Radiology: F. Lecouvet (UCL), a second expert must still to be identified,

Anesthesiology: P. Van Elderen (Ziekenhuis Oost-Limburg), B. le Polain (UCL),

Surgery: X. Banse (orthopaedic surgery, UCL), E. Van de Kelft (neurosurgery, Middelares, St Niklaas) or D. Pëuskens , (neurosurgery, Ziekenhuis Oost-Limburg,

Psychology, psychiatry: J. De Bie (Ziekenhuis Oost-Limburg), J. Grisart (UCL),

Physical Medicine and Rehabilitation: H. Nielens (UCL),

Physiotherapy, rehabilitation: P. Mahaudens (UCL), M. Vanderthommen (ULG).

Each expert will only revise the part of the "KCE Guidelines for the evaluation and treatment of patients with chronic low back pain V1" he is specialized in.

Only well documented revisions based on valuable references will be accepted.

Redaction of the final "KCE guidelines for the evaluation and treatment of chronic low back pain"

[a] Guyatt et al. Grading strength of recommendations and quality of evidence in clinical guidelines; Report from an American college of chest physician task force. Chest, 2006;126:174-181

"KCE Guidelines for the evaluation and treatment of patients with chronic low back pain V1" will be corrected by J. Gailly, H. Nielens and L. Plaghki. Only well documented revisions based on valuable references will be accepted.

The final "KCE guidelines for the evaluation and treatment of chronic low back pain" will be prepared by J. Gailly and H. Nielens. All revisions included in that final version will be presented to the expert clinician for approval.

Validation of the "KCE guidelines for the evaluation and treatment of chronic low back pain"

Finally, the "KCE guidelines for the evaluation and treatment of chronic low back pain" will be approved and validated by the KCE experts.

APPENDIX 1.2.6-3 RESULTS OF THE LITERATURE SEARCH

Guidelines

NHS Guidelines Finder search (March 8, 2006)

Guidelines Finder site (http://rms.nelh.nhs.uk/guidelinesfinder/) was searched.

In the Search window of the main page of the site "low back pain" was entered

7 references were obtained.

1 reference was discarded because it was not a guideline.

The following 6 references were kept:

1. Automated percutaneous mechanical lumbar discectomy, NICE, 2005, Care Guideline
2. Back pain - lower, PRODIGY, 2005, Care Guideline
3. Percutaneous intradiscal electrothermal therapy for lower back pain, NICE, 2004, Care Guideline
4. Percutaneous intradiscal radiofrequency thermocoagulation for lower back pain, NICE, 2004, Care Guideline
5. Percutaneous vertebroplasty, NICE, 2003, Care Guideline
6. Prosthetic intervertebral disc replacement, NICE, 2004, Care Guideline

A second search on Guidelines Finder site (http://rms.nelh.nhs.uk/guidelinesfinder/) was conducted. In the Search window of the main page of the site "sciatica" was entered

A total 2 references were obtained.

One had already been retrieved in the previous search for "low back pain" on this site.

Only the following one was kept:

1. Guidelines on epidural steroids for spinal pain, British Society for Rheumatology, Aug 2001

National Guidelines Clearing House search (March 8, 2006)

In the disease/condition window of the "detailed search" page

(http://www.guideline.gov/search/detailedsearch.aspx), of the National Guidelines Clearing House site (http://www.guideline.gov/) "low back pain" was entered

A total of 17 references were found.

Eight were discarded because not corresponding to the PICO (acute low back pain, prevention…).

The following 9 references remained:

1. Philadelphia Panel evidence-based clinical practice guidelines on selected rehabilitation interventions for low back pain. Philadelphia Panel - Independent Expert Panel. Phys Ther. 2001 Oct;81(10):1641-74. Review. NGC:4016
2. Intradiscal electrotherapy. Intracorp - Public For Profit Organization. 1997 (revised 2004), NGC:3745
3. Low back - lumbar & thoracic (acute & chronic). Work Loss Data Institute - Public For Profit Organization. 2003 (revised 2005), NGC:4690
4. Clinical utility of surface EMG: report of the Therapeutics and Technology Assessment Subcommittee of the American Academy of Neurology. American Academy of Neurology - Medical Specialty Society. 2000 Jul (reviewed 2003), NGC:2054
5. Use of back belts to prevent occupational low-back pain. Recommendation statement from the Canadian Task Force on Preventive Health Care. Canadian Task Force on Preventive Health Care - National Government Agency [Non-U.S.]. 2003, NGC:3237
6. Interventional techniques in the management of chronic spinal pain: evidence-based practice guidelines. American Society of Interventional Pain Physicians - Medical Specialty Society, 2003 (revised 2005), NGC:4173
7. Guidelines for lumbar fusion (arthrodesis). Washington State Department of Labor and Industries - State/Local Government Agency [U.S.]. 2001 Jun (republished 2002 Aug), NGC:3218
8. Adult low back pain. Institute for Clinical Systems Improvement, 1994 (revised 2005 Sep), NGC:4543
9. Low back. Expert Clinical Benchmarks, NGC:3946

A second search on this site was conducted. In the disease/condition window of the "detailed search" page of the site (http://www.guideline.gov/search/detailedsearch.aspx), "sciatica" was entered

Only had reference was found that had already been obtained from previous searches and are included in the here above retrieved references.

New Zealand Guidelines Group search (March 8, 2006)

In the "Basic search" window of the "Guidelines and Other Major Publications" page (http://www.nzgg.org.nz/index.cfm?fuseaction=fuseaction_10&fusesubaction=docs&documentid=22) of the New Zealand Guidelines Group page (http://www.nzgg.org.nz/), "low back pain" was entered

Only one reference on acute low back pain was found and was discarded because not corresponding to the PICO.

A second search on this site was conducted

In the "Basic search" window of the "Guidelines and Other Major Publications" page (http://www.nzgg.org.nz/index.cfm?fuseaction=fuseaction_10&fusesubaction=docs&documentid=22) of the New Zealand Guidelines Group page (http://www.nzgg.org.nz/), "sciatica" was entered

No reference was found.

Medline search (March 8, 2006)

A PubMed search (http://www4.ncbi.nlm.nih.gov/entrez/query.fcgi) was conducted using the Mesh entry term "low back pain". The search was limited to:

1996 to 2006,

practice guidelines (in the "publication types" window)

A total of 23 references were found.

Six references were discarded because not corresponding to the PICO (acute low back pain, prevention…).

One had already been obtained from previous searches and is included in the here above retrieved references.

The following 16 new references were kept:

1. 17 to 24 as recorded in PubMed as 8 separate references:
2. Guidelines for the performance of fusion procedures for degenerative disease of the lumbar spine. Part 2, 6, 7, 8, 11, 12, 13, 14. Resnick DK et al. J Neurosurg Spine. 2005 Jun;2(6), 639-724
3. [Guidelines for back pain.] Becker et al. Deutsche Gesellschaft fur Allgemeinmedizin und Familienmedizin. [Z Orthop Ihre Grenzgeb. 2004 Nov-Dec;142(6):716-9. German.
4. [The Dutch Institute for Health Care Improvement (CBO) guideline for the diagnosis and treatment of aspecific acute and chronic low back complaints]. Kwaliteitsinstituut voor de Gezondheidszorg, CBO. Koes et al. Ned Tijdschr Geneeskd. 2004 Feb 14;148(7):310-4. Dutch.

5. The role of activity in the therapeutic management of back pain. Report of the. International Paris Task Force on Back Pain. Abenhaim et al. Spine. 2000 Feb 15;25(4 Suppl):1S-33S. No abstract available.
6. [Back pain--from the viewpoint of medical technology. Danish National Board of Health] Manniche C, Bendix T. Nord Med. 1998 Sep;113(7):230-2, 239. Danish.
7. [Treatment guideline--backache. Drug Committee of the German Medical Society] Z Arztl Fortbild Qualitatssich. 1997 Aug;91(5):457-60. German.
8. [Synopsis of the standard 'Low Back Pain' of the Dutch Society of Family Physicians] van der Laan JR, Thomas S. Ned Tijdschr Geneeskd. 1996 Apr 6;140(14):769-72. Dutch.
9. The AHCPR practice guidelines for low back pain. Materson RS. Bull Rheum Dis. 1996 Apr;45(2):6-8.
10. [Guidelines for treating low back pain in primary care]. Borkan et al. The Israeli Low Back Pain Guideline Group. Harefuah. 1996 Feb 1;130(3):145-51; 224. Hebrew.

A second PubMed search (http://www4.ncbi.nlm.nih.gov/entrez/query.fcgi) was conducted, using the Mesh entry term "sciatica". The search was limited to:

1996 to 2006,

practice guidelines (in the "publication types" window)

Only one reference were found and discarded as not corresponding to the PICO (acute low back pain).

Pedro search (March 8, 2006)

In the advanced search page (http://129.78.28.173/pedro/FMPro?-db=Sessions.fp5&-format=search_new.htm&-new) of the Pedro site (http://www.pedro.fhs.usyd.edu.au/index.html),

"low back pain" was entered in the "Abstract & Title" window,

"1996" was entered in the "Published since" window

A total of 481 records were found which included only 22 recorded as practice guidelines in Pedro.

Twelve were discarded because not corresponding to the PICO.

Four had already been obtained from previous searches and are included in the here above retrieved references.

The following 6 new references were kept:

1. Australian Physiotherapy Association: low back pain position statement [with systematic review], Rebbeck T [Australian Physiotherapy Association (APA) and Musculoskeletal Physiotherapy Australia (MPA)], no date available
2. Vertebral axial decompression therapy for chronic low back pain. Stokes B, Blair R, Bogduk N, Glasziou P, Greenway T, Johnson M, McMeeken J, Yelland M [Medical Services Advisory Committee, Department of Health and Aged Care, Commonwealth of Australia], June 2001 assessment report [with systematic review]
3. Low-back pain. Frequency, management and prevention from an HTA perspective. Horder M, Borum F, Gjorup T, Jorgensen T, Kamper-Jorgensen F, Madsen M, Olesen F, Sogaard J, Timm H [Danish Institute of

Health Technology Assessment (DIHTA)]. Danish Health Technology Assessment 1999;1(1):1-106

4. Clinical guideline on low back pain: low back pain support document. Wong DA, Errico T, Saal J, Sims W, Watters W [American Academy of Orthopaedic Surgeons (AAOS) and the North American Spine Society].
5. Diagnosis, management and follow-up of patients with chronic low back pain [quick reference guide for clinicians]. Delcambre et al. [Agence Nationale d'Accréditation et d'Évaluation en Santé (ANAES)], 2000
6. Dutch physiotherapy guidelines for low back pain. Bekkering GE, Hendriks HJM, Koes BW, Oostendorp RAB, Ostelo RWJG, Thomassen JMC, van Tulder MW [Koninklijk Nederlands Genootschap voor Fysiotherapie (KNGF) [Royal Dutch Society for Physiotherapy]]. Physiotherapy 2003;89(2):82-96

In the advanced search page (http://129.78.28.173/pedro/FMPro?-db=Sessions.fp5&-format=search_new.htm&-new) of the Pedro site (http://www.pedro.fhs.usyd.edu.au/index.html), a second search was conducted

"sciatica" was entered in the "Abstract & Title" window,

"1996" was entered in the "Published since" window

A total of 26 records were found which included no practice guidelines.

Institutional sites

SSMG: One reference was found:

1. [La lombalgie commune]. Timmermans et al., 2001

WvvH: No reference was found

ANAES (Haute Autorité de la Santé, France):

"Lombalgie" was entered in the search window of the "Publications" page (http://www.anaes.fr/anaes/anaesparametrage.nsf/Page?ReadForm&Section=/anaes/SiteWeb.nsf/wRubriquesID/APEH-3YTFUH?OpenDocument&Defaut=y&) of the ANAES site (http://www.anaes.fr/anaes/anaesparametrage.nsf/HomePage?ReadForm). The box "dans cette rubrique" was checked,

A total of 29 references were found.

Twenty two references were discarded because not corresponding to the PICO.

One reference is included in the references previously retrieved.

The following 6 new references were retrieved:

1. L'imagerie dans la lombalgie commune de l'adulte, 1999
2. Prise en charge masso-kinésithérapique dans la lombalgie commune : modalités de prescription, 2005
3. Prise en charge kinésithérapique du lombalgique, 1998
4. Prothèses discales et arthrodèses dans la pathologie dégénérative du rachis lombaire, 2000
5. Massokinésithérapie dans les lombalgies communes, 1998
6. Diagnostic, prise en charge et suivi des malades atteints de lombalgie chronique, 2004

NHG: Page "NHG-Standaard"

1. NHG-Standaard aspecifieke lagerugpijn M54, 2005

WHO

No reference corresponding to the PICO was found.

Additional search for guidelines

As a preliminary search in Embase and Medline for SR and MA have been conducted (2000 to 2006; see section on SR and MA searches below), an additional search for guidelines has been manually conducted while selecting relevant SR and MA on the basis of the PICO and the abstracts of the retrieved references (see below for details).

One more relevant guidelines that was recorded as a systematic review was found :

1. European guidelines for the managment of low back pain. Published as a supplement to Acta Orthopaedica Scandinavica in 2002. Cost B13,

HTAs

Search for HTA on the CRD site (march 10, 2006)

In the "Searching CRD databases" page (http://144.32.150.197/scripts/WEBC.EXE/nhscrd/restart) of the Centre for Reviews and Dissemination site (http://www.york.ac.uk/inst/crd/), "Health Technology Assessment database" was selected in the databases window and "low back pain" was entered in the first search window (all fields, all records, unsorted),

A total of 61 references were found.

One was obtained twice in the same search; after discarding that duplicate, 60 references remained.

Ten references were discarded because not corresponding to the PICO.

One was discarded because dated in 1991.

Seven references had been retrieved in the previous searches.

The following 42 references were kept:

1. Chiropractic treatment of neck and back disorders: a review of selected studies. Conlon J. Canadian Coordinating Office for Health Technology Assessment (CCOHTA) 1992: 35 (English), 34 (French).
2. Treatment of low back pain - primary research. Healthcare Insurance Board/College voor zorgverzekeringen. Healthcare Insurance Board/College voor zorgverzekeringen (CVZ) 1996.
3. Evidence-based physiotherapy for patients with low-back pain. Harms-Ringdahl K, Holmstrom E, Jonsson T, Lindstrom I. Swedish Council on Technology Assessment in Health Care (SBU) 1999 (Report Number 102): 101.
4. The evaluation of back school programmes as medical technology - systematic review. Raspe H, Kohlmann T, Luhmann D. German Agency for Health Technology Assessment at the German Institute for Medical Documentation and Information (DAHTA) (DIMDI) 1997.
5. Back and neck pain. Nachemson A, Carlsson C-A, Englund L, Goossens M et al. Swedish Council on Technology Assessment in Health Care (SBU) 2000 (Report No. 145): 417 (vol I), 389 (vol II).
6. Acute and chronic low back pain. NHS Centre for Reviews and Dissemination. Centre for Reviews and Dissemination (CRD) 2000 (Effective Health Care 6(5)): 8.
7. Treatment of degenerative lumbar spinal stenosis - Volume 1. Evidence report; Volume 2. Evidence tables and bibliography. Agency for Healthcare Research and Quality. Agency for Healthcare Research and Quality (AHRQ) 2001 (Evidence Report/Technology Assessment 32).
8. Arachnoiditis: a brief summary of the literature. Day P. New Zealand Health Technology Assessment (NZHTA) 2001 (NZHTA Report): 33.
9. Intradiscal electrothermal therapy for chronic discogenic back pain - horizon scanning review. National Horizon Scanning Centre. National Horizon Scanning Centre (NHSC) 2001 (New and Emerging Technology Briefing): 5.
10. Endoscopic laser foraminoplasty for low back pain - horizon scanning review. National Horizon Scanning Centre. National Horizon Scanning Centre (NHSC) 2001 (New and Emerging Technology Briefing): 5.

11. Intradiscal electrothermal anuloplasty. A treatment for patients with chronic low back pain due to anular disruption of contained herniated discs. Medical Services Advisory Committee. Medical Services Advisory Committee (MSAC) 2002 (MSAC Application 1048): 92.

12. Multidisciplinary pain programs for chronic pain: evidence from systematic reviews. Ospina M, Harstall C. Alberta Heritage Foundation for Medical Research (AHFMR) 2003 (HTA 30): 53.

13. Intradiscal electrothermal therapy (IDET) for lower back pain. Health Technology Advisory Committee. Health Technology Advisory Committee (HTAC) 2001.

14. Acupuncture for chronic osteoarthritis pain, headache and low back pain. Institute for Clinical Systems Improvement. Institute for Clinical Systems Improvement (ICSI) 2000 (Technology Assessment Report).

15. Intradiscal electrothermal therapy (IDET) for low back pain. Institute for Clinical Systems Improvement. Institute for Clinical Systems Improvement (ICSI) 2002 (Technology Assessment Report).

16. Exercise therapy for the treatment of chronic low back pain. Jackson N. Centre for Clinical Effectiveness (CCE) 2002 (Evidence Centre Critical Appraisal): 22.

17. Percutaneous intradiscal radiofrequency thermocoagulation for chronic discogenic low back pain. Blue Cross Blue Shield Association. Blue Cross Blue Shield Association (BCBS) 2002 (TEC Assessment 17(11)): 31.

18. Spinal manipulation for lower back pain. Canadian Coordinating Office for Health Technology Assessment. Canadian Coordinating Office for Health Technology Assessment (CCOHTA) 2002.

19. Intradiscal electrothermal therapy (IDET) for the treatment of chronic, discogenic low back pain. Canadian Coordinating Office for Health Technology Assessment. Canadian Coordinating Office for Health Technology Assessment (CCOHTA) 2003.

20. Multidisciplinary care for chronic low back pain. French S. Centre for Clinical Effectiveness (CCE) 2003 (Evidence Centre Critical Appraisal): 12.

21. Outpatient physiotherapy services for low back pain. Fischbacher C. Bazian Ltd, Wessex Institute for Health Research and Development (WIHRD) 2002 (STEER: Succint and Timely Evaluated Evidence Reviews 2(3)): 8.

22. Spinal manipulation for chronic low back pain. Patterson J. Bazian Ltd, Wessex Institute for Health Research and Development (WIHRD) 2003 (STEER: Succint and Timely Evaluated Evidence Reviews 4(2)): 8.

23. Percutaneous intradiscal radiofrequency thermocoagulation for chronic discogenic low back pain. Blue Cross Blue Shield Association. Blue Cross Blue Shield Association (BCBS) 2004 (TEC Assessment 18(19)): 23.

24. Low level laser therapy. Washington State Department of Labor and Industries. Washington State Department of Labor and Industries (WSDLI) 2004: 36.

25. Discography for low back pain. HAYES, Inc.. HAYES, Inc. 2000: 31.

26. Intradiscal electrothermal therapy. HAYES, Inc.. HAYES, Inc. 2003: 11.

27. Laparoscopic anterior lumbar interbody fusion for treatment of low back pain. HAYES, Inc.. HAYES, Inc. 2002: 23.

28. Mechanized spinal distraction therapy for low back pain. HAYES, Inc.. HAYES, Inc. 2003: 14.

29. Spinal unloading devices for low back pain. HAYES, Inc.. HAYES, Inc. 2001: 10.

30. Fluoroscopically guided transforaminal epidural steroid injections for lumbar radicular pain. Institute for Clinical Systems Improvement. Institute for Clinical Systems Improvement (ICSI) 2004 (Technology Assessment Report).

31. Endoscopic division of epidural adhesions. National Institute for Clinical Excellence. National Institute for Clinical Excellence (NICE) 2004 (Interventional Procedure Guidance 88): 2.

32. COX-2 inhibitors (etoricoxib) for the treatment of non-malignant chronic low back pain. Alberta Heritage Foundation for Medical Research. Alberta Heritage Foundation for Medical Research (AHFMR) 2005 (Technote TN 48): 21.

33. Artificial vertebral disc replacement. Blue Cross Blue Shield Association. Blue Cross Blue Shield Association (BCBS) 2005 (TEC Assessment 20(1)): 17.

34. Costs and outcomes of chiropractic treatment for low back pain. Brown A, Angus D, Chen S, Tang Z, Milne S, Pfaff J, Li H, Mensinkai S. Canadian Coordinating Office for Health Technology Assessment (CCOHTA) 2005 (Technology Report Issue 56): 88.

35. The evaluation of back school programmes as medical technology. Luhmann D, Kohlmann T, Raspe H. Hannover Medical School, Medizinische Hochschule Hannover (MHH) 1998 (Volume 2).

36. Radiofrequency techniques for the management of lumbar discopathy (discal nucleoplasty, percutaneous thermocoagulation, electrothermal annuloplasty). Lopez A, Pichon Riviere A, Augustovski F, Garcia Marti S. Institute for Clinical Effectiveness and Health Policy (IECS) 2005 (Report ITB No. 20).

37. Longer term clinical and economic benefits of offering acupuncture care to patients with chronic low back pain. Thomas K J, MacPherson H, Ratcliffe J, Thorpe L, Brazier J, Campbell M, et al. The National Coordinating Centre for Health Technology Assessment (NCCHTA) 2005: 140.

38. Intradiscal electrothermal therapy for discogenic low back pain. Banken R. Agence d'Evaluation des Technologies et des Modes d'Intervention en Sante (AETMIS) 2005 (AETMIS 05-02 RE): 30.

39. Ozone therapy for the management of lumbar disc pathologies. Lopez A, Pichon Riviere A, Augustovski F, Garcia Marti S. Institute for Clinical Effectiveness and Health Policy (IECS) 2005 (Report ITB no. 21).

40. Epidural steroid injections for low back pain and sciatica. HAYES, Inc.. HAYES, Inc. 2005.

41. Automated percutaneous nucleotomy for herniated lumbar discs. ECRI. ECRI 2005 (Windows on medical technology ; no. 124): 51.

42. Clinical practice guidelines for the diagnosis and treatment of low back pain. WCB Evidence Based Practice Group. WorkSafe BC 1995: 55.

A second search for sciatica HTA was conducted on this site

In the "Searching CRD databases" page (http://144.32.150.197/scripts/WEBC.EXE/nhscrd/restart) of the Centre for Reviews and Dissemination site (http://www.york.ac.uk/inst/crd/), "Health Technology Assessment database" was selected in the databases window and "sciatica" was entered in the first

search window (all fields, all records, unsorted),

A total of 6 references were found.

One reference was discarded because not corresponding to the PICO.

One was discarded because dated in 1991.

Two references had been retrieved in the previous searches.

The following 2 references were kept:

1. Management of the lumbosacral syndrome (sciatica). Health Council of the Netherlands Gezondheidsraad. Health Council of the Netherlands Gezondheidsraad (GR) 1999
2. Cost-effectiveness and safety of epidural steroids in the management of sciatica. Price C, Arden N, Coglan L, Rogers P. The National Coordinating Centre for Health Technology Assessment (NCCHTA) 2005: 88.

Search for HTA reports on the NHS site (march 10, 2006)

In the "Project search and select" page (http://www.hta.nhsweb.nhs.uk/ProjectData/1_project_select.asp) of the NHS site (http://www.hta.nhsweb.nhs.uk/index.htm), "Health Technology Assessment database" was selected in the databases window and "low back pain" was entered in the "search project titles and abstract window" with the "exact phrase" box checked (no ICD disease selected, all key area, all ICD chapter headings, all interventions),

A total of 7 references were found.

Six references were discarded because not corresponding to the PICO or because the project had been discontinued.

One reference had already been retrieved in the previous searches.

No references were kept.

A second search for sciatica was conducted on that site:

In the "Project search and select" page (http://www.hta.nhsweb.nhs.uk/ProjectData/1_project_select.asp) of the NHS site (http://www.hta.nhsweb.nhs.uk/index.htm), "Health Technology Assessment database" was selected in the databases window and "sciatica" was entered in the "search project titles and abstract window" with the "exact phrase" box checked (no ICD disease selected, all key area, all ICD chapter headings, all interventions),

A total of 2 references were found.

One reference was discarded because the project had been discontinued.

One reference had already been retrieved in the previous searches.

No references were kept.

SR and MAs

A first search on the Cochrane Collaboration was conducted (February 13, 2006)

The reviews on "Lumbar Spine" were searched from the "Back" page (http://www.cochrane .org/reviews/en/topics/51.html#topic_4) of the "Topics" section,

A total of 34 references were found.

Five were discarded because still protocols.

One has been withdrawn by the Cochrane Collaboration.

One duplicate was discarded.

One was discarded because not corresponding to the PICO (subacute low back pain).

The following 26 Cochrane reviews were kept:

1. Rehabilitation after lumbar disc surgery,
2. Surgery for lumbar disc prolapse,
3. Advice to stay active as a single treatment for low-back pain and sciatica,
4. Bed rest for acute low-back pain and sciatica,
5. Surgery for degenerative lumbar spondylosis,
6. Acupuncture and dry-needling for low back pain,
7. Back schools for non-specific low-back pain.
8. Bed rest for acute low-back pain and sciatica,
9. Behavioural treatment for chronic low-back pain,
10. Exercise therapy for treatment of non-specific low back pain,
11. Herbal medicine for low back pain,
12. Lumbar supports for prevention and treatment of low-back pain,
13. Massage for low-back pain,
14. Multidisciplinary bio-psycho-social rehabilitation for chronic low-back pain,
15. Multidisciplinary biopsychosocial rehabilitation for subacute low-back pain among working age adults,
16. Muscle relaxants for non-specific low-back pain,
17. Neuroreflexotherapy for non-specific low-back pain,
18. Non-steroidal anti-inflammatory drugs for low-back pain,
19. Patient education for low back pain,
20. Prolotherapy injections for chronic low-back pain,
21. Radiofrequency denervation for neck and back pain,
22. Spinal manipulative therapy for low-back pain,
23. Superficial heat or cold for low back pain,
24. Traction for low-back pain with or without sciatica,
25. Transcutaneous electrical nerve stimulation (TENS) for chronic low-back pain,
26. Work conditioning, work hardening and functional restoration for workers with back and neck pain.

The preliminary literature search (2000 to 2006) for SR and MA on “low back pain” and “sciatica” (“ischialgia” in Embase) produced the following results:

Medline (2000 to 2006) for “low back pain”: 338 references,

Medline (2000 to 2006) for “sciatica”: 30 references,

Embase (2000 to 2006) for “low back pain”: 438 references,

Embase (2000 to 2006) for “ischialgia”: 42 references,

APPENDIX 1.2.6-3: RESULTS OF THE LITERATURE SEARCH

Retrieved guidelines and HTA and first selection of references

A total of 47 Guidelines and 44 HTAs have been retrieved that correspond to the PICO and to period of search (1996 to 2006). As could be expected several references may be described as « general guidelines » as they cover most of the PICO subheadings. Others are more topic-oriented as they focus only on one PICO subheading (Intervention>evaluation>imaging) or even on a PICO sub-subheading (intervention>treatment>surgery>disc prothesis).

It was decided to make a first selection out the numerous relevant references retrieved. This first selection would be based on the following criteria :

- Only « general guidelines » will be selected,
- More recent references (>2000),
- Only references that score high on AGREE. More specifically, they should score a minimum of 3 on item 8 (corresponding to SR quality appraisal) on AGREE,
- Guidelines that do not provide a clear description of the well-structured search strategy, the methodology used to elaborate the guidelines as well as a complete list of references have been discarded. Such guidelines may in fact be considered as true Systematic Review. Hence, they will also be evaluated using the Cochrane Collaboration tools to evaluate SR and MA.

Based on such criteria, 8 guidelines were selected (Table III).

First selection of the guidelines and respective AGREE scores

Title	Year	Source	AGREE score
Back pain - lower	2005	Prodigy	50
Interventional techniques in the management of chronic spinal pain: evidence-based practice guidelines.	2003 (revised 2005)	American Society of Interventional Pain Physicians - Medical Specialty Society	58
The Dutch Institute for Health Care Improvement guideline for the diagnosis and treatment of aspecific acute and chronic low back complaints	2003	Kwaliteitsinstituut voor de Gezondheidszorg, CBO	78
Dutch physiotherapy guidelines for low back pain.	2003	KNGF	68
European guidelines for the managment of low back pain	2002	Cost B13	63
Philadelphia Panel evidence-based clinical practice guidelines on selected rehabilitation interventions for low back pain.	2001	Philadelphia Panel - Independent Expert Panel	64
Diagnostic, management and follow-up of patients with chronic low back pain	2000	ANAES	50
Back and neck pain	2000	SBU	?

Although not fulfilling all the previously established criteria, the following guidelines could also be considered :

La lombalgie commune, SSMG, 2001

Adult Low Back pain, ICSI, 1994 (revised in 2005)

Retrieved SR and MA

All Cochrane reviews (26) will be included in the selected SR.

The preliminary literature search (2000 to 2006) for SR and MA on “low back pain” and “sciatica” (“ischialgia” in Embase) produced the following results:

Medline (2000 to 2006) for “low back pain”: 338 references,

Medline (2000 to 2006) for "sciatica": 30 references,

Embase (2000 to 2006) for "low back pain": 438 references,

Embase (2000 to 2006) for "ischialgia": 42 references,

All references found were imported in one Endnote® spreadsheet. After fusion of all searches and elimination of duplicates a total of 796 references remained.

The results of this preliminary search was discussed and the decision was taken to limit the period of search to 2003 to 2006 which still left 490 references.

A manual selection based on the title, and the abstract of all references to eliminate all references not corresponding to the PICO led to a final selection of 166 relevant SR and MA that can be retrieved from Medline and Embase (2003 to 2006). All Cochrane reviews were eliminated from that selection.

Thorough description of searches and references obtained will be provided in the next deliverable.

References that have been considered in the selected guidelines (Table III) will be eliminated. Remaining references will be evaluated (critical appraisal) and incorporated in the EBM Summaries as described here above in the guidelines section.

APPENDIX 1.2.6-4: SELECTION OF THE LITERATURE

Sélection/exclusion :

Seuls les guidelines postérieurs au 1.1.2000, correspondants au PICO de la recherche et basés sur une systematic review ont été retenus.

Les guidelines NHG 2005, SSMG 2001 (seul guideline national mais non spécifique du CLBP) et ICSI 2005 méritent d'être mentionnés en raison de leur importance nationale ou internationale. Ils ne précisent cependant pas de méthodologie de recherche systématique de littérature dans leur publication. Le guide du bon usage des examens d'imagerie médicale ANAES 2005 n'a pas été retenu en raison d'une méthodologie basée sur le consensus.

Vu leur excellente qualité méthodologique, les Cochrane systematic reviews ne sont pas décrites dans les« Evidence Tables ». Elles sont intégrées dans le texte du rapport. Les Cochrane systematic review Karjalainen 2006 (fibromyalgia and musculoskeletal pain) et Ostelo 2006 (rehabilitation after Lumbar disc surgery) n'ont pas été retenue (hors PICO).

Study identification	**PICO**	Quality apraisal	Avis général
ABDI 2005 Role of epidural steroids in the management of chronic spinal pain : a systematic review of effectiveness an complications	P: patients suffering with chronic low back pain for at least 3 months I: three types of epidural injections (interlaminar, transforaminal and caudal) with local anesthetic, steroid, or other drugs, provided for management of spinal pain were evaluated	Systematic review Validation Cochrane Va SR Question clinique décrite Procédure de recherche décrite Sélection des articles pertinents : critères définis Evaluation de la qualité des articles : AHRQ and Cochrane Etudes de base décrites Recueil des données Non Hétérogénéité des études Non décrite Analyse statistique Non Résultats applicables	Included not only randomised trials but also all available non-randomised trials.
AETMIS 2005	Intradiscal electrothermal therapy for discogenic low back pain	HTA Report Bonne qualité méthodologique Recherche systématique d'HTA sur le sujet Une seule RCT (Pauza et al 2004) est reprise dans toutes les HTA Les autres études sont non randomisées ou des case series	HTA basée sur 6 autres HTA Institute for clinical systems improvement (ICSI 2002 United states) ; Medical services advisory committee (MSAC 2002 Australia); ASERNIP-S 2003 (Australia); Washington state departement of labor and industries, 2003 (United states) Technology evaluation center and blue cross blue shield association, 2004 (United states) National Institute for clinical excellence 2004 United Kingdom
AHFMR 2005	COX-2 inhibitors (etoricocib) for the treatment of non-malignant chronic low back pain	HTA Report ? Pas d'auteur, pas de notion de conflits d'intérêt, pas de résumé clair des résultats Response to a request from the information sharing group on chronic pain for evidence on	HTA based on only one RCT of relatively small sample. Eterocoxib should be considered for use in patients who consent to be enrolled in clinical studies.

		the efficacy/effectiveness and safety of COX-2 inhibitors for the treatment of non-malignant CLBP.	HTA non incluse dans le rapport
AIRAKSINEN 2004 See COST B13 2004			
AIRAKSINEN 2006 See COST B13 2004			Publication dans Eur Spine J de COST B13 2004 No update
AMMENDOLIA 2005 Back belt use for prevention of occupational low back pain: a systematic review	Primary prevention of occupational low back pain	Systematic review	SR non retenue et non validée car en dehors PICO défini
ANAES 2000 Diagnostic, prise en charge et suivi des malades atteints de lombalgie chronique.	P : Douleur habituelle de la région lombaire évoluant depuis plus de 3 mois. Cette douleur peut s'accompagner d'une irradiation à la fesse, à la crête iliaque, voire à la cuisse et ne dépasse qu'exceptionnellement le genou. Pas de notion d'âge I : Diagnostic et prise en charge	GUIDELINE Score AGREE : 61 Validation Cochrane SR : Procédure de recherche bien décrite Sélection des articles décrite Evaluation des études de base (grille utilisée non précisée) Etudes de base décrites	Bonne qualité méthodologique
ASSENDELFT 2003 Spinal mainpulative therapy for low back pain : a meta-analysis of effectiveness relative to other therapies	P: Low back pain (acute or) chronic, with or without sciatica I: Spinal manipulative therapy: le type varie selon les etudes: rotational manipulation; manipulation and mobilization according to Cyriax, Kaltenborn, Lewit and Janda ; or to Maitland;or to Maigne; or to Kaltenbon, Evjent and Hamberg; rotational thrust manipulation to both sides; or in pain free direction; long-lever high-velocity thrust manipulation; Side-Lying	Validation Cochrane Va SR Question clinique décrite Procédure de recherche décrite Sélection des articles pertinents : critères d'inclusion décrits Evaluation de la qualité des articles : Cochrane back pain group score Etudes de base bien décrites Recueil des données oui Hétérogénéité des études : forest plot and chi-square test Analyse statistique décrite Résultats à partir d'interventions diverses	Systematic review de bonne qualité méthodologique A noter la grande diversité des interventions dans les études incorporées

	manipulation		
BIYANI 2003 Intradiscal electrothermal therapy. A treatment option in patients with internal disc disruption	P: low back pain with internal disc disruption I: Intradiscal electrothermal therapy	Systematic review Validation Cochrane Va SR Question clinique décrite Procédure de recherche non décrite	Synthèse narrative Non retenue
Blue Cross Blue Shield association 2004	Percutaneous intradiscal radiofrequency thermocoagulation for chronic discogenic low back pain	HTA Report Bonne qualité HTA déjà intégrée dans l'HTA de synthèse AETMIS	Pas reprise isolément dans le rapport : considérée dans AETMIS

BOAL 2003 Central neuronal plasticity, low back pain and spinal manipulative therapy			Non retenu Etude expérimentale Pas de pertinence clinique
Boswell 2005. Interventional techniques in the management of chronic spinal spain : evidence-based practice guidelines	P : All patients suffering with chronic spinal pain eligible to undergo commonly utilized and effective interventional techniques Chronic: pas de définition claire Pas de notion d'âge I : Diagnostic and therapeutic interventions	GUIDELINE Pas de méthodologie décrite dans la version 2005. Sur base de la méthodologie décrite dans la version 2003 : Score AGREE : 60 Validation Cochrane SR Recherche systématique de littérature Evaluation des articles : AHRQ criteria, QUADAS criteria et Cochrane review citeria Etudes de base décrites Consensus et avis d'experts quand les preuves apportées par la littérature sont insuffisantes	Doutes sur la méthodologie : divergences entre les articles cités et les conclusions retenues Utilisation de critères intermédiaires pour juger de l'efficacité thérapeutique :p ex bonne localisation du produit d'injection Concerne une sous population sélectionnée :CLBP nécessitant une intervention diagnostique ou thérapeutique

BRINKHAUS 2006 Acupuncture in patients with chronic low back pain	P: patients with chronic low back pain I: to compare efficacy of acupuncture compared with minimal acupuncture (sham intervention) and with no acupuncture (waiting list) at week 8	Randomized controlled trial Validation Cochrane RCT Attribution de l'intervention par randomisation oui Randomisation « aveugle » oui Prise en charge aveugle pour le patient Oui sauf « waiting list group » Prise en charge aveugle pour les soignants non Analyse des effets aveugle non précisé Equivalence des groupes oui sauf waiting list Loss to follow-up: petit nombre Intention to treat analyse oui Prise en charges comparables hors intervention oui sauf waiting list Résultats valides et applicables oui	Pas de différence significative entre acupuncture et sham acupuncture (minimal acupuncture) The difference for the acupuncture versus waiting list group was 21.7 mm (95% confidence interval, 13.9-30.0mm; p<.OO1); on a Visual analog scale range 0-100).

BRONFORT 2004 Efficacy of spinal manipulation and mobilization for low back pain and neck pain: a systematic review and best evidence synthesis.	P: (acute or) chronic low back pain I: Spinal manipulative therapy and mobilization	Systematic review Validation Cochrane Va SR Question clinique décrite Procédure de recherche décrite Sélection des articles pertinents : critères d'inclusion décrits Evaluation de la qualité des articles : Critical Evaluation List for RCT Etudes de base décrites Recueil des données non Hétérogénéité des études :non Analyse statistique non Résultats à partir d'études de faible qualité méthodologique	SR de qualité méthodologique moindre Basée sur des études de quality score très variable : seules 3 études sur 11 ont un score ≥ 50.
BROX 2003. Randomized clinical trial of lumbar instrumented fusion and cognitive intervention and exercises in patients with chronic low back pain and disc degeneration.			Etude déjà reprise dans COST B13 2004

BROX 2006 Lumbar instrumented fusion compared with cognitive intervention and exercises in patients with chronic low back pain after previous surgery for disc herniation: a prospective randomized controlled study.	P: 60 patients with chronic low back pain after previous surgery for disc herniation I: lumbar fusion with posterior transpedicular screws versus cognitive intervention and exercises	Randomized controlled trial Validation Cochrane RCT Attribution de l'intervention par randomisation oui Randomisation « aveugle » oui Prise en charge aveugle pour le patient non Prise en charge aveugle pour les soignants non Analyse des effets aveugle non précisé Equivalence des groupes quasi (sauf sexe) Loss to follow-up: 7 Intention to treat analyse oui mais 3 patients non integrés dans les résultats Prise en charges comparables hors intervention unclear Résultats valides et applicables oui	No difference between the two groups
BROWN 2005 CCOHTA Costs and outcomes of chiropractic treatment for low back pain	P: low back pain (acute and chronic separate) I: chiropractic treatment: the full range of treatment options available (including but not exclusive to chiropractic spinal manipulation)	HTA report Bonne qualité Basé sur une systematic review Inclut 18 SR, 2 RCTs et 2 non-RCTs Etude économique également	HTA report Outcomes similar to those of medical care and physical therapy

CARRAGEE 2005. Persistent low back pain	P: Persistent low back pain I: Diagnosis and treatment	Systematic review Validation Cochrane Va SR Question clinique décrite Procédure de recherche non décrite Sélection des articles pertinents : non décrite Evaluation de la qualité des articles : non décrite Etudes de base non décrites Recueil des données non Hétérogénéité des études :non décrite Analyse statistique non Résultats	Synthèse narrative à partir d'une question clinique Méthodologie non décrite Non retenu
CBO 2003 Richtlijn Aspecifieke lage rugklachten	P : CLBP > 12 weeks Pas de notion d'âge Le guideline traite à la fois des aspects aigus et chroniques I : Diagnostic et traitement	GUIDELINE Score AGREE : 78 Validation Cochrane SR : Procédure de recherche bien décrite Evaluation des études de base (grille utilisée non précisée) Etudes de base décrites	Bonne qualité méthodologique La partie traitant du diagnostic ne concerne pas spécifiquement le patient avec CLBP tandis que la partie traitant de la prise en charge correspond bien au PICO

CHOPRA 2005 Role of adhesiolysis in the management of chronic spinal pain: a systematic review of effectiveness and complications	P: chronic spinal pain, chronic low back pain and lower extremity pain for at least 6 months I percutaneous epidural adhesiolysis and spinal endoscopic adhesiolysis	Systematic review Validation Cochrane Va SR Question clinique décrite Procédure de recherche décrite Sélection des articles pertinents : critères décrits Evaluation de la qualité des articles : AHRQ and Cochrane Etudes de base décrites Recueil des données décrit Hétérogénéité des études :non présentée Analyse statistique non Résultats à partir d'études de qualités méthodologiques très diverses	Systematic review de bonne qualité méthodologique Résultats à interpréter : Inclut des RCTs, des études observationnelles
Commission européenne Recommandations en matière de prescription de l'imagerie médicale	P : douleur lombaire chronique sans indices d'infection ou de néoplasme I : Radiographie simple, IRM, TDM ou MN	GUIDELINE Validation Cochrane SR : Procedure de recherche non décrite Evaluation de la qualité méthodologique non décrite Critères d'inclusion et d'exclusion des études non décrits Description des études de base non existante dans le texte	Qualité méthodologique faible Il s'agit plutôt d'un consensus d'experts. Ces recommandations donnent des niveaux de preuve. Cependant la présentation ne permet pas de faire un lien entre le niveau de preuve et la référence scientifique sous-jacente

COST B13 2004 European guidelines for the management of chronic non-specific low back pain.	P: Pain and discomfort, localised below the costal margin and above the inferior gluteal folds, with or without referred legs pain Persisting for at least 12 weeks Adultes (age non précisé) I: Diagnosis Treatment	GUIDELINE Score AGREE : 69 Validation Cochrane SR : Procédure de recherche bien décrite Evaluation de la qualité méthodologique : Oxman & Guyatt index Critères d'inclusion et d'exclusion des études décrits Description narrative des études de base dans le texte	Bonne qualité méthodologique
CALMELS 2005 Outils de mesure des parameters fonctionnels dans la lombalgie. Low back pain assessment tools.	P: LBP en général I: identifier et décrire les outils d'évaluation fonctionnelle et déterminer les caractéristiques et critères de choix de leur utilisation	Systematic review Validation Cochrane SR diagnostic Question clinique décrite Procédure de recherche décrite Sélection des articles pertinents en fonction du PICO Etudes de base non décrites Recueil des données non décrit Pas de méta-analyse Résultats peu applicables	Systematic review de faible qualité méthodologique Pas de gold standard de l'évaluation fonctionnelle Jugement sur des critères métrologiques : validité de contenu, de construit, faisabilité, adaptation linguistique, usage international

CARTER 2004 Spinal cord stimulation in chronic pain: a review of the evidence	P: patients with various chronic pain states		Non retenu: Hors PICO il ne s'agit pas de patients CLBP
CCOHTA 2002	Spinal manipulation for lower back pain	HTA Report Etude de pré-assessment : Limited search of literature	The Cochrane work on reviewing the clinical evidence is comprehensive. A CCOHTA clinical review in this area would be redundant. A full economic evaluation would not appear to be practical given the difficulty in obtaining primary data.
CCOHTA 2003	Intradiscal electrothermal therapy(IDET) for the treatment of chronic discogenic low back pain	HTA Report Etude de pré-assessment : Limited search of literature	Non retenu
CLARE 2004 A systematic review of efficacy of McKenzie therapy for spinal pain	P: spinal pain		SR non retenu et non validée: aucune etude ne concerne le patient avec LBP ≥ 12 semaines
DELGADO 2005 Papel de la cirugia en la enfermedad degenerative espinal. Analisis de revisions sistematicas sobre tratamientos quirurgicos y conservadores desde el punto de vista de la medicina basada en la evidencia.	P : with spinal degenerative disease (cervical, dorsal or lumbar chronic)	Systematic review Validation Cochrane Va SR Difficile à appliquer vu la langue d'origine	Article en espagnol, abstract en anglais Validation non possible Texte non retenu
DEMOULIN 2006 Spinal muscle evaluation using the Sorensen test : a critical appraisal of the literature	P: LBP en général I: Sorensen tool to evaluate muscle performance	Systematic review Validation Cochrane SR diagnostic Question clinique peu claire Procédure de recherche décrite Sélection des articles pertinents non décrite Etudes de base non décrites Recueil des données non décrit Pas de méta-analyse Résultats peu applicables	Systematic review de faible qualité méthodologique Résultats peu applicables

EPSTEIN 2004 Lumbar synovial cysts. A review of diagnosis, surgical management, and outcome assessment.			Non retenu Synthèse narrative
FERREIRA 2003 Efficacy of spinal manipulative therapy for low back pain of less than three month's duration	P: low back pain of less than 3 months		SR non retenue et non validée car hors PICO: il ne s'agit pas de patients CLBP
FISCHBACHER 2002 Outpatient physiotherapy services for low back pain.	P: low back pain acute or chronic I: effect of an outpatient physiotherapy service	HTA Report Based on systematic review Appraisal of each paper Peer reviewed of the draft No conflict of interest	No study addressing the effectiveness of a physiotherapy service "However, we found evidence from existing review sources that the services most likely to be effective are those giving advice to remain active during acute back pain and those providing back exercises for chronic pain"

FISHBAIN 2003 A structured evidence-based review on the meaning of nonorganic physical signs : Waddell signs.	P: mélange de patients aigus, chroniques, avec ou sans parésie ou engourdissement des membres inférieurs I: Waddell's non organic signs	Systematic review Validation Cochrane SR diagnostic Question clinique décrite Procédure de recherche décrite Sélection des articles pertinents décrite Etudes de base décrites Recueil des données non décrit Pas de méta-analyse Résultats peu applicables	Systematic review de bonne qualité méthodologique (61 études) Lien entre les signes de Waddel et l'examen clinique Pas spécifique du CLBP
FREEMAN 2005 A randomized double blind controlled trial; Intradiscal electrothermal therapy versus placebo for the treatment of chronic discogenic low back pain.	P: chronic discogenic (degenerative disc disease on magnetic resonance scan) low back pain and failure to improve with a conservative treatment I: IDET (versus sham placebo)	Prospective Randomized controlled trial Validation Cochrane RCT Attribution de l'intervention par randomisation oui Randomisation « aveugle » non 2 :1 IDET :placebo Prise en charge aveugle pour le patient Oui Prise en charge aveugle pour les soignants unclear (technicien non aveugle ; chirurgien aveugle) Analyse des effets aveugle : independent third party Equivalence des groupes : décrite Loss to follow-up: Intention to treat analyse :non Prise en charges comparables hors intervention :oui Résultats valides et applicables	with cross over offered to placebo subjects when unblinding occurred at 6 months No difference
FRENCH 2003	Multidisciplinary care for chronic low back pain	HTA Report Bonne Recherche systématique de littérature Ciritères d'inclusion et d'exclusion Quality assessment des articles	Une seule SR passe par les mailles du quality assessment : la Cochrane systematic review de Guzman. Les conclusions sont celles de Guzman.
FRIEDRICH 2005 Long-term effect of a combined exercise and motivational program on the level of	P: 93 patients with chronic low back pain (at least 4 months of duration) I: standard exercise program	Prospective clinical randomised controlled trial Validation Cochrane RCT Attribution de l'intervention par randomisation oui	Follow up of 5 years

disability of patients with chronic low back pain.	versus a combined exercise and motivational program	Randomisation « aveugle » oui Prise en charge aveugle pour le patient Oui Prise en charge aveugle pour les soignants non Analyse des effets aveugle : unclear Equivalence des groupes : oui Loss to follow-up: important à 5 ans mais pas de difference significative entre les groupes Intention to treat analyse :oui Prise en charges comparables hors intervention : unclear Résultats valides et applicables oui	
FRYER 2004 Paraspinal muscles and intervertebral dysfunction : part two.	P: Low back pain I: paraspinal electromyography (EMG)	Synthèse narrative	This review aims to highlight areas that require further research and make recommendations for future studies Pas d'application clinique actuellement
GAGNIER 2004 Harpagophytum procumbens for osteoarthritis and low back pain: a systematic review	P: adults suffering from pain in the musculoskeletal system due to osteoarthritis or low back pain. I: Harpagophytum procumbens (preparations may differ in the solvent , the drug extract ratio, the galenic application form, the content of active principle .		SR non retenue: Les conclusions concernent les exacerbations aiguës des CLBP. Ce qui n'est pas repris dans les points étudiés dans les études de base
GAJRAJ 2004 Selective nerve root blocks for low back pain and radiculopathy	P: low back pain and radiculopathy	Systematic review Validation Cochrane Va SR Question clinique décrite Procédure de recherche non décrite	Synthèse narrative Non retenue
GEISSER 2005a A meta-analytic review of surface electromyography among persons with low back	P: persons with low back pain (most commonly with duration greater than 3 or 6 months) and normal healthy controls I: surface electromyography	Systematic review Validation Cochrane SR diagnostic Question clinique décrite Procédure de recherche décrite Sélection des articles pertinents en fonction du	Pertinence clinique non reconnue L'EMG de surface n'est pas une technique de diagnostic en usage courant.

pain and normal, healthy controls.	SEMG during a static position SEMG during a dynamic activity such as bending SEMG during an isometric hold, contraction , or exertion SEMG response to an expected or unexpected increase in physical demand, or following the release of a physical demand	PICO Etudes de base décrites Recueil des données décrit Meta-analyse Résultats peu applicables : SEMG est actuellement une technique utilisée dans le cadre de la recherche	
GEISSER 2005b A randomized, controlled trial of manual therapy and specific adjuvant exercise for chronic low back pain.	P: chronic low back pain 3 or more months duration I: exercises program (specific or non specific) + manual therapy (MT) (manual therapy or sham manual therapy) four groups	Randomized controlled trial Validation Cochrane RCT Attribution de l'intervention par randomisation oui . Randomisation « aveugle » oui Prise en charge aveugle pour le patient Oui Prise en charge aveugle pour les soignants non Analyse des effets aveugle : non Equivalence des groupes : non pas tout à fait Loss to follow-up: 72/100 completed the study Intention to treat analyse :non Prise en charges comparables hors intervention : personnalisation Résultats valides et applicables ?	RCT de qualité méthodologique faible. The study concludes that "when controlling for pre-treatment scores, subjects receiving manual therapy with specific adjuvant exercise reported significant reductions in pain". No difference mentioned versus others groups.
GROTLE 2004 Functional status and disability questionnaires: What do they assess? A systematic review of back specific outcome questionnaires.	P: Patients (>18 years age) with low back pain I: questionnaires for assessing disability, function, activity limitations, or participation reduction	Systematic review Validation Cochrane SR diagnostic Question clinique décrite Procédure de recherche décrite Sélection des articles pertinents selon le PICO Questionnaires des études de base décrits : good when supported by Rasch analysis, acceptable when supported by factor analysis Pas de recueil des données Pas de méta-analyse Résultats portant uniquement sur la validité des questionnaires	Systematic review de bonne qualité méthodologique Portant sur la validité des questionnaires utilisés
HARTE 2003 The efficacy of traction for back	Patients with low back pain with or without radiation		SR non retenue et non validée car hors PICO: il ne s'agit pas de patients CLBP

pain : a systematic review of randomised controlled trials			
HAYDEN 2005a Meta-Analysis: exercise therapy for non-specific low back pain	P: adult non specific acute, subacute, and chronic low back pain I: exercise therapy	Systematic review Validation Cochrane Va SR Question clinique décrite Procédure de recherche décrite Sélection des articles pertinents : critères d'inclusion et d'exclusion décrits Evaluation de la qualité des articles : non précisé Etudes de base décrites Recueil des données oui Hétérogénéité des études décrite Analyse statistique décrite Résultats : incluent des études de moins bonne qualité	Meta-analyse de bonne qualité méthodologique Inclusion d'études de pauvre qualité

HAYDEN 2005b Systematic review: strategies for using exercise therapy to improve outcomes in chronic low back pain	P: chronic (>12 weeks duration) low back pain I: identify particular exercise intervention characteristics that decrease pain and improve function in adults with non specific chronic low back pain.	Systematic review Validation Cochrane Va SR Question clinique décrite Procédure de recherche décrite Sélection des articles pertinents : critères d'inclusion décrits Evaluation de la qualité des articles : Non précisé Etudes de base peu décrites Recueil des données oui Hétérogénéité des études décrite Analyse statistique décrite Résultats incluent des études de moins bonne qualité	Systematic review de bonne qualité méthodologique Inclusion d'études de pauvre qualité
HOOTEN 2005 Radiofrequency neurotomy for low back pain: evidence-based procedural guidelines.	P: chronic low back pain > 3 months I: diagnostic blocks and radiofrequency neurotomy	Systematic review Validation Cochrane Va SR Question clinique décrite Procédure de recherche décrite Sélection des articles pertinents décrite : Evaluation de la qualité des articles Non Etudes de base décrites Recueil des données non décrit Hétérogénéité des études non décrite Analyse statistique non décrite Résultats nécessité d'études autres	Revue critique des RCTs au sujet de la Radiofrequency neurotomy conclut que la méthodologie utilisée de-ans les RCTs ne permet pas d'en tirer des conclusions basées sur l'EBM.

HTAC Minnesota 2001	Intradiscal electrothermal therapy (IDET) for lower back pain	HTA Report HTA de moins bonne qualité méthodologique N'intègre pas la seule RCT connue: Pauza 2004 N'apporte rien de plus par rapport à AETMIS	Non retenue
HURWITZ2005 Effects of recreational physical activity and back exercises on low back pain and psychological distress: findings from the UCLA Low Back pain Study.	681 patients with a complaint of low back pain Participation in recreational physical activities.(during 18 months)	Cross sectional and longitudinal study	No CLBP patients "participation in recreational physical activities was inversely associated with low back pain, related disability, and psychological distress. By contrast, back exercise was positively associated with low back pain and related activity"
ICSI 2002	Intradiscal electrothermal Therapy (IDET) for low back pain	HTA Report Bonne qualité N'intègre pas la seule RCT connue: Pauza 2004 N'apporte rien de plus par rapport à AETMIS	Non retenue
ICSI 2004	Fluoroscopically guided transforaminal epidural steroid injections for lumbar radicular pain	HTA Report Bonne qualité 2 RCTs de bonne qualité Patients candidats à une intervention chirurgicale (refractory to more conservative care)	The results appears promising. However, at this time, there is insufficient evidence to comment on the efficacy of epidural steroids injections
ICSI 2005	Percutaneous radiofrequency ablation for facet-mediated neck and back pain	HTA Report Bonne qualité 3 RCTs de bonne qualité et une case series study	The scientific evidence does not permit a conclusion
JACKSON 2002	Exercise therapy for the treatment of chronic low back pain	HTA Report Bonne qualité Recherche systématique de littérature Ciritères d'inclusion et d'exclusion Quality assessment des articles (9/27 retenus) Description des articles de base	The conclusions supports the finding of the systematic review previously published (van Tulder, 2002)
JACKSON 2003 An audit of the use of epidural injections for back pain and sciatica	P: low back pain non specified with or without sciatica		Etude de l'utilisation des injections épidurales en Australie. Non retenu : Hors PICO il ne s'agit pas de patients CLBP
KAAPA 2006-10-13 Multidisciplinary group rehabilitation versus individual	P: 120 women (22 to 57 year old) with chronic low back pain in an outpatient setting	Randomized controlled trial Validation Cochrane RCT Attribution de l'intervention par randomisation	No statistically differences between the two treatments groups

physiotherapy for chronic non specific low back pain	I: multidisciplinary rehabilitation (70 hours) versus individual physiotherapy (10 hours)	oui Randomisation « aveugle » oui Prise en charge aveugle pour le patient Oui Prise en charge aveugle pour les soignants non Analyse des effets aveugle : unclear Equivalence des groupes : oui Loss to follow-up: equivalent Intention to treat analyse : non Prise en charges comparables hors intervention unclear Résultats valides et applicables oui	

KATZ 2005 A randomised, placebo-controlled trial of bupropion sustained release in chronic low back pain	P: chronic low back pain for 3 months or more C: bupropion versus placebo	Randomized controlled trial Validation Cochrane RCT Attribution de l'intervention par randomisation oui Randomisation « aveugle » oui Prise en charge aveugle pour le patient Oui Prise en charge aveugle pour les soignants oui Analyse des effets aveugle : oui Equivalence des groupes : pas tout à fait Loss to follow-up: Intention to treat analyse : oui Prise en charges comparables hors intervention oui Résultats valides et applicables oui	Double blind, randomized, 2-period crossover trial "Bupropion was not significantly better than placebo in the treatment of patients with non neuropathic low backpain."
KENT 2005 Does clinician treatment choice improve the outcomes of manual therapy for non specific low back pain? A metaanalysis	P: non specific low back pain		Metaanalyse non retenue et non validée car hors PICO: il ne s'agit pas de patients CLBP

KHADILKAR 2005 Transcutaneous Electrical Nerve Stimulation for the treatment of chronic low back pain: A systematic review.	P: Chronic low back pain I: Transcutaneous Electrical Nerve Stimulation (TENS)	Systematic review Validation Cochrane Va SR Question clinique décrite. Procédure de recherche décrite.Sélection des articles pertinents décrite : Evaluation de la qualité des articles : Jadad scale (5 points) Etudes de base décrites. Recueil des données décrit. Hétérogénéité des études testée par Cochrane's Q test Analyse statistique décrite Résultats peu valides : divergences d'interventions et d'outcomes measured entre les études	SR de bonne qualité méthodologique Seules les RCTs sont incluses : 37 études exclues et 2 incluses They differed with respect to study design, methodologic quality, inclusion and exclusion criteria, characteristics of TENS application, treatment schedule, cointerventions and measured outcomes.
KHOROMI 2005 Topiramate in chronic lumbar radicular pain	P: chronic lumbar radicular pain for 3 months or greater C: topiramate versus diphenhydramine as active placebo	Randomized controlled trial Validation Cochrane RCT Attribution de l'intervention par randomisation oui. Randomisation « aveugle » oui. Prise en charge aveugle pour le patient Oui Prise en charge aveugle pour les soignants oui. Analyse des effets aveugle : non précisé. Equivalence des groupes non détaillé. Loss to follow-up: 13/42 Intention to treat analyse avec 31/42 patients. Prise en charges comparables hors intervention oui Résultats valides et applicables Non	Double blind, randomized, 2-period crossover trial 29 of 49 patients completed the study "we would not recommend topiramate unless studies of alternative regimens showed a better therapeutic ratio".
KIM 2004 Critical review of prolotherapy for osteoarthritis, low back pain, and other musculoskeletal conditions: a physiatric perspective.	P: 3 RCTS concernent spécifiquement des patients chronic low back pain, réfractaires aux traitement antérieurs conservateurs ou chrirugicaux I : use of dextrose/glycerine/phenol prolotherapy (multiples	Systematic review Validation Cochrane Va SR Question clinique décrite Procédure de recherche non décrite Sélection des articles pertinents non décrite Etudes de base décrites Recueil des données non décrit Hétérogénéité des études non décrite Analyse statistique non décrite Résultats	Synthèse narrative Non retenue

	attachement points of ligaments)		
KNGF 2005 Koninklijk Nederlands genootscap voor Fysiotherapie. Lage-rugpijn.	P : Aspecifieke lage-rugpijn (zonder radiculair syndroom) Chronisch lage-rugpijn > 12 weken Meestal personen tussen 20 en 55 jaar I : Fysiotherapeutisch handelen : Diagnostisch proces Therapeutisch proces	GUIDELINE Score AGREE: 68 Validation Cochrane SR : Procédure de recherche décrite en référant à d'autres articles Description narrative des études de base dans le texte	Méthodologie imprécise pour les aspects diagnostic Mieux précisée pour les aspects thérapeutiques Guideline ciblant les physiothérapeutes

KOES 2006 Diagnosis and treatment of low back pain	P: patients with low back pain; acute separate from chronic I diagnosis and treatment	Systematic review Validation Cochrane V SR Question clinique décrite Procédure de recherche décrite Sélection des articles pertinents non décrite Evaluation de la qualité des articles : non décrite Etudes de base non décrites Recueil des données non décrit Hétérogénéité des études non calculée Analyse statistique non décrite Résultats valides	Clinical review Méthodologie peu décrite Synthèse de la littérature par des auteurs connus pour leurs publications EBM
KOOL 2004 Exercise reduces sick leave in patients with non-acute non-specific low back pain: a meta-analysis	P: patients with non-specific non-acute low back pain I: exercise alone of as a part of a multidisciplinary treatment	Systematic review Validation Cochrane Va SR Question clinique décrite Procédure de recherche décrite Sélection des articles pertinents décrite Evaluation de la qualité des articles : Pedro scale Etudes de base décrites Recueil des données décrit Hétérogénéité des études calculée Analyse statistique décrite Résultats valides	Meta-analyse de bonne qualité méthodologique

LEHMAN 2003 Biomechanical assessments of lumbar spinal function. How low back pain sufferers differ from normals. Implications for outcome measures research. Part 1: kinematic assessments of lumbar function			Article non retenu: concerne des aspects de recherche et non de pratique clinique
LEWIS 2005 A randomised clinical trial comparing two physiotherapy interventions for chronic low back pain.	P: 80 patients with chronic low back pain (> 3 months, of a non radicular nature) I: individual physiotherapy treatment versus group exercise treatment	Randomized controlled trial Validation Cochrane RCT Attribution de l'intervention par randomisation oui Randomisation « aveugle » oui Prise en charge aveugle pour le patient unclear Prise en charge aveugle pour les soignants non Analyse des effets aveugle : oui Equivalence des groupes : quasi Loss to follow-up: 18/80 Intention to treat analyse : non Prise en charges comparables hors intervention unclear Résultats valides et applicables oui	« Both forms of intervention were associated with significant improvement » But no conclusion of comparison between the two groups

LICCIARDONE 2005 Osteopathic manipulative treatment for low back pain: a systematic review and meta-analysis of randomised controlled trials	P: low back pain: aucune mention de chronic I: osteopathic manipulative treatment		Etude exclue et non validée car hors PICO: il ne s'agit pas de patients CLBP
LIDDLE 2004 Exercise and chronic low back pain : what works ?	P: chronic low back pain I: type, mode of delivery and quality of exercise being offered within RCTs	Systematic review Validation Cochrane Va SR Question clinique décrite Procédure de recherche décrite Sélection des articles pertinents : critères d'inclusion et d'exclusion décrits Evaluation de la qualité des articles : van Tulder methodological quality criteria Etudes de base décrites Recueil des données Non Hétérogénéité des études Non décrite Analyse statistique sur le type d'exercices Résultats valides	Systematic review de bonne qualité méthodologique RCT de qualité bonne ou medium exclusivement (pas de low quality trial) : 16 études retenues sur 51 analysées
LOPEZ 2005	Ozone therapy for the management of lumbar disc pathologies	HTA Report New technology Conclusion: not enough literature has been published	Non retenu Abstract disponible en anglais, texte en espagnol

LOPEZ 2005 Ozone therapy for the management of lumbar disc pathologies			Fecha de ultima actualizacion 07/2005 Non retenu: article non finalisé
MANCHIKANTI 2005 A randomised controlled trial of spinal endoscopic adhesiolysis in chronic refractory low back and lower extremity pain	P: 83 patients with chronic refractory low back and lower extremity pain who lacked significant response to fluoroscopically-directed epidural steroids injections and one day percutaneous adhesiolysis with hypertonic saline neurolysis, as well as to other conservative modalities of treatment I: spinal endoscopic adhesiolysis and decompression by distension and target delivery of anesthetic and steroids versus control by endoscopy into the sacral level without adhesiolysis but with target delivery of anesthetic and steroids	Randomized controlled trial Validation Cochrane RCT Attribution de l'intervention par randomisation oui Randomisation « aveugle » unclear 2 :3 (33 control /50 interv) Prise en charge aveugle pour le patient oui Prise en charge aveugle pour les soignants non Analyse des effets aveugle : oui Equivalence des groupes : non Loss to follow-up: 3/83 Intention to treat analyse : oui Prise en charges comparables hors intervention unclear Résultats valides et applicables	66/83 ont un antécédent de chirurgie (failed back surgery syndrome ?) les résultats sont établis grâce à une comparaison entre les pourcentages de patients ayant une différence significative (versus baseline) dans les 2 groupes :

MANHEIMER 2005 Méta-analysis: acupuncture for low back pain	P: patients with low back pain subgrouped according to acute or chronic pain I: acupuncture	Systematic review Validation Cochrane Va SR Question clinique décrite Procédure de recherche décrite Sélection des articles pertinents : critères d'inclusion et d'exclusion décrits Evaluation de la qualité des articles : Jadad et van Tulder methodological quality criteria Etudes de base décrites Recueil des données oui Hétérogénéité des études Non décrite Analyse statistique Résultats valides	Méta-analyse de bonne qualité méthodologique (hormis hétérogénéité non considérée)
MAUL 2005 Long-term effects of supervised physical training in secondary prevention for low back pain	P: more than 30 days LBP within the preceding 12 months		Not CLBP patients
McLAIN 2005 Epidural steroids therapy for back and leg pain : mechanisms of action and efficacy	P: back and leg pain		Synthèse narrative Non retenue
McNEELY 2003 A systematic review of physiotherapy for spondylolysis and spondylolisthesis			Non retenu: ne concerne pas le patient CLBP aspécifique
MOSELEY 2004 A randomized controlled trial of intensive neurophysiology education in chronic low back pain.	P: chronic low back pain I: neurophysiology education	Randomized controlled trial Validation Cochrane RCT Attribution de l'intervention par randomisation oui Randomisation « aveugle » unclear Prise en charge aveugle pour le patient oui Prise en charge aveugle pour les soignants non Analyse des effets aveugle : unclear Equivalence des groupes : oui Loss to follow-up: 4/58 Intention to treat analyse : non	Education about pain neurophysiology change pain cognitions and physical performance but it is insufficient by itself to obtain a change in perceived disability.

		Prise en charges comparables hors intervention unclear Résultats valides et applicables oui	
NHS CRD 2000	Effective health care Acute and chronic low back pain	HTA Report Bonne Basé essentiellement sur les Cochrane systematic review L'acute low back pain est bien distinguée de la chronic low back pain	Les conclusions sont intégrées dans les différents chapitres du rapport
NICE 2004 National Institute for Clinical Excellence	Endoscopic division of epidural adhesions	HTA Report Bonne Studies small and uncontrolled	No randomised evidence to show that the procedures were efficacious

NIEMISTO 2005 Cost-effectiveness of combined manipulation, stabilizing exercises, and physician consultation compared to physician consultation alone for chronic low back pain: a prospective randomized trial with 2-year follow-up.	P: 204 chronic low back pain with or without sciatica (no duration) in Finland I: combined manipulative treatment, exercise and physician consultation group versus consultation alone group (information and advice).	Randomized controlled trial Validation Cochrane RCT Attribution de l'intervention par randomisation oui Randomisation « aveugle » oui Prise en charge aveugle pour le patient unclear Prise en charge aveugle pour les soignants non Analyse des effets aveugle : unclear Equivalence des groupes : oui Loss to follow-up: 20% Intention to treat analyse : non Prise en charges comparables hors intervention unclear Résultats valides et applicables oui	Etude cost effectiveness
NORDIN 2006 Non specific lower-back pain: surgical versus nonsurgical treatment.	Patients: distinction entre aigu, subaigu et chronique	Systematic review Validation Cochrane Va SR Question clinique décrite. Procédure de recherche décrite . Sélection des articles pertinents : critères d'inclusion et d'exclusion décrits. Evaluation de la qualité des articles : van Tulder methodological quality criteria. Etudes de base décrites Recueil des données oui Hétérogénéité des études Non décrite Analyse statistique oui Résultats valides	Systematic review de bonne qualité méthdodologique
PATTERSON 2004 STEER Spinal manipulation for chronic low back pain.	P: chronic low back pain > 12 weeks duration without specific underlying pathology I spinal manipulation (osteopathy and chiropractic; excluding manipulation under anrsthesia)	HTA Report Based on systematic review Appraisal of each paper Peer reviewed of the draft No conflict of interest	It found no evidence for people with non-specific chronic low back pain, but many studies in people with acute or subacute LBP
Philadelphia 2001 Philadelphia panel evidence-based clinical practice guidelines on selected rehabilitation	P : Chronic LBP > 12 weeks Si une étude inclut des LBP subaiguës et des chroniques, elle est assimilée aux chroniques.	GUIDELINE Score AGREE : 64 Validation Cochrane SR : Recherche de littérature bien décrite.	Bonne qualité méthodologique

interventions for low back pain.	I: 9 selected interventions for LBP: Thermo therapy, therapeutic massage, therapeutic exercises, Ellectromyographic (EMG) biofeedback,mechanical traction, ultrasound, Tens, electrical stimulation, and combined rehabilitation interventions.	Validation des articles à partir de critères définis à priori (Jadad scale) Etudes de base décrites Récolte des données et méta-analyse des résultats	
POLATIN 2004 Psychotropic medication in chronic spinal disorders.	P : patients with chronic spinal disorders and psychiatric comorbidity or not		Synthèse narrative : a concise review of the use of psychotropic medications with CSP patients Non retenue

PRICE 2005	Cost-effectiveness and safety of epidural steroids in the management of sciatica	HTA Report RCT double blind, placebo controlled. 18 patients duration of symptoms between 4 weeks and 18 months	Non retenu Hors PICO: patients aigus, subaigus et chroniques mêlés.
PRODIGY 2005 Guidance - Back pain –- Lower.	P : Simple low back pain Chronic if has lasted more than 12 weeks (mais guideline pas spécifique du CLBP) Adults (âges non précisés) Le guideline traite à la fois des aspects aigus et chroniques, avec sciatiique ou non. I : To manage and to treat	GUIDELINE Score AGREE : 50 Ce score pourrait être faussé : la description méthodologique n'est pas intégrée dans le guideline. Le groupe responsable nous a cependant fourni la méthodologie générale des guidelines prodigy : Validation Cochrane SR : Procédure de recherche bien décrite, sélection des articles, évaluation (grille non précisée) Pas de description des études de base.	Qualité méthodologique moins bonne mais suffisante La présentation ne précise pas toujours clairement les termes du PICO considérés : aigu ? chronique ? Pas de justification claire des décisions de recommander (seules les références bibliographiques sont précisées)

RAINVILLE 2004 Exercise as a treatment for chronic low back pain	P: asymptomatic, acute, subacute, recurrent or chronic back pain I: exercise Safety of the exercise in terms of added risk for production of further pain, injury of disability Improving impaired back function Decreasing back pain symptoms Minimizing disability by diminishing fears and concerns about pain	Systematic review Validation Cochrane Va SR Question clinique décrite Procédure de recherche décrite dans l'abstract et peu détaillée Sélection des articles pertinents en fonction du sujet Evaluation de la qualité des articles : Non Etudes de base décrites Recueil des données Non Hétérogénéité des études Non décrite Analyse statistique Non Résultats : validité ?	Review article : Plutôt descriptif, de moins bonne qualité méthodologique
RASMUSSEN 2005 Rates of lumbar disc surgery before and after implementation of multidisciplinary non surgical spine clinics.			Correlation study Pas RCT: pas retenu
RATHMELL 2006 Infections risks of chronic pain treatments: injection therapy, surgical implants, and intradiscal techniques.			Revue narrative Non retenue
RESNICK 2005 Guidelines for the performance of fusion procedures for degenerative disease in the lumbar spine.	Patient with degenerative disease of the lumbar spine Performance of fusion procedure	Systematic review Validation Cochrane Va SR Question clinique décrite Procédure de recherche décrite Sélection des articles pertinents oui Evaluation de la qualité des articles : oui mais pas détaillé Etudes de base décrites oui Recueil des données Non Hétérogénéité des études Non décrite Analyse statistique Non	Guideline de neurochirurgie (USA) Basé sur une systematic review Bonne qualité méthodologique

		Résultats valides	
RESNIK 2005 Outcomes measurement for patients with low back pain.		Pas de méthodologie décrite	Revue narrative
SCHNITZER 2004 A comprehensive review of clinical trials on the efficacy and safety of drugs for the treatment of low back pain	P: Patients with acute or chronic LBP; résultats présentés séparément I: drugs, oral therapies	Systematic review Validation Cochrane Va SR Question clinique décrite Procédure de recherche décrite Sélection des articles pertinents : critères définis Evaluation de la qualité des articles : critères présentés Etudes de base décrites Recueil des données oui Hétérogénéité des études Non décrite Analyse statistique Non Résultats applicables	Systematic review de bonne qualité méthodologique Etudie l'efficacité et la sécurité des médicaments utilises dans le low back pain (50 études entre 1980 et 2004, dont 17 concernent le CLBP).

SEGHAL 2005 Diagnostic utility of facet (zygapophysial) joint injections in chronic spinal pain: a systematic review of evidence	P: Subjects experiencing more than 3 months of chronic spinal pain of sufficiently severe intensity to warrant further investigations or justify referral spinal/spine specialist, and who add failed adequate trial of conservative management with medications, physical therapy, psychological interventionsI: Facet (zygapophysial) joint injections	Systematic review Validation Cochrane SR diagnostic Question clinique décrite Procédure de recherche décrite Sélection des articles pertinents décrite Evaluation des articles pertinents Décrite : AHRQ et QUADAS Pas de recueil des données Etudes de base décrites Pas de méta-analyse Résultats peu applicables : absence de « gold standard »	Revue systématique de littérature Bonne qualité méthodologique 13 études retenues pour CLBP Diagnostic utility of facet (zygapophysial) joint A noter l'absence de « gold standard » pour établir le diagnostic. Sous population définie de CLBP concernée par cette méthode
SHAH 2005 Discography as a diagnostic test for spinal pain: a systematic and narrative review.	P: Asymptomatic volunteers or symptomatic patients with chronic spinal pain; patients may or may not have undergone prior surgery I Discography alone or in combination with other diagnostic tests; Non-ionic, water-soluble contrast media should be used; pain provocation reported as no pain, dissimilar pain, or familiar/exact pain	Systematic review Validation Cochrane SR diagnostic Question clinique décrite Systematic revew Sélection des articles pertinents : AHRQ et QUADAS Pas de recueil des données Etudes de base décrites Pas de méta-analyse Résultats peu applicables: « Gold standard » discutable	Systematic revew de bonne qualité méthodologique There is no « gold standard » for discogenic pain and thus, the authors considered pathological disc morphology to be the « gold standard ». Ce choix est cliniquement discutable.
SLIPMAN 2003 A critical review of the evidence for the use of zygapophysial injections and radiofrequency denervation in the treatment of low back pain.	P: low back pain		Cet article traite du low back pain en general Non retenu: Hors PICO il ne s'agit pas de patients CLBP
SBU 2000 Back pain Neck pain. An evidence based review.	P : Distinction acute low back pain et chronic low back pain au niveau de la thérapeutique (pas	GUIDELINE HTA systematic review Seul le résumé est accessible en anglais. Le	HTA systematic review Qualité méthodologique reconnue au niveau international

Summary and conclusions. The Swedish council on technology assessment in Health care.	au niveau diagnostic) Pas de définition claire de CLBP Ages non précisés (sauf pour certains items) I : Conservative treatment and surgical treatment étudiés pour CLBP	texte complet (800 pages) est en suédois. Score AGREE : non calculé Seules des RCT ont été retenues Qualité des études évaluée (grille non précisée)	La partie mise au point ne concerne pas le chronic low back pain

STAIGER 2003 Systematic review of antidepressants in the treatment of chronic low back pain	P: patients with chronic low back pain (une étude concerne des patients avec LBP > 6 semaines, une de durée non précisée et 5 études > 6 mois)	Systematic review Validation Cochrane Va SR Question clinique décrite. Procédure de recherche décrite .Sélection des articles pertinents : critères d'inclusion décrits Evaluation de la qualité des articles décrite Etudes de base décrites. Recueil des données oui.Hétérogénéité des études considérée comme trop importante pour permettre une analyse chiffrée. Analyse statistique Non.Résultats : valides	Systematic review de bonne qualité (hétérogénéité importante des études)
STOCKS 2001 STEER report Spinal cord stimulation for chronic pain.	P: chronic low back pain and leg pain and failed back surgery	HTA Report Based on systematic review Appraisal of each paper Peer reviewed of the draft No conflict of interest	Based on one high quality SR (Turner 1995) and 2 case series "we found insufficient evidence "
TAYLOR 2004 Spinal cord stimulation for chronic and leg pain and failed back surgery syndrome	P: patients with chronic back and leg pain and failed back surgery syndrome, or arachnoïditis.	Systematic review Validation Cochrane Va SR Question clinique décrite Procédure de recherche décrite Sélection des articles pertinents : critères d'inclusion décrits Evaluation de la qualité des articles décrite Etudes de base décrites Recueil des données non Hétérogénéité des études Analyse statistique Non Résultats : valides	« to date, the one RCT in this area by North and colleagues has only been reported as interim results. For the review, the authors used the full trial results presented at a recent meeting. " Même auteur et mêmes conclusions que pour la Cochrane systematic review déjà citée dans le texte
THOMAS 2005	Acupuncture to patients with chronic low back pain	HTA Report Non évalué La définition de CLBP n'est pas identique à celle de ce rapport Inclut des lombalgies subaiguës + chroniques (4 à 52 semaines).	Cette HTA n'est pas retenue car les patients concernés ne sont pas ceux de notre PICO

TURNER 2004 Spinal cord stimulation for patients with failed back surgery syndrome or complex regional pain syndrome: a systematic review of effectiveness and complications.	P: patients with failed back surgery syndrome or complex regional pain syndrome I: spinal cord stimulation In relieving pain and improving the function And complications	Systematic review Validation Cochrane Va SR Question clinique décrite Procédure de recherche décrite Sélection des articles pertinents : critères d'inclusion/exclusion décrits Evaluation de la qualité des articles non décrite Etudes de base décrites Recueil des données non Hétérogénéité des études non validées Analyse statistique Non Résultats : valides	Systematic review basée sur des articles de pauvre qualité méthodologique For effectiveness, only one Randomized trial (without control) was identified: Kemler 2002, the others are case series

UK BEAM 2004 effectiveness of physical treatments for back pain in primary care.	P: with low back pain (four weeks after complaint) in general practice I: six groups: general practice care or exercise or manipulation (private or NHS) or manipulation and exercise (private or NHS)	Randomized controlled trial Validation Cochrane RCT Attribution de l'intervention par randomisation oui Randomisation « aveugle » oui Prise en charge aveugle pour le patient non Prise en charge aveugle pour les soignants non. Analyse des effets aveugle : non Equivalence des groupes : oui.Loss to follow-up: ?. Intention to treat analyse : non Prise en charges comparables hors intervention oui Résultats valides et applicables oui	Le seul intervalle de confiance qui n'inclut pas le 1 est « for manipulation followed by exercise the additional improvement was 1.9 (1.2 to 2.6) at three months (and 1.3 (0.5 to 2.1) at 12 months. »
VAN DER HULST 2005 A systematic review of sociodemographic, physical, and psychological predictors of multidisciplinary rehabilitation – or, back school treatment outcomes in patients with chronic low back pain.	P: subjects between 18 and 65 years of age, with as primary complaint chronic non specific LBP (more than 12 weeks continual or recurrent episodes of LBP). I: multidisciplinary (physician consultation in addition to psychological, social or vaocational intervention, or a combination of these interventions) and back schools (an education and skills program and an exercise regimen)	Systematic review Validation Cochrane Va SR Question clinique décrite. Procédure de recherche décrite. Sélection des articles pertinents : critères d'inclusion décrits Evaluation de la qualité des articles décrite Etudes de base décrites Recueil des données oui Hétérogénéité des études considérée comme trop importante pour permettre une analyse chiffrée Analyse statistique Non Résultats : valides	Systematic review de bonne qualité méthodologique
VAN DER ROER 2005 What is the most cost-effective treatment for patients with low back pain? A systematic review.	P: low back pain en general Pas de séparation entre les études en fonction de aigu ou chronique		SR non retenue Les patients ne correspondent pas au PICO défini pour ce rapport
VAN TRIJFEL 2005 Inter-examiner reliability of passive assessment of intervertebral motion in the cervical and lumbar spine : A	P: Cervical and low back pain I: Passive assessment of motion C Comparison inter-examiner O : inter-examiner reliability	Systematic review Validation Cochrane SR diagnostic Question clinique décrite Procédure de recherche décrite Sélection des articles pertinents décrite :	Systematic review de bonne qualité méthodologique Selon les auteurs : most studies did not fulfill the criteria for external and internal validity. In general, reporting of study protocol and statistical was

systematic review.		STARD and QUADAS Etudes de base décrites Pas de recueil des données Pas de méta-analyse Résultats non valides : études de pauvre qualité méthodologiques	inadequate. Résultats non applicables
VAN TULDER 2006 Outcome of invasive treatment modalities on back pain and sciatica: an evidence-based review. Eur Spine J (2006) 15: S82-S92.	P: with back pain and sciatica Pas de séparation entre les études en fonction de aigu ou chronique I: surgery and other invasive procedures for low back pain		SR non retenue Les patients ne correspondent pas au PICO défini pour ce rapport

VAN WIJK 2005 Radiofrequency denervation of lumbar facet joints in the treatment of chronic low back pain: a randomized, double blind, sham lesion-controlled trial.	P: low back pain duration more than 6 months and ≥50% VAS (Visual Analog Scale) Radiofrequency facet joint denervation 81 selected for the study out of 462 patients after diagnostic block with at least 50% pain reduction on VAS	Randomized controlled trial Validation Cochrane RCT Attribution de l'intervention par randomisation oui Randomisation « aveugle » non précisé Prise en charge aveugle pour le patient Oui Prise en charge aveugle pour les soignants oui Analyse des effets aveugle : non précisé Equivalence des groupes oui Loss to follow-up: aucun Intention to treat analyse oui Prise en charges comparables hors intervention oui Résultats valides et applicables oui	randomized, double blind, sham lesion-controlled trial. The combine outcome measure and VAS showed no difference between radiofrequency and sham, though in both groups, significant VAS improvement occurred.
WETZEL 2003 The role of repeated end-range/pain assessment in the management of symptomatic lumbar discs.	P: candidates for surgery for disc-related pain; patients with low back and leg pain I: use of repeated end-range/pain response assessment (dynamic mechanical evaluation) in obtaining diagnostic and therapeutic information	Revue narrative	Article non retenu: revue narrative ; pas de recherche systématique de la littérature

WANG 2004	Low Level Laser Therapy (LLLT)	HTA Report Pauvre: La présentation est faite sous forme de graphiques, de moyennes. Pas de résultats chiffrés ni d'intervalles de confiance. L'auteur travaille pour l'office of the medical director, department of labor and industries	Cette HTA envisage un grand nombre de pathologies traitées par LLLT. Une seule étude (Gur 2003) (randomized, observer-blinded, controlled trial) concerne la CLBP : 75 patients with chronic LBP for one year Les résultats sont difficilement interprétables en raison de leur présentation uniquement sous forme de graphiques basés sur des moyennes.

APPENDIXES PART II

HOW ARE CHRONIC LOW BACK PAIN PATIENTS ASSESSED AND TREATED IN BELGIUM?

Appendix 2.2-1: Percentage of new diagnosis per year according to the ICPC-classification

	Year of diagnosis	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	total
ICPC chapter												
R	Respiratory	34,62	37,83	37,05	38,33	38,14	37,76	37,07	36,31	37,36	37,58	37,24
L	Locomotor apparatus	15,68	15,08	15,62	15,31	15,72	16,15	16,63	17,36	16,80	16,69	16,09
D	Gastro-intestinal tract	11,21	10,72	11,30	10,90	10,76	10,91	11,37	11,53	11,76	11,53	11,19
S	Skin	10,74	9,96	9,57	9,83	9,47	9,93	9,75	9,85	9,71	9,57	9,83
K	Cardiovasculary system	4,65	4,14	4,06	3,84	3,88	3,99	3,90	3,96	3,94	4,04	4,03
H	Ear	4,10	3,98	3,92	3,81	3,98	3,59	3,54	3,57	3,39	3,36	3,72
A	General not specified	3,40	3,31	3,40	3,25	3,12	3,13	3,08	2,73	2,93	2,82	3,12
P	Psychological	2,66	2,59	2,67	2,56	2,64	2,54	2,63	2,71	2,77	2,68	2,64
U	Urinary tract	2,67	2,65	2,55	2,66	2,57	2,56	2,65	2,69	2,57	2,55	2,61
N	Nervous system	2,67	2,57	2,65	2,53	2,61	2,61	2,51	2,58	2,42	2,32	2,55
X	Female reproductive system	2,28	2,08	2,02	1,89	2,00	1,73	1,81	1,87	1,64	1,73	1,90
T	Endocrine, metabolic and nutritional diseases	1,82	1,67	1,59	1,61	1,76	1,69	1,59	1,47	1,51	1,63	1,63
F	Eye	1,32	1,21	1,28	1,23	1,23	1,25	1,39	1,32	1,27	1,39	1,29
Y	Male reproductive system	0,86	0,85	0,83	0,85	0,81	0,79	0,78	0,81	0,77	0,89	0,82
W	Pregnancy, anticonception	0,55	0,62	0,74	0,65	0,56	0,59	0,48	0,43	0,41	0,51	0,56
B	Blood, blood producing organs and immune system	0,54	0,49	0,51	0,54	0,50	0,49	0,50	0,46	0,42	0,38	0,48
Z	Social problems	0,23	0,26	0,23	0,22	0,26	0,28	0,34	0,34	0,33	0,33	0,28
	Total:	100	100	100	100	100	100	100	100	100	100	100

Appendix 2.2-2: Evolution of the participants in the Intego-project

Year data collection	Number practices	Number GPs	Number practices preceding year	Number new practices
1999	26	34	0	26
2001	34	37	19/26	15
2003	43	51	31/34	12
2004	47	55	43/43	4
2005	52	67	47/47	5

Appendix 2.2-3: Proportion of the population of Intego in comparison to Flanders

Year	Population Flanders	YCG* Intego	% of population Flanders	PP† Intego	% of population Flanders
1994	5847022	57298	0,98	73154	1,25
1995	5866106	58598	1,00	74798	1,28
1996	5880357	59701	1,02	76038	1,29
1997	5898824	59676	1,01	76015	1,29
1998	5912382	62361	1,05	79298	1,34
1999	5926838	61886	1,04	78572	1,33
2000	5940251	64338	1,08	81407	1,37
2001	5952552	62887	1,06	79182	1,33
2002	5972781	63979	1,07	80437	1,35
2003	5995553	63929	1,07	80208	1,34

* yearly contact group; † practice population

Appendix 2.2-4: List of medication researched in general practice

ATC code	Name
M01A	Anti-inflammatory and antirheumathic products, non-steroids
M01AB	Acetic acid derivatives and related substances
M01AC	Oxicams
M01AE	Propionic acid derivatives
M01AH	Coxibs
M01AX	Other anti-inflammatory and antirheumatic agents, non –steroids
M02A	Topical products for joint and muscular pain
M02AA	Anti-inflammatory preparations, non-steroids for topical use
M02AB	Capsicum preparations and similar agents
M02AC	Preparations with salicylic acid derivatives
M03B	Muscle relaxants, centrally acting agents
N02A	Opioids
N02AA	Natural opium alkaloids
N02AB	Phenylpiperidine derivatives
N02AX	Other opioids
N02B	Other analgesics and antipyretics
N02C	Antimigraine preparations
N03A	Antiepileptics
N03AB	Hydantoin derivatives
N03AE	Benzodiazepine derivatives
N03AF	Carboxamide derivatives
N03AG	Fatty acid derivatives
N03AX	Other antiepileptics
N06A	Antidepressants
N06AA	Non-selective monoamine reuptake inhibitors
N06AB	Selective serotonin reuptake inhibitors
N06AX	Other antidepressants
N06B	Psychostimulants, agents used for ADHD and Nootropics
N06C	Psycholeptics and psychoanaleptics in combination

Appendix 2.2-5: Co-morbidity in patients with and without low back pain, stratified for age and sex

Female								
Age group	ICPC		Patients with LBP		Patients without LBP			
	code	title	n pat	%	n pat	%	Ratio	95% CI
15-24	L03	Symptomen/klachten lage-rug	98	91.59	0	0	nvt	nvt
15-24	R74	Acute infectie bovenste luchtwegen	29	27.1	890	21.15	1.28	0.88 to 1.85
15-24	D73	Verondersteld infect gastro-enteritis	20	18.69	412	9.79	1.90	1.21 to 2.98
15-24	R80	Influenza	14	13.08	246	5.85	2.23	1.30 to 3.82
15-24	R78	Acute bronchitis/bronchiolitis	10	9.35	126	2.99	3.12	1.64 to 5.94
15-24	U71	Cystitis/andere urineweginfectie	9	8.41	185	4.4	1.91	0.98 to 3.73
15-24	L86	Rugsyndroom met uitstralende pijn	8	7.48	0	0	nvt	nvt
15-24	R76	Acute tonsillitis	7	6.54	161	3.83	1.70	0.80 to 3.62
15-24	S16	Buil/kneuzing	7	6.54	95	2.26	2.89	1.34 to 6.23
15-24	R75	Acute/chronische sinusitis	6	5.61	139	3.3	1.70	0.75 to 3.85
25-44	L03	Symptomen/klachten lage-rug	470	76.92	0	0	nvt	nvt
25-44	R74	Acute infectie bovenste luchtwegen	147	24.06	1785	18.36	1.31	1.11 to 1.55
25-44	L86	Rugsyndroom met uitstralende pijn	141	23.08	0	0	nvt	nvt
25-44	D73	Verondersteld infect gastro-enteritis	66	10.8	688	7.08	1.52	1.18 to 1.96
25-44	L83	Neksyndroom	48	7.86	375	3.86	2.03	1.50 to 2.74
25-44	R80	Influenza	46	7.53	505	5.19	1.45	1.07 to 1.96
25-44	U71	Cystitis/andere urineweginfectie	41	6.71	347	3.57	1.87	1.35 to 2.58
25-44	R78	Acute bronchitis/bronchiolitis	37	6.06	315	3.24	1.87	1.33 to 2.63
25-44	L84	Rugsyndroom zonder uitstralende pijn	36	5.89	0	0	nvt	nvt
25-44	R77	Acute laryngitis/tracheitis	34	5.56	233	2.4	2.31	1.61 to 3.31
45-64	L03	Symptomen/klachten lage-rug	505	65.08	0	0	nvt	nvt
45-64	L86	Rugsyndroom met uitstralende pijn	220	28.35	0	0	nvt	nvt
45-64	R74	Acute infectie bovenste luchtwegen	188	24.23	1442	16	1.51	1.30 to 1.76
45-64	L84	Rugsyndroom zonder uitstralende pijn	103	13.27	0	0	nvt	nvt
45-64	R78	Acute bronchitis/bronchiolitis	71	9.15	484	5.37	1.70	1.33 to 2.18
45-64	L83	Neksyndroom	63	8.12	411	4.56	1.78	1.37 to 2.32
45-64	L87	Bursitis/tendinitis/synoviitis nao	62	7.99	325	3.61	2.21	1.68 to 2.90
45-64	D73	Verondersteld infect gastro-enteritis	47	6.06	272	3.02	2.00	1.47 to 2.73
45-64	R80	Influenza	42	5.41	265	2.94	1.84	1.33 to 2.55
45-64	R75	Acute/chronische sinusitis	42	5.41	268	2.97	1.82	1.31 to 2.52

Female									
Age group	ICPC		Patients with LBP			Patients without LBP			
65-74	L03	Symptomen/klachten lage-rug	179	58.69		0	0	nvt	nvt
65-74	L86	Rugsyndroom met uitstralende pijn	94	30.82		0	0	nvt	nvt
65-74	R74	Acute infectie bovenste luchtwegen	54	17.7		490	13.23	1.33	1.00 to 1.76
65-74	L84	Rugsyndroom zonder uitstralende pijn	52	17.05		0	0	nvt	nvt
65-74	U71	Cystitis/andere urineweginfectie	28	9.18		187	5.05	1.81	1.22 to 2.69
65-74	L83	Neksyndroom	22	7.21		124	3.35	2.15	1.37 to 3.38
65-74	R78	Acute bronchitis/bronchiolitis	21	6.89		222	5.99	1.15	0.74 to 1.80
65-74	L87	Bursitis/tendinitis/synoviitis nao	21	6.89		120	3.24	2.12	1.33 to 3.37
65-74	L99	Andere ziekte bewegingsapparaat	16	5.25		55	1.48	3.54	2.03 to 6.18
65-74	R77	Acute laryngitis/tracheitis	15	4.92		108	2.92	1.68	0.98 to 2.88
75+	L03	Symptomen/klachten lage-rug	111	56.35		0	0	nvt	nvt
75+	L86	Rugsyndroom met uitstralende pijn	53	26.9		0	0	nvt	nvt
75+	L84	Rugsyndroom zonder uitstralende pijn	41	20.81		0	0	nvt	nvt
75+	R74	Acute infectie bovenste luchtwegen	31	15.74		379	8.61	1.82	1.26 to 2.62
75+	U71	Cystitis/andere urineweginfectie	21	10.66		197	4.47	2.38	1.52 to 3.73
75+	R78	Acute bronchitis/bronchiolitis	16	8.12		275	6.25	1.29	0.78 to 2.14
75+	L83	Neksyndroom	15	7.61		78	1.77	4.29	2.47 to 7.45
75+	S16	Buil/kneuzing	14	7.11		112	2.54	2.79	1.60 to 4.86
75+	L92	Schoudersyndroom	13	6.6		73	1.66	3.97	2.20 to 7.16
75+	S88	Contacteczeem	12	6.09		54	1.23	4.95	2.65 to 9.25

Male									
Age group	ICPC		Patients with LBP			Patients without LBP			
	code	title	n pat	perct		n pat	perct	Ratio	95% CI
15-24	L03	Symptomen/klachten lage-rug	132	91.03		0	0	nvt	nvt
15-24	R74	Acute infectie bovenste luchtwegen	33	22.76		823	20.49	1.11	0.78 to 1.57
15-24	D73	Verondersteld infect gastro-enteritis	18	12.41		395	9.84	1.26	0.79 to 2.02
15-24	R80	Influenza	16	11.03		274	6.82	1.61	0.97 to 2.67
15-24	L86	Rugsyndroom met uitstralende pijn	13	8.97		0	0	nvt	nvt
15-24	L83	Neksyndroom	11	7.59		48	1.2	6.32	3.28 to 12.17
15-24	S16	Buil/kneuzing	9	6.21		178	4.43	1.40	0.72 to 2.73
15-24	R76	Acute tonsillitis	8	5.52		123	3.06	1.80	0.88 to 3.68
15-24	R78	Acute bronchitis/bronchiolitis	7	4.83		118	2.94	1.64	0.77 to 3.52
15-24	L18	Spierpijn	6	4.14		37	0.92	4.50	1.9 to 10.66

Male								
Age group	ICPC		Patients with LBP		Patients without LBP			
25-44	L03	Symptomen/klachten lage-rug	539	80.21	0	0	nvt	nvt
25-44	L86	Rugsyndroom met uitstralende pijn	144	21.43	0	0	nvt	nvt
25-44	R74	Acute infectie bovenste luchtwegen	133	19.79	1529	17.33	1.14	0.95 to 1.36
25-44	D73	Verondersteld infect gastro-enteritis	83	12.35	737	8.35	1.47	1.17 to 1.84
25-44	R80	Influenza	46	6.85	531	6.02	1.13	0.84 to 1.53
25-44	L83	Neksyndroom	44	6.55	239	2.71	2.41	1.75 to 3.32
25-44	L87	Bursitis/tendinitis/synoviitis nao	35	5.21	310	3.51	1.48	1.04 to 2.1
25-44	L84	Rugsyndroom zonder uitstralende pijn	29	4.32	0	0	0.00	0
25-44	R75	Acute/chronische sinusitis	25	3.72	267	3.03	1.22	0.81 to 1.84
25-44	S16	Buil/kneuzing	24	3.57	221	2.51	1.42	0.93 to 2.16
45-64	L03	Symptomen/klachten lage-rug	603	77.91	0	0	nvt	nvt
45-64	L86	Rugsyndroom met uitstralende pijn	177	22.87	0	0	nvt	nvt
45-64	R74	Acute infectie bovenste luchtwegen	171	22.09	1283	14.48	1.52	1.3 to 1.78
45-64	L84	Rugsyndroom zonder uitstralende pijn	62	8.01	0	0	nvt	nvt
45-64	D73	Verondersteld infect gastro-enteritis	51	6.59	308	3.48	1.89	1.41 to 2.54
45-64	R78	Acute bronchitis/bronchiolitis	46	5.94	448	5.06	1.17	0.86 to 1.58
45-64	R80	Influenza	45	5.81	320	3.61	1.60	1.17 to 2.19
45-64	L83	Neksyndroom	45	5.81	271	3.06	1.89	1.38 to 2.59
45-64	L87	Bursitis/tendinitis/synoviitis nao	40	5.17	324	3.66	1.41	1.02 to 1.96
45-64	L92	Schoudersyndroom	30	3.88	175	1.97	1.96	1.33 to 2.89
65-74	L03	Symptomen/klachten lage-rug	128	62.14	0	0	nvt	nvt
65-74	L86	Rugsyndroom met uitstralende pijn	64	31.07	0	0	nvt	nvt
65-74	L84	Rugsyndroom zonder uitstralende pijn	28	13.59	0	0	nvt	nvt
65-74	R74	Acute infectie bovenste luchtwegen	28	13.59	428	12.4	1.09	0.74 to 1.6
65-74	R78	Acute bronchitis/bronchiolitis	28	13.59	258	7.47	1.81	1.23 to 2.67
65-74	L87	Bursitis/tendinitis/synoviitis nao	11	5.34	102	2.95	1.81	0.97 to 3.37
65-74	P76	Depressieve stoornis	10	4.85	24	0.7	6.92	3.31 to 14.47
65-74	L89	Coxartrose	9	4.37	6	0.17	25.70	9.15 to 72.2
65-74	R80	Influenza	8	3.88	101	2.92	1.32	0.64 to 2.71
65-74	D73	Verondersteld infect gastro-enteritis	7	3.4	69	2	1.70	0.78 to 3.70
75+	L03	Symptomen/klachten lage-rug	61	58.1	0	0	nvt	nvt
75+	L86	Rugsyndroom met uitstralende pijn	37	35.24	0	0	nvt	nvt
75+	L84	Rugsyndroom zonder uitstralende pijn	21	20	0	0	nvt	nvt
75+	R78	Acute bronchitis/bronchiolitis	15	14.29	246	8.55	1.67	0.99 to 2.81
75+	R74	Acute infectie bovenste luchtwegen	10	9.52	270	9.39	1.01	0.54 to 1.90
75+	L89	Coxartrose	6	5.71	7	0.24	23.79	8.00 to 70.79
75+	L95	Osteoporose	5	4.76	5	0.17	28.00	8.11 to 96.72
75+	F70	Infectieuze conjunctivitis	5	4.76	20	0.7	6.80	2.55 to 18.12
75+	L92	Schoudersyndroom	4	3.81	40	1.39	2.74	0.98 to 7.66
75+	Y73	Prostatitis/vesiculitis seminalis	4	3.81	7	0.24	15.87	4.65 to 54.21

Appendix 2.2-6: Prescription of pain medication for patients with and without low back pain

			age group							
ATC code	ATC name	Data	18-24	25-44	45-49	50-54	55-59	60-64	65-74	75+
M01A	ANTIINFLAMMATORY AND ANTIRHEUMATIC PRODUCTS, NON-STEROIDS	n pat LBP presc	146	982	369	332	288	212	354	186
		perct pat LBP presc	71.22	76.54	78.34	74.61	79.12	78.52	69.28	61.59
		ratio_	4.01	3.85	3.20	2.93	2.99	3.12	2.81	3.94
N02B	OTHER ANALGESICS AND ANTIPYRETICS	n pat LBP presc	45	258	91	82	72	48	124	110
		% pat LBP presc	21.95	20.11	19.32	18.43	19.78	17.78	24.27	36.42
		ratio_	2.12	2.08	2.52	2.37	3.00	2.55	3.21	4.68
N02A	OPIOIDS	n pat LBP presc	21	178	83	91	75	70	122	103
		% pat LBP presc	10.24	13.87	17.62	20.45	20.6	25.93	23.87	34.11
		ratio_	6.06	4.10	3.69	3.44	3.53	3.93	3.29	5.66
M03B	MUSCLE RELAXANTS, CENTRALLY ACTING AGENTS	n pat LBP presc	39	367	124	109	77	54	64	23
		% pat LBP presc	19.02	28.6	26.33	24.49	21.15	20	12.52	7.62
		ratio_	10.34	8.61	6.49	6.50	6.89	9.71	6.80	6.93
M02A	TOPICAL PRODUCTS FOR JOINT AND MUSCULAR PAIN	n pat LBP presc	30	144	43	52	50	25	55	34
		% pat LBP presc	14.63	11.22	9.13	11.69	13.74	9.26	10.76	11.26
		ratio_	3.11	2.54	1.83	2.08	2.37	1.58	2.23	3.04
N06A	ANTIDEPRESSANTS	n pat LBP presc	7	112	57	67	48	39	86	54
		% pat LBP presc	3.41	8.73	12.1	15.06	13.19	14.44	16.83	17.88
		ratio_	1.24	1.39	1.48	1.53	1.30	1.63	1.86	2.03
N03A	ANTIEPILEPTICS	n pat LBP presc	2	15	8	14	8	9	12	15
		% pat LBP presc	0.98	1.17	1.7	3.15	2.2	3.33	2.35	4.97
		ratio_	1.42	1.02	1.06	1.60	1.49	1.92	1.26	3.09
N06C	PSYCHOLEPTICS AND PSYCHOANALEPTICS IN COMBINATION	n pat LBP presc	0	7	5	2	10	3	7	3
		% pat LBP presc	0	0.55	1.06	0.45	2.75	1.11	1.37	0.99
		ratio_	0.00	1.12	1.41	0.65	3.27	1.25	1.57	1.68

Appendix 2.2-7:

Patients with (n: 3851) and without (n:56771) a diagnosis of LBP in 2004 and at least one laboratory test, standardized to the population with LBP							
		With diagnosis LBP		Without diagnosis LBP			
Cluster	Test	n patients at least one test	% with test	n patients at least one test	% with test	Ratio	95% CI
Complet	BLOEDBEZINKING 1 UUR	1570	40.77	19121	34.13	1.19	(1.13 to 1.26)
	HEMATOCRIET	1669	43.34	20618	36.78	1.18	(1.12 to 1.24)
	HEMOGLOBINE	1691	43.91	20921	37.31	1.18	(1.12 to 1.24)
	ERYTHROCYTEN	1665	43.23	20601	36.77	1.18	(1.12 to 1.24)
	MCV	1664	43.21	20726	36.95	1.17	(1.11 to 1.23)
	MCH	1662	43.16	20666	36.85	1.17	(1.11 to 1.23)
	MCHC	1658	43.05	20653	36.83	1.17	(1.11 to 1.23)
	LEUKOCYTENTELLING	1670	43.37	20544	36.63	1.18	(1.13 to 1.24)
	SEGMENTKERNIGEN	1210	31.42	15208	26.98	1.16	(1.1 to 1.23)
	EOSINOFIELEN	1501	38.98	18740	33.33	1.17	(1.11 to 1.23)
	LYMFOCYTEN	1500	38.95	18754	33.36	1.17	(1.11 to 1.23)
	BASOFIELEN	1499	38.92	18721	33.30	1.17	(1.11 to 1.23)
	MONOCYTEN	1498	38.90	18718	33.30	1.17	(1.11 to 1.23)
	NEUTROFIELEN	343	8.91	4329	7.73	1.15	(1.03 to 1.29)
	RETICULOCYTEN	319	8.28	3873	6.94	1.19	(1.06 to 1.34)
	STAAFKERNIGEN	355	9.22	3945	6.96	1.32	(1.19 to 1.48)
	TROMBOCYTEN	1452	37.70	18533	33.06	1.14	(1.08 to 1.2)

Patients with (n: 3851) and without (n:56771) a diagnosis of LBP in 2004 and at least one laboratory test, standardized to the population with LBP							
		With diagnosis LBP		Without diagnosis LBP			
Cluster	Test	n patients at least one test	% with test	n patients at least one test	% with test	Ratio	95% CI
Anemiebilan	IJZER	915	23.76	11056	19.64	1.21	(1.13 to 1.29)
	TRANSFERRINE	428	11.11	5429	9.65	1.15	(1.04 to 1.27)
	FERRITINE	736	19.11	9042	16.00	1.19	(1.11 to 1.29)
	IJZERBINDINGSCAPACITEIT	174	4.52	1795	3.12	1.45	(1.24 to 1.69)
	Transferrine saturatie	183	4.75	2535	4.50	1.06	(0.91 to 1.23)
	VITAMINE B12	326	8.47	4454	7.69	1.10	(0.98 to 1.23)
	FOLIUMZUUR SERUM	262	6.80	3792	6.56	1.04	(0.92 to 1.18)
Stolling	P.T.	238	6.18	2667	4.54	1.36	(1.19 to 1.56)
	P.T.QUICK INR	193	5.01	2246	3.76	1.33	(1.15 to 1.55)
KH metabolisme	GLUCOSE NUCHTER	1347	34.98	16801	30.10	1.16	(1.1 to 1.23)
	Hb A1c	247	6.42	3375	5.90	1.09	(0.96 to 1.24)
Nierfunctie	CREATININE	1618	42.01	19490	34.84	1.21	(1.15 to 1.27)
	UREUM	713	18.51	9709	17.20	1.08	(1 to 1.16)
	URINEZUUR	1215	31.55	14929	26.75	1.18	(1.11 to 1.25)

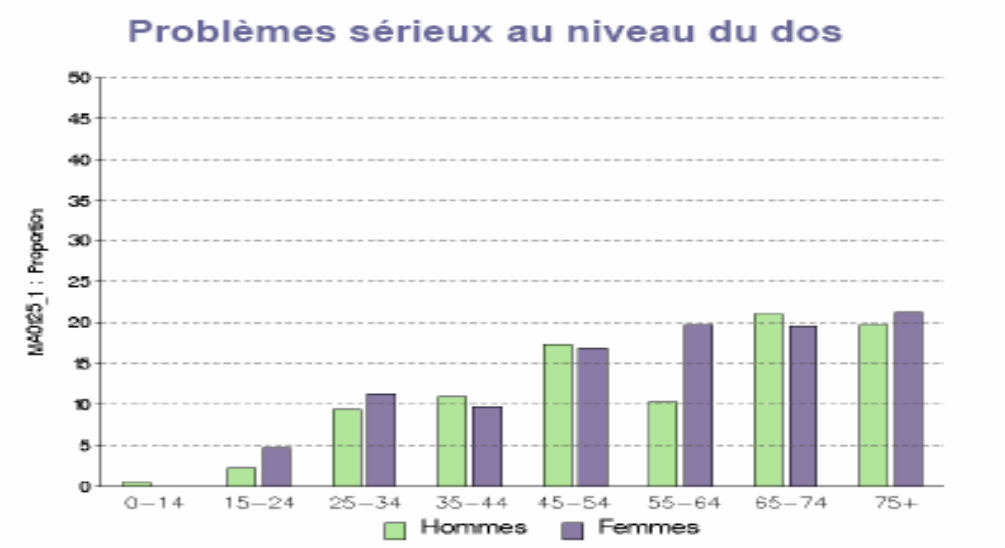
Patients with (n: 3851) and without (n:56771) a diagnosis of LBP in 2004 and at least one laboratory test, standardized to the population with LBP							
		With diagnosis LBP		Without diagnosis LBP			
Cluster	Test	n patients at least one test	% with test	n patients at least one test	% with test	Ratio	95% CI
Serumeiwitten	EIWIT TOTAAL	587	15.24	7073	12.46	1.22	(1.12 to 1.33)
	ALBUMINE ELECTROFORESE	294	7.64	3678	6.43	1.19	(1.05 to 1.34)
	ALFA-1-GLOBULINE ELECTROFORESE	306	7.94	3830	6.69	1.19	(1.06 to 1.33)
	ALFA-2-GLOBULINE ELECTROFORESE	306	7.94	3830	6.69	1.19	(1.06 to 1.33)
	BETA-GLOBULINE ELECTROFORESE	285	7.40	3585	6.26	1.18	(1.05 to 1.33)
	GAMMA GLOBULINE ELECTROFORESE	301	7.81	3785	6.62	1.18	(1.05 to 1.33)
Lever, pancreas, spier	BILIRUBINE Direct	309	8.02	4894	8.75	0.92	(0.82 to 1.03)
	BILIRUBINE Totaal	437	11.35	6601	11.79	0.96	(0.87 to 1.06)
	SGOT	1377	35.76	17349	30.99	1.15	(1.09 to 1.22)
	SGPT	1511	39.24	18360	32.80	1.20	(1.14 to 1.26)
	Y-GT	1469	38.15	18035	32.29	1.18	(1.12 to 1.25)
	ALKALISCHE FOSFATASE	1143	29.68	14077	25.19	1.18	(1.11 to 1.25)
	LDH	538	13.97	6310	11.22	1.25	(1.14 to 1.36)
	AMYLASE	256	6.65	3563	6.38	1.04	(0.92 to 1.18)
	LIPASE	226	5.87	3073	5.47	1.07	(0.94 to 1.23)

Patients with (n: 3851) and without (n:56771) a diagnosis of LBP in 2004 and at least one laboratory test, standardized to the population with LBP							
		With diagnosis LBP		Without diagnosis LBP			
Cluster	Test	n patients at least one test	% with test	n patients at least one test	% with test	Ratio	95% CI
Ionen	CALCIUM	431	11.19	5175	9.11	1.23	(1.11 to 1.36)
	FOSFOR	177	4.60	2349	4.14	1.11	(0.95 to 1.29)
	NATRIUM	873	22.67	11058	19.29	1.18	(1.1 to 1.26)
	KALIUM	912	23.68	11000	19.20	1.23	(1.15 to 1.32)
	CHLORIDE	492	12.78	6501	11.34	1.13	(1.03 to 1.23)
	BICARBONAAT	333	8.65	4008	6.95	1.24	(1.11 to 1.39)
	MAGNESIUM	161	4.18	1706	3.14	1.33	(1.13 to 1.56)
Lipiden	CHOLESTEROL TOTAAL	1530	39.73	18320	33.32	1.19	(1.13 to 1.26)
	TRIGLYCERIDEN	1452	37.70	17353	31.69	1.19	(1.13 to 1.26)
	HDL-CHOLESTEROL	1425	37.00	17068	31.18	1.19	(1.12 to 1.25)
	LDL-CHOLESTEROL	962	24.98	11755	21.42	1.17	(1.09 to 1.25)
	LDL (berekend)	407	10.57	5125	9.41	1.12	(1.01 to 1.24)
	RATIO TOTAAL CHOLESTEROL:HDL CHOLESTEROL	1193	30.98	13760	25.16	1.23	(1.16 to 1.31)
Schildklier	T4 VRIJ	410	10.64	5590	10.01	1.06	(0.96 to 1.18)
	TSH	1243	32.28	15260	27.24	1.18	(1.12 to 1.26)

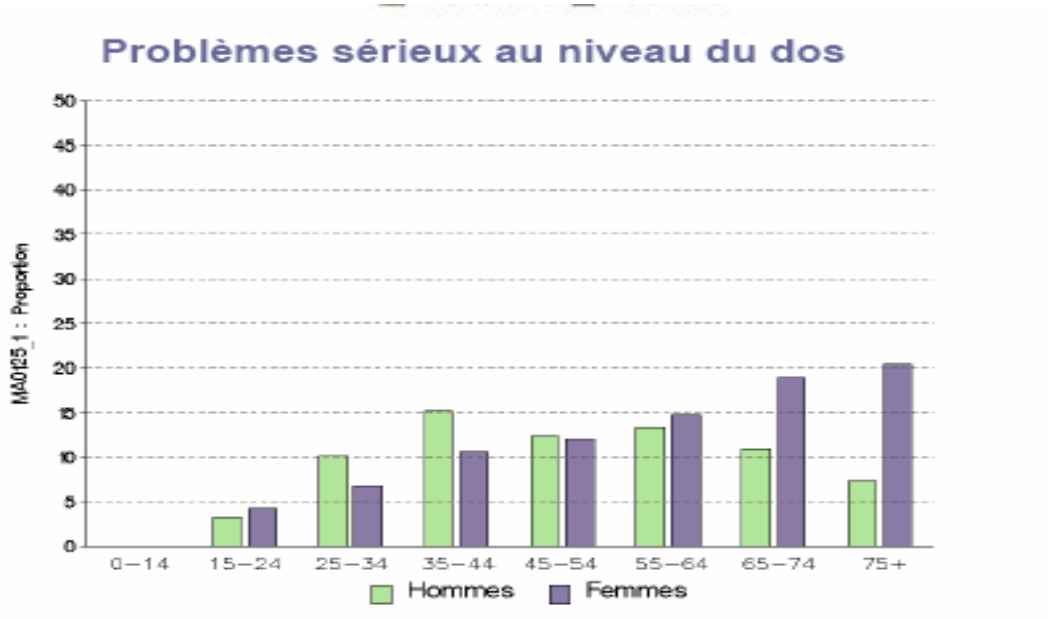
Patients with (n: 3851) and without (n:56771) a diagnosis of LBP in 2004 and at least one laboratory test, standardized to the population with LBP							
		With diagnosis LBP		Without diagnosis LBP			
Cluster	Test	n patients at least one test	% with test	n patients at least one test	% with test	Ratio	95% CI
Reuma as	REUMATOIDE FACTOR (WAALER ROSE)	104	2.70	1179	2.15	1.25	(1.03 to 1.53)
	REUMATOIDE FACTOR (RIA)	94	2.44	1141	2.10	1.16	(0.94 to 1.43)
	REUMATOIDE FACTOR (LATEX)	40	1.04	554	1.03	1.01	(0.73 to 1.39)
	CRP	1040	27.01	12423	22.14	1.22	(1.15 to 1.3)
Hart	CK	302	7.84	3256	5.89	1.33	(1.18 to 1.5)
Tumormarkers	PSA	419	10.88	5267	9.69	1.12	(1.02 to 1.24)
	CEA	93	2.42	997	1.71	1.41	(1.14 to 1.75)

Appendix 2.2-8: Prevalence of chronic back problems by gender and age for Brussels, Flanders and Wallonie (from the National Health Survey) (326)

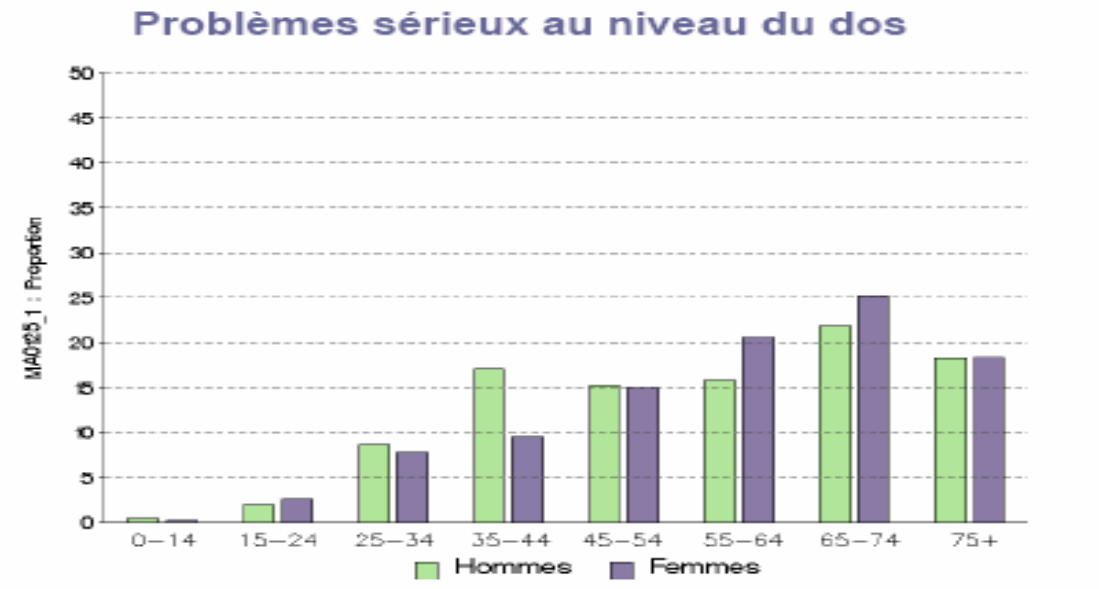
Brussels



Flanders



Wallonie



Appendix 2.3-1: List of selected diagnostic ICD-9- CM codes

ICD-9-CM codes	Description
Herniated Disc	
722.10	Displacement of lumbar disc without myelopathy
722.2	Displacement of unspecified disc without myelopathy
722.70	Disc disorder with myelopathy, site unspecified
722.73	Lumbar disc disorder with myelopathy
Probably degenerative diseases	
721.3	Lumbosacral spondylosis without myelopathy
721.5*	Kissing spine
721.90 721.6* 721.7* 721.8*	Spondylosis of unspecified site without myelopathy Ankylosing vertebral hyperostosis Traumatic spondylopathy Other disorders of spine
722.52	Degeneration of lumbar or lumbosacral disc
722.6	Degeneration of disc, site unspecified
722.90	Other and unspecified disc disorder, site unspecified
722.93	Other and unspecified lumbar disc disorder
Spinal stenosis	
721.42	Spondylogenic compression of lumbar spinal cord
721.91	Spondylogenic compression of spinal cord, not specified
724.00	Spinal stenosis, unspecified site (not cervical)
724.09	Spinal stenosis, other NNO
724.02	Lumbar stenosis
Possible instability	
724.6	Disorders of sacrum (including lumbosacral joint instability)
738.4	Acquired spondylolisthesis
756.11	Spondylolysis, lumbosacral region (congenital anomalies)
756.12	Spondylolisthesis (congenital anomalies)

Fractures (closed, without spinal cord involvement)	
805.4	Lumbar fracture
805.6	Sacral or coccygeal fracture
805.8	Vertebral fracture of unspecified site
Nonspecified backache	
307.89	Psychogenic backache
724.2	Lumbago
724.5	Backache unspecified
846.0-9	Sprains and strains, sacroiliac
847.2	Sprains and strains lumbar
847.3	Sprains and strains sacral
847.9	Sprains and strains, unspecified region
Failed Back Surgery Syndrome (FBSS)	
722.80	Postlaminectomy syndrome, unspecified region
722.83	Postlaminectomy syndrome, lumbar
996.4	Mechanical complication of internal orthopedic device, implant and graft
Miscellaneous	
722.30°	Schmorl's nodes, unspecified
722.32	Lumbar Schmorl's nodes
724.3	Sciatica
724.4	Thoracic or lumbosacral neuritis or radiculitis, unspecified (radicular syndrome)
724.8	Other symptoms referable to back
724.9	Other unspecified back disorders
737.10*	Kyphosis
737.30	Idopathic scoliosis & kyphosocliosis
738.5	Other acquired deformity of back or spine (categ. possible instability)
739.3°	Nonallopathic lesions, lumbar region
739.4°	Nonallopathic lesions, sacral region
756.10	Anomaly of spine, unspecified (congenital anomalies)
756.13*	Absence of vertebra (congenital anomalies)
756.19	Various congenital anomalies

Codes additional to Cherkin codes are indicated with *.
Codes absent from the MCD are indicated with ° in the list.

Appendix 2.3-2: List of procedure ICD-9-CM codes studied for the project low back pain

Laminectomy	
03.01	Exploration and decompression of spinal canal structures= removal of foreign body from spinal canal
03.09	Other exploration and decompression of spinal canal, laminectomy laminotomy for decompression
Discectomy	
80.50	Excision or destruction of intervertebral disc unspecified
80.51	Excision of intervertebral disc
80.52	Intervertebral disc chemonucleolysis
80.59	Other destruction of intervertebral disc
84.60*	Replacement of spinal disc, insertion of SDP NOS includes discectomy
84.64*	Insertion of partial disc prosthesis lumbosacral
84.65*	Insertion of total spinal disc prosthesis
84.68*	Revision or replacement of artificial spinal disc prosthesis lumbosacral
84.69*	Revision or replacement of artificial spinal disc prosthesis NOS
Fusion	
81.00*	Spinal fusion, NOS code also insertion of interbody spinal fusion device (84.51
81.06	Lumbar spinal fusion, anterior technique
81.07	Lumbar & lumbosacral spinal fusion, lateral transverse technique
81.08	Lumbar en lumbosacral fusion, posterior technique
81.09	Other spinal fusion
81.30*	Refusion of spine NOS also code insertion of interbody…
81.36*	Refusion of lumbar & lumbosacral spine, anterior technique
81.37*	Refusion of lumbar & lumbosacral spine, lateral transverse…
81.38*	Refusion of lumbar & lumbosacral spine, posterior technique
81.39*	Refusion of spine, not elsewhere classified
81.61*	360° spinal fusion, single incision approach (code also refusion of spine, spinal fusion and total number of vertebrae) 81.62=2-3 81.63= 4-8 & 81.64 = 9 or more

Other injection	
03.8*	injection of destructive agent into spinal canal
03.91*	injection of anesthetic into spinal canal for analgesia (LEI)
03.92*	injection of other substance into spinal canal
03.95*	spinal blood patch
05.23*	lumbar sympathectomy
05.31*	injection of anesthetic into sympathetic nerve
05.32*	injection of neurolytic agent into sympathetic nerve
81.92*	injection of therapeutic substance into joint or ligament
99.23*	injection of steroid (cortisone)
Other percutaneous pain management techniques	
03.6	lysis of adhesions of cord or nerve root
03.96*	percutaneous denervation of facet
04.2*	destruction of cranial and peripheral nerves (cryo, RF,injection of neurolytic agent
Other neurostimulation	
03.93*	implantation or replacement of spinal neurostimulator (lead-s)also code insertion pulse generator (86.94 (single) 86.95 dual,-86.96 other
03.94*	removal of spinal neurostimulator lead(s) code also removal generator 86.05
Other surgery	
03.02	reopening of laminectomy site
78.69	removal of internal fixation device (vertebral, pelvic, or phalangeal)
Diagnostic procedures	
03.31*	Spinal tap/lumbar puncture for removal of dye
03.39*	Other diagnostic procedures on spinal cord and spinal canal structures
87.21*	lumbar puncture for injection of dye (myelogram)
87.24*	X-ray of lumbosacral spine/sacrococcygeal
87.29*	Other X-ray of spine NOS
88.93*	MRI of spinal canal
88.38*	CAT-scan NOS
92.18*	Total body scan

Appendix 2.3-3: list of diagnostic ICD-9-CM codes to be studied per province for classic hospitalization

ICD-9 code	Description
Classic hospitalization	
722.52	degeneration of lumbar or lumbosacral disc
724.2	lumbago
724.02	lumbar stenosis
996.4	mechanical complication of internal orthopedic device, implant and graft
722.10	displacement of lumbar disc without myelopathy
One day hospitalization	
722.52	degeneration of lumbar or lumbosacral disc
724.2	lumbago
724.3	sciatica
722.10	displacement of lumbar disc without myelopathy

Appendix 2.3-4: Number of hospital stays per principal diagnosis (D=one day hospitalization).

ICD-9-CM	Label	Total (100%)	Day Class		Day	Classc
72210	Displacement of lumbar disc without myelopathy	26345	12790	13555	48.5%	51.5%
7243	Sciatica	12490	10221	2269	81.8%	18.2%
7242	Lumbago	9677	6731	2946	69.6%	30.4%
72402	Lumbar stenosis	7212	2360	4852	32.7%	67.3%
72252	Degeneration of lumbar or lumbosacral disc	5322	2717	2605	51.1%	48.9%
7213	Lumbosacral spondylosis without myelopathy	4624	2676	1948	57.9%	42.1%
9964	Mechanical complication of internal orthopedic device, implant and graft	4274	662	3612	15.5%	84.5%
72273	Lumbar disc disorder with myelopathy	2319	245	2074	10.6%	89.4%
72293	Other and unspecified lumbar disc disorder	2268	1205	1063	53.1%	46.9%
8054	Lumbar fracture	2017	52	1965	2.6%	97.4%
72283	Postlaminectomy syndrome, lumbar	1929	1336	593	69.3%	30.7%
7244	Thoracic or lumbosacral neuritis or radiculitis, unspecified (radicular syndrome)	1351	937	414	69.4%	30.6%
7222	displacement of unspecified disc without myelopathy	916	819	97	89.4%	10.6%
7248	Other symptoms referable to back	911	873	38	95.9%	4.1%
72142	Spondylogenic compression of lumbar spinal cord	884	360	524	40.7%	59.3%
7245	Backache unspecified	856	562	294	65.7%	34.3%
72400	Spinal stenosis, unspecified site (not cervical)	712	573	139	80.5%	19.5%
7384	Acquired spondylolisthesis	454	82	372	18.1%	81.9%
8056	Sacral or coccygeal fracture	390	15	375	3.8%	96.2%
72190	Spondylosis of unspecified site without myelopathy	285	179	106	62.8%	37.2%
7246	Disorders of sacrum (including lumbosacral joint instability)	194	82	112	42.3%	57.7%
73730	Idiopathic scoliosis & kyphoscoliosis	172	56	116	32.6%	67.4%
7249	Other unspecified back disorders	164	133	31	81.2%	18.8%
72280	Postlaminectomy syndrome, unspecified region	127	66	61	52.0%	48.0%
30789	Psychogenic backache	112	8	104	7.3%	92.7%
72290	Other and unspecified disc disorder, site unspecified	95	70	25	74.0%	26.0%
75612	Spondylolisthesis (congenital anomalies)	86	7	79	8.0%	92.0%
7226	Degeneration of disc, site unspecified	80	55	25	68.8%	31.3%
8058	Vertebral fracture of unspecified site	75	7	68	9.2%	90.8%
7218	Other disorders of spine	71	34	37	47.8%	52.2%
75611	Spondylolysis, lumbosacral region (congenital anomalies)	59	10	49	16.9%	83.1%
72409	Spinal stenosis, other NNO	43	3	40	7.2%	92.8%
7215	Kissing spine	35	15	20	43.6%	56.4%
75619	Various congenital anomalies	21	5	16	24.2%	75.8%
73710	Kyphosis	17	1	16	3.7%	96.3%
8472	Sprains and strains lumbar	15		15	0.0%	100.0%

ICD-9-CM	Label	Total (100%)	Day	Class	Day	Classc
72191	Spondylogenic compression of spinal cord, not specified	14	3	11	18.2%	81.8%
72270	disc disorder with myelopathy, site unspecified	13	4	9	30.7%	69.3%
7217	Traumatic spondylopathy	7	1	6	9.1%	90.9%
75610	Anomaly of spine, unspecified (congenital anomalies)	7	4	3	63.6%	36.4%
8473	Sprains and strains sacral	6	2	4	33.3%	66.7%
72232	Lumbar Schmorl's nodes	4	2	2	50.0%	50.0%
8479	Sprains and strains, unspecified region	4	1	3	25.0%	75.0%
7216	Ankylosing vertebral hyperostosis	3	1	3	20.0%	80.0%
7385	Other acquired deformity of back or spine (categ. possible instability)	3		3	0.0%	100.0%
8461	Sprains and strains, sacroiliac	3		3	0.0%	100.0%
8460	Sprains and strains, sacroiliac	3	2	1	66.7%	33.3%
8468	Sprains and strains, sacroiliac	1		1	0.0%	100.0%
8469	Sprains and strains, sacroiliac	1		1	0.0%	100.0%
75613	Absence of vertebra (congenital anomalies)	1		1	0.0%	100.0%

	TOTAL	86673	45967	40706	53,0%	47,0%

Appendix 2.3-5: Percentage of stays with one or more secondary diagnoses in other categories than the principal diagnosis (classic hospitalization and one day hospitalization).

		Diagnostic categories: Percentage of stays								
ICD-9-CM	**Principal diagnosis**	**Nb of stays**	**Herniated disc**	**Probably degen. diseases**	**Spinal stenosis**	**Possible instability**	**Fractures**	**Non specified backache**	**FBSS**	**Miscell.**
CLASSIC HOSPITALIZATION										
72210	**Displacement of lumbar disc without myelopathy**	**13555**	100.0%	12.5%	2.9%	1.0%	0.1%	1.2%	1.1%	4.6%
72402	**Lumbar stenosis**	**4852**	5.8%	9.5%	100.0%	4.6%	0.3%	2.7%	0.7%	11.6%
9964	**Mechanical complication of internal orthopedic device, implant and graft**	**3612***	0.3%	2.8%	0.6%	0.4%	0.1%	0.6%	100.0%	1.5%
7242	**Lumbago**	**2946**	3.0%	8.9%	2.4%	1.3%	0.2%	100.0%	1.1%	18.2%
72252	**Degeneration of lumbar or lumbosacral disc**	**2605**	8.0%	100.0%	3.1%	5.1%	0.2%	2.7%	2.6%	6.3%
7243	Sciatica	2269	7.4%	10.3%	4.8%	1.2%	0.2%	12.2%	0.9%	100.0%
72273	Lumbar disc disorder with myelopathy	2074	100.0%	7.3%	6.0%	2.7%	0.1%	1.7%	1.1%	5.4%
8054	Lumbar fracture	1965	1.5%	8.4%	1.5%	1.1%	100.0%	2.1%	0.3%	2.5%
7213	Lumbosacral spondylosis without myelopathy	1948	6.8%	100.0%	3.8%	3.6%	0.5%	2.9%	1.6%	6.5%
72293	Other and unspecified lumbar disc disorder	1063	3.7%	100.0%	3.0%	3.8%	0.0%	2.4%	0.8%	4.5%
…..	*…..other principal diagnoses…..*	*3817**								
ONE DAY HOSPITALIZATION										
72210	**Displacement of lumbar disc without myelopathy**	**12790**	100.0%	10.0%	1.4%	0.7%	0.0%	1.4%	0.7%	3.9%
7243	**Sciatica**	**10221**	1.9%	2.6%	0.8%	0.2%	0.0%	21.4%	0.1%	100.0%
7242	**Lumbago**	**6731**	1.9%	3.1%	1.3%	0.4%	0.0%	100.0%	0.3%	52.0%
72252	**Degeneration of lumbar or lumbosacral disc**	**2717**	5.6%	100.0%	3.4%	3.4%	0.0%	4.7%	1.3%	8.3%
7213	**Lumbosacral spondylosis without myelopathy**	**2676**	4.6%	100.0%	3.7%	2.4%	0.0%	2.7%	2.4%	7.1%
72402	Lumbar stenosis	2360	2.0%	4.5%	100.0%	0.8%	0.0%	2.5%	0.2%	19.9%
72283	Postlaminectomy syndrome, lumbar	1336	4.9%	13.2%	1.2%	0.8%	0.0%	1.0%	100.0%	4.1%

		Diagnostic categories: Percentage of stays								
ICD-9-CM	**Principal diagnosis**	**Nb of stays**	**Herniated disc**	**Probably degen. diseases**	**Spinal stenosis**	**Possible instability**	**Fractures**	**Non specified backache**	**FBSS**	**Miscell.**
72293	Other and unspecified lumbar disc disorder	1205	1.0%	100.0%	3.2%	0.2%	0.0%	0.9%	0.2%	30.1%
7244	Thoracic or lumbosacral neuritis or radiculitis, unspecified (radicular syndrome)	937	1.4%	3.6%	3.1%	0.3%	0.0%	0.9%	1.5%	100.0%
7248	Other symptoms referable to back	873	0.4%	0.4%	1.0%	0.4%	0.0%	1.9%	0.1%	100.0%
…..	*…..other principal diagnoses…..*	*4121*								

Appendix 2.3-6: Number (and percentage) of hospital stays per injection procedure.

	One day hospitalization 100%=45966		Classic hospitalization 100%=40705	
Injection procedure	**Number of stays**	**% of total number of stays**	**Number of stays**	**% of total number of stays**
0391 Injection of anesthetic into spinal canal for analgesia (LEI)	18601	40.47%	2586	6.35%
0392 Injection of other substance into spinal canal	19143	41.65%	1898	4.66%
9923 Injection of steroid	7604	16.54%	765	1.88%
8192 Injection of therapeutic substance into joint or ligament	1284	2.79%	328	0.81%
038 Injection of destructive agent into spinal canal	535	1.16%	38	0.09%
0531 Injection of anesthetic into sympathetic nerve	256	0.56%	30	0.07%
0532 Injection of neurolytic agent into sympathetic nerve	45	0.10%	14	0.03%
0523 Lumbar sympathectomy	34	0.07%	4	0.01%
0395 Spinal blood patch	5	0.01%	28	0.07%

Appendix 2.3-7: Injection Procedures per principal diagnosis category (classic and one day hospitalization

		Injected substance								
DIAGNOSTIC CATEGORY	Nb of stays	038 Destructive agent into spinal canal	0391 Anesthetic into spinal canal (LEI)	0392 Other substance into spinal canal	0395 Spinal blood patch	0523 Lumbar sympathectomy	0531 Anesthetic into sympathetic nerve	0532 Neurolytic agent into sympathetic	8192 Therapeutic substance into joint or ligament	9923 Steroid
Herniated disc	15735	0.1%	6.2%	4.7%	0.1%	0.0%	0.0%	0.0%	0.4%	1.9%
Probably degenerative diseases	5849	0.2%	7.6%	4.5%	0.1%	0.0%	0.0%	0.0%	1.8%	2.4%
Spinal stenosis	5555	0.1%	5.3%	4.6%	0.1%	0.0%	0.0%	0.0%	0.4%	1.3%
Failed Back Surgery Syndrome	4266	0.1%	2.6%	0.7%	0.1%	0.0%	0.1%	0.0%	0.6%	0.4%
Non specified backache	3372	0.1%	9.1%	6.4%	0.0%	0.0%	0.4%	0.3%	0.8%	3.1%
Miscellaneous	2909	0.0%	14.3%	12.5%	0.2%	0.0%	0.1%	0.1%	2.6%	3.9%
Fractures	2408	0.0%	0.7%	0.5%	0.0%	0.0%	0.0%	0.0%	0.4%	0.5%
Possible instability	612	0.3%	2.9%	1.8%	0.2%	0.0%	0.0%	0.0%	0.5%	1.1%
Total Classic Hospitalization	**40706**	**0.1%**	**6.4%**	**4.7%**	**0.1%**	**0.0%**	**0.1%**	**0.0%**	**0.8%**	1.9%

DIAGNOSTIC CATEGORY	Nb of stays	038 Destructive agent into spinal canal	0391 Anesthetic into spinal canal (LEI)	0392 Other substance into spinal canal	0395 Spinal blood patch	0523 Lumbar sympathectomy	0531 Anesthetic into sympathetic nerve	0532 Neurolytic agent into sympathetic nerve	8192 Therapeutic substance into joint or ligament	9923 Steroid
Herniated disc	13858	0.2%	41.3%	62.9%	0.0%	0.0%	0.2%	0.0%	0.8%	25.5%
Miscellaneous	12232	0.5%	51.7%	27.6%	0.0%	0.0%	0.1%	0.1%	1.5%	7.7%
Non specified backache	7306	1.3%	31.7%	37.7%	0.0%	0.0%	0.8%	0.5%	4.7%	9.9%
Probably degenerative diseases	6956	3.8%	30.6%	33.9%	0.0%	0.5%	2.1%	0.1%	6.7%	20.6%
Spinal stenosis	3296	0.4%	43.5%	46.8%	0.0%	0.0%	0.2%	0.0%	2.1%	23.1%
Failed Back Surgery Syndrome	2064	3.5%	31.1%	15.8%	0.0%	0.0%	0.5%	0.0%	3.5%	8.6%
Possible instability	181	0.0%	18.2%	32.6%	0.0%	0.0%	0.0%	0.0%	18.8%	27.1%
Fractures	74	0.0%	0.0%	2.7%	0.0%	0.0%	0.0%	0.0%	0.0%	2.7%
Total One day hospitalization	**45967**	**1.2%**	**40.5%**	**41.6%**	**0.0%**	**0.1%**	**0.6%**	**0.1%**	**2.8%**	16.5%

Appendix 2.3-8: Diagnostic procedures per principal diagnosis category (classic and one day hospitalization).

DIAGNOSTIC CATEGORY	Nb of stays	0331 Spinal tap	0339 Other	8721 Contrast myelogram	8724 X-ray of lumbosacral spine	8729 Other X-ray of spine NOS	8838 CAT-scan NOS	8893 MRI of spinal canal	9218 Total body scan
CLASSIC HOSPITALIZATION									
Herniated disc	15735	0.2%	0.0%	1.4%	4.3%	0.9%	5.4%	3.3%	0.7%
Probably degenerative diseases	5849	0.4%	0.1%	1.5%	10.4%	0.4%	8.4%	2.6%	3.5%
Spinal stenosis	5555	0.6%	0.0%	3.5%	8.0%	0.5%	5.0%	3.2%	1.5%
Failed Back Surgery Syndrome	4266	0.0%	0.0%	0.2%	1.6%	0.2%	1.2%	0.3%	0.5%
Non specified backache	3372	0.4%	0.0%	1.2%	10.2%	0.7%	8.7%	3.5%	3.1%
Miscellaneous	2909	1.3%	0.0%	2.8%	6.7%	1.3%	6.0%	3.3%	3.0%
Fractures	2408	0.1%	0.0%	0.0%	17.1%	1.7%	10.9%	1.2%	6.1%
Possible instability	612	0.3%	0.2%	1.0%	14.5%	0.8%	5.6%	1.6%	1.3%
Total Classic Hospitalization	**40706**	**0.3%**	**0.0%**	**1.6%**	**7.0%**	**0.8%**	**6.0%**	**2.8%**	**1.9%**
ONE DAY HOSPITALIZATION									
Herniated disc	13858	0.0%	0.0%	0.7%	0.3%	0.1%	0.5%	0.3%	0.0%
Miscellaneous	12232	0.0%	0.0%	0.1%	0.4%	0.1%	0.2%	0.1%	0.0%
Non specified backache	7306	0.0%	0.0%	0.2%	2.3%	0.2%	0.6%	0.2%	0.2%
Probably degenerative diseases	6956	0.0%	0.0%	4.4%	0.6%	0.0%	0.3%	0.3%	0.0%
Spinal stenosis	3296	0.1%	0.0%	0.5%	0.2%	0.2%	0.7%	0.1%	0.0%
Failed Back Surgery Syndrome	2064	0.0%	0.0%	0.1%	0.7%	0.1%	0.0%	0.1%	0.0%
Possible instability	181	0.0%	0.0%	4.4%	0.6%	0.0%	0.0%	0.0%	0.0%
Fractures	74	0.0%	0.0%	0.0%	8.1%	0.0%	5.4%	0.0%	0.0%
Total One day hospitalization	**45967**	**0.0%**	**0.0%**	**1.0%**	**0.7%**	**0.1%**	**0.4%**	**0.2%**	**0.0%**

Appendix 2.3-9: Procedures administered to more than 10% stays per principal diagnosis (classic and one day hospitalization).

ICD-9-CM	Principal diagnosis	Number of stays	% of total number of stays
CLASSIC HOSPITALIZATION			
72210	**Displacement of lumbar disc without myelopathy**	**13555**	
	8051 Excision of intervertebral disc	9009	66.5%
72402	**Lumbar stenosis**	**4852**	
	309 Other exploration and decompression of spinal canal	2728	56.2%
	8108 Lumbar and lumbosacral fusion, posterior technique	614	12.7%
9964	**Mechanical complication of internal orthopedic device, implant and graft**	**3612***	nihil ≥10%
7242	**Lumbago**	**2946**	
	(8724 X-ray of lumbosacral spine/sacrococcygeal)	(324)	(11.0%)
	391 Injection of anesthetic into spinal canal for analgesia (LEI)	295	10.0%
72252	**Degeneration of lumbar or lumbosacral disc**	**2605**	
	8108 Lumbar and lumbosacral fusion, posterior technique	733	28.1%
	8051 Excision of intervertebral disc	684	26.3%
	8106 Lumbar spinal fusion, anterior technique	367	14.1%
	309 Other exploration and decompression of spinal canal	307	11.8%
7243	**Sciatica**	**2269**	
	391 Injection of anesthetic into spinal canal for analgesia (LEI)	358	15.8%
	392 Injection of other substance into spinal canal	304	13.4%
72273	**Lumbar disc disorder with myelopathy**	**2074**	
	8051 Excision of intervertebral disc	1296	62.5%
8054	**Lumbar fracture**	**1965**	
	(8724 X-ray of lumbosacral spine/sacrococcygeal)	(353)	(18.0%)
	(8838 CAT-scan NOS)	(224)	(11.4%)
7213	**Lumbosacral spondylosis without myelopathy**	**1948**	
	8108 Lumbar and lumbosacral fusion, posterior technique	267	13.7%
	309 Other exploration and decompression of spinal canal	231	11.9%
	(8724 X-ray of lumbosacral spine/sacrococcygeal)	(225)	(11.6%)
	(391 Injection of anesthetic into spinal canal for analgesia (LEI))	(211)	(10.8%)
	(8838 CAT-scan NOS)	(209)	(10.7%)
72293	**Other and unspecified lumbar disc disorder**	**1063**	
	8108 Lumbar and lumbosacral fusion, posterior technique	261	24.6%
	8106 Lumbar spinal fusion, anterior technique	185	17.4%
	8051 Excision of intervertebral disc	169	15.9%

ICD-9-CM	Principal diagnosis	Number of stays	% of total number of stays
	(8724 X-ray of lumbosacral spine/sacrococcygeal)	(151)	(14.2%)
ONE DAY HOSPITALIZATION			
72210	**Displacement of lumbar disc without myelopathy**	**12790**	
	392 Injection of other substance into spinal canal	8483	66.3%
	391 Injection of anesthetic into spinal canal for analgesia (LEI)	4977	38.9%
	9923 Injection of steroid	3410	26.7%
7243	**Sciatica**	**10221**	
	391 Injection of anesthetic into spinal canal for analgesia (LEI)	6164	60.3%
	392 Injection of other substance into spinal canal	2505	24.5%
7242	**Lumbago**	**6731**	
	392 Injection of other substance into spinal canal	2735	40.6%
	391 Injection of anesthetic into spinal canal for analgesia (LEI)	2030	30.2%
	9923 Injection of steroid	699	10.4%
72252	**Degeneration of lumbar or lumbosacral disc**	**2717**	
	392 Injection of other substance into spinal canal	1012	37.2%
	391 Injection of anesthetic into spinal canal for analgesia (LEI)	901	33.2%
	9923 Injection of steroid	513	18.9%
7213	**Lumbosacral spondylosis without myelopathy**	**2676**	
	392 Injection of other substance into spinal canal	875	32.7%
	9923 Injection of steroid	799	29.9%
	396 Percutaneous denervation of facet	651	24.3%
	391 Injection of anesthetic into spinal canal for analgesia (LEI)	556	20.8%
72402	**Lumbar stenosis**	**2360**	
	392 Injection of other substance into spinal canal	1073	45.5%
	391 Injection of anesthetic into spinal canal for analgesia (LEI)	1001	42.4%
	9923 Injection of steroid	568	24.1%
72283	**Postlaminectomy syndrome, lumbar**	**1336**	
	391 Injection of anesthetic into spinal canal for analgesia (LEI)	611	45.7%
	392 Injection of other substance into spinal canal	318	23.8%
	9923 Injection of steroid	169	12.6%
72293	**Other and unspecified lumbar disc disorder**	**1205**	
	391 Injection of anesthetic into spinal canal for analgesia (LEI)	592	49.1%
	392 Injection of other substance into spinal canal	407	33.8%

ICD-9-CM	Principal diagnosis	Number of stays	% of total number of stays
7244	**Thoracic or lumbosacral neuritis or radiculitis, unspecified (radicular syndrome)**	**937**	
	392 Injection of other substance into spinal canal	198	21.1%
	391 Injection of anesthetic into spinal canal for analgesia (LEI)	140	14.9%
	396 Percutaneous denervation of facet	124	13.2%
	9923 Injection of steroid	108	11.5%
7248	**Other symptoms referable to back**	**873**	
	392 Injection of other substance into spinal canal	602	69.0%
	396 Percutaneous denervation of facet	216	24.7%

Appendix 2.4-1: List of nomenclature codes for medical imaging

code	description
455475 455486	Radiography of the lumbar vertebral column, inclusive the sacra iliac join, min 3 images
466476 466480	Radiography of the lumbar vertebral column, inclusive the sacro iliac join, min 3 images (connexists)
458835 458846	Computer guided tomography of 1 level in the shape of a vertebral body or the intervertebral space: 1 level.
458850 458861	Computer guided tomography of 1 level in the shape of a vertebral body or the intervertebral space: for ≥2 levels.
459491 459502	MRI investigation of the cervical, thoracic or lumbo sacral vertebral column

Appendix 2.4-2: List of nomenclature codes for percutaneous interventional pain management techniques

code	description
350652 350663	Destruction of a nerve, exclusive the facial nerves, or ganglion by means of alcohol, electrocoagulation, section or other method
354034 354045	Partial rhizolysis with high frequency current

Appendix 2.4-3: List of nomenclature codes for spine surgery

Code	Description
281514 281525	Bloedige repositie ven een luxatie, fractuur of luxatiefractuur van de dorsolumbale wervelkolom
281536* 281540*	Vertebrale osteosynthese
281551* 281562*	Vertebrale arthrodesia achteraan met unilateraal of bilateraal aangebrachte ent
281573* 281584*	Vertebrale arthrodesia achteraan met ingekeepte ent
281595 281606	Gedeeltelijke of totale resectie van de ent na vertebrale arthrodesia
281610 281621	Eenvoudig interarticulair schroeven achteraan
281632* 281643*	Interarticulaire arthrodesia achteraan
281654* 281665*	Arthrodesia of schroeven tussen de wervellichamen langs voor
281676* 281680*	Arthrodesia tussen de wervellichamen langs achter intraspinaal
281691* 281702*	Epifysiodesis of vasthechten van wervel met agrafen
281713* 281724*	Laminectomie zonder openen van de dura mater
281735* 281746*	Laminectomie met arthrodesia
281750 281761	Flavoligamentectomie
281772* 281783*	Heelkundige behandeling van een andere discushernia dan een cervicale
281794* 281805*	Heelkundige behandeling van een discushernia en arthrodesia
281816* 281820*	Resectie van de achterste boog
281831 281842	Exeresis van beentumor uit de achterste boog
281853* 281864*	Resectie van de achterste boog met arthrodesia
281875 281886	Resectie van één of meer doornuitsteeksels
281890 281901	Resectie van werveldwarsuitsteeksels
281912 281923	Costotransversectomie
281934 281945	Operatie wegens spondylistis of infectueuze spondylodiscitis recthstreeks langs de wervellichamen met of zonder beenent
281956 281960	Exeresis van beentumor uit een wevellichaam
281971* 281982*	Resectie-reconstructie van één of meer wervellichamen
281993 281204	Vertebrale osteotomie voor redressie wegens ankyloserende spondylarthritis, bewerking actheraan
282015 282026	Vertebrale osteotomie voor redressie wegens ankyloserende spondylarthritis, bewerking vooraan
282030 282041	Alloplastiek type Gruca
282052 282063	Heelkundige behandeling van scoliosis door de techniek van Harrington
282074 282085	Transplantatie of myoplastiek wegens sekwellen van verlamming van de rugspieren

282096 282100	Tweezijdige lumbale fasciotomie

Appendix 2.4-4: List of codes relative to implants for back surgery

Code	Description
637932 637943	Schacht met behandeld oppervlak
637954 637965	Raam
637991 637980	Synthetisch ligament
638234 638245	Samengesteld implantaat

Appendix 2.4-5: List of nomenclature codes for neuromodulation

Relative to neurostimulation	
232831 232842	Vervanging van een definitieve neurostimulator, inclusief de werkingsmetingen
232853 232864	Installatie van een definitieve neurostimulator met heelkundig plaatsen van de elektrode in de intradurale positie
232875 232886	Vervanging van een definitieve neurostimulator voor medullaire stimulatie
232890 232901	Plaatsen van een definitieve neurostimulator met percutaan plaatsen van de elektrode, met het oog op het stimuleren van het ruggenmerg, inclusief de werkingsmetingen
683104	Neurostimulator
683115 683126	Electrode & accessories neurostimulator.
683130 683141	Electrode stimulation essai négative

Appendix 2.4-6: List of nomenclature codes for rehabilitation

558736 558740	Thermotherapy
558751 558762	Traction par table mécanique ou moteur ou suspension
558773 558784	Manipulations vertébrales
558972 a 558997 b	Multidisciplinary, ambulatory rehabilitation of diseases of the vertebral column

a: from August 2004
b: replaces code 558972 since December 2004

Appendix 2.4-6: List of nomenclature codes for kinesitherapy

560011 (T1) 560033 (T2) 560055 (>18) 560092 (Cons)	Exercise therapy performed in the physical therapist's practice
560210 (T1) 560232 (T2) 560254 (>18) 560291 (Cons)	Exercise therapy performed in an organised medical practice but not in the hospital
560313 (T1) 560335 (T2) 560350 (> 18) 560394 (cons)	Exercise therapy performed at the patient's home
560416 (T1) 560431 (T2) 560453 (> 18)	Exercise therapy performed for handicapped patients (home, specialized residence)
560501 (T1) 560523 (T2)	Exercise performed in the hospital
560534 (T1) (Amb) 560556 (T2) (Amb) 560545 (T1) (Hosp) 560560 (T2) (Hosp)	Exercise performed in a center for re education (conventioné)
560571 (T1) 560593 (T2) 560615 (>18)	Exercise performed in a revalidation center for elderly

Appendix 2.5-1: Nomenclatuurcodes voor selectie van de studiepopulatie.

nomencl.	*omschrijving*
455475	Radiografie van de lumbale wervelkolom, inclusief eventueel de sacro-iliacale articulatie - AMBULANT.
466476	Radiografie van de lumbale wervelkolom, inclusief eventueel de sacro-iliacale articulatie - AMBULANT.
458835 458846	Computergestuurde tomografie van 1 niveau in de vorm van een wervellichaam of een tussenwervelruimte, met of zonder contrastmiddel, minimum 6 coupes: voor 1 niveau - AMBULANT & GEHOSPITALISEERD.
458850 458861	Computergestuurde tomografie van 1 niveau in de vorm van een wervellichaam of een tussenwervelruimte, met of zonder contrastmiddel, minimum 6 coupes: voor > 2 niveaus - AMBULANT & GEHOSPITALISEERD.
459491 459502	NMR-onderzoek van de cervicale of thoracale of lumbosacrale wervelzuil, minstens 3 sequenties, met of zonder contrast, met registratie op optische of electromagnetische drager - AMBULANT & GEHOSPITALISEERD.

Appendix 2.5.2 Aantal patiënten met CLBP uitgesloten van analyse. (NVSM 2004)

exclusiecriterium	*aantal patiënten*	*% van totale studiepopulatie (N=30.124)*
chemotherapie	274	0,9%
radiotherapie	358	1,2%
osteoporose - bifosfonaten	1.225	4,1%
diabetes	2.150	7,1%
zelfstandig regime	1.404	4,7%
<18 jaar	381	1,3%
>75 jaar	1.919	6,4%
totaal aantal patiënten met één of meerdere exclusiecriteria	6.677	22,2%

Appendix 2.5-3: Codes voor selectie van de uitgavengegevens voor medische beeldvorming

boekhoudcode document C RIZIV	*artikel nomenclatuur geneesk. verstrekkingen*	*omschrijving*
437	Art. 17 quater	Medische beeldvorming - echografie
438	Art. 17, § 1	Medische beeldvorming - radiologie - screeningsmammografie
439	Art. 17 ter	Medische beeldvorming - radiologie
440	Art. 17	Medische beeldvorming - radiologie
441	Art. 17 bis	Medische beeldvorming - echografie

Appendix 2.5.4: Codes voor selectie van de uitgavengegevens voor pijnmedicatie van het type NSAID

ATC code	*omschrijving*
M01AA	Pyrazolinonderivaten
M01AB	Azijnzuurderivaten en verwante stoffen
M01AC	Oxicamderivaten
M01AE	Propionzuurderivaten
M01AH	Coxibs
M01AX	Overige niet-steroïde anti-inflammatoire/anti-rheumatische middelen

Appendix 2.5.4: Codes voor selectie van de uitgavengegevens voor pijnmedicatie van het type narcotisch analgeticum

ATC code	*omschrijving*
N02AA	Natuurlijke opiumalkalonden
N02AB	Fenylpiperidinederivaten
N02AC	Difenylpropylaminederivaten
N02AD	Benzomorfanderivaten
N02AE	Oripavinederivaten
N02AX	Overige opionden
N02BA	Salicylzuur en derivaten
N02BE	Aniliden
N02BG	Overige analgetica en antipyretica

Appendix 2.5-6: Codes voor selectie van de uitgavengegevens voor kinesitherapie of fysiotherapie

boekhoudcode document C RIZIV	*artikel nomenclatuur geneesk. verstrekkingen*	*omschrijving*
305	Art. 7	Verzorging door kinesitherapeuten
306	-	Vast bedrag kinesitherapie in gezondheidscentra
470	Art. 22	Fysiotherapie

Appendix 2.5-7: Codes voor selectie van de uitgavengegevens voor chirurgie van de dorsolumbale wervelzuil

nomencl.	*omschrijving*
281514 281525	Bloedige repositie van een luxatie, fractuur of luxatiefractuur van de dorsolumbale wervelkolom.
281536 281540	Vertebrale osteosynthese.
281551 281562	Vertebrale arthrodesia achteraan met unilateraal of bilateraal aangebrachte ent.
281573 281584	Vertebrale arthrodesia achteraan met ingekeepte ent.
281595 281606	Gedeeltelijke of totale resectie van de ent na vertebrale arthrodesia.
281610 281621	Eenvoudig interarticulair schroeven achteraan.
281632 281643	Interarticulaire arthrodesia achteraan.
281654 281665	Arthrodesia of schroeven tussen de wervellichamen langs voor.
281676 281680	Arthrodesia tussen de wervellichamen langs achter intraspinaal.
281691 281702	Epifysiodesis of vasthechten van wervel met agrafen.

Appendix 2.5.8: Vervolg Codes voor selectie van de uitgavengegevens voor chirurgie van de dorsolumbale wervelzuil

nomencl.	*omschrijving*
281713 281724	Laminectomie zonder openen van de dura mater.
281735 281746	Laminectomie met arthrodesia.
281750 281761	Flavoligamentectomie
281772 281783	Heelkundige behandeling van een andere discushernia dan een cervicale.
281794 281805	Heelkundige behandeling van een discushernia en arthrodesia.
281816 281820	Resectie van de achterste boog.
281831 281842	Exeresis van beentumor uit de achterste boog.
281853 281864	Resectie van de achterste boog met arthrodesia.
281875 281886	Resectie van één of meer doornuitsteeksels.
281890 281901	Resectie van werveldwarsuitsteeksels.
281912 281923	Costotransversectomie.
281934 281945	Operatie wegens spondylistis of infectueuze spondylodiscitis rechtstreeks langs de wervellichamen met of zonder beenent.
281956 281960	Exeresis van beentumor uit een wervellichaam.
281971 281982	Resectie-reconstrucie van één of meer wervellichamen.
281993 282004	Vertebrale osteotomie voor redressie wegens ankyloserende spondylarthritis, bewerking achteraan.
282015 282026	Vertebrale osteotomie voor redressie wegens ankyloserende spondylarthritis, bewerking vooraan.
282030 282041	Alloplastiek type Gruca.
282052 282063	Heelkundige behandeling van scoliosis door de techniek van Harrington.
282074 282085	Transplantatie of myoplastiek wegens sekwellen van verlamming van de rugspieren.
282096 282100	Tweezijdige lumbale fasciotomie.
300355 300366	Percutane nucleotomie wegens discushernia.

Appendix 2.5-9: Aantal patiënten met CLBP volgens leeftijd en geslacht (NVSM 2004)

leeftijdcategorie		geslacht man	vrouw	Totaal
18 tot 39 jaar	*Aantal*	3.973	3.701	**7.674**
	% binnen leeftijdcategorie	51,8	48,2	100,0
	% binnen geslacht	37,1	29,1	32,7
40 tot 59 jaar	*Aantal*	4.992	6.260	**11.252**
	% binnen leeftijdcategorie	44,4	55,6	100,0
	% binnen geslacht	46,6	49,2	48,0
60 tot 75 jaar	*Aantal*	1.757	2.764	**4.521**
	% binnen leeftijdcategorie	38,9	61,1	100,0
	% binnen geslacht	16,4	21,7	19,3
Totaal	*Aantal*	10.722	12.725	**23.447**
	% binnen leeftijdcategorie	45,7	54,3	100,0

Appendix 2.5-10: Duration of pharmacological treatment of chronic low back pain patients

duur van behandeling met pijnmedicatie	*aantal patiënten*	*% patiënten*	*cumulatief % patiënten*
7 dagen	5.216	27,1%	27,1%
8-14 dagen	324	1,7%	28,8%
15-30 dagen	793	4,1%	32,9%
1-3 maanden	1.846	9,6%	42,5%
3-6 maanden	2.292	11,9%	54,5%
6-12 maanden	8.755	45,5%	100,0%
Totaal	19.226	100,0%	

Appendix 2.5-11: Duration of physiotherapy

duur van behandeling met kinesitherapie	*aantal patiënten*	*% patiënten*	*cumulatief % patiënten*
1 dag	1.240	12,1%	12,1%
2-14 dagen	1.782	17,4%	29,6%
15-30 dagen	1.458	14,3%	43,8%
1-3 maanden	2.092	20,5%	64,3%
3-6 maanden	1.269	12,4%	76,7%
6-12 maanden	2.380	23,3%	100,0%
Totaal	10.221	100,0%	

Appendix 2.5-12 : Duration of rehabilitation treatment /physical medicine

duur van behandeling met fysiotherapie	*aantal patiënten*	*% patiënten*	*cumulatief % patiënten*
1 dag	3.729	48,8%	48,8%
2-14 dagen	800	10,5%	59,2%
15-30 dagen	551	7,2%	66,5%
1-3 maanden	929	12,2%	78,6%
3-6 maanden	706	9,2%	87,8%
6-12 maanden	929	12,2%	100,0%
Totaal	7.644	100,0%	

Appendix: 2.5-13: Distribution of the costs for physiotherapy and rehabilitation

		kinesitherapie (N = 10.221)		fysiotherapie (N = 7.644)	
		ZIV kost	***aantal prestaties***	***ZIV kost***	***aantal prestaties***
Totaal		2.409.905 €	209.765	1.888.627 €	61.801
Gemiddelde		236 €	21	247 €	8
Mediaan		129 €	12	101 €	2
Minimum		2 €	1	4 €	1
Maximum		5.132 €	606	7.323 €	181
Percentielen	*5*	21 €	2	20 €	1
	10	34 €	4	48 €	2
	25	87 €	9	90 €	2
	75	256 €	21	199 €	8
	90	511 €	43	494 €	20
	95	795 €	64	1.004 €	35

Appendix 2.5-14: Cost of rehabilitation and physiotherapy for conservatively treated patients and patients treated with surgery.

			ambulante kinesitherapie bij conservatieve behandeling (N = 8.225)						ambulante fysiotherapie bij conservatieve behandeling (N = 6.171)				
			ZIV kost			***aantal prestaties***			***ZIV kost***			***aantal prestaties***	
Gemiddelde			228	€		20			226	€		8	
Mediaan			126	€		11			90	€		2	
			ambulante kinesitherapie bij rugchirurgie (N = 948)						ambulante fysiotherapie bij rugchirurgie (N = 623)				
			ZIV kost			***aantal prestaties***			***ZIV kost***			***aantal prestaties***	
Gemiddelde			370	€		30			276	€		8	
Mediaan			279	€		22			95	€		2	

Appendix 2.5-15: Distribution of use of physiotherapy and/or rehabilitation therapy in the different age groups

type therapie	***18 tot 39 j***		***40 tot 59 j***		***60 tot 75 j***		***Totaal***	
	aantal	*%*	*aantal*	*%*	*aantal*	*%*	*aantal*	*%*
enkel kine	2.259	50,5%	2.904	43,3%	1.244	43,4%	**6.407**	**45,6%**
enkel fysio	1.151	25,7%	1.934	28,8%	745	26,0%	**3.830**	**27,3%**
kine en fysio	1.067	23,8%	1.872	27,9%	875	30,6%	**3.814**	**27,1%**
totaal aantal patiënten met kine en/of fysio	4.477	100,0%	6.710	100,0%	2.864	100,0%	**14.051**	**100,0%**

Appendix 2.5-16. Verdeling van de totale ZIV kost van de hospitalisaties voor rugchirurgie bij 1201 CLBP patiënten, volgens kostengroep. (NVSM 2004)

kostengroep	***ZIV kost per kostengroep***	***Aandeel van kostengroep in totale ZIV kost***
honoraria heelkunde en anesthesie	1.171.074 €	34,2%
andere artsenhonoraria	155.537 €	4,5%
implantaten	1.240.219 €	36,2%
verpleegdagprijs	254.532 €	7,4%
kinesitherapie	31.991 €	0,9%
medicatie	196.853 €	5,7%
klinische biologie	218.221 €	6,4%
medische beeldvorming	156.602 €	4,6%
totale ZIV kost	3.425.029 €	100,0%

Appendix 2.5-17. Distributie van de ZIV kost naargelang de kostengroep van de hospitalisaties voor rugchirurgie bij 1201 CLBP patiënten. (NVSM 2004)

		honoraria heelkunde en anesthesie (N = 1.201)	**andere artsen-honoraria** (N = 1.201)	**implantaten** (N = 475)	**verpleegdagprijs** (N = 1.201)
		ZIV kost	***ZIV kost***	***ZIV kost***	***ZIV kost***
Totale ZIV kost		1.171.074 €	155.537 €	1.240.219 €	254.532 €
Gemiddelde		975 €	130 €	2.611 €	212 €
Mediaan		652 €	85 €	2.554 €	181 €
Minimum		258 €	8 €	22 €	-538 €
Maximum		5.758 €	1.813 €	15.761 €	2.707 €
Percentielen	*5*	583 €	19 €	310 €	114 €
	10	585 €	19 €	620 €	124 €
	25	622 €	51 €	1.370 €	149 €
	75	1.250 €	148 €	3.478 €	231 €
	90	1.680 €	247 €	4.538 €	303 €
	95	1.952 €	380 €	5.365 €	365 €

		kinesitherapie (N = 647)	**medicatie** (N = 1.201)	**klinische biologie** (N = 1.201)	**medische beeldvorming** (N = 1.201)
		ZIV kost	***ZIV kost***	***ZIV kost***	***ZIV kost***
Totale ZIV kost		31.991 €	196.853 €	218.221 €	156.602 €
Gemiddelde		49 €	164 €	182 €	130 €
Mediaan		39 €	115 €	160 €	114 €
Minimum		4 €	13 €	53 €	26 €
Maximum		545 €	11.503 €	1.026 €	1.093 €
Percentielen	*5*	10 €	49 €	92 €	56 €
	10	12 €	58 €	107 €	66 €
	25	18 €	79 €	128 €	84 €
	75	62 €	166 €	203 €	149 €
	90	97 €	250 €	268 €	209 €
	95	130 €	330 €	337 €	261 €

Appendix 2.5-18: most frequently prescribed medical imaging

ALLE VOORSCHRIJVERS		
	Aantal prestaties	*Percentage van totaal*
RX lumbale wervelkolom	30.426	18,2%
CT wervelkolom	21.730	13,0%
RX bekken	16.672	10,0%
RX thorax	10.175	6,1%
RX heup	8.963	5,4%
NMR wervelkolom	8.929	5,4%
RX dorsale wervelkolom	5.290	3,2%
RX mammo	4.985	3,0%
RX cervicale wervelkolom	4.718	2,8%
RX knie	4.347	2,6%
echo ledematen	3.712	2,2%
CT hals, thorax, abdomen	3.196	1,9%
echocardiografie	2.793	1,7%
transvaginale echografie	2.735	1,6%
RX schouder	2.473	1,5%
echo borsten	2.400	1,4%
echo abdomen	2.107	1,3%
CT schedel	1.893	1,1%
RX middelvoet	1.788	1,1%
RX enkel	1.451	0,9%

APPENDIXES PART III: OCCUPATIONAL MEDICINE

APPENDIX 3.2.2-1: SEARCH STRATEGY AND RESULTS

3.2.2-1.1 Search and selection of guidelines

The search strategy combined 3 groups of terms, using the "OR strategy" inside the group and the "AND strategy" between the groups:

The first group included "low back pain" or "backache" or "sciatica (ischialgia)" as main MesH or key words;

The second group included the field of research: "occupational health" or "occupational medicine" or "occupational disease" or "occupational accident". For a more specific search, several other MesH terms relating to various outcomes and interventions (return to work, absenteeism, sick leave, disability, retirement, employment, job change, job adaptation, job loss, light duty, ergonomic, rehabilitation, back school, lumbar support) were associated to this group to renforce the effectiveness of the strategy.

The third group included the type of reference: "guidelines" or "clinical guidelines" or "practice guidelines".

The Dutch publication (Staal et al 2002) describing an international comparison of occupational low back pain guidelines also served as a source to identify additional interesting guidelines.

3.2.2-1.2 Results of the search for guidelines

First selection step

The literature search identified 440 references for the corresponding period (EMBASE: 206; MEDLINE: 73; COCHRANE: 89; PUBMED: 56; National Guidelines Clearing House: 3; NHS guidelines Finder 7; New Zealand Guidelines Group Search: 1; Pedro: 5).

All publications electronically identified from various databases were combined in one Reference Manager Database (except for those with a no compatible format) and duplicate publications were removed.

In this first step of selection, the majority of publications (n=379) were discarded on the basis of the title and/or abstract. Some publications did not correspond to the inclusion criteria (PICO), some were not guidelines, and some other ones were not related to "back pain" or to occupational settings. Twenty-six publications matched the PICO definition but they were discarded because they were redundant. Twelve (12) were discarded because of the language (Italian, German, Norwegian, and Japanese).

As a result, 26 guidelines were kept for analysis (11 occupational health focused guidelines and 15 low back pain guidelines dealing with occupational issues or settings).

Second selection step and guidelines appraisal

The 26 references were submitted to a second selection step based on the full text of the publication. This selection was performed by the researcher (D. Mazina) and his decision was validated by a second reviewer (M. Dujardin, senior researcher in the department and specialist in occupational medicine). During that selection process, it appeared that most of those references were "general guidelines" or "clinical focused guidelines" rather than guidelines relating to the occupational settings. Some guidelines focused on a specific aspect of the PICO. Eight guidelines were judged relevant and corresponding to the PICO, but one of them (the Canadian guidelines: CTFPHC 2003) was removed from the list because it was found that it was a systematic review and not a guideline (Ammendolia et al 2005; see 1.2.2.4). The 7 guidelines kept were assessed using the AGREE [2] instrument (AGREE Collaboration group 2003).

The AGREE analysis was conducted independently by 2 reviewers (D. Mazina and M. Dujardin) who attributed a score to each guideline; both individual scores were discussed and combined to get one global score for each guideline.

Three of the 7 guidelines (COST B 13, Philadelphia Panel and ANAES) had already been evaluated by the part I team and the scores attributed were thus those determined by the previous evaluator (J. Gailly). One guideline with a low score (Switzerland guidelines: less than 50) was kept because a part of its content was judged of interest according to the PICO.

The 7 guidelines are listed below (by alphabetic order) and their AGREE scores are given in table 2 (by year of publication).

1. ANAES. Diagnostic and therapeutic management of common lumbago and sciatica of less than 3 months of duration. Recommendations of the ANAES. [Agence Nationale d'Accréditation et d'Evaluation en Santé] *J Radiol*. 2000;81:1665-6. (in French).
2. Burton AK, Balague F, Cardon G et al. COSTB13 Working group: European guidelines for the management of low back pain - Chapter 2: European guidelines for prevention in low back pain: November 2004. Workers. *Eur Spine J.* 2006; 15:S148-S157.

[2] AGREE : Appraisal of Guidelines for Research & Evaluation

3. Dutch Association of Occupational Medicine (NVAB): Management of low back workers by the occupational physician. *Approved guidelines*, April 1999 (In Dutch).

4. Fédération des Médecins Suisses (FMH). [Lombalgies : recommandations pour le diagnostic et la prise en charge - Algorithmes 1 à 4]. 1997. 32 p. Berne (in French).

5. New Zealand Acute Low Back Pain Guide, incorporating the Guide to Assessing Psychosocial Yellow Flags in Acute Low Back Pain**.** Best Practice Guideline; Source: *Accident Compensation Corporation (ACC)*. Date Published: 1-Jun-03

6. Tugwell P. Philadelphia panel evidence-based clinical practice guidelines on selected rehabilitation interventions for low back pain. *Phys.Ther.* 2001; 81:1641-74.

7. Waddell G, Burton AK. Occupational health guidelines for the management of low back pain at work: evidence review. *Occup Med* 2001; 51:124-35.

Table 1: Guidelines selected for appraisal with their AGREE score

N°	Title	Year	Source	AGREE
1	European guidelines for the management of low back pain	2004	COST B13	63
2	**New Zealand Acute Low Back Pain Guide, incorporating the Guide to Assessing Psychosocial Yellow Flags in Acute Low Back Pain**	2004	Accident Compensation Corporation (ACC), New Zealand	68
3	Philadelphia Panel evidence-based clinical practice guidelines on selected rehabilitation interventions for low back pain.	2001	Philadelphia Panel - Independent Expert Panel (NGC:4016)	64
4	Occupational health guidelines for management of low back pain at work: Evidence Review and Recommendations.	2000	UK Royal College of Physicians: Faculty of Occupational Medicine (FOM/RCP)	72
5	Diagnostic and therapeutic management of common lumbago and sciatica of less than 3 months of duration	2000	ANAES	50
6	Dutch guidelines: Management by the occupational physicians of employees with low back pain	1999	Dutch Association of Occupational Medicine (NVAB)	51
7	Lombalgies : recommandations pour le diagnostic et la prise en charge - Algorithmes 1 à 4	1997	Fédération des Médecins Suisses (FMH)	34

Search and selection of systematic reviews

An electronic search for systematic reviews (SR) was carried out for the 2000-2006 period on the following databases: EMBASE, OVID Cochrane Database of Systematic Reviews (2006 2nd quarter), OVID Medline, AMED (Allied and Complementary Medicine) and Pedro search database. The electronic selection was similar to that used for retrieving guidelines and based on the following strategy:

Main MesH or key words: "low back pain" or "backache" or "sciatica (ischialgia)";

The field of research: "occupational health" or "occupational medicine" or "occupational disease" or "occupational accident"; Other MeSH terms or key words associated to this group for a more specific search are also return to work, absenteeism, sick leave, disability, retirement, employment, job change, job adaptation, job loss, light duty, ergonomic, rehabilitation, back school, lumbar support (see Appendix 2: search strategy).

And the type of reference: "Systematic reviews" or "Meta-analysis"

Results of the search for systematic reviews

First selection step

The electronical search was performed by the main researcher (D. Mazina). In the list of retrieved references (from each database), a selection was made on the basis of the title or after a quick reading of the abstract when the title did not allow any decision. All references that did not include any of the keywords in the title, in the abstract or in the list of

keywords were discarded. When the selection raised question, the final decision was taken by the principal investigator (P.Mairiaux). This process was repeated for all databases.

From the electronical search, 392 systematic reviews have been identified as including the 3 groups of keywords aforementioned (EMBASE: 79; COCHRANE: 91; MEDLINE: 107; Pubmed: 56; AMED: 50; and Pedro database: 9).

As for the guidelines, most retrieved references were duplicates found in several databases. Other ones were not "systematic reviews" (although the term review was mentioned in the keywords); some others were not related to "back pain" nor to the occupational setting. From the 392 references retrieved, 338 were discarded based on the title (not corresponding to the inclusion criteria): 54 references were kept for analysis (see Appendix 2: search history).

Second selection step

The 54 systematic reviews were submitted to a second selection step, based on the abstract and the full text.

Of the 54 eligible references, 21 references were discarded because they were not corresponding to the research question; 4 were updated versions of a Cochrane review with a different name (Hayden 2005; Schonstein 2003; van Poppel 2000 and Jellema 2001) and 2 were descriptive reviews (Verbeek JH 2001; Staal JB 2002). One Cochrane Systematic Review (Hilde G 2002) has been withdrawn by the Cochrane Back Review Group because it was out of date (last search Dec 1998) and had methodological problems. Finally, 27 systematic reviews including 8 "Cochrane systematic reviews" were kept for supplementing the evidence base provided by the guidelines.

One recent published systematic review (Henrotin YE et al 2006) was added to the list of references before finalizing the report. The full list of systematic reviews is given below.

1. Ammendolia C, Kerr MS, Bombardier C. Back belt use for prevention of occupational low back pain: a systematic review. *J Manipulative Physiol Ther*. 2005 Feb; 28(2):128-34. Review.
2. Elders LA, van der Beek AJ, Burdorf A. Return to work after sickness absence due to back disorders--a systematic review on intervention strategies. *Int Arch Occup Environ Health*. 2000 Jul; 73(5):339-48.
3. Fayad F, Lefevre-Colau MM, Poiraudeau S, Fermanian J, Rannou F, Wlodyka Demaille S, Benyahya R, Revel M. [Chronicity, recurrence, and return to work in low back pain: common prognostic factors]. *Ann Readapt Med Phys*. 2004 May; 47(4):179-89 (in French).
4. Franche RL, Cullen K, Clarke J, Irvin E, Sinclair S, Frank J. Work-Place-Based Return-to-Work Interventions: A Systematic Review of the Quantitative Literature. *J Occup rehabil, 2005; 15(4): 607-631.*
5. Guzman J, Esmail R, Karjalainen K et al. Multidisciplinary bio-psycho-social rehabilitation for chronic low-back pain [Systematic Review]. *Cochrane Database of Systematic Reviews* 2006.
6. Hartvigsen J, Lings S, Leboeuf-Yde C, Bakketeig L. Psychosocial factors at work in relation to low back pain and consequences of low back pain; a systematic, critical review of prospective cohort studies. *Occup Environ Med*. 2004 Jan;61(1): e2
7. Hayden JA, van Tulder MW, Malmivaara A et al. Exercise therapy for treatment of non-specific low back pain [Systematic Review]. *Cochrane Database of Systematic Reviews* 2006.

8. Henrotin YE, Cedraschi C, Duplan B, Bazin T, Duquesnoy B. Information and Low Back Management. *Spine* 2006; 31(11): E326-E334

9. Heymans MW, van Tulder MW, Esmail R et al. Back schools for non-specific low-back pain [Systematic Review]. *Cochrane Database of Systematic Reviews* 2006.

10. Hlobil H, Staal JB, Spoelstra M, Ariens GA, Smid T, van Mechelen W. Effectiveness of a return-to-work intervention for subacute low-back pain. *Scand J Work Environ Health*. 2005 Aug; 31(4):249-57.

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multidisciplinary rehabilitation-or, back school treatment outcome in patients with chronic low back pain. *Spine.* 2005 Apr 1; 30(7):813-25.

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Quality appraisal of systematic reviews

The systematic reviews (SR's) meeting inclusion criteria were assessed for methodological quality using the Validation Cochrane criteria assessment for systematic reviews Va form (*Formulier voor het beoordelen van een systematic review van randomised controlled trials; Versie oktober 2002, geldig t/m december 2006*), translated in English.

Out of the 27 SR's meeting inclusion criteria, 8 were "Cochrane Systematic Reviews" and were not assessed (Guzman J. 2006; Hayden JA. 2006; Heymans MW. 2006; Karjalainen K. 2006; Ostelo RWJG. 2006; Schonstein E. 2006; van Tulder MW. 2006; van Tulder M. 2000); two had been evaluated by part I researchers (Kool J et al 2004; van der Hulst M et al 2005) and were judged as of good methodological quality. Seventeen remaining were submitted to the quality appraisal and all of them were judged to be of a good quality methodology.

The synthesis of this assessment is described in the table 2.

Table 2: Quality appraisal for included non Cochrane Systematic Reviews

AUTHOR - YEAR	SUBJECT	QUALITY APPRAISAL*	COMMENTS
AMMENDOLIA C. 2002	Back belt use for prevention of occupational low back pain: systematic review and recommendations	Clinical question appropriately formulated : Y Literature search appropriately carried out : Y Selection of publications appropriately carried out : Y Quality appraisal appropriately carried out : Y Data extraction appropriately carried out : Y Main characteristics of original studies described : Y Heterogeneity of studies considered : Y Statistical pooling properly carried out : NMA* Results from the SR valid and applicable : Certainly	Systematic Review of a methodology of a relative good quality. Inclusion of RCTs, non-RCTs, Cohort studies, survey No answer possible for question 8
ELDERS LA. 2000	Return to work after sickness absence due to back disorders--a systematic review on intervention strategies	Clinical question appropriately formulated : Y Literature search appropriately carried out : Y Selection of publications appropriately carried out : Y Quality appraisal appropriately carried out : N Data extraction appropriately carried out : Y Main characteristics of original studies described : Y Heterogeneity of studies considered : Y Statistical pooling properly carried out : NMA* Results from the SR valid and applicable : Y	Systematic Review of a good quality methodology. No methodological quality appraisal described No answer possible for question 8

Y=Yes; N=No; TFI=To Few Information; NMA=No Meta-Analysis performed

FAYAD F. 2004	Chronicity, recurrence, and return to work in low back pain: common prognostic factors	Clinical question appropriately formulated : Y Literature search appropriately carried out : Y Selection of publications appropriately carried out : Y Quality appraisal appropriately carried out : Y Data extraction appropriately carried out : Y Main characteristics of original studies described : TFI* Heterogeneity of studies considered : TFI* Statistical pooling properly carried out : NMA* Results from the SR valid and applicable : Y	Systematic Review of a good quality methodology. Main characteristics of study insufficiently described Heterogeneity of studies not discussed. No answer possible for question 8
FRANCHE RL. 2005	Work-Place-Based Return-to-Work Interventions: A Systematic Review of the Quantitative Literature.	Clinical question appropriately formulated : Y Literature search appropriately carried out : Y Selection of publications appropriately carried out : Y Quality appraisal appropriately carried out : Y Data extraction appropriately carried out : Y Main characteristics of original studies described : Y Clinical and statistical heterogeneity of studies considered : Y **Statistical pooling properly carried out : NMA*** Results from the SR valid and applicable : **Y**	Systematic Review of a good quality methodology. Background of the problem insufficiently described No answer possible for question 8

HARTVIGSEN J. 2004	Psychosocial factors at work in relation to low back pain and consequences of low back pain; a systematic, critical review of prospective cohort studies	Clinical question appropriately formulated : Y Literature search appropriately carried out : Y Selection of publications appropriately carried out : Y Quality appraisal appropriately carried out : Y Data extraction appropriately carried out : Y Main characteristics of original studies described : Y Heterogeneity of studies considered : Y Statistical pooling properly carried out : NMA* Results from the SR valid and applicable : **Y**	Systematic Review of a good quality methodology. No answer possible for question 8
HENROTIN YE. 2006	Information and Low Back Management	Clinical question appropriately formulated : Y Literature search appropriately carried out : Y Selection of publications appropriately carried out : Y Quality appraisal appropriately carried out : Y Data extraction appropriately carried out : Y Main characteristics of original studies described : Y Heterogeneity of studies considered : Y Statistical pooling properly carried out : NMA* Results from the SR valid and applicable : Y	Systematic Review of a good quality methodology. No answer possible for question 8

	HLOBIL H. 2005	Effectiveness of a return-to-work intervention for sub acute low-back pain.	Clinical question appropriately formulated : Y Literature search appropriately carried out : Y Selection of publications appropriately carried out : Y Quality appraisal appropriately carried out : Y Data extraction appropriately carried out : Y Main characteristics of original studies described : Y Heterogeneity of studies considered : Y Statistical pooling properly carried out : NMA* Results from the SR valid and applicable : Y	Systematic Review of a good quality methodology. No answer possible for question 8
	KUIJER W. 2006	Prediction of Sickness Absence in Patients with Chronic Low Back Pain	Clinical question appropriately formulated : Y Literature search appropriately carried out : Y Selection of publications appropriately carried out : Y Quality appraisal appropriately carried out : Y Data extraction appropriately carried out : Y Main characteristics of original studies described : Y Heterogeneity of studies considered : Y Statistical pooling properly carried out : **NMA*** Results from the SR valid and applicable : **Certainly**	Systematic Review of a good quality methodology. No answer possible for question 8

MEIJER EM. 2005	Evaluation of effective return-to-work treatment programs for sick-listed patients with non-specific musculoskeletal complaints: A systematic review.	Clinical question appropriately formulated : Y Literature search appropriately carried out : Y Selection of publications appropriately carried out : Y Quality appraisal appropriately carried out : Y Data extraction appropriately carried out : Y Main characteristics of original studies described : Y Heterogeneity of studies considered : Y Statistical pooling properly carried out : **NMA*** Results from the SR valid and applicable : **Y**	Systematic Review of a good quality methodology. No answer possible for question 8
NIELSON WR. 2001	Biopsychosocial approaches to the treatment of chronic pain.	Clinical question appropriately formulated : Y Literature search appropriately carried out : Y Selection of publications appropriately carried out : Y Quality appraisal appropriately carried out : Y Data extraction appropriately carried out : Y Main characteristics of original studies described : Y Heterogeneity of studies considered : N Statistical pooling properly carried out : **NMA*** Results from the SR valid and applicable : **Y**	Systematic Review of a good quality methodology. No answer possible for question 8

PINCUS T. 2002	A systematic review of psychological factors as predictors of chronicity/disability in prospective cohorts of low back pain	Clinical question appropriately formulated : Y Literature search appropriately carried out : Y Selection of publications appropriately carried out : Y Quality appraisal appropriately carried out : Y Data extraction appropriately carried out : Y Main characteristics of original studies described : Y Heterogeneity of studies considered : Y Statistical pooling properly carried out : **NMA*** Results from the SR valid and applicable : **Y**	Systematic Review of a good quality methodology. Background of the problem not sufficiently given Period of search not precised Combining acute, subacute and chronic LBP. No answer possible for question 8
SHAW W.S. 2001	Early prognosis for low back disability: intervention strategies for health care providers.	Clinical question appropriately formulated : Y Literature search appropriately carried out : Y Selection of publications appropriately carried out : Y Quality appraisal appropriately carried out : TFI* Data extraction appropriately carried out : Y Main characteristics of original studies described: Y Heterogeneity of studies considered : N Statistical pooling properly carried out : NMA* Results from the SR valid and applicable : Y	Systematic Review of a good quality methodology. Search from only one database (Medline) + inspection of 3 recent related reviews Methodological quality appraisal not précised. No answer possible for question 8

STEENSTRA IA. 2005	Prognostic factors for duration of sick leave in patients sick listed with acute low back pain: A systematic review of the literature.	Clinical question appropriately formulated : Y Literature search appropriately carried out : Y Selection of publications appropriately carried out : Y Quality appraisal appropriately carried out : Y Data extraction appropriately carried out : Y Main characteristics of original studies described : Y Heterogeneity of studies considered : Y Statistical pooling properly carried out : Y Results from the SR valid and applicable : Y	Systematic Review of a good quality methodology. Literature search from only one database (Medline)
SBU 2004	Sickness absence due to back and neck disorders.	Clinical question appropriately formulated : Y Literature search appropriately carried out : Y Selection of publications appropriately carried out : Y Quality appraisal appropriately carried out : Y Data extraction appropriately carried out : Y Main characteristics of original studies described : Y Heterogeneity of studies considered : Y Statistical pooling properly carried out : **NMA*** Results from the SR valid and applicable : **Y**	Systematic Review of a good quality methodology. Except that back and neck disorders are combined; Also in studies analysed, only 2 were of high quality and 26 other of medium and low quality. No answer possible for question 8.

TVEITO TH. 2004	Low back pain interventions at the workplace: a systematic literature review	Clinical question appropriately formulated : Y Literature search appropriately carried out : Y Selection of publications appropriately carried out : Y Quality appraisal appropriately carried out : Y Data extraction appropriately carried out : Y Main characteristics of original studies described : Y Heterogeneity of studies considered : Y Statistical pooling properly carried out : **NMA*** Results from the SR valid and applicable : **Y**	Systematic Review of a good quality methodology. No answer possible for question 8
van POPPEL MN. 2004	An update of a systematic review of controlled clinical trials on the primary prevention of back pain at the workplace.	Clinical question appropriately formulated : Y Literature search appropriately carried out : Y Selection of publications appropriately carried out : Y Quality appraisal appropriately carried out : Y Data extraction appropriately carried out : Y Main characteristics of original studies described : Y Heterogeneity of studies considered : Y Statistical pooling properly carried out : **Y** Results from the SR valid and applicable : **Y**	Systematic Review of a good quality methodology. Except that the authors pointed out the problem that most studies analysed were globally of low quality. For meta-analysis: calculation of "effect size" (Cohen's d (95 % CI).

WESSELS T. 2006	What predicts outcome in non-operative treatments of chronic low back pain? A systematic review	Clinical question appropriately formulated : Y Literature search appropriately carried out : Y Selection of publications appropriately carried out : Y Quality appraisal appropriately carried out : Y Data extraction appropriately carried out : Y Main characteristics of original studies described : Y Heterogeneity of studies considered : Y Statistical pooling properly carried out : **NMA*** Results from the SR valid and applicable : **Y**	Systematic Review of a good quality methodology. No answer possible for question 8

SEARCH HISTORY

Table 1: EMBASE: Session strategy and Results

EMBASE SEARCH June 30 2006: http://www.EMBASE.com

No. Query	Results	Results Date
#1. 'low back pain'/exp	17,503	30 Jun 2006
#2. 'backache'/exp	31,452	30 Jun 2006
#3. 'ischialgia'/exp	3,959	30 Jun 2006
#4. 'injury'/exp	898,338	30 Jun 2006
#5. #1 OR #2 OR #3 OR #4	927,164	30 Jun 2006
#6. 'occupational accident'/exp	14,102	30 Jun 2006
#7. 'occupational health'/exp	116,039	30 Jun 2006
#8. 'occupational medicine'/exp	45,036	30 Jun 2006
#9. 'occupational disease'/exp	95,749	30 Jun 2006
#10. 'medical leave'/exp	127	30 Jun 2006
#11. 'retirement'/exp	6,827	30 Jun 2006
#12. 'retirement'/exp	6,827	30 Jun 2006
#13. 'job adaptation'/exp	40	30 Jun 2006
#14. 'job change'/exp	5	30 Jun 2006
#15. 'absenteeism'/exp	8,857	30 Jun 2006
#16. 'work disability'/exp	1,823	30 Jun 2006
#17. 'workplace'/exp	11,623	30 Jun 2006
#18. 'employment'/exp	29,103	30 Jun 2006
#19. 'ergonomics'/exp	6,069	30 Jun 2006
#20. 'rehabilitation'/exp	110,255	30 Jun 2006
#21. #6 OR #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20	372,667	30 Jun 2006
#22. #5 AND #21	42,649	30 Jun 2006
#23. 'practice guideline'/exp	150,057	30 Jun 2006
#24. #22 AND #23	913	30 Jun 2006
#25. #6 OR #7 OR #8 OR #9	231,060	30 Jun 2006
#26. #5 AND #25	30,022	30 Jun 2006
#27. 'back'/exp AND [2000-2006]/py	24,593	30 Jun 2006
#28. #4 AND #27	6,661	30 Jun 2006
#29. #1 OR #2 OR #3 OR #28	39,819	30 Jun 2006
#30. #21 AND #29	5,145	30 Jun 2006
#31. #23 AND #30	**206**	**30 Jun 2006**
#32. #21 AND #29 AND ([meta analysis]/lim OR [systematic review]/lim)	**79**	**30 Jun 2006**

Table 2: MEDLINE Session strategy and results (June 15 2006)

Ovid MEDLINE(R) http://gateway.ut.ovid.com/gw2/ovidweb.cgi

N°	Request	Records
#	Search History	Results
1	Back Pain/	2838
2	Low Back Pain/	5755
3	Back Pain/	2838
4	Sciatica/ or ischialgia.mp.	829
5	injuries.mp.	94707
6	Back Injuries/	531
7	1 or 2 or 3 or 4 or 5 or 6	103293
8	Occupational Therapy/ or Accidents, Occupational/ or Occupational Health/ or Occupational Medicine/ or Occupational Health Services/ or Occupational Diseases/	28825
9	Occupational Health/ or Employment/ or Sick Leave/ or medical leave.mp.	19498
10	Retirement/ or retirement.mp.	3420
11	job change.mp.	46
12	job loss.mp.	104
13	Rehabilitation Centers/ or Job Satisfaction/ or Organizational Policy/ or job adaptation.mp. or Rehabilitation, Vocational/	14475
14	Absenteeism/	1637
15	Work Capacity Evaluation/ or Disability Evaluation/ or work disability.mp. or Disabled Persons/	15905
16	Workplace.mp.	9479
17	Low Back Pain/ or ergonomics interventions.mp.	5769
18	8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17	77639
19	Health Planning Guidelines/ or guidelines.mp. or Guidelines/ or Practice Guidelines/	79840
20	limit 19 to yr="2000 - 2006"	57099
21	7 and 18 and 19 and 20	381
23	7 and 18 and 20	381
24	Systematic reviews	45599
25	23 and 24	234
26	from 25 keep 6-7, 9-10, 13-17, 19, 21, 29...	107

Tab. 3: OVID Cochrane Database of Systematic Reviews:

Session strategy and results (June 15 2006) OVID: EBM Reviews - Cochrane Database of Systematic Reviews (2nd Quarter 2006) .
http://gateway.uk.ovid.com/gw2/ovidweb.cgi

N°	Request	Records
1	Back pain	143
2	Backache	48
3	Low back pain	73
4	Low backache	1
5	Chronic low back pain	31
6	Chronic backache	0
7	Occupational low back pain	1
8	1 or 2 or 3 or 4 or 5 or 7	169
9	Guideline or guidelines	1394
10	8 and 9	89
11	Systematic review	2397
12	Systematic reviews	957
13	11 or 12	2691
14	10 and 13	91

Table 4: AMED (Allied and Complementary Medicine)

Session strategy and results

AMED (Allied and Complementary Medicine) 1985 to September 2006

#	Search History	Results
1	Low back pain.mp. or Low back pain/	3305
2	limit 1 to yr="1996 - 2006"	2408
3	Backache/ or backache.mp.	1509
4	Sciatica/ or sciatica.mp.	190
5	ischialgia.mp.	2
6	1 or 2 or 3 or 4 or 5	4496
7	Occupational health.mp. or occupational health/	298
8	Occupational disease/ or occupational medicine.mp.	1054
9	Occupational accident.mp.	0
10	7 or 8	1297
11	Guidelines/ or Guidelines.mp.	2439
12	Practice guidelines/ or practice guidelines.mp.	213
13	11 or 12	2439
14	Rehabilitation/ or Employment/ or return to work.mp.	26021
15	Sick leave/ or sick leave.mp.	227
16	Absenteeism/ or absenteeism.mp.	110
17	disability.mp. or Disability/	15730
18	retirement.mp. or Retirement/	149
19	Job change.mp.	2
20	Job loss.mp.	14
21	Light duty.mp.	6
22	ergonomic.mp.	284
23	14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22	36704
24	10 or 23	37525
25	**6 and 13 and 24**	**50**

Table 5: PEDro database

Pedro search (June 15 2006):
http://www.pedro.fhs.usyd.edu.au/index.html
Advanced search http://129.78.28.173/pedro/FMPro

N°	Request	Records
1	back pain	1090
2	Backache	7
3	Low back pain	760
4	Low backache	5
5	Chronic low back pain	332
6	Chronic backache	3
7	Occupational low back pain	71
8	Guidelines	349
9	Guidelines and occupational low back pain	43
9	Guidelines and occupational low back pain	5
10	Systematic review	1327
11	Systematic reviews	488
12	Systematic review or systematic reviews	431
16	Systematic review or systematic reviews and low back pain	176
17	Systematic review or systematic reviews and occupational low back pain	9
18	Low back pain and work injury	12
19	Low back pain and Sick leave	59
20	Low back pain and Return to work	70
21	Low back pain and Job loss	0
22	Low back pain and Job change	1
23	Low back pain and sickness absence	7
24	Low back pain and back school	60
25	Low back pain and early retirement	3
26	Low back pain and disability	243
27	Low back pain and workplace	9

New Zealand Guidelines Group Search (search June 15 2006):
http://www.nzgg.org.nz/

Search criteria: *Occupational low back pain*
No reference found

Search criteria: *Low back pain*
1 reference found and kept

Table 6: NHS database

NHS guidelines Finder (search June 15 2006): http://www.library.nhs.uk/guidelinesFinder/	
Searched for: "low back pain" :	
Total records kept:	7 were obtained
Searched for: "Sciatica"	
Total records:	2 were obtained
Searched for: "Backache"	
Total records:	0 obtained
Searched for: "Occupational low back pain"	
Total records:	0 obtained
Searched for: "Compensable low back pain"	
Total records:	0 obtained

Table 7: National Guidelines Clearing House database

National Guidelines Clearing House (search June 15 2006): http://www.guideline.gov/

Search for: Occupational low back pain

The search process found 50 references.

Based on titles:

46 were discarded because they were not related to the low back pain or to the occupational low back pain (based on titles).

1was redundant with those found below (back belts)

3 references were kept

Search criteria: backache

The search found 27 related guidelines:

Based on titles:

21 were rejected because they were not specific to the low back pain or occupational low back pain,

5 redundant with those found below.

1 references was kept,

Search criteria: sciatica

The search found 7 related guidelines:

2 were redundant with those below,

5 other ones were rejected because they were not related to the back pain.

Appendix 1: List of occupational health services – EXTERNAL prevention and protection At work SERVICES - contacted

1.	ARISTA
2.	ATTENTIA (merging of Intermedicale and Agathos)
3.	CBMT
4.	CESI
5.	CORPORATE PREVENTION SERVICES (CPS)
6.	ENCARE prevent (before: Gedilo-IK)
7.	IDEWE
8.	IKMO
9.	MEDIMAR
10.	MEDIWET
11.	MENSURA (merging of MSR-FAMEDI and APRIM)
12.	PREMED
13.	PREVEMED-BEWEL.
14.	PROGECOV
15.	PROVILIS
16.	SECUREX
17.	SEMISUD
18.	SIMETRA
19.	SPMT

Appendix 2: Survey of computerized databases available in the Belgian occupational health services

Variables	Answers	
	N	%
Contacted	19	
Respondents	12	63,2
Computerized medical data (n= 12)		
Yes	9	75,0
No	3	25,0
Since (n= 9)		
< 1 year	1	11,1
1 - < 2 years	2	22,2
2 - < 5 years	1	11,1
≥ 5 years	5	55,6
Using ICD-9-CM codes (n=11)		
Yes	3	27,3
No	8	72,7
Possible scientific use (n= 9)		
Yes	7	77,8
No	2	22,2
Computerization project (n=6)		
Yes	5	83,3
No	1	16,7
Computerization within (n= 5):		
< 1 year	3	60,0
1-2 years	2	40,0
> 2 years	-	
ICD-9-CM codification planned (n=5)		
Yes	4	80,0
No	1	20,0

Appendix 3: List of disabilities recorded by AWIPH

Handicap principal (code)	**Handicap principal (code+fdeno)**
010	Troubles moteurs
020	Paralysie cérébrale
030	troubles respiratoires
040	malformations cardiaques
050	dysmélie
060	poliomyélite
070	troubles graves de la parole, de la vue ou de l'ouïe
071	aveugles/amblyopes/troubles graves de la vue
072	sourds/demi-sourds/troubles graves de la parole/troubles graves de l'ouïe
080	sclérose en plaques
090	spinabifida ou myopathie
100	épilepsie
110	déficience mentale (uniquement Aide à l'Intégration)
111	déficience mentale légère
112	déficience mentale modérée
113	déficience mentale sévère
114	déficience mentale profonde
115	déficience profonde et troubles envahissants du développement
120	malformations du squelette ou des membres
130	Polyhandicap
140	troubles caractériels, présentant un état névrotique ou prépsychotique
141	troubles caractériels graves (uniquement Placement Familial)
142	troubles caractériels légers (uniquement Placement Familial)
150	affectation chronique non-contagieuse...
160	Autisme
170	Lésion cérébrale congénitale ou acquise

Appendix 4: FAT-FAO List of circumstances of back injury accidents and their code numbers

11. Chute de personne avec dénivellation
12. Chute de personne de plain pied
21. Eboulement
22. Ecroulement
23. Chute d'objet en cours de manutention
24. Autre chute d'objet
31. Marche sur des objets
33. Contact avec objet mobile
40. Coinçage dans ou entre objets
51. Au cours de manutention sans force motrice
52. Au cours de toute autre circonstance
60. Exposition à, ou contact avec chaleur ou froid
71. Haute tension
72. Basse tension
81. Contact par inhalation, par ingestion ou par absorption de ces substances nocives
82. Exposition à des radiations ionisantes
83. Exposition à des radiations autres qu'ionisantes
90. Autres formes d'accident

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Dépôt légal : D/2006/10.273/64

KCE reports

1. Efficacité et rentabilité des thérapies de sevrage tabagique. D/2004/10.273/2.
2. Etude relative aux coûts potentiels liés à une éventuelle modification des règles du droit de la responsabilité médicale (Phase 1). D/2004/10.273/4.
3. Utilisation des antibiotiques en milieu hospitalier dans le cas de la pyélonéphrite aiguë. D/2004/10.273/6.
4. Leucoréduction. Une mesure envisageable dans le cadre de la politique nationale de sécurité des transfusions sanguines. D/2004/10.273/8.
5. Evaluation des risques préopératoires. D/2004/10.273/10.
6. Validation du rapport de la Commission d'examen du sous financement des hôpitaux. D/2004/10.273/12.
7. Recommandation nationale relative aux soins prénatals: Une base pour un itinéraire clinique de suivi de grossesses. D/2004/10.273/14.
8. Systèmes de financement des médicaments hospitaliers: étude descriptive de certains pays européens et du Canada. D/2004/10.273/16.
9. Feedback: évaluation de l'impact et des barrières à l'implémentation – Rapport de recherche: partie 1. D/2005/10.273/02.
10. Le coût des prothèses dentaires. D/2005/10.273/04.
11. Dépistage du cancer du sein. D/2005/10.273/06.
12. Etude d'une méthode de financement alternative pour le sang et les dérivés sanguins labiles dans les hôpitaux. D/2005/10.273/08.
13. Traitement endovasculaire de la sténose carotidienne. D/2005/10.273/10.
14. Variations des pratiques médicales hospitalières en cas d'infarctus aigu du myocarde en Belgique. D/2005/10.273/12
15. Evolution des dépenses de santé. D/2005/10.273/14.
16. Etude relative aux coûts potentiels liés à une éventuelle modification des règles du droit de la responsabilité médicale. Phase II : développement d'un modèle actuariel et premières estimations. D/2005/10.273/16.
17. Evaluation des montants de référence. D/2005/10.273/18.
18. Utilisation des itinéraires cliniques et guides de bonne pratique afin de déterminer de manière prospective les honoraires des médecins hospitaliers: plus facile à dire qu'à faire.. D/2005/10.273/20
19. Evaluation de l'impact d'une contribution personnelle forfaitaire sur le recours au service d'urgences. D/2005/10.273/22.
20. HTA Diagnostic Moléculaire en Belgique. D/2005/10.273/24, D/2005/10.273/26.
21. HTA Matériel de Stomie en Belgique. D/2005/10.273.28.
22. HTA Tomographie par Emission de Positrons en Belgique. D/2005/10.273/30.
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35. Etude relative aux coûts potentiels liés à une éventuelle modification des règles du droit de la responsabilité médicale – Phase III : affinement des estimations. D2006/10.273/27.
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