Etat fonctionnel du patient : un instrument potentiel pour le remboursement de la kinésithérapie en Belgique?

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Federaal Kenniscentrum voor de gezondheidszorg
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Préface

Un système de santé idéal permettrait à chaque citoyen de recevoir la totalité des soins dont il a besoin dans les limites du budget disponible. Le projet actuel tente de relever ce défi pour la kinésithérapie ambulatoire : il analyse dans quelle mesure les remboursements de soins pourraient se baser sur l'état fonctionnel du patient. Ce domaine des soins de santé présente par ailleurs un intérêt réel : la kinésithérapie est en effet une spécialité pour laquelle très peu de données sont disponibles, tant au niveau de l'organisation des soins qu'au niveau des modalités thérapeutiques appliquées.

Avant d'ancrer ce nouveau système de remboursement en Belgique, plusieurs questions en suspens nécessitaient une analyse scientifique rigoureuse. Quelles sont les activités des kinésithérapeutes en pratique ambulatoire en Belgique ? En particulier, quelle population de patients les consulte et quelles sont les modalités thérapeutiques appliquées ? Existe-t-il des échelles d'évaluation fonctionnelles du patient dont les qualités psychométriques sont telles qu'elles pourraient servir de base à un système de financement ? Si oui, sont-elles applicables par une large population de soignants en pratique ambulatoire ? Ce type de financement est-il en vigueur à l'étranger ? Si nous envisageons de tester ce système de remboursement, quels sont les traitements basés sur des données probantes qui serviraient de référence ?

Les réponses à ces questions étaient un pré-requis indispensable avant d'élaborer une étude pilote qui testerait un nouveau système de remboursement. En effet, force est de constater l'absence de systèmes étrangers qui puissent inspirer la Belgique dans ce domaine. L'étude de l'organisation des soins de kinésithérapie dans d'autres pays révèle cependant des initiatives intéressantes dont la Belgique pourrait s'inspirer, en particulier dans le domaine de la qualité des soins.

Ce rapport allie rigueur scientifique et réalité quotidienne des kinésithérapeutes en pratique ambulatoire. L'expertise scientifique de l'équipe de l'UCL a été une pierre d'angle de la qualité de cette étude. Le projet a en outre bénéficié de la collaboration d'associations de kinésithérapeutes, celle de Wavre et la Wetenschappelijke Vereniging voor Vlaamse Kinesitherapeuten. Qu'ils trouvent ici l'expression de nos chaleureux remerciements pour leur enthousiasme et leur contribution. La kinésithérapie en Belgique est, dans tous les sens du terme, en mouvement.

Jean-Pierre CLOSON
Directeur général adjoint

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Directeur général

Executive Summary

Contexte

Le système de remboursement belge actuel limite le nombre de séances de kinésithérapie en pratique ambulatoire: le remboursement diminue après dix-huit séances, excepté pour des pathologies spécifiques.

Le but de ce projet était d'analyser la faisabilité d'adapter le remboursement des séances de kinésithérapie en pratique ambulatoire à l'état fonctionnel du patient. Plus particulièrement, cette étude avait pour objectif de déterminer les éléments à prendre en considération dans la conception d'une étude pilote pour tester la relation entre l'état fonctionnel et le nombre de séances et/ou la durée du traitement.

Plusieurs conditions devaient être réunies pour répondre à cette question:

- L'étude de systèmes de soins de santé étrangers pour analyser l'organisation de la profession de kinésithérapeute et le système de remboursement en particulier,
- L'analyse des activités des kinésithérapeutes belges pour s'assurer que leur pratique quotidienne puisse être compatible avec un système de remboursement basé sur l'état fonctionnel,
- Une revue de la littérature relative aux échelles d'évaluation fonctionnelle avec trois objectifs, à savoir (1) identifier les instruments fonctionnels utilisés dans le domaine de la kinésithérapie et dont les qualités psychométriques sont étayées par des données probantes, (2) étudier dans quelle mesure ces instruments ont un lien avec la Classification Internationale du Fonctionnement, du handicap et de la santé (CIF) et (3) étudier l'usage de ces instruments fonctionnels dans le cadre du financement de la kinésithérapie,
- Une analyse des traitements de kinésithérapie basés sur des données probantes pour identifier ceux qui pourraient être sélectionnés dans la conception de l'étude pilote mentionnée ci-dessus.

Méthodes

L'étude de la kinésithérapie à l'étranger s'est basée sur la littérature grise. Les rapports nationaux et internationaux constituaient des sources d'information précieuses au sujet du contexte général des systèmes de soins de santé nationaux. Les sites Web des gouvernements et des associations professionnelles, aussi bien nationales qu'internationales, figuraient parmi les sources de données les plus importantes. Le recours à des experts locaux a permis de vérifier les informations nationales spécifiques et d'en assurer l'exhaustivité.

L'étude de la littérature relative aux traitements basés sur des données probantes a sélectionné des pathologies spécifiques aiguës / chroniques représentatives de tous les âges, à savoir : entorse de la cheville, lombalgie, bronchiolite, hémiplégie/hémiparésie due à un accident vasculaire cérébral et rééducation à la marche chez les personnes âgées. La recherche de littérature a été effectuée dans Medline, PEDRO, Embase, Cochrane et les bases de données de recommandations de bonne pratique. Vu le nombre élevé de références relatives à ces affections, la recherche s'est limitée aux recommandations de bonne pratique, aux méta-analyses et aux revues systématiques lorsque celles-ci étaient disponibles. Deux chercheurs indépendants ont sélectionné les références en fonction du titre et du résumé.

L'étude de la littérature relative à l'évaluation fonctionnelle a été réalisée dans les bases de données Medline et PEDRO. Deux chercheurs indépendants ont sélectionné les références en fonction du titre et du résumé. Ils ont analysé les tests de manière standardisée afin d'en décrire l'utilité clinique, d'identifier la dimension CIF couverte et de rapporter les données relatives aux qualités psychométriques.

La population de l'enquête concernait tous les kinésithérapeutes (15 874) en Belgique ayant facturé à l'INAMI au moins une séance (pratique ambulatoire) en 2004. Le principal critère d'inclusion dans l'étude était une facturation d'au moins 1000 séances ambulatoires en 2004 (c'est-à-dire 10 440 kinésithérapeutes, soit 93% de toutes les séances facturées). Un échantillonnage aléatoire de 2000 kinésithérapeutes a finalement été effectué par l'INAMI. Un questionnaire postal a été développé pour analyser les points suivants : raisons ayant motivé la consultation des patients reçus durant une journée, modalités de traitement, tests fonctionnels pour cinq pathologies courantes et connaissance de la CIF.

Résumé des résultats

Organisation de la kinésithérapie à l'étranger: aucun système de remboursement n'est basé sur l'état fonctionnel

La sélection des pays s'est basée sur la similarité de leurs caractéristiques principales et sur leur système de soins : Canada (province d'Ontario), France, Allemagne, Portugal, Pays-Bas, Royaume-Uni (Angleterre). Ce projet n'a trouvé dans les pays étudiés aucune couverture des services de kinésithérapie ambulatoire exclusivement basée sur l'évaluation fonctionnelle : l'évaluation quantitative du degré du trouble fonctionnel n'est jamais été utilisée comme base pour un système de remboursement global.

Cette analyse indique que tous les pays ont recours à divers moyens pour freiner les dépenses de soins ambulatoires en réduisant la demande (induite par le prestataire). Tout d'abord, certains pays limitent l'accès à la profession en organisant des examens d'entrée ou en limitant les postes vacants. Deuxièmement, tous les pays limitent l'accès aux soins pour les patients de nombreuses façons, par exemple en plafonnant le nombre de séances remboursées dans les pays qui utilisent un système de rémunération à l'acte.

Les mécanismes d'assurance qualité gagnent en importance comme l'atteste la récente tendance vers un développement professionnel continu obligatoire dans plusieurs pays. Les associations professionnelles jouent un rôle important dans ce domaine. Une initiative intéressante en matière de qualité est actuellement en cours de développement par une association scientifique de kinésithérapeutes en Belgique (WVVK). Différentes initiatives en matière de qualité ont été rassemblées dans une boîte à outils proposée par l'Association professionnelle européenne, à savoir des normes de qualité liées à des outils d'audit.

Modalités de traitement en kinésithérapie: peu de données probantes

Une conclusion de l'étude de la littérature est le peu de données probantes disponibles pour de nombreuses techniques de kinésithérapie fréquemment utilisées. Certaines données ont été identifiées pour quelques pathologies tandis que la littérature fournissait des données contre d'autres traitements encore utilisés actuellement. Il est frappant de constater le nombre d'essais cliniques de qualité médiocre qui ont été effectués dans le but d'établir l'efficacité des traitements de kinésithérapie.

Pour les accidents vasculaires cérébraux, des niveaux de preuve modérés à élevés existent en faveur de la mobilisation, de la rééducation à la marche, du renforcement musculaire, de la rééducation de l'équilibre et des exercices de type aérobie. En outre, il existe des données probantes contre l'utilisation de la stimulation nerveuse électrique transcutanée (TENS) chez les patients ayant été victimes d'un accident vasculaire cérébral. Pour les lombalgies, il existe également des niveaux de preuve modérés à

élevés en faveur de certaines modalités thérapeutiques de kinésithérapie, comme le conclut une étude KCE en cours.

Tous les traitements des autres pathologies étudiées ont montré des niveaux de preuves faibles à modérés. Pour la rééducation à la marche chez les personnes âgées, il existe des niveaux de preuves faibles à modérés en faveur du renforcement musculaire et des exercices de type aérobie. Dans le domaine de la prothèse totale du genou, seuls existaient des niveaux de preuves modérés en faveur des exercices à domicile et en défaveur de la stimulation nerveuse électrique transcutanée (TENS) pour diminuer la douleur.

La littérature sur les traitements de l'entorse de la cheville repose essentiellement sur un consensus d'experts : seul un traitement fonctionnel bien administré (mobilisation précoce avec utilisation d'un support externe) pourrait constituer une alternative intéressante mais étayée seulement par un faible niveau de preuves. Il existe également quelques niveaux de preuve modérés pour la prévention de la récidive de l'entorse de la cheville dans la pratique d'un sport (orthèses stabilisatrices semi-rigides de la cheville).

L'usage fréquent des techniques de kinésithérapie respiratoire pour la bronchiolite pose question : il existe des niveaux de preuve faibles à modérés indiquant que ces techniques ne sont pas utiles.

Échelles d'évaluation fonctionnelle : certains tests fonctionnels de qualité ont été développés pour des pathologies spécifiques

Cette analyse de la littérature met en évidence certains tests fonctionnels sélectionnés pour leurs caractéristiques psychométriques. Ils se rapportent à quatre groupes de diagnostics principaux: les troubles musculo-squelettiques, les accidents vasculaires cérébraux, la rééducation des personnes âgées et les lésions cérébrales. La plupart des tests sélectionnés sont des questionnaires validés et largement utilisés qui peuvent être facilement appliqués à la kinésithérapie ambulatoire.

Les tests fonctionnels sélectionnés ne couvrent pas l'ensemble des trois dimensions de la classification CIF : les dimensions relatives au corps et aux activités sont principalement représentées. En outre, il faut partir du principe que, au sein d'une même dimension, les échelles recommandées couvrent les éléments les plus importants de la dimension CIF pour une pathologie spécifique.

Cependant, aucune échelle valide n'a été trouvée pour une série d'autres pathologies courantes telles que l'entorse de la cheville, la bronchiolite ou le lymphoedème. Cette analyse de la littérature n'a également pas permis de trouver une description quelconque d'une expérience en matière d'utilisation des résultats fonctionnels pour le financement de la kinésithérapie.

Aperçu des activités des kinésithérapeutes en Belgique : résultats de l'enquête

Cette étude est la première en Belgique à documenter les pathologies prises en charge par les kinésithérapeutes en pratique ambulatoire. La principale conclusion est le vaste éventail de pathologies rencontrées par les kinésithérapeutes : plus d'une centaine de motifs de consultation différents ont été enregistrés pour 5210 séances. Sans grande surprise, les pathologies musculo-squelettiques et neurologiques arrivent en première position, représentant 50% et 21% respectivement des pathologies enregistrées. Viennent ensuite l'hémiplégie/accident vasculaire cérébral (8%), les fractures (6%), la lombalgie (6%) et les troubles de la marche/équilibre. Le syndrome de l'épaule, la cervicalgie, et le lymphoedème/œdème sont également courants mais dans une moindre mesure (4%).

La plupart des participants (89%) considèrent l'état fonctionnel du patient comme un élément-clé de la planification du traitement. Cependant, ils utilisent rarement des outils standardisés d'évaluation fonctionnelle dont les propriétés métriques et la qualité ont été scientifiquement documentées. On note une exception pour l'évaluation fonctionnelle des troubles de la marche chez les personnes âgées : deux tests (test de Tinetti et évaluation de la marche et test de marche de 6 minutes) sont régulièrement utilisés puisqu'ils sont requis pour le remboursement. L'évaluation fonctionnelle effectuée dans la pratique quotidienne repose sur l'observation, l'anamnèse, la palpation, le "testing" musculaire et la goniométrie. Bien que ces tests puissent être utiles dans la pratique clinique, ils peuvent difficilement être utilisés dans le cadre d'un financement de la kinésithérapie puisque leurs propriétés métriques et l'évaluation de leur qualité n'ont quasiment pas été documentées dans la littérature. Enfin, peu de kinésithérapeutes connaissent les concepts CIF mais on assiste fort heureusement à un intérêt de plus en plus marqué de la part des jeunes praticiens.

Discussion

Résultats de l'enquête à la lumière de l'étude de la littérature

L'évaluation des modalités thérapeutiques en rapport avec l'existence de données probantes est limitée par la rareté de ces données en kinésithérapie. Beaucoup de kinésithérapeutes pratiquent des techniques basées sur des données probantes lorsqu'elles sont disponibles dans la littérature. Cependant, le contenu précis de ces techniques présente des lacunes en matière de fréquence, de durée et de nature de la technique qui devrait être recommandée (par exemple le traitement par exercice). Le contenu précis de la technique pratiquée par les participants reste également indéterminé. Par conséquent, aucune conclusion ferme ne peut être tirée concernant la qualité des soins prodigués. Toutefois, le fait que la majorité des kinésithérapeutes déclare utiliser ces pratiques basées sur des données probantes fait de celles-ci une priorité potentielle pour définir le contenu d'un programme de formation permanente.

Les techniques pour lesquelles il existe des données probantes en défaveur de leur utilisation sont toujours utilisées par certains kinésithérapeutes (de 2% pour la stimulation nerveuse électrique transcutanée pour les prothèses du genou à 18% pour les tractions en cas de lombalgie). Ces chiffres soulignent la nécessité de prendre des mesures afin d'assurer la qualité des soins.

De nombreux traitements mentionnés par les kinésithérapeutes ne reposent que sur des consensus d'experts. La kinésithérapie réclame de toute urgence une recherche pour identifier des thérapies étayées par des données scientifiques. D'autre part, la question de l'utilité de certaines techniques spécifiques peut être soulevée lorsqu'il existe données attestant leur non-efficacité ou qui soient en défaveur de ces techniques. Un des exemples les plus frappants est la bronchiolite : les techniques de kinésithérapie respiratoire enseignées dans les écoles de kinésithérapie et pratiquées sur le terrain ne semblent pas utiles et pourraient même être nuisibles. Ce cas illustre le besoin urgent

de recherche afin d'accroître les connaissances basées sur des données probantes dans le domaine de la kinésithérapie et de réorienter la formation/l'éducation permanente des kinésithérapeutes vers des techniques au contenu clairement défini pour lesquelles existent des données probantes.

Faisabilité d'une étude pilote pour analyser l'association entre l'état fonctionnel du patient et la durée du traitement

Ce projet conclut que la classification CIF n'est pas adaptée à un usage dans le cadre d'un système de remboursement. Cette classification propose un cadre conceptuel pour étudier et évaluer les conséquences d'un problème de santé dans la pratique clinique. Malheureusement, la classification qui en résulte est assez complexe et donne lieu à une combinaison sophistiquée d'éléments pour décrire précisément l'état fonctionnel du patient. D'un point de vue pratique, il semble impossible que différents kinésithérapeutes utilisent une classification si complexe dans un système de remboursement : l'enquête a révélé que les kinésithérapeutes traitent un nombre important de pathologies, présentant différents degrés de gravité et des évolutions variables. L'utilisation d'une classification unique correspondant à un code de nomenclature semble irréaliste. Cependant, ces conclusions relatives à la CIF ne signifient pas que l'utilisation d'autres instruments validés ne soit utile dans le cadre de la pratique pour assurer une bonne qualité des soins.

Une étude pilote pour déterminer la durée optimale d'un traitement semble réalisable pour des pathologies spécifiques pour lesquelles existent des échelles fonctionnelles et des traitements basés sur des données probantes. L'accident vasculaire cérébral et la lombalgie sont les deux pathologies qui satisfont à ces conditions. L'élargissement de cette expérience au remboursement d'une large variété de conditions médicales pour lesquelles n'existe ni échelle d'évaluation ni données probantes est clairement impossible.

De nombreuses questions ont également été soulevées quant à la mise en œuvre d'un tel système à l'échelon politique, à savoir la nécessité d'un schéma de traitement homogène pour tous les patients, la définition du point critique sur la courbe d'amélioration, la difficulté de tenir compte de l'évolution naturelle de la maladie, l'isolation de l'effet du traitement par rapport à tous les autres facteurs intercurrents. Si ces questions trouvent une réponse, la mise en place d'un tel système doit également faire envisager les conséquences pratiques en termes de dissémination sur le terrain, de maniabilité et de complexité potentielle de la nomenclature produite. Des politiques de contrôle accrues découleront également de ce nouveau système de remboursement si le fournisseur de soins de santé décide lui-même de la durée du traitement.

Conclusions et recommandations

Le Centre fédéral d'expertise des soins de santé tire de ce projet les principales conclusions suivantes:

- L'applicabilité à large échelle d'un système de remboursement de la kinésithérapie tenant compte de l'état fonctionnel du patient semble non réalisable. Des problèmes majeurs tels que le manque d'échelles fonctionnelles validées pour des conditions variées, la complexité de l'évaluation du résultat, des problèmes éthiques en relation avec le couplage de l'état fonctionnel au remboursement et les conflits d'intérêt potentiels du prestataire de soins empêchent la généralisation de ce système de remboursement au niveau de la politique de santé;
- L'utilisation d'échelles fonctionnelles est actuellement marginale dans la pratique quotidienne du kinésithérapeute : ce projet a identifié des échelles fonctionnelles valides et praticables à recommander afin d'améliorer la qualité des soins.
- Il est indispensable de développer une connaissance basée sur des données probantes dans le domaine de la kinésithérapie. Lorsque ces dernières sont disponibles, de nombreux kinésithérapeutes utilisent ces techniques, bien que leur contenu reste indéfini. À contrario, des techniques obsolètes préjudiciables sont encore utilisées.
- L'assurance qualité et le développement professionnel permanent du kinésithérapeute sont moins organisés en Belgique que dans la plupart des autres pays. Le rôle des organisations professionnelles scientifiques est faible comparé aux systèmes de soins de santé similaires, avec des conséquences prévisibles sur la qualité des soins. La dissémination et la mise en pratique de la connaissance scientifique reposent essentiellement sur la qualité de l'enseignement dans les écoles, les universités et les associations scientifiques impliquées dans l'enseignement de la kinésithérapie. Par ailleurs, des initiatives en matière d'assurance qualité doivent être supportées, incluant un système d'accréditation (comme dans d'autres pays) avec un développement professionnel de qualité. L'ensemble des outils proposés par l'Association européenne de kinésithérapeutes est un point de départ précieux pour initier des initiatives relatives à la qualité en Belgique.

Sur base des différentes parties de ce projet :

- L'utilisation du statut fonctionnel dans le cadre du système de remboursement actuel ne peut être recommandée;
- La durée optimale d'un traitement peut faire l'objet d'un futur projet de recherche seulement pour certaines conditions pour lesquelles des échelles validées et des traitements sont disponibles.

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1 INTRODUCTION

The aim of this project was to study the feasibility of adapting the reimbursement system of community physiotherapy in Belgium taking into account the functional state of the patient. Therefore, two main questions were raised:

First, do other selected countries use reimbursement systems based on functional assessment of the patient in order to finance outpatient physiotherapy?

The starting point of this section is a brief overview of the healthcare systems and organisation of the physiotherapy profession in selected countries (Canada, France, Germany, Portugal, The Netherlands, United Kingdom). The selection of the countries was based on general similarity in key characteristics to Belgium. Next, the study focused on various coverage schemes of physiotherapy services through country-based comparison. In addition, the analysis emphasizes quality assurance and evaluation mechanisms in relation to existing health information systems.

Second, how to propose a survey design for collecting information related to the functional status of the patient in order to adapt the Belgian outpatient physiotherapy reimbursement system to a system based on the functional evaluation of the patient?

This point was addressed through:

1. a literature review on functional assessment in community physiotherapy,
2. a literature review of evidence-based treatments used in outpatient physiotherapy settings and,
3. a survey in order to study the activities of the physiotherapists in Belgium.

The purpose of the literature review on functional assessment in community physiotherapy is to (1) identify the functional instruments used in the field of physiotherapy that are supported by published evidences of their psychometric qualities, (2) investigate how these instruments relate to the International Classification of Functioning, Disability and Health and (3) investigate the use of functional instruments in the financing of physiotherapy.

The second point aims at reviewing the literature in order to identify evidence-based therapeutic modalities that can be proposed to patients presenting with common medical and/or traumatic conditions requiring physical therapy as part of the treatment. The following conditions were selected: bronchiolitis in the infant and the child, hemiplegia/hemiparesis due to stroke, gait rehabilitation in the elderly, ankle sprain, total knee replacement and low back pain.

The purpose of the survey is to report (1) the most frequent pathologies treated in Belgian outpatient physiotherapy, (2) the physiotherapeutic treatment modalities applied by the respondents and (3) the functional assessment tools possibly used to determine the patient's evolution. The results of the survey are confronted to the results of the literature reviews on functional assessment and on evidence-based treatments.

The report ends-up with a reflection on the feasibility of an experimental protocol to test a reimbursement model based on the functional evaluation in the diagnostic groups for which both functional scales and evidence-based treatments have been identified in the literature reviews.

2 INTERNATIONAL COMPARISON OF PHYSIOTHERAPY SERVICES

2.1 RATIONALE AND SCOPE

2.1.1 Rationale

A concise analysis of physiotherapy services in several countries was carried out in order to refine and enlighten the debate on topics of interest to Belgian policymakers and physiotherapists.

2.1.2 Scope

Unless indicated otherwise, the general scope of this analysis is limited to outpatient physiotherapy treatment.

2.1.2.1 Selected Countries

Six countries were selected for a comparative analysis:

- Canada (province of Ontario)
- France
- Germany
- Portugal
- The Netherlands
- United Kingdom (country of England)

These countries all enjoy a standard of living comparable to Belgium's. Furthermore, the local health care systems are primarily financed through some form of collective taxation. Hence it appeared logical to analyse selected traits of physiotherapy care as feasible (and thus prominent) policy options from a Belgian standpoint.

2.1.2.2 Topics of interest

A brief overview of various general healthcare systems and stylized traits of the physiotherapist's profession in the selected countries was a logical starting point in our review.

Next, we focused on various coverage schemes for physiotherapy services. In addition, we emphasized quality assurance and evaluation mechanisms in relation to health information systems in place. These topics are relevant for policy makers and practitioners as both parties are continuously confronted with the task of assuring high quality care subject to budgetary constraints.

Key points

- **The selection of comparator countries was based on general similarity in key characteristics to Belgium.**
- **In particular, quality assurance mechanisms in physiotherapy care under budgetary restrictions will be analysed through country-based comparison.**

2.2 METHODS

2.2.1 Search for Information

The WHO report series "Healthcare Systems in Transition", the recent in-house country-based comparison of (diabetes) care[1] and STAT-USA market reports all served as valuable information sources on the general background of national health care systems[2].

The perusal of the official regulation on physiotherapy through governmental websites constituted a rich source of information. Websites from several professional associations, both national and international, further completed our grey search.

Contacts with local experts allowed for the verification and completion of specific country information. Written queries for information were transmitted by email containing a standardised questionnaire in attachment. Telephone interviews further allowed to identify relevant points of interest. Respondents, however, are not individually committed to the final contents of the report.

Other documents that served for the analysis of physiotherapy care are clearly referenced in the appendices. No formal search filter was applied to literature databases as preliminary literature screening proved the topic of interest to be scarcely documented. Moreover, the use of up-to-date information through grey search sources was advised given the dynamic nature of physiotherapy care policies in the selected countries.

Single-source data (e.g. OECD Health Data) were preferred when possible for comparative country analyses.

2.2.2 Comparison

The country comparison was set up in a topical, stepwise manner. In a first stage, piecemeal country reviews were structured according to the treated topics. These separate country reviews can be found in the appendix 1.B. They contain references to data sources and various attachments.

Second, a transverse overview was constructed, using separate country reviews as building blocks. In order to enhance this analysis (single-source comparative) data can be referenced additionally in the main overview.

The document at hand is the comparative analysis and as such part of the main text body of this report. It should be read as the transverse synthesis of separate country analyses.

2.3 RESULTS

As indicated above, our review follows a topical structure. If not specifically mentioned otherwise, all references to information sources can be found through the country reviews in the appendices.

2.3.1 General Background of Healthcare Systems

The figures in the table below [3] indicate that the panel of countries is similar to Belgium with respect to general characteristics of its health care sector, notwithstanding the striking exception of (modest) health employment in Portugal. In all, the selection of comparator countries has been expedient. For the featured countries health care represents a considerable part of their economies and public financing is dominant within their health care systems.

Conspicuous distinctions between the selected countries concern the nature of prevailing coverage schemes and the degree of (de)centralisation governing health services regulation and supervision[4]. Countries' health services can largely be

categorized as either (National Health Insurance) NHS-type or (Statutory Health Insurance) SHI-type systems. In the latter ("Bismarckian") type, financing of health care traditionally depended on employment-based taxation with sickness funds acting as an intermediate between government and public. The ("Beveridgean") NHS-type systems are financed through general taxation, traditionally leaving less choice in health care provision to the public. Evidently, these differences should not be overemphasized[5] as they have been blurred by various reforms (notably the introduction of universal coverage within SHI and allowing more leeway for private provision within NHS).

Another salient criterion setting selected countries apart, is the degree to which regulatory devolution marks their health care system. In effect, geographically determined self-regulation typifies the health systems in the UK, Canada and Germany.

Table 1: General characteristics of health care systems.

	BE	CA	FR	GE	NL	PG	UK
Total Expenditures on Health 2002: % GDP*	8,70%	9,20%	9,50%	10,60%	8,80%	9,20%	6,6% (data for 1996)
Private Expenditures on health 2002: % Total Expenditures on Health	25,00%	29,20%	23,90%	21,30%	32,90%	29,50%	15% (data for 1996)
Total Health Employment 2002: % Total Employment	5,6% (data for 1992)	7,90%	7,50%	10,50%	6,10%	2,80%	6,70%
Type of Coverage System	SHI**	NHS***	SHI	SHI	SHI	NHS	NHS
Health Services Regulation and Supervision	Centralized	Decentralized (Provinces/Territories)	Centralized	Decentralized (Länder)	Centralized	Centralized	Country Level (England)
* GDP: Gross Domestic Product ** SHI: Statutory Health Insurance ***NHS: National Health Insurance							

Key point

- **The country panel's general health system characteristics correspond to the Belgian health system, confirming the featured countries as suited comparators.**

2.3.2 Stylized traits of Physiotherapist's profession

2.3.2.1 Current Minimal Entry Requirements

Entry requirements first and foremost regard minimal schooling levels. In all selected countries specialised schooling beyond minimally foreseen secondary education is required for practising physiotherapy. Minimally required physiotherapy schooling can be part of a two-tier academic curriculum as well as a vocational program depending on the country of reference. Noteworthy is that Canada will make a Canadian Master's degree (6 years of post-secondary schooling) mandatory for practice from 2010 forth.

Self-evidently, various types of postgraduate training beyond the indicated schooling levels in table 2 exist. Moreover, countries such as Germany and the Netherlands effectively recognize the importance of further specialisation within physiotherapy care, either by restricting the delivery of specific care to certified specialists (e.g. manipulation techniques in the Netherlands) or by offering specialists better financial conditions for the delivery of specific care (e.g. manipulation techniques in Germany).

In general, physiotherapists setting up a private practice are required to register with official instances. Interestingly, under NHS-provisions all physiotherapists in the UK are required to become member of the Chartered Society of Physiotherapy, a professional member-led organisation. Likewise, membership with a professional organisation is obligatory for German physiotherapists treating outpatients under general coverage schemes.

Further remarkable points are the French entry examinations, effectively restricting access to physiotherapy education and the Canadian Physiotherapy Competence Examinations (CPEs). The latter tests are to be taken posterior to graduation and prior to professional entry. A salient feature of the CPE is its clinical component (involving actor-patients), which sets it apart from the Belgian competence examination organised for newly graduated Dutch speaking in 2005. A de facto restricted access to the physiotherapy profession in the UK is currently imposed by limiting NHS vacancies.

Table 2: minimal entry requirements for practicing physiotherapy (from ER-WCPT[6])

	BE	CA	FR	GE	NL	PG	UK
Years of schooling prior to Physiotherapy schooling	12	12	12	10	13	12	13
Years of schooling in physiotherapy	3+1	4	3	3	3+1	3+1	3
Type of required degree*	MSc	BSc	Diploma	Diploma	Diploma	MSc	BSc
Mandatory Membership of Professional Association	No	No	No	Yes	No	No	Yes

* "BSc/MSc" referring to two-tier academic degrees and "diploma" referring to non-academic (vocational) type of higher schooling

2.3.2.2 *Number of physiotherapists*

The below data describe the number of active physiotherapists per country in 2005 (capita, inpatient and outpatient treatment). These data, with the exception of the Canadian figure, were derived from a single source[6]. Data on overall country population used for our calculations were derived from the CIA World Fact Book[7] and apply to July 2006. Based on the displayed figures, it would appear that a disproportionately high number of physiotherapists are active in Belgium as demonstrated by the derived number of physiotherapists per 1.000 residents and the (inverse value of) number of residents per physiotherapist. Another remarkable conclusion is that there are relatively few Portuguese physiotherapists, a conclusion in keeps with the overall stake health employment holds in Portugal (see table 1).

Table 3: Number of active physiotherapists.

COUNTRY	PHYSIOTHERAPISTS[4] in 2005	PHYSIOTHERAPISTS / 1000 CAPITA	CAPITA / PHYSIOTHERAPIST
Belgium	18.000	1,73	577
Netherlands	19.000	1,15	868
Germany	75.000	0,91	1.099
France	45.000	0,74	1.353
United Kingdom	35.952	0,59	1.686
Canada	15.607 (data for 2004)	0,47	2.121
Portugal	2.000 (data for 2003)	0,19	5.303
COUNTRY AVERAGE		0,83	1.858

These data should be interpreted with due care, however; as figures quoted in the separate country analyses tend to diverge considerably:

- Belgium: 28.252 (all RIZIV/INAMI recognised physiotherapists)[8];
- Germany: about 100.000 (number of practicing physiotherapists, private and government employed);
- France: 58.642 (no specification)
- Netherlands: 32.668 (government ("BIG") registered physiotherapists): this number does not include 2600 "manueeltherapeuten";
- United Kingdom: about 45.000 (chartered physiotherapists, physiotherapy students and assistants);
- Portugal: some 2.500 (no specification).

Most likely, underlying semantic problems (homogeneity of definitions) and differences in date of reference cause this divergence. In particular, the data for Belgium featured in table 3 appear to approximate the number of "RIZIV / INAMI-recognized" physiotherapists, i.e. physiotherapists who are entitled to deliver government reimbursed care, who filed at least 1 reimbursed intervention with RIZIV / INAMI in 2005. The rounded number of 18.000 indeed corresponds well with similar data available through an alternative source that estimates this particular variable at 17.936 physiotherapists for 2003[9].

As the numbers quoted in the separate country analyses appear to consistently cover larger numbers of physiotherapists, we will assume the overall between-countries proportionality holds.

2.3.2.3 *Competence of professional associations*

Further remarkable differences among the observed countries can be found in the competence various professional associations exert. Countries such as Canada, the Netherlands, Portugal and the UK centralized their professional association through single nation-wide organisations.

Moreover, membership with a professional association can be mandatory for reimbursed practice in mandatory care, either through legal requirement or as a de facto obligation imposed by private health insurers (as found to be the case in the Netherlands). Consequently, rules laid down by professional associations for their members take on a (semi-)official character.

Belgium stands out as membership with a physiotherapists' association is not mandatory and several mutually independent organisations are active in the country.

Table 4: Competence of professional associations

	BE	FR	CA	PG	GE	NL	UK
Centralisation	N	N	Y	Y	N	Y	Y
(Semi-)Official Status	N	N	N	N	Y	Y	Y

2.3.2.4 *Outpatient Practice*

As briefly hinted at in table 1, provision of physiotherapy care in NHS-type systems is mostly public. Consequently, physiotherapists in general receive salaried pay. Provision of outpatient care in SHI-type systems is mostly private following fee-for-service payment.

Key points

- **There is a clear difference in formally required schooling for newly established physiotherapists between countries with regard to academic or vocational degrees.**
- **Countries such as Germany and the Netherlands effectively encourage postgraduate specialisation, the field of manipulation techniques is a prime example in this respect.**
- **Several mechanisms to restrict access to the profession are in effect: restriction through examinations prior or posterior to graduation and limits on the number of vacant posts.**
- **All methodological reserves due, Belgium stands out against comparator countries on account of a high number of active physiotherapists per capita.**
- **Regulations by Belgian physiotherapists' associations are formally less representative of the profession than abroad as membership is not mandatory and organisations are not organized on a national basis.**
- **Provision of outpatient care in NHS-type systems and SHI-system is respectively mostly public through salaried pay or private through fee-per-service pay.**

2.3.3 Coverage in outpatient services

2.3.3.1 Cost Containment at the patient level

The minimal criteria for access to the profession we discussed above, can be seen as a form of cost containment at provider level. At the patient level, a host of possible cost containment mechanisms exists in various countries.

In order to qualify for third-party coverage in most countries a prescription by a specialist physician or general practitioner is mandatory. Recently, the Dutch system has been reformed so direct access (bypassing prior prescriptions) has become a covered practice. Likewise, "direct access" is covered in the Canadian province of Ontario, be it for complementary employment-schemes only. Finally, some NHS trusts in England have launched "self-referral schemes" allowing critical cases to be fast-tracked through direct telephone access to physiotherapy services. The professional association is firmly advocating the introduction of direct access as a general principle.

Another containment measure can be found in patient co-payments applying to various countries, though these in general can be covered by complementary private insurance. Some countries restrict the number of treatment sessions per prescription (and average duration of these sessions), often depending on the type of disorder. In general, patients presenting with exceptional needs can receive additional treatment on prescription. Further limits can be established according to a more "objective" patient characteristic like the patient's age (as is the case with Ontario's OHIP coverage for outpatient care).

In Canada and the United Kingdom long waiting lists are both by the profession and the wider public perceived to be a persistent problem. Moreover, a lack of qualified professionals (and resulting difficulty to schedule treatment sessions) is observed in France.

Table 5: Cost Containment in covered outpatient services

	Referral Prescription	Patient Co-Payments	Limits in Treatment Sessions (per prescription)	Perceived Scarcity of Care Provision
BE	Y	Y	Y	N
CA	Y*	N	N	Y
FR	Y	Y	N	Y
GE	Y	Y	Y	N
NL	N	N	Y	N
PG	Y	Y	Y	N
UK	Y**	N	N	Y

* Not required for employment-based coverage **self-referral schemes are being developed

2.3.3.2 Reimbursement based on functional assessment

Currently none of the insurance schemes/benefit schemes in the observed countries formally relate to ICF-concepts[a]. The "Amsterdams Dienstenmodel" (see discussion in the country review for the Netherlands) proved a remarkable experiment, but was discontinued due to market shifts among Dutch insurers. It should be duly noted that the 'Amsterdams dienstenmodel' made use of ICF *concepts* - (**not** of ICF codes or definitions). As such, the Dienstenmodel did not aspire to offer exhaustive coverage of all possible patient cases through a detailed coding system. It did, however, prove to be an alternative for the more rigid "one size fits all" reimbursement schemes existing at the time by linking treatment objectives to a certain number of sessions classified into 11 different categories of entitlements, from one session (diagnosis) to more than 30 sessions per year (see country appendix for the Netherlands in appendix 1.B.).

It has been reported that some private insurance companies in Canada rely on ICF concepts in coverage of whiplash injuries. German and Portuguese experts declared they are favourably disposed towards the introduction of ICF in existing coverage schemes. At present, however, the ICF is not applied as a tool in financing physiotherapy care in the compared countries and further information on possible future initiatives proved hard to obtain.

2.3.3.3 Fee-for-service systems

Features of fee-for-service schemes are highlighted as these are considered most relevant for our analysis.

As demonstrated in table 5, the analyzed fee-for-service schemes set limits in the number of reimbursed treatment sessions. The French system constitutes a noteworthy exception to this rule. An earlier proposal to limit the number of reimbursed treatment session was dismissed by the professional associations. Strikingly, the French reimbursement system therefore is simple in its outline. A drawback of the system can be found in the lack of insight and control policy makers have regarding reimbursed care. Exemplary in this respect is the non-compliance of physiotherapists with the obligation to file a diagnostic/therapeutic overview for treatment cycles assumed to exceed 10 sessions.

In the Netherlands most physiotherapy care in primary settings is paid for by private insurances, and most contracts with insured persons simply stipulate a fixed ceiling for the number of sessions and/or the cost of physiotherapy that could be refunded to the insured person per year, whatever his or her problem(s). On the other hand, health insurers want to pay the providers they contract 'per product'. Only one large company (Agis) has so far defined some 'products' for physiotherapy. This takes on the form of 'protocols'. Again we find a tendency toward organisational simplicity, this time through notions of capitation contracting and product bundling. Private insurers monitor overall budgetary constraints on the provider-level, i.e. by making a (patient case-mix corrected) comparison of an individual physiotherapist's care provision to the care distribution of peer providers.

The German reimbursement scheme is similar to the Dutch system with respect to the role insurers play. As no direct access to reimbursed care is possible under the German scheme referring physicians fulfil the role of gatekeepers. Data on the mean number of treatment sessions (see country appendix 1.B) suggest this gatekeeping system is effective as few treatment sessions beyond set standard (one-time prescription) maximums are provided. Another distinction can be found in the fact that the German reimbursement scheme is harmonized at the national level (although negotiated fees vary across insurers). The most salient characteristic of the German scheme is its degree of detail as it characterizes anatomically grouped disorders by type

[a] A more theoretic exposition on the role of ICF codification in health care reimbursement can be found as a general appendix to this report.

of diagnosis, indication/symptoms, treatment objectives, duration and number of sessions per "typical" patient case. By formally incorporating "Funktionstörung" (functional disorder) and "Ziel" (treatment objective) into its reimbursement scheme, the German "Heilmittel" system probably corresponds best among reviewed country schemes to the notion of coverage based on functional assessment. No quantitative evaluation of the degree of functional disorder and targeted outcome, however, is featured in this reimbursement scheme.

The Belgian reimbursement scheme obeys to the general principle of ceiling the number of reimbursed treatment sessions as Germany, the Netherlands and Portugal do. In regulating both the entitled number of sessions and patient co-payment levels it incorporates notions of pathology-based classification, required number of (additional) treatment sessions, patient's statutory profile, provider adherence to annual tariff agreements, set average duration of treatment sessions and point of care. Consequently, it can be reckoned to be relatively complex.

Key points

- **Cost containment at patient level is imposed in all observed countries in various forms: gatekeeper referral, patient co-payments, limits on covered number of sessions, etc.**
- **De facto restriction to physiotherapy services as witnessed by persistent waiting lists has proven controversial.**
- **Our research did not indicate the existence of specific coverage based exclusively on functional assessment in the analysed countries. Of all reviewed reimbursement schemes the German "Heilmittel-Richtlinien" scheme comes closest to the notion of coverage based on functional assessment.**
- **Fee-for-service schemes generally ceil the number of reimbursed treatment sessions. The French system constitutes a remarkable exception to this rule. Relatively simple schemes can be found in France and the Netherlands. The German and Belgian systems prove to more complex in design.**

2.3.4 Quality Assurance and Evaluation

2.3.4.1 Mandatory quality standards

All countries impose quality standards on physiotherapists entering the profession. These quality standards can relate to both organisational aspects of health service (required equipment and practice space, billing procedures, etc.) as well as individual practitioners' competences and conduct (ethics, application of guidelines, etc.).

These standards are imposed either through governmental authorities such as the Health Professions Council (HPC) in the UK or the Canadian provincial authorities or by professional associations in consultation with health insurers as is the case in Germany and France. A wide range of quality standards can be imposed, either very comprehensive as is the case in the UK, Ontario and Germany or limited as in France, Belgium, Portugal and the Netherlands.

The official regulations laid down by the Ontario provincial authorities cover aspects such as confidentiality, conflicts of interests, record keeping, billing procedures, referral procedures, supervision of physiotherapy students, and the application of medical guidelines.

The German regulation is the result of (legally binding) agreements between insurers and professionals. It deals in detail with required staff, practice space, equipment and various other organisational prerequisites. It focuses specifically on standardization of reimbursed treatment protocols, seeking to impose high and uniform quality of care.

In the UK, the third country where a comprehensive package of quality standards is legally imposed the Health Professions Council (HPC) operates as a regulator for 13 professions in the UK by setting comprehensive standards for individual practitioners. For physiotherapists these include standards of proficiency regarding skills and professional knowledge, standards of conduct, performance and ethics and standards of continuing professional development.

The "standards of continuing professional development" (CPD) apply to the development of skills related to physiotherapy practice, teaching activities, management and research. Registrants of the HPC are obliged to maintain a record of their CPD activities and present a written profile to the HPC on request. Random checks are performed routinely by the HPC. This system came into practice 1st July 2006 and the first wave of compliance audits are scheduled in 2008.

Furthermore, continuing education will become compulsory for French and German physiotherapists in the near future. Due to pressure from insurers on physiotherapists to adhere to quality regulations ("Centraal Kwaliteitsregister") set by the nation-wide professional association, KNGF, it is a de facto obligation in the Netherlands. Officially, however, adherence to the "Kwaliteitsregister" is voluntary (cf. infra).

2.3.4.2 Voluntary standards for active professionals

Voluntary initiatives are channelled both through professional association and external organisations. The latter tend to focus on total quality of services by means of self-assessment procedures followed by an external (peer reviewed) audit. This type of credentialing illustrated with Canadian and German examples is reminiscent of existing and more widely known protocols for ISO-certification.

The various professional associations tend to tackle quality issues both by enhancing individual physiotherapists' skills and spurring organisational efficiency. Prime examples of this comprehensive approach can be found in the British Chartered Society of Physiotherapy (CSP), Dutch KNGF and Canadian Physiotherapy Association (CPA), with the latter even having developed its own services accreditation program. .An external assessment of service standards by peer review referees is offered through this program. Additionally, individual CPA-members have access to continuing education facilities at reduced rates.

In the UK, the CSP adopted the principles of CPD In accordance to the HPC regulations. It offers support in individual practitioners' CPD portfolio's and "personal development plans" and has developed its own "CSP outcomes model". The model complements the CSP approach to CPD and focuses on broad outcomes that constitute individual professional competence: ethics, effectiveness and communication skills in professional conduct.

Since 2000, Dutch physiotherapists can register with a Central Quality Register (*Centraal Kwaliteitsregister*, CKR). This register is maintained by KNGF. Requirements include having attended a compulsory 'quality programme' focusing on 'methods and tools' Furthermore, physiotherapists should earn a certain number of 'points'. through following accredited training courses, and/or participating in quality circles (peer groups, that are also used to disseminate the good practices guidelines) and commit themselves to work in accordance with KNGF guidelines. Organisational quality standards cover affiliation to a recognized 'complaint committee', adherence to partial quality management systems and sufficient overall workload.

The Dutch CKR-system, though more comprehensive as it also addresses organisational quality standards, is reminiscent of the Belgian (voluntary) accreditation programs for physicians These programs include criteria with regard to size of practice, peer review, patient records and continuing development. Adherence to the accreditation is rewarded with an annual lump sum payment and the possibility to charge higher tariffs (without raising related patient co-payments). Currently, no similar (financial) regulation exists in Belgium for physiotherapists .

Belgian professional association endorse and centralize continuing development initiatives. The "WVVK", Wetenschappelijke Vereniging van Vlaamse Kinesisten, a scientific physiotherapist-led association propagates evidence based physiotherapy by offering access to medical databases, organising courses on information retrieval strategies and advocates the use of evidence-based guidelines in physiotherapy. Further noteworthy developments include peer review projects and smaller local quality control groups of members.

In collaboration with the UZK professional association, the WVVK elaborated a quality management program for physiotherapists financed by the European Social Fund and the Flemish Community. This program is designed as a modular teaching package, comprising 4 components: efficient use of ICT in physiotherapy practices, "Rationalisation" of patient record keeping, understanding and usability of physiotherapy care based on functional assessment and effective communication in physiotherapy: By October 2006 the program should have been fully tested and ready for general implementation. This program is similar to foreign counterparts in the way it deals with quality both at the individual practitioner's level and the organisational level of health services.

Finally, physiotherapists contribute, through the professional associations, to the development of guidelines as found to be the case the UK, the Netherlands and Germany ("Leitlinien"). In France the "Haute Autorité en Santé" (HAS), a public scientific body publishes guidelines ("recommendations de bonne pratique") on physiotherapy care. The Belgian scientific physiotherapists' association "WVVK" refers to the clinical guidelines its foreign counterparts developed and advocates the (critical) application of guidelines in physiotherapy care.

2.3.4.3 Structural reforms targeting quality of care

Portuguese NHS

At present, the Portuguese NHS is undergoing a general overhaul. The "New National Healthcare System" drafted by the government came into effect during 2002-2006. The reform was inspired by a need for cost containment and an awareness of lacking efficiency, accessibility and accountability in the national healthcare. The main traits of the reform concern:

- The introduction of Public/Private Partnerships (PPPs), with far-reaching consequences in the field of hospital management.
- The shortening of existing waiting lists for surgery and consultations.
- Curbing expenditures for pharmaceuticals by promoting generics through public campaigning and reference pricing.
- A more expedient management of human resources, specifically addressing geographic distribution through means of an integrated information system.

An assessment of the above policy measures would be premature at this stage.

British NHS

It is observed that, in some parts of the UK, shortages of qualified health professionals such as physiotherapists exist. In the NHS Plan (2000) considerable increases in manpower have been programmed by 2008. It would seem, however, that currently vacant physiotherapist positions are not been filled in or even permanently lost due to budgetary constraints. Furthermore, training budgets for physiotherapists are reported to have been reduced.

In general long waiting lists for physiotherapy care prove to be a burden on healthcare delivery. One solution mentioned to remedy this shortcoming is by direct self-referral, bypassing mandatory GP referrals. It is argued that the current gatekeeper system

hampers efficient working standards at GP practices and further lengthens existing waiting lists.

Alternatively, some NHS trusts, have set up a "Physio Direct" service for patients (e.g. the East Gloucestershire NHS trust) allowing patients telephone access to physiotherapists so patients can be presented with direct advise and exercises and seemingly acute patient cases can be fast-tracked. The purpose of Physio Direct is to lower organisational strain on GP practices and to optimise and tailor patient identification and timely follow-up.

Belgian SHI

Recent reforms in the field of reimbursed physiotherapy care were designed to avoid unnecessary expenses in care whilst enhancing quality of care. Measures were taken regarding both the level of patient access and access to the profession.

Criticisms mainly address the arbitrary nature of qualifying certain disorders for longer (and more intensive) treatment as opposed to others. Also, the number of scheduled sessions for common disorders is considered too low. Moreover, the new reimbursement scheme is seen to disregard the potential preventive nature of physiotherapy care and hence thwarting potential overall savings in health care.

The current practice of limiting entry to the profession posterior to graduation is criticized by some who feel the content of the 2005 examination overemphasized legal aspects and hence was ill-considered. More in general, it is claimed entrance examinations should focus on limiting access to education, thus avoiding aspiring future physiotherapists spending unnecessary years of training.

2.3.4.4 Supranational Initiatives

The World Confederation for Physical Therapy (WCPT) with its European Region branch as most relevant for Belgium, has made admirable efforts in setting (voluntary) standards for the profession. These standards are readily accessible through the Confederation's website:

- Core standards, which take their lead from the British CSP's standards: treatment strategies, communicative skills and continuing development are the cornerstones of these standards.
- Service standards, further complementing the core standards: risk management, patient complaint procedures, staffing policies are but a few of the broached topics.

These standards are accompanied by audit tools proposed by the Confederation, consisting of patient record auditing tools, CPD auditing tools, peer review tools of the aforementioned core standards and also a patient feedback instrument. The ER-WCPT database offers a brief outline of core and practice standards as applied by the different member states.

A framework document for the development of clinical guidelines is featured on the website as well.

Key points

- **Mandatory quality standards are set in all countries. They concern both the quality from an organisational viewpoint as well as individual practitioners' skills and conduct.**
- **Professional associations play a pivotal role in developing various quality enhancing initiatives. Here too, both individual and organisational effectiveness are targeted.**
- **A recent movement toward (de facto) compulsory continuing education for physiotherapists is observed in the UK, Germany and France and the Netherlands as opposed to Belgium.**
- **Portuguese NHS services are currently being revised in remedial of lacking efficiency, accessibility and accountability. Contractual services through private providers, as in physiotherapy care, are seen as key in addressing these shortcomings.**
- **As long waiting lists persist in the UK and NHS vacancies in physiotherapy remain unfilled, professionals advocate direct patient access to physiotherapy as a possible manner of optimizing available resources.**
- **The Belgian reform of the physiotherapy reimbursement system is criticized for having set marked differences on arbitrary and short-sighted criteria.**
- **The Pan-European professional association has achieved a laudable performance in proposing comprehensive standards and accompanying auditing tools to its member associations.**

2.3.5 Health Information Systems

In the selected countries data on physiotherapy care are centralized for various purposes. In most countries, however, the collection of data for administrative and organisational purposes such as billing administration and human resources planning is emphasized.

Notable exceptions to this rule can be found in the Netherlands and the United Kingdom. The Dutch physiotherapists sentinel network enables policy makers to monitor trends such as the use of guidelines, of physical techniques, the impact of various reforms on duration of treatment episodes. In the United Kingdom the "sharing effective physiotherapy project" (SEPP) pioneered by the CPS hallmarks selected initiatives in physiotherapy care as prime examples of good practice standards that should be promoted through an accessible on-line database.

Key point

- **In general, data are centralized with an eye to administrative, organisational purposes. Notable exceptions are to be found in the Netherlands and the UK. Here, information systems were developed that serve long term quality enhancing purposes.**

2.4 DISCUSSION

Our review indicates that all countries resort to various ways of curbing expenditures for covered outpatient services curtailing (supplier-induced) demand. First, some countries restrict access to the profession by organising entrance examinations or limiting vacant posts. Second, all countries restrict access to care for patients in diverse ways. We also found that professional associations, often within the context of consultative decision making with sickness funds (SHI-type systems), tend to play an important role in scope and regulation of covered services.

Quality assurance mechanisms are gaining importance as demonstrated by the recent movement toward mandatory continuing development in several countries. Here too, professional associations have a considerable role to play. Quality initiatives, however, should also aim at raising organisational efficiency. Currently, interesting initiatives in this field are being developed by physiotherapist associations in Belgium that merit policy makers' (further) support.

Health information systems at present are mostly geared toward administrative purposes. Nevertheless, examples demonstrate how accessible databases can aid to further improve effective care.

The variety of existing quality initiatives culminates in the comprehensive toolbox the European professional association has on offer: sets of standards that serve to raise both the effectiveness of the individual physiotherapist's as well as of his/her working environment. These standards are accompanied by tailored audit tools. A fully-integrated quality model for Belgium should incorporate these elements whilst feeding noteworthy observations and experiences back into freely accessible information sources. Following the international examples we described, it would appear logical to have physiotherapist associations take the lead in undertaking this vast though rewarding challenge by expanding the promising initiatives they have already taken.

3 LITERATURE REVIEW ON FUNCTIONAL ASSESSMENT IN PHYSIOTHERAPY

Physiotherapy is based on an evaluation of the patient's functional health. This evaluation supplements the medical diagnosis, which is primarily concerned with pathology. For example, in addition to the medical diagnosis 'osteoarthritis' the physical therapist needs information on pain, joint range of motion, muscle strength, etc. This information is used to select appropriate interventions, follow the patient's recovery and assess treatment outcome.

The International Classification of Functioning, Disability and Health (ICF, World Health Organisation 2001) has been hypothesised to offer an excellent conceptual framework to envision the consequences of the health condition, or pathology, on the function of individuals. It establishes a common language for describing the consequences of health that facilitates the comparison of data across countries, health care disciplines, services and time. This descriptive extensiveness implies that per person up tu 1424 scored ICF-codes can be distinguished. Three separate but related dimensions of functioning are defined: body functions and structures (body dimension), activity (individual dimension), and participation (social dimension). *i*) Body functions are the physiologic or psychologic functions of body systems (e.g. mental, sensory, neuromusculoskeletal, and movement related functions). Body structures are anatomic parts of the body such as organs, limbs, and their components. Impairments refer to anomaly, defect, loss or other significant deviation in body functions and structures. *ii*) An activity is the execution of a task or action by the patient. This dimension deals with all aspects of daily life, envisioning human activities as the purposeful, integrated use of body functions (e.g. activities of moving around and self-care activities; and communication, domestic, or interpersonal activities). Activity limitations are difficulties the patient may have in the performance of these daily activities, whatever the extent and magnitude of the underlying impairments. Hence, contextual factors such as the use of assisting devices or alternative strategies or another person's help do not eliminate the impairment, but might reduce limitations on activities in specific domains. *iii*) Participation is defined as the patient's involvement in life situations in relation to health conditions, body functions and structures, activities, and contextual factors. It refers to the experience of the patient in the actual context of life (e.g. social relationships, employment, and economic life) and also includes society's response to the patient's level of functioning. Participation restrictions are the problems the patient may experience in the involvement in life situations.

Rehabilitation can be defined as a reiterative problem solving and educational process that focuses on disability (altered activities) and aims to maximise participation in society while minimising the stress on and distress of the patient and family (Wade 2003). On the other hand, 'community' is used to refer to the physical and social environment of the patient in the place that she or he lives. It is usually set in contrast to a hospital, or other institutional setting where the patient may go or reside for short periods while receiving a service. The community might include a nursing home or residential care home if it is the patient's long-term accommodation, but would not normally include a hospital or short-term stays in a nursing home or other place. The politico-economical profile of 'rehabilitation in the community' has raised in the last decade. Three factors have contributes to this raise of interest: *i*) the increasing awareness of disability, *ii*) the increasing evidence that active rehabilitation has a beneficial effect in terms of reducing dependence and care costs, and in terms of improving the patient's quality of life and *iii*) the increasing pressure to shorten the time patients spend in hospital beds. Politicians, and health-care funding agencies, have seen an opportunity to control healthcare expenditure while also appearing to improve rehabilitation services to disabled people. They have started to champion 'Community Rehabilitation' in the hope that this will contain or reduce expenditure by shortening the time patients spend in hospital whilst also improving patient outcomes.

While the outcome of physiotherapy can be assessed with functional tests, a major issue to consider is the clinical purpose of measurement. For instance, a diagnostic test

should evaluate aspects in relation to the diagnosis in question and within-subject variations across repeated measurements should be as small as possible. In order to monitor the progress of patients, the measure should provide reproducible results over time, but also a sufficient range of measurement with enough sensitivity to detect meaningful changes. Whether measures are meaningful for diagnosis or for evaluation of progress, their psychometric qualities are encompassed under the umbrella terms of validity, reliability (including sensitivity and specificity) and responsiveness (Streiner & Norman 1995).

Validity is how well a functional test measures what it purports to measure. Ideally, validity is assessed against a "gold standard", even though such a standard is not always available for tests measuring variables that were not previously defined. While there are many ways to address the issue of validity, it is generally appraised in terms of the content of the test or by examining the behaviour of the measurement scale in regard to the underlying theoretical construct. Reliability refers to the reproducibility of the measure, and is therefore depending on the amount of measurement error associated with the measure. A reliable test has items that are internally consistent (i.e. related to one another) and minimises measurement error in order to provide the same results (within confidence limits) regardless of the particular circumstances in which the measure was obtained (e.g. rater, time of evaluation). Finally, measures intended to measure patient's recovery or lack of regression should be sensitive to change (have the ability to detect change given the range of measurement and the measurement error), as well as show responsiveness (the ability to detect meaningful change).

The purpose of the literature review on functional assessment in physiotherapy is to (1) identify the functional instruments used in the field of physiotherapy that are supported by published evidences of their psychometric qualities, (2) investigate how these instruments relate to the International Classification of Functioning, Disability and Health and (3) investigate the use of functional instruments in the financing of physiotherapy.

3.1 METHODOLOGY FOR THE LITERATURE REVIEW

A literature search of Medline and PEDro was undertaken between October and December 2005 in order to identify the functional evaluation instruments that would be potentially useful for the practice of physiotherapy within the Belgian health care system. The literature search focused on four specific areas: *i*) the identification of functional tests, *ii*) psychometric qualities of the tests, *iii*) the ICF dimensions covered by functional test and *iv*) the use of functional tests in health care policy. Multiple searches were carried out according to the procedures detailed in Appendix 2. Briefly, a number of keywords were identified in order to cover the various areas of interests. For the Medline search, the keywords were entered into the Medical Subject Heading (MeSH) in order to find the corresponding MeSH terms. Each MeSH term was combined with the keyword "physical therapy" and with a fixed list of qualifiers representing psychometric qualities in order to limit the search to a manageable number of references. For the PEDro search, a different strategy was adopted, as decribed more in detail in Appendix 2.A. The whole literature search resulted in 1567 studies matching these criteria. No systematic review was found: only original studies were found to conduct this literature review.

Two reviewers examined the resulting references in order to select the studies that presented evidences on the psychometric qualities of functional evaluation tests in physiotherapy. The references were selected on the basis of their title and the abstract was consulted when necessary. Studies with title or abstract including psychometric qualities of functional tests or other arguments in relation with functional assessment in community-based physiotherapy were included. Studies published earlier than 1990, not written in English, specific to hospital rehabilitation, requiring the use of sophisticated devices (e.g. goniometer, dynamometer), relating to psychiatric and scar care and studies focused on country-specific adaptations of previously validated scales were excluded. This process allowed 60 references to be selected for the review.

Two independent readers reviewed the selected list of references in order to collect evidences on each study and encode them in a standard way (see checklist in Appendix 2.B). A preliminary assessment of 10 studies was done in common in order to standardise the data collection. Functional tests were reviewed systematically in order to describe the clinical utility of each test, identify the ICF dimension covered by the test, and report the published evidences on the psychometric qualities of the test including validity, reliability and responsiveness.

3.2 RESULTS OF THE LITERATURE REVIEW

Four types of studies were identified among the 60 reviewed references. Forty-four studies presented psychometric qualities of functional tests used in physiotherapy. Fifteen studies discussed clinical, methodological or organisational issues, not directly presenting evidences of functional tests qualities. One study discussed issues relative to patient satisfaction with physiotherapy services. The latter 16 studies were not formally used to review the psychometric qualities of functional tests (*e.g.* clinical utility, metric properties); they were used to develop the arguments presented in the introduction and in the general discussion of the study.

Each of the 44 studies investigating functional tests had addressed the metric qualities of one or multiple tests. The tests were evaluated for validity, reliability and/or for responsiveness in the following diagnostic groups: patients with musculoskeletal disorders (n =24) including low back pain, spine disorders, chronic pain, lower limb amputees, lower limb dysfunction and ankilosing spondylitis; stroke patients (n =16); elderly patients (n = 4) and patients with brain injury (n = 3). Evidences of clinical utility, covered ICF dimension and metric qualities of functional tests are described as they were found in the literature.

The content validity was assessed either using experts' or patients' advice or by a literature review. Concurrent and construct validity was generally assessed by correlation analyses. The internal consistency was assessed with Chronbach's alpha (Streiner & Norman 1995). A higher diversity of methods were used to assess test-retest reliability: paired t-test, correlation analysis, percentage of agreement, intraclass correlation coefficient (ICC, Shrout & Fleiss 1979), weighted or unweighted Cohen's kappa coefficient (Cohen, 1960; Soeken & Prescott 1986) and Kendall's coefficient of concordance (Maclure & Willet 1987). Inter-rater reliability was generally assessed by comparing blinded rater evaluations of videotaped patient performance. Multiple rater assessments were compared with the same methods used to address test-retest reliability. Responsiveness was generally assessed with analysis of variance (with or without repeated measures), percentage change score, effect size (Kazis et al 1989), standardised response mean (Liang et al 1990) or with the responsiveness index (Guyatt et al 1987).

The evidence table of the functional tests used in musculoskeletal disorders is presented in Table 1. Among the 24 studies reviewed, 16 investigated patients with low back pain, 2 with spine disorders non specific to the low back, 2 with chronic pain non specific to the low back, 2 with lower extremity dysfunction, 1 with lower limb amputation and 1 with ankylosing spondylitis. Three main types of functional tests were identified. Patients classification based on anatomo-pathological or treatment criteria were used by the physical therapist mostly for treatment planning. Clinical tests carried out by the physical therapist as part of the clinical examination (n = 8) were used essentially to evaluate the body structures and functions. Patient-reported questionnaires, either self-administered or interview-based, were used essentially to evaluate the activities of the patient, though some of them also address the body or participation dimension.

The evidence table of the functional tests used in stroke patients is presented in Table 2. A total of 16 functional tests were reviewed. Among them, 10 clinical tests carried out by the physical therapist addressed the body dimension. Five tests addressed the whole body functions after stroke, 4 were specific to balance function and 1 to gait function. The evaluation of activities was carried out either with clinical tests or with

questionnaires (either self-administered or interview-based). Two test address activities of the whole body, 2 tests were specific to the activities of the upper limb, 1 to locomotor activity and 1 to mobility.

The table of evidence of the functional tests used in elderly patients is presented in Table 3. The 4 clinical tests identified addressed the dimension of activities. Two tests address the performance of whole body activities and two were specific to locomotor activities.

The table of evidence of the functional tests used in patient with traumatic brain injury is presented in Table 4. Three functional tests were identified. One of them consists in a classification of functional goals used for treatment planning. Two other clinical tests address either whole body activities, though mainly focussed on locomotor and transfer activities.

Table 1. Evidence table of functional tests used in patients with musculoskeletal disorders

Functional test	Clinical utility	Metric properties	General appraisal
Low back pain			
Diagnostic classification system for non-specific low back pain Type: Classification Ref: Petersen et al. 2004	Diagnostic subclassification of non-specific LBP consisting of pathoanatomically labeled syndromes assumed to refer to a specific pathological condition. ICF dimension: Body Structure, Body unction.	Reliability: Percentages of agreement ranged from 74% to 100% and kappa coefficients ranged from 0.26 to 1.00. Inter-tester reliability of categorisation of the syndromes was acceptable.	Not applicable since this study proposes a diagnostic classification system for non specific low back pain, rather than functional evaluation.
Treatment based classification of low back pain patients (TBC) Type: Classification Ref: Fritz & George 2000	Treatment-based classification system, based on physical examination and patient self-reports of pain and disability, for use in the evaluation and treatment of patients with acute low back pain. ICF dimension: Body Structure, Body Function.	Reliability: The interrater reliability was moderate (kappa = 0.56) according to criteria of Landis and Koch. The percentage agreement between therapists was 65%.	Not applicable since this study proposed a classification process for patients in the acute stage, rather than functional evaluation.
Classification of patients with low back pain Type: Clinical test Ref: Van Dillen et al 1998	Impairment-based classification system addressing 28 symptom behavioral items and 22 alignment and movement items in an attempt to define mutually exclusive categories of low back pain problems. ICF dimension: Body Structure, Body Function.	Validity: Content validated by 4 orthopeadic physical therapists. Reliability: Experienced therapist who had trained together were able to agree on the results of examination and obtain acceptable level of reliability (kappa >= 0.75 for all items related to symptoms elicited and >= 0.40 in 72% of items related to alignment and movement).	Not applicable since this study proposed a classification of impairments in low back pain patients, rather than functional evaluation.

Table 1 (continued)

Functional test	Clinical utility	Metric properties	General appraisal
Modified–Modified Schober Test (MMST) Type: Clinical test Ref: Toussignant et al 2005	Test measuring range of motion of the lumbar spine in the follow-up of low back pain patients. ICF dimension: Body Function	Validity: Pearson correlation coefficient between the MMST measurements and the gold standard (Xray) is 0.67 (95%CI: 0.44 – 0.84). Reliability: The intra-rater reliability was excellent (ICC= 0.95; 95%CI 0.89 – 0.97) The inter- rater reliability was excellent (ICC= 0.91; 95%CI 0.83 – 0.96) Responsiveness: A change over 1 cm on the MMST must be observed to be 95% confident that a true change in ROM occurred.	The metric properties of this test support its use in community-based physiotherapy. The test takes 5 minutes to be administered in by the therapist.
Physical Impairment Index (PII) Type: Clinical test Ref: Fritz & Piva 2003	Evaluate the physical impairment in low back pain patients, through 7 tests, each scored dichotomously based on published cut-offs. ICF dimension: Body Function, Body Structure.	Validity: Convergent validity was supported by significant correlations with disability (r = 0.51 with the Roland-Morris questionnaire), work loss in the past year (r = 0.43), pain (r = 0.27), depression (r = 0.26 with the Zung depression inventory), somatisation (r = 0.32 with the modified somatic perception questionnaire), nonorganic signs (r = 0.49) and nonorganic symptoms (r = 0.35). The highest correlation were found with pain ratings (r = 047), the Oswestry disability questionnaire (r = 0.42), nonorganic signs (r = 0.42) and nonorganic symptoms (r = 0.36). Smaller but significant correlations were found with the physical component score of the SF-6 (r = -0.28) and the physical activity subscale of the fear-avoidance beliefs questionnaire (r = 0.24). Reliability: Good to excellent reliability for individual items (ICC or kappa coefficients ranging from 0.48 to 0.96). The overall score demonstrated excellent interrater reliability (ICC = 0.89); the reliability coefficients for individual components rang	Systematic clinical test using published cut-off values for scoring physical impairment in acute low back pain.

Table 1 (continued)

Functional test	Clinical utility	Metric properties	General appraisal
Shuttle walking test Type: Clinical test Ref: Taylor et al 2001	Measure of walking capacity in patients with chronic airways obstruction, chronic heart failure and low back pain, requiring the patient to shuttle on a 10-meter course at speeds ranging from 1.8 to 8.53 km/h. ICF dimension: Activities.	Reliability: The test-reliability is excellent (ICC =0.99) with a mean difference of 2.5 m between assessments, and upper and lower limits of agreement of 52 m and –47 m. Responsiveness: Patients undertaking fitness training reached an effect size of 1.2 compared to a control group of 0.23 and 0.94 for a group undergoing various orthopaedic treatments.	The metric properties of this test show sensitivity to clinically meaningful change, a 10 meter walking course is required and the test takes 15 minutes to be administered by the therapist.
Standing Flexion Test Type: Clinical test Ref: Vincent-Smith et al. 1999	Manual palpation of the sacroiliac joint in in patients with low back pain. ICF dimension: Body Function.	Reliability: Intra-examiner reliability data demonstrated a mean percentage agreement of 68% and a k coefficient of 0.46 indicating moderate reliability. Inter-examiner reliability data, with a mean percentage agreement of 42% and a k coefficient of 0.052, demonstrated statistically insignificant reliability. These results suggest that the reliability of the standing flexion test as an indicator of sacroiliac joint dysfunction still remains questionable.	The metric properties do not support the use of this test in community-based physiotherapy. Moreover, the sample size of the study was very small (9 patients).
Aberdeen back pain scale Type: Self-administered questionnaire Ref: Garrat et al 2001	Clinical assessment of patients with low back pain made of 19 items of either forced choice or multiple choice, producing a back pain severity score. ICF dimension: Body Function, Activities, Participation.	Validity: Developed through a review of the clinical literature and selection of items that reflected areas of importance in the clinical assessment of patients with low back pain. Small but significant correlation ($p < 0.01$) with two pain scales ($r = 0.24$ with worst pain and 0.25 with best pain), the number of days absent from work over the past 6 months ($r = 0.26$) and the number of visits to a general practitioner for back pain in the last 6 months ($r = 0.23$). Responsiveness: Large responsiveness to treatment as assessed by the standardized response mean (-7.64 to -13.36), either at 6 weeks, 6 months and 1 year follow-up.	The metric properties do not support the use of this test in community-based physiotherapy since it is less discriminating than the well known Roland Disability Questionnaire.

Table 1 (continued)

Functional test	Clinical utility	Metric properties	General appraisal
EuroQol (EuroQol) Type: Self-administered questionnaire Ref: Garrat et al 2001	Generic instrument that incorporates descriptions and valuations of health states, applied in low back pain patients. ICF dimension: Participation.	Validity: Content derived from a review of existing instruments, consisting of five items measuring mobility, self-care, usual activities, pain/discomfort and anxiety/depression. Small but significant correlation ($p < 0.01$) with two pain scales ($r = -0.20$ with worst pain and -0.29 with best pain), the number of days absent from work over the past 6 months ($r = -0.14$) and the number of visits to a general practitioner for back pain in the last 6 months ($r = -0.28$). Responsiveness: Moderate responsiveness to treatment as assessed by the standardized response mean (0.02 to 0.11), either at 6 weeks, 6 months and 1 year follow-up.	The metric properties do not support the use of this test in community-based physiotherapy since it is a generic instrument, lacking responsiveness to treatment.
Jan Van Breemen Instituut pain and function questionnaire Type: Self-administered questionnaire Ref: Stratford et al 1994	Self-administered questionnaire consisting of 6 questions addressing pain and 9 questions addressing functional capacity in low back pain patients. ICF dimension: Body Function, Activities.	Responsiveness: Sensitive to clinically important change (with function scale %change = 33 and pain scale % change = 37) after treatment of 4 to 6 weeks.	The metric properties support the use of this test, nevertheless this scale is multidimensional.

Table 1 (continued)

Functional test	Clinical utility	Metric properties	General appraisal
Low back SF-36 physical functioning scale (Low back SF-36 PF) Type: Self-administered questionnaire Ref: Davidson et al 2004	Back-specific version of the SF-36 physical functioning scale, combining the advantages of both generic and specific functional questionnaires into a single, parsimonious set of items from which the original SF-36 PF10-item scale can still be extracted. ICF dimension: Body Function, Activities.	Validity: 18 items pooled from the Australian version of the SF-36 physical functioning scale, the modified version of the Oswestry questionnaire and the Quebec back pain disability scale. The low back SF-36 PF scale has fewer misfitting items than the original SF-36 PF scale and eliminates its floor and ceiling effects. Unidimensional and linear scale developed with the Rasch partial credit model. Reliability: intrarater reliability of the PCBS test were .94 and .96, respectively. The test-retest of the low back SF-36 PF (ICC = 0.91) was comparable to that of the original SF-36 PF and of the Oswestry. Responsiveness: The responsiveness of the low back SF-36 PF was slightly, though not significantly, improved compared to that of the original SF-36 PF. The minimum detectable change was improved, as compared to the original SF-36 PF, from 16 to 12 points on a 0-100 scale expressing a percentage of the maximum possible score.	The Low-back SF-36 PF18 proposes a revision of the well established SF-36 PF scale. It shows better psychometric properties than the original scale for the assessment of functioning in patients with low back pain. The scores are expressed on a linear scale which enables quantitative comparisons of functional states. The test is self-administered and takes 5 minutes.
Oswestry Type: Self-administered questionnaire Ref: Stratford et al 1994	Self-administered questionnaire of disability in low back pain patients. ICF dimension: Activities.	Responsiveness: Sensitive to clinically important change (%change = 40) after treatment of 4 to 6 weeks.	This self-administered disability measure in low back pain is a well established test completed in 5 minutes. Instructions are available.

Table 1 (continued)

Functional test	Clinical utility	Metric properties	General appraisal
Roland disability questionnaire Type: Self-administered questionnaire Ref: Garrat et al 2001	Self-administered disability measure in low back pain reflecting 24 activities of daily living. ICF dimension: Activities.	Validity: 24 items selected form the Sickness Impact Profile represent the areas of greatest relevance to low back pain. Small but significant correlation ($p < 0.01$) with two pain scales ($r = 0.26$ with worst pain and 0.33 with best pain), the number of days absent from work over the past 6 months ($r = 0.28$) and the number of visits to a general practitioner for back pain in the last 6 months ($r = 0.29$). Responsiveness: Large responsiveness to treatment as assessed by the standardized response mean (-1.04 to -3.62), either at 6 weeks, 6 months and 1 year follow-up.	This self-administered disability measure in low back pain is a well established test completed in 5 minutes. Instructions are available.
Roland-Morris Questionnaire (RMQ) Type: Self-administered questionnaire Ref: Stratford et al b 1996	Self-administered disability measure in low back pain reflecting 24 activities of daily living. ICF dimension: Activities.	Responsiveness: The magnitude of the measurement error is sufficiently small to detect change after 4 to 6 weeks of physiotherapy treatment in patients with initial scores in the central portion of the scale; however, the magnitude is too large to detect improvement in patients with scores of less than 4 and deterioration in patients who have scores greater than 20.	This self-administered disability measure in low back pain is a well established test completed in 5 minutes. Instructions are available.
Roland-Morris Type: Self-administered questionnaire Ref: Stratford et al 1994	Self-administered disability measure in low back pain reflecting 24 activities of daily living. ICF dimension: Activities.	Responsiveness: Sensitive to clinically important change (%change = 40) after treatment of 4 to 6 weeks.	This self-administered disability measure in low back pain is a well established test completed in 5 minutes. Instructions are available.

Table 1 (continued)

Functional test	Clinical utility	Metric properties	General appraisal
Sickness Impact Profile (SIP) Type: Self-administered questionnaire Ref: Stratford et al 1993	Behaviorally based measure of perceived health status applicable across a spectrum of illnesses and among various demographic and cultural subgroups, applied in low back pain patients. ICF dimension: Participation.	Validity: Validity coefficients of moderate magnitude have been reported between the SIP and various biologic and clinical measures, and between subsections of the SIP and sub categories of the Minnesota Multiphasic Personality Inventory. Reliability: A high test-retest reliability coefficient (r = 0.85) has been demonstrated in a low back pain patient group. Responsiveness: 20 items of the SIP showed change in at least 20% of the patients after a 6.4 weeks treatment and have an item-total score (minus item) correlation greater than 0.30. Seven of the 20 items identified in this study appear in the Roland-Morris disability questionnaire.	The metric properties support the use of this self-administered test addressing participation in low back pain patients.
Spine disorders			
Fingertip-to-Floor Test Type: Clinical test Ref: Perret et al 2001	The finger-to-floor distance might be used to assess spine stiffness and the effects of exercise on spine stiffness in persons with spine disorders. ICF dimension: Body Function	Validity: Spearman's correlation coefficient of trunk flexion assessed by the fingertip-to-floor test and the radiologic measure was excellent (r=-0.96). Reliability: The intra-observer reliability of the fingertip-to-floor test was excellent with an ICC of .99. The interobserver reliability of the radiologic analysis was excellent with an ICC of .99. Responsiveness: The responsiveness of the fingertip-to-floor test was evaluated by the SRM (0.97) and the effect size (0.87).	The metric properties of this test support its use in community-based physiotherapy. The test takes 1 minutes to be administered in by the therapist.
Passive intervertebral motion of the cervical spine Type: Clinical test Ref: Smedmark 2000	Passive motion between adjacent articular segments is assessed when diagnosing and treating dysfunctions of the spine. ICF dimension: Body Function.	Reliability: The percentage agreement for both therapists for all tests was 77% (70±87%). The kappa coefficient varied between 0.28 and 0.43, considered to be only `fair to moderate'. Even if two examiners have equivalent clinical experience and educational backgrounds it is difficult to demonstrate acceptable inter-examiner reliability in the assessment of passive cervical joint motion. The results of this study	The metric properties do not support the use of this test in community-based physiotherapy.

Table 1 (continued)

		showed lower concordance than expected in spite of the optimal testing conditions.	

Table 1 (continued)

Functional test	Clinical utility	Metric properties	General appraisal
Chronic pain			
Global Physiotherapy Examination 52 (GPE-52) Type: Clinical test Ref: Kvale et al. 2005	Physical examination for musculoskeletal pain patients in 5 domains: posture, respiration, movement, palpation muscle, palpation skin. ICF dimension: Body Structure, Body Function.	Validity: Discriminates between patients with localized versus widespread pain. Discriminates between patients with long-lasting musculoskeletal problems and people who are healthy. Recently examined on data from people who were healthy and patients with long-lasting musculoskeletal pain. Reliability: Good to excellent inter rater reliability of the total score (ICC=0.91) and individual components (ICC = 0.65 for posture, 0.60 for respiration, 0.89 for movement, 0.83 for muscle palpation and 0.76 for skin palpation). Responsiveness: Responsiveness to important change, defined in this study as return to work, was found only for the total GPE-52 score and within the movement and respiration domains. Responsiveness to important change was greater in patients with localized pain than in patients with widespread pain.	This test requires a 3-day training which is a disadvantage compared to other tests, and it takes 30 minutes to be completed.
Chronic pain intensity measures Type: Telephone interview Ref: Jensen et al. 1999	Rating through telephone interview of current, worst, least and average pain intensity on Visual Analog Scales over a determined period of time in chronic pain patients. ICF dimension: Body Function.	Reliability: The relatively low test-retest stability (0.55±0.65) of some of the individual ratings (average, current and worst) between one pair of assessments (1-month to 2-month follow-up) raises some issues. Responsiveness: Each of the individual ratings was able to detect expected changes in pain intensity from pre-treatment to various points after treatment. Although the composite measures appeared more sensitive to treatment effects when compared to the individual ratings, these differences were not statistically significant.	The metric properties do not support the use of this test in community-based physiotherapy since it is not reproducible over time.

Table 1 (continued)

Functional test	Clinical utility	Metric properties	General appraisal
Lower extremity dysfunction			
Lower Extremity Functional Scale (LEFS) Type: Self-administered questionnaire Ref: Binkley et al. 1999	Self-reported, condition-specific, functional measure applicable to a wide range of patients with lower-extremity orthopedic conditions. ICF dimension: Activities.	Validity: Correlations between the LEFS and the SF-36 physical function subscale and physical component score were r =0.80. Reliability: Excellent internal consistency (Chronbach's alpha = 0.96). Test-retest reliability of the LEFS scores was excellent (R = 0.94 [95% lower limit confidence interval = 0.89]). Responsiveness: The sensitivity to change of the LEFS was superior to that of the SF-36 in this population.	The metric properties are supported by the methodology of the study. The test can be self-administered in 5 min.
Questionnaire Rising and Sitting Down (QR&S) Type: Self-administered questionnaire Ref: Roorda et al 1996	A self-administered questionnaire that measures perceived and actual functional limitations in rising and sitting down of patients with lower extremity dysfunction. ICF dimension: Activities.	Validity: Scale sum scores correlate 0.30 to 0.41 ($p < 0.001$) with doctor's or therapist's global assessment of functional limitations. Sum scores correlate 0.20 to 0.59 ($p < 0.001$) with self assessment of functional limitations in walking outdoors and walking stairs. Reliability: The reliability coefficient Rho for object and combination scales ranges from 0.77 to 0.91. The intraclass correlation coefficient ranges from 0.72 to 0.90.	The metric properties of this test support its use in community-based physiotherapy. The test is self-administered in 5 minutes.
Lower limb amputation			
Functional Measure for Amputees (FMA) Type: Self-administered questionnaire Ref: Callaghan et al. 2002	A questionnaire collecting long-term functional and prosthetic use information following discharge in lower limb amputees. ICF dimension: Activities.	Reliability: The FMA questionnaire showed moderate test-retest agreement.	The metric properties of this test do not support its use in community-based physiotherapy.

Table 1 (continued)

Functional test	Clinical utility	Metric properties	General appraisal
Ankylosing spondylitis			
World Health Organisation Disability Assessment Schedule II (WHODAS II) Type: Self-, Interviewer- or Proxy- administered questionnaire Ref: van Tubergen et al. 2003	Generic instrument measuring the level of disability across various conditions and interventions, applied in ankylosing spondylitis. ICF dimension: Activities.	Validity: The scores on the WHODAS II were significantly correlated with AS oriented questionnaires on physical functioning, disease activity, and quality of life. The WHODAS II and all AS oriented questionnaires also correlated well with all domains of the generic health status questionnaire SF-36. The variables BASDAI and BASFI at baseline were selected as independently associated with WHODAS II scores after five years (adjusted $R^2 = 0.48$). Responsiveness: In all variables an improvement was seen, with moderate to large responsiveness scores. The WHODAS II showed a comparable, moderate responsiveness score. In the short term, a change in WHODAS II was significantly correlated with a change in physical functioning (BASFI and DFI), but not with a change in disease activity or quality of life.	The test is useful for measuring disability in Ankylosing spondylitis and can also be self-administered.

Table 2. Evidence table of functional tests used in stroke patients.

Functional test	Clinical utility	Metric properties	General appraisal
Body dimension - global			
Fugl-Meyer Type: Clinical test Ref: Sanford et al 1993	Assess the physical impairment following stroke, in terms of motor performance, balance, sensation, range of movement and pain in 155 items. ICF dimension: Body Structure, Body Function.	Reliability: The standard error of measurement (combining, rater, occasion and error variance) may be significant, however, when only small changes in the patient's level of motor performance are expected. The overall inter-rater reliability was high (ICC = 0.96) as well as the subscore (ICC = 0.85 to 0.97), with exception of pain (ICC = 0.61).	This widely used test is hardly applicable since it is composed of multiple sub-scales which cannot be summed in a total score. The test takes 30 minutes to be administered by the therapist.
Rivermead Motor Assessment (RMA) Type: Clinical test Ref: Collen et al 1990	Detailed assessment of gross motor control, upper limb control and lower limb and trunk control after stroke. ICF dimension: Body Function.	Reliability: Reliability varied between questions (kappa = 0.33 to 0.37), but agreements between assessors and between observed and asked performance were always better than chance.	The metric properties do not support the use of this test in community-based physiotherapy.
Stroke Impairment Assessment Set (SIAS) Type: Clinical test Ref: Tsuji et al 2000	The SIAS assesses various aspects of impairment in hemiplegic patients (e.g. motor function, sensory function, pain). ICF dimension: Body Function	Validity: Standardized measure of stroke impairment consisting of subcategories of motor function, tone, sensory function, ROM, pain, trunk function, visuospatial function, speech, and sound side function. The scale has been validated with the Rasch model. The item difficulty patterns were similar for the right- and left-sided lesion groups. Reliability: Scale realiability is usually analyzed as internal consistency or unidimensionality. The fit statistifcs were acceptable, except for a few items. Justifications for these discrepancies are presented in the study. The item difficulty patterns were identical at admission and discharge.	The metric properties of this test support its use in community-based physiotherapy. The scores are expressed on a linear scale which enables quantitative comparisons of functional states. The test administered by the therapist in approx. 10 minutes. Published scoring guidelines are available.

Table 2 (continued).

Functional test	Clinical utility	Metric properties	General appraisal
Stroke Physiotherapy Intervention Recording Tool (SPIRIT) Type: Clinical test Ref: Tyson & Selley 2004	Define and describe the content of physiotherapy intervention for postural control (posture, balance, walking) post stroke. ICF dimension: Body Function, Body Structure, Activities.	Validity: First study in the development of a recording system for physiotherapy interventions in the rehabilitation of postural control post-stroke. Content based on literature review and validated against expert advice.	Not applicable since this study proposes a recording system for physiotherapy interventions in postural control of acute stroke patients, rather than functional evaluation.
Stroke Rehabilitation Assessment of Movement (STREAM) Type: Clinical test Ref: Wang et al 2002	Objective and quantitative evaluation of the motor functioning of individuals with stroke among 3 subscales: upper-limb movements, lower-limb movements, and basic mobility items. ICF dimension: Body Function.	Validity: The total STREAM score was moderately to highly associated with the score of the Barthel Index (rho = 0.67) and Fugl-Meyer motor assessment scale (rho = 0.95). Reliability: Moderate to excellent agreement inter-rater on scores for individual items (weighted kappa = 0.55 to 0.94). Very high inter-rater reliability (ICC = 0.96 for the total score, 0.95 for upper extremity, 0.92 for lower extremity and 0.92 for mobility subscales).	This test requires a 2-day training, and was validated on mostly acute patients. Moreover, the total score is composed of three sub-scales, which makes not suitable for financing purposes.
Body dimension - balance			
Berg Balance Scale (BBS) Type: Clinical test Ref: Stevenson & Garland 1996	Determine change in functional standing balance over time. ICF dimension: Body Function.	Validity: In arm flexion condition, the force platform and accelerometer outcomes were significantly related to BBS performance, with CP-flexion explaining 43% and peak arm acceleration explaining 45% of the variance in BBS scores. It appears that the ability to show activation of postural muscles in advance of focal movement is associated with higher BBS scores. In quiet stance condition, performance on the BBS was found to be significantly related to CP-stance (R^2 = 58%). Reliability: Paired tests of difference failed to reveal any differences in the variables over the two days.	There is evidence in the literature to support the use of the BBS. Established guidelines allow the test to be administered by the therapist in 20 min.

Table 2 (continued).

Functional test	Clinical utility	Metric properties	General appraisal
Berg Balance Scale (BBS) Type: Clinical test Ref: Stevenson et al. 2001	Determine change in functional standing balance over time. ICF dimension: Body Function.	Validity: R = 0.80 with gait speed, R > 0.80 with Barthel Index, R > 0.70 with Fugl-Meyer, R < 0.60 with FIM. Reliability: Excellent test-retest reliability (ICC = 0.97). Excellent inter rater reliability (ICC = 0.98). Responsiveness: A difference of five to seven BBS points is necessary to conclude with 90% certainty that patients receiving rehabilitation following CVA have undergone a real change in BBS performance when assessed in a between-rater situation.	There is evidence in the literature to support the use of the BBS. Established guidelines allow the test to be administered by the therapist in 20 min.
Functional balance tests post stroke Type: Clinical test Ref: Tyson & DeSouza 2004	Functional test of postural control post stroke. ICF dimension: Body Function.	Validity: Poor to high: rho=0.33 - 0.54 with Motor Assessment scale, rho=0.26 - 0.70 with Berg Balance Scale, rho = 0.32 - 0.61 with Rivermead Mobility Index. Reliability: Good to excellent test-retest reliability (ICC: 0.91 - 1). Good to excellent inter rater reliability (ICC = 0.88 -1).	The metric properties do not support the use of this test in community-based physiotherapy.
Postural Control and Balance for Stroke test (PCBS) Type: Clinical test Ref: Pyoria et al. 2005	Assess balance in terms of postural changes, sitting balance, and standing balance in order to help physiotherapists in planning balance interventions and in rehabilitation follow-up. ICF dimension: Body Function.	Reliability: The Cronbach alpha for all the items combined was 0.96. The ICC values for the interrater and intrarater reliability of the PCBS test were 0.94 and 0.96, respectively. Responsiveness: The PCBS test showed an acceptable level of reliability and the responsiveness results indicated a good level before 120 days but not between 120 and 360 days after stroke.	The metric properties do not support the use of this test in community-based physiotherapy since the criteria for scoring are doubtful and the resulting score is multidimensional. The test takes 30 minutes to be completed.

Table 2 (continued).

Functional test	Clinical utility	Metric properties	General appraisal
Body dimension - gait			
Rivermead Visual Gait Assessment (RVGA) Type: Clinical test Ref: Lord et al 1998	The current study aims to develop a procedure and assessment form which allows practising therapists to record relevant aspects of the quality of gait observed in patients with neurological disease in a reliable and valid way. ICF dimension: Body Function	Validity: There was a significant correlation between the global RVGA score and the various criterion measures (r = 0.53–0.79; p <0.001) and between change in the RVGA score and change in walking time in patients who received treatment (r = 0.68; p <0.01). Reliability: Inter-rater reliability between multiple raters was reasonable both for the global scores from the gait assessment form (Kendall's coefficient of concordance; p <0.001), and for individual items (complete agreement occurred on 63.8% of all observations).	The metric properties of this test support its use in community-based physiotherapy. The test takes 15 minutes to be administered in by the therapist.
Activities - global			
Mobility milestones Type: Clinical test Ref: Bear et al. 2003	Evaluate mobility after stroke in 4 simple functional tasks providing a quick, simple, and standardized outcome measure. ICF dimension: Activities.	Reliability: Three quarters of the physiotherapists showed high intrarater reliability, with only 3 subjects showing poor intrarater reliability. 28 (subjects?)of the sample showed good or high test-retest reliability, with only 3 subjects showing poor reliability. The percentage agreement on the mobility milestones between the physiotherapists' ratings and our ratings was very high overall. Percentage agreement between therapists between 78.3 and 97.5 for all items.	Not applicable since the test addresses early recovery stages after stroke in hospital setting.
Stroke Activity Scale (SAS) Type: Clinical test Ref: Horgan et al. 2003	Measure motor function at the level of disability in stroke patients. ICF dimension: Body Function, Activities.	Reliability: The internal consistency of the SAS was estimated using Cronbach's alpha as 0.68 at time 1 and 0.69 at time 2. A high level of agreement was observed for the total score (GCC = 0.96). Inter-rater reliability for individual items was good to very good. A very high level of agreement was observed for the total score (GCC > 0.94).	Not applicable since the test addresses early recovery stages after stroke in hospital setting.

Table 2 (continued).

Functional test	Clinical utility	Metric properties	General appraisal
Activities - upper limb			
ABILHAND Type: Self-administered questionnaire Ref: Penta et al 2001	Self-reported questionnaire on the perceived difficulty of manual activities of daily living. ICF dimension: Activities	Validity: Content validated against the involvement of the affected limb in each activity. The activities that define the more difficult levels of the scale also tend to require a higher involvement of the affected limb, while the easier activities can be achieved in a movement sequence that does not require the affected limb. ABILHAND measures are significantly correlated to grip strength (r = 0.56), motricity (rho = 0.73), dexterity (r = 0.60), and depression (rho = -0.21). The ABILHAND questionnaire results in a valid, unidimensional, person-centered measure of manual ability in everyday activities. The stability of the item-difficulty hierarchy across different patient classes further supports the clinical application of the scale. Reliability: The overall scale precision is summarized by a good person separation reliability of 0.90 in this sample. It appears sufficient to discriminate across patients and, presumably, to capture even subtle functional changes with time.	The metric properties of this test support its use in community-based physiotherapy. The scores are expressed on a linear scale which enables quantitative comparisons of functional states. The test can be self-administered in 5 minutes.
Motor Activity Log (for the Assessment of Arm Use in Hemiparetic Patients) (MAL) Type: Semi-structured interview Ref: van der Lee et al. 2004	Assess the use of the paretic arm and hand during activities of daily living in terms of the amount of use (AOU) and of the quality of movement (QOM) of the paretic arm. ICF dimension: Activities.	Validity: The cross-sectional construct validity of the MAL is reasonable, but the results raise doubt about its longitudinal construct validity. Reliability: Internal consistency was high (Chronbach's alpha = 0.88 for the AOU and 0.91 for the QOM). The reproducibility is sufficient to detect an individual change of at least 12% to 15% of the range of the scale. Responsiveness: The improvement on the MAL during the intervention was only weakly related to the improvement on the Action Research Arm test (rho = 0.16 to 0.22).	The use of the MAL as a primary outcome measure in clinical trials is not recommended because there are reasons to doubt the longitudinal construct validity of the instrument.

Table 2 (continued).

Functional test	Clinical utility	Metric properties	General appraisal
Activities – gait			
Gait speed Type: Clinical test Ref: Collen et al 1990	Timed walk at the patient's preferred speed, using the patient's own selection of walking aid or assistance, over a distance of 5 meter, including turn and walk back. ICF dimension: Activities.	Reliability: Intercorrelations between 3 repetitions of the test, between 5m and 10m walks, and between test and retest were very high (r = 0.95 to 0.99). For individual patients, the test-retest variability ranged from 0 to 40%, with 95% of the patients varying the walking speed between tests by less than 25% of the slowest time.	The metric properties of this test support its use in community-based physiotherapy. The test can be administered in 5 minutes.
Activities – mobility			
New mobility scale Type: Open-ended questionnaire Ref: Stanko et al. 2001	Measure mobility inside and outside the home and in the community. ICF dimension: Activities.	Validity: Content of mobility scale assessed through open-ended questionnaire sent to 15 experienced physiotherapists. They identified important mobility tasks and important places to access inside the house, outside the house and in the community as well as additional mobility abilities required for independent mobility in the house and community.	Preliminary study of test under development; not applicable.

Table 3. Evidence table of functional tests used in elderly patients.

Functional test	Clinical utility	Metric properties	General appraisal
6-minute Walk Test Type: Clinical test Ref: King et al. 2000	Measure of exercise capacity and endurance also used as an outcome measure. ICF dimension: Activities.	Reliability: Intraclass correlation coefficients for test-retest reliability were 0.93. Responsiveness: There was no change in 6-minute walk test distance in the intervention group when compared with the control group.	The test was unable to measure change in performance expected with a functional training intervention. An indoor 32-meter course is also required. Its applicability is limited.
8-item Physical Performance Test (PPT-8) Type: Clinical test Ref: King et al. 2000	Evaluate the ability to use the upper and lower extremities in activities of daily living. ICF dimension: Activities.	Reliability: Good internal consistency (Cronbach's alpha = 0.78). Intraclass correlation coefficients for test-retest reliability was 0.88. The intraclass correlation coefficient for interrater reliability was 0.96. Responsiveness: The responsiveness index was 0.8, indicating a significant difference of effect between intervention and control group.	The metric properties are supported by the methodology of the study. A published test protocol allows the test to be administered by the therapist.
Functional Gait Assessment (FGA) Type: Clinical test Ref: Wrisley et al. 2004	Assess postural stability during gait tasks in the older adult (greater than 60 years of age) at risk for falling. ICF dimension: Activities.	Validity: Poor to moderate correlation with balance measurements (rho = 0.11 to .67). Reliability: Good internal consistency (Cronbach's alpha = 0.79). Good inter rater reliability (ICC = 0.74). Good inter rater reliability (ICC = 0.86).	This test has been developed for a very specific group of patients. The results of this study should be interpreted cautiously since the sample size was very small (6 patients).
General Motor Function Assessment Scale (GMF) Type: Clinical test Ref: Aberg et al. 2003	Compound assessment of three components (dependence, pain and insecurity) of daily living activities among older rehabilitation patients. ICF dimension: Activities.	Validity: Principal components factor analysis demonstrated individual FGA item loading across 3 extracted factors that may represent separate domains of performance on the total battery. Reliability: Analysis of reliability showed overall high values of percentage agreement (PA= 0.70) and of the rank-order agreement coefficient (ra = 0.82), and low degrees of systematic disagreement.	The metric properties do not support the use of this test in community-based physiotherapy.

Table 4. Evidence table of functional tests used in patients with brain injury.

Functional test	Clinical utility	Metric properties	General appraisal
Clinical Outcomes Variable Scale (COVS) Type: Clinical test Ref: Low Choy 2002	Evaluation of functional ability following traumatic brain injury in a large range of motor tasks retrained by physiotherapists including a measure for transfer ability to and from bed and floor surfaces as well as wheelchair skill. ICF dimension: Body Function, Activities.	Reliability: The intra-class correlation coefficients (ICC) were very high for both inter-tester reliability (ICC > 0.97 for total COVS scores, ICC > 0.93 for individual COVS items) and intra-tester reliability (ICC > 0.97).	The metric properties do not support the use of this test in community-based physiotherapy.
Step length and step width measurement Type: Clinical test Ref: van Loo et al. 2003	Walking performance after traumatic brain injury assessed by step length and step width measures. ICF dimension: Body Function.	Validity: Concurrent validity was excellent, with correlations between the procedures ranging from 0.93 to 1.00. Reliability: The inter-rater reliability of step length and width measurements was very high, with intraclass correlation coefficients between 0.94 and 1.00, for both procedures.	Potentially interesting test for neurological patients, but its metric properties should be interpreted cautiously since the sample size was small (20 patients). A 14-meter walk course is required.
Taxonomy of patient goals in acquired brain injury comprising 21 categories within five domains, utilizing 125 descriptors. Type: Classification Ref: Kuipers et al. 2003	Classification of client goals in community-based acquired brain injury rehabilitation allowing treatment focus and changes in service delivery to be investigated. ICF dimension: Activities, Participation.	Reliability: The taxonomy demonstrated good inter-rater consistency and was able to discriminate between similar but related data sets comprising goal statements. Out of the 140 goal statements 128 (92%) were placed in the same category by at least three of the four, and there was full agreement between all four on 91 of the goal statements (65%). This indicated that the taxonomy and descriptor statements had been refined to a stage where there was significant inter-rater consistency.	Not applicable since this study proposes a classification of patient goals, rather than functional evaluation.

3.3 DISCUSSION OF THE LITERATURE REVIEW

The literature review allowed a selection of functional tests to be identified in four major diagnostic groups treated in community physiotherapy: musculoskeletal disorders (including low back pain), stroke, elderly, and traumatic brain injuries. The functional tests identified cover essentially the body and activities dimension of the International Classification of Functioning, Disability and Health (ICF). Along with functional tests allowing one aspect of the patient functioning to be assessed, a few studies described patient classification systems that were mostly used by physical therapist in order to establish treatment goals and plan the patient treatment.

The primary observation is that most of the tests identified cover the body and activity dimensions of the ICF, while very few tests address the participation dimension. Note that tests addressing participation have been developed more recently than tests for the other dimensions of functioning. Although rehabilitation aims at improving the performance of activities and the participation in the society according to Wade (2003), the clinical practice of physiotherapy puts a higher emphasis on the body dimension of functioning. This traditional approach is probably motivated by the fact that the selection of interventions of physical therapists is related to the treatment goals that are pursued (Dekker 1995). Especially treatment goals at the level of impairments (body dimension) and at the level of activity limitations (individual dimension) are formulated (Dekker et al 1993). Thus, up to now, treatment goals at the level of participation restrictions (social dimension) seem to be less specific to physiotherapy, and they rather fall into the realm of other medical and paramedical specialities. This notwithstanding, participation remains one of the key research areas in community rehabilitation according to Wade (2003): "Much research is needed to develop and evaluate the expertise that community-based teams might have. For example there is minimal research into the processes of giving support to patients and their families, monitoring, prevention of complications, and facilitation of social participation. This observation also suggests that outcome evaluation in physiotherapy should be in keeping with this framework in order to monitor functional recovery of the patient and treatment efficacy."

The functional tests reviewed appeared to address the dimensions most related to the clinical management of patients in physiotherapy. All tests addressed either the body or the activities dimension of the patient's functioning, which are the most related to the clinical management of patients in physiotherapy. Nevertheless, some of the most widely used tests in rehabilitation (e.g. the Functional Independence Measure or the Barthel Index) were not listed, which contrasts with a recent inquiry on outcome measurement in Physical Medicine and Rehabilitation across Europe (Haigh et al. 2001). This observation might be explained by the fact that the current literature review was focussed on functional evaluation carried in the community, where patients are able to live at home, and therefore located at the higher range of measurement of such tests. While the tests mostly used in hospital rehabilitation are pretty well documented, functional assessment in the community are less standardised. Moreover, this literature review considered only papers published since 1990. Consequently, some standardised tests were not reported because they were validated before 1990. This is particularly the case for some functional tests in the body dimension like the nine-hole peg test or the purdue pegboard test.

The body dimension was mostly addressed in terms of body function, except in low back pain patients or in other spinal disorders also testing body structures mostly through skin palpation. The activities dimension was generally addressed with clinical tests performed by the physical therapist or by self-reported questionnaire relating to the patient's perceived disability in daily life activities. Clinical test typically address movement quality or patient's performance in standardized activities and are considered more reliable. Nevertheless, questionnaires present several advantages over clinical test. First, they address the perception of disability in activities as they are actually realized by the patient in their own environment. Second, they capture an average perception of disability over rather period of time (one up to several weeks) and are probably more

representative of the patient's disability than the performance of standardized activities in a consultation room. Third, they are very inexpensive and can be completed by the patient in the waiting room in order to reduce the burden of work of the physical therapist. On the other hand, it can be discussed whether it is feasible to base reimbursement on self-reported questionnaires.

The psychometric qualities of the test were reported as presented in each study. These statistics can be interpreted by the reader in order to make an optimal choice of functional tests for the purpose to cover. Some precautions, however, must be kept in mind in the comparison of statistical indices. For instance, although validity was generally assessed by correlation analyses, it is well known that correlation coefficients are sensitive to the range and distribution of the values correlated (Bland & Altman 1986). The intensity of the reported correlations is therefore influenced by the difference in sampling strategies used between studies. Moreover, different inclusion criteria were used between studies (e.g. elderly patients with or without a previous stroke). The selection bias should be considered from a clinical perspective in comparing statistical indices since it influences the relation between the functional test and the "gold standard".

Responsiveness was also assessed with different types of indicators. Responsiveness is generally defined as the ability of a test to elicit clinically meaningful change. Nevertheless, all evaluations with functional tests are accompanied by a certain amount of measurement error, and some of the statistics used to assess responsiveness do not take the error of measurement into account (e.g. percentage of change score). Thus, when assessing change with such statistics, scores obtained at both occasions and regarded as significantly different might very well be within the error of measurement and therefore the possibility that the change is due to chance cannot be excluded. Moreover, the reviewed functional tests used different levels of measurements (Stevens 1946). Though the large majority of results were reported at the ordinal level (i.e. allowing for ranking comparisons), some tests reported their results on nominal scales (i.e. only allowing for equivalence comparison) or on interval or ratio scale (i.e. allowing difference, or change score, to be computed on a linear scale). Mis-inferences due to linear interpretation of data at the nominal or ordinal level of measurement has been largely reported in the literature (Merbitz et al 1989).

3.4 CONCLUSION AND PERSPECTIVES

Functional evaluation is part of the process of rehabilitation (Wade 2003). The process of rehabilitation involves identifying the problems and needs of individuals, defining therapy goals, planning and implementing the interventions and assessing the effect of interventions using measurements of relevant variables (Steiner et al. 2002). The literature review presented in this report provides a selection of functional tests in the major diagnostic groups treated in community physiotherapy. These functional tests cover essentially the body dimension and the activities dimension of the International Classification of Functioning, Disability and Health. These dimensions are the most pertinent to the current practice of physiotherapy.

Table 5. Selected tests according to the dimensions of the International Classification of Functioning, Disability and Health (ICF).

Body	Activities	Participation
Musculoskeletal disorders		
Fingertip-to-floor test Low back SF-36 physical functioning Modified-Modified Schöber Test (MMST)	Low back SF-36 physical functioning Lower Extremity Functional Scale (LEFS) Oswestry Questionnaire Rising and Sitting Down (QR&S) Roland-Morris Shuttle walking test World Health Organisation Disability Assessment Schedule II (WHODAS II)	Sickness Impact Profile (SIP)
Stroke		
Berg Balance Scale (BBS) Rivermead Visual Gait Assessment (RVGA) Stroke Impairment Assessment Set (SIAS)	ABILHAND Gait speed	
Elderly		
	8-item Physical Performance Test (PPT-8)	
Brain injury		
Step length and step width measurement		

A selection of tests in each dimension of the ICF is presented in Table 5 according to their metric properties and quality appraisal for the four diagnostic groups emerging from this review. The metric properties include published evidences of reliability, validity and reponsiveness, but also the unidimensionality and linearity of each scale. The latter properties are requisite in order to make quatitative comparison of functional status along time. Quality appraisal includes a general evaluation of the methodology of each study, and the practical applicability of each test in community physiotherapy (i.e. evaluation time, required equipment). It is important to emphasize that time and quality of evaluation are not strictly related. Indeed, very short, well calibrated scales can be much more efficient than time consuming tests.

The body and activities dimensions of the ICF are the most represented. Musculoskeletal disorders is the diagnostic groups for which the largest number of high quality tests have been identified. The body dimension in musculoskeletal disorders is mostly evaluated with active mobility tests. Although these tests are widely used, one of their major drawbacks is that they measure a maximal performance, *i.e.* maximal

mobility, which can be hindered by pain or other factors (Watson 1999). The activities dimension in musculoskeletal disorders is the most represented among the four diagnostic groups. Most tests used in this domain are widely used, validated, questionnaires which can be easily and inexpensively applied in community physiotherapy. The body dimension in stroke patients is addressed either with global tests and/or tests of specific functions (*e.g.* balance). The activities dimension is evaluated either with upper limb or with lower limb specific tests; no global activity instrument was identified in stroke community rehabilitation. Although few tests are available for the elderly and brain injured patients, one test in each diagnostic group presented enough quality to be retained in this selection.

The summary table presented here above indicates that *i*) high quality functional tests were found for the main diagnostic groups treated in community physiotherapy (*e.g.* musculoskeletal disorders, stroke); *ii*) the functional tests identified do not cover all dimensions of the ICF for all diagnostic groups, *iii*) in some dimensions, various valid scales are proposed, hence emphasising the need for a standard in each diagnostic group.

This literature review has identified a selection of valid tests which could be used a basis for the standardisation of functional evaluation of the major diagnostic groups treated in community physiotherapy. This means that standards are available to report and follow the evolution of patients both longitudinally and transversally. Nevertheless, no attempt in using functional outcomes as a rationale for financing physiotherapy was found to date in the current literature review. The next step is to make an optimal choice of evaluation instruments for each diagnostic according to the conclusions of the two other parts of this project.

4 LITERATURE REVIEW OF PHYSICAL THERAPY TREATMENTS FOR SPECIFIC CONDITIONS

Physical therapy as proposed in most conditions medical and musculoskeletal usually include several therapeutic modalities (electrotherapy, passive mobilization, active mobilization, strengthening and/or stretching exercises…). The third part of this project aims at reviewing the literature in order to identify evidence-based physical therapy modalities that can be proposed to patients presenting with specific conditions. The selection of these conditions was based on three main criteria, i.e.: their high frequency in outpatient physiotherapy sessions (see chapter 4), their representativeness of medical and traumatic problems and their occurrence in different age groups.

The selected conditions are the following ones:

- Bronchiolitis in the infant and the child,
- Hemiplegia/hemiparesis due to stroke,
- Gait rehabilitation in the elderly,
- Ankle sprain,
- Total knee replacement,
- Low back pain.

Although the selected conditions were chosen because of their high frequency in out-patient physiotherapy practice, for the review of physiotherapy treatment modalities evidence concerning both inpatient and outpatient treatments has been taken into account. The reason is that many articles did not specify explicitly the location where the treatment had been performed.

4.1 METHODOLOGY FOR THE LITERATURE SEARCH

For each of the selected conditions, a search for the evidence available in the literature has been conducted using a defined strategy described in detail in the appendix 3.A.

The following databases and websites have been searched:

- Medline (using MESH terms whenever applicable),
- National Guideline Clearing House (AHRQ, US), Guidelines Finder (NHL, UK)
- Centre for Reviews and Dissemination databases (University of York, UK),
- Cochrane Reviews database,
- Pedro (University of Sydney, Aus),
- ANAES, SSMG, WVVH and KNGF
- Embase (this final search has been conducted independently by a KCE expert).

The search strategy is described in detail in the appendices (database, period of search, Mesh and/or "free terms") in order to be easily replicated for further validation.

The literature search was conducted according to a "waterfall" principle. According to this search method, practice guidelines, meta-analyses and systematic reviews were first searched. A search for randomized controlled trials was conducted only if an insufficient number of recent references were found. For each of the first five medical conditions, the search was performed independently by two investigators. Both

investigators confronted the results of their searches and proceeded to a selection of final references to be considered.

References selection was performed on the basis of titles and abstracts. Selected references included in more recent Cochrane reviews and/or in good quality practice guidelines or systematic reviews were discarded from the final selection of references. The table entitled "References retrieved from the literature on…" presents the results of the critical appraisal applied to each reference (appendix 3.A). The critical appraisal of the practice guidelines was performed using Agree and the Va form of the Cochrane Collaboration. The critical appraisal of the systematic reviews and meta-analyses was performed using the Va form of the Cochrane Collaboration. RCT's quality was evaluated using the form II of the Cochrane Collaboration.

The evidence found in the final selection of references is summarized and presented for each physical therapy modality in a separate table entitled "Evidence available in the literature for… " (one for each medical condition). This table also presents the levels of evidence and strengths of recommendations corresponding to each therapeutic modality. Levels of evidence and grades of recommendation were estimated according to Guyatt G. et al. (1). When evidence against a physical therapy modality was identified in the retrieved references, the level of evidence (high, moderate, low or very low) was followed by the word "against" in this table. For instance, the evidence about the effectiveness of visual feedback in rehabilitation after stroke is "high against". Evidence could also be described as "very low, conflicting" when any estimate of effect was uncertain due to very low quality of studies or even conflicting results.

Table 3.1 Quality of evidence (from Guyatt et al. (1))

Level of evidence	Definition
High	Further research is very unlikely to change our confidence in the estimated effect
Moderate	Future research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate
Low	Future research is very likely to have an important impact on our confidence in the estimate of effect and is likely change the estimate
Very low	Any estimate of effect is very uncertain

Grading of recommendation strengths was defined according to the recent report of the American College of Chest Physicians (ACCP) Task Force (2) (table 3.2). The strength of any recommendation depends on the following two factors: the trade-off between the benefits and the risks, burdens and costs and the quality of the evidence regarding treatment effect. According to this grading system, strengths of recommendations are either strong or weak. A strong recommendation (grade 1) can de made when benefits clearly outweigh potential risks, burden and costs. A weak recommendation (grade 2) should be made when it is not clear whether benefits outweigh potential risks, burden and costs. Finally, each grade of recommendation (grade 1 or grade 2) is divided in three levels (A, B or C) according to the quality of the underlying evidence. As the retrieved references for this literature review mainly consisted in practice guidelines, meta-analyses and systematic reviews the grading of recommendations strength and the levels of evidence of each RCT cited in the retrieved references (practice guidelines, meta-analyses and systematic reviews) could not be directly evaluated. The levels of evidence and strengths of recommendations mentioned in the retrieved practice guidelines, meta-analyses and systematic reviews were translated into the ACCP Task Force grading system.

Table 3.2 Grading of recommendation (adapted from Guyatt G. et al. (2))

Grade of Recommendation	Trade-off between risks vs burdens	Quality of evidence supporting recommendation
1A **Strong** recommendation High-quality evidence	Benefits clearly outweigh risks and burdens (or vice versa)	RCTs without important limitations
1B **Strong** recommendation Moderate-quality evidence	Benefits clearly outweigh risks and burdens (or vice versa)	RCTs with important limitations
1C **Strong** recommendation Low-quality evidence	Benefits clearly outweigh risks and burdens (or vice versa)	Observational studies, case series…
2A **Weak** recommendation High-quality evidence	Benefits closely balanced with risks and burdens	RCTs without important limitations
2B **Weak** recommendation Moderate-quality evidence	Benefits closely balanced with risks and burdens	RCTs with important limitations
2C **Weak** recommendation Low-quality evidence	Uncertainty in the estimates of benefits, risks, burdens…	Observational studies, case series…

When no recommendations could be made due to conflicting findings, it was indicated in the table.

Literature evidence on rehabilitation of low back pain is not presented in the present report as it constitutes the subject of another KCE project by Nielens H., Van Zundert J and Mairiaux, P. However, a preliminary draft of the relevant part of this project (physiotherapy treatments of chronic low back pain) is presented in appendix 3.F.

4.2 RESULTS

4.2.1 Bronchiolitis in the infant and the child

Common chest physical therapy modalities usually include postural drainage, chest percussion, vibration, chest shaking, directed coughing or forced exhalation techniques. The rationale for the use of such therapeutic modalities is that it enhances clearance of secretions and improves oxygenation. Physiotherapists are also regularly involved in medical therapeutic modalities such as suction, aerosol and oxygen therapy. Therefore, suction, most common aerosol therapies and oxygen therapy have also been included in the results as they were included in the Cincinnati's practice guideline (3). A thorough search of the literature on such therapeutic modalities has however not been conducted. Moreover, most literature concerning aerosol therapy in bronchiolitis deals

with the composition of the aerosol fluid. This can be considered to be medical rather than a physiotherapy discussion, and therefore is beyond the scope of this study.

A recent study published by Belgian paediatricians reported that between 76 and 86% of the infants with acute bronchiolitis receive chest physiotherapy in Belgium (4). The authors of this study underline that this observation contrasts with the paucity of evidence available in the literature on the efficacy of such treatments. It seems thus particularly relevant to review the evidence available in the field of physiotherapy for bronchiolitis.

4.2.1.1 Detailed search procedures and description of the retrieved references for bronchiolitis (see appendix 3.A)

The paucity of evidence mentioned in the previous paragraph was confirmed by this literature review on physiotherapy for bronchiolitis in the infant and the child. The appendix 3.A presents a summary table with a brief description of the main characteristics of the five references retrieved.

One excellent quality practice guideline from the Cincinnati Children's Hospital Medical Center has been retrieved (3). This reference does not focus specifically on chest physiotherapy but it includes a brief recommendation (based on the Cochrane review by Perrotta) not to perform any physiotherapy.

The two most relevant references are the Cochrane reviews as they are recent and specifically address physical therapy modalities (5, 6).

The French reference on bronchiolitis management in infants cited by Perrotta et al (7) is based on an expert consensus report that includes a section on physiotherapy.

The last reference included in the summary table (appendix 3.A) will not be discussed as it does not address physiotherapy at all (8).

4.2.1.2 Discussion of the evidence available in the literature on bronchiolitis

Table 3.3 presents a summary of the evidence on physical therapies used in acute bronchiolitis in children.

As mentioned in several European references, chest physiotherapy is widely used in continental Europe to treat acute bronchiolitis in the infant (4, 7). This observation contrasts with the results of the two Cochrane Reviews, which could only identify a very small number of RCTs on the topic and all concluded that chest physiotherapy is not effective. However, it must be pointed out that the physiotherapy techniques described in the French reference (passive forced exhalation techniques) are different from the ones evaluated in the RCTs included in the Cochrane reviews. However, it must be pointed out that this French reference which is the only one to favour chest physiotherapy is an expert consensus report. It does not include any reference to support the effectiveness of those physical therapy modalities.

Chest physiotherapy is often performed daily and sometimes even twice a day in infants with bronchiolitis. However, the selected literature does not analyse the optimal frequency and duration of chest physiotherapy (vibration, percussion, shaking…). In the only study on continuous negative extra-thoracic pressure (CNEP) selected in the Cochrane Review on CNEP and continuous positive airway pressure (CPAP) (6), the median duration of CNEP was 5 days (range one to seven days). Likewise, no recommendation was found on the duration of chest physiotherapy sessions in the selected references.

Safety of chest physiotherapy, CNEP and CPAP may be a concern although it has seldom been addressed in the literature. Rib fractures after vibration and percussion techniques have been reported (9, 10).

Key messages for physiotherapy of bronchiolitis of the infant

- **The use of chest physiotherapy (postural drainage, percussion, shaking, vibration, directed and assisted coughing techniques, forced exhalation techniques) to treat acute bronchiolitis in the infant varies among countries and institutions. Physical therapy modalities also varies among countries,**
- **The evidence for and against the use of chest physiotherapy techniques is weak. Postural drainage combined with chest vibration, percussion and/or shaking seems ineffective. No evidence is available on passive forced exhalation techniques and assisted coughing as recommended by French experts. More studies are needed to assess chest physiotherapy efficacy to treat acute bronchiolitis in the infant,**
- **Safety of chest physiotherapy has not been specifically studied. However, rib fractures after chest vibration and percussion have been reported.**

Table 3.3. Evidence available in the literature on physiotherapy for bronchiolitis in the infant

Physical therapy modality	Care provider	Evidence in the literature	Levels of evidence (1)	Grades of recommendations (2)
Chest physiotherapy: postural drainage	Physiotherapist	• Chest percussion in association with postural drainage followed by assisted coughing or gentle suction: no statistically significant improvement of clinical score, length of hospital stay; (11) cited by (5), • Chest percussion and vibration in postural drainage position: no statistically significant difference in clinical score, duration of oxygen supplementation, length of hospital stay; (12) cited by (5), • Chest percussion and vibration in association with postural drainage and suction versus suction only: no statistically significant difference in duration of hospital stay; (13) cited by (5).	Low against Low against Low against	Weak recommendation (2B) against. Effectiveness of postural drainage alone has not been sufficiently studied. Until further evidence becomes available, chest physiotherapy consisting in postural drainage should not be recommended as part of the treatment of acute bronchiolitis in the infant. Safety of such a technique has not been sufficiently evaluated.
Chest physiotherapy: chest percussion, shaking, vibration	Physiotherapist	• Chest percussion in association with postural drainage followed by assisted coughing or gentle suction: no statistically significant improvement of clinical score, length of hospital stay; (11) cited by (5) • Chest percussion and vibration in postural drainage position: no statistically significant difference in clinical score, duration of oxygen supplementation, length of hospital stay; (12) cited by (5)	Low against Low against	Weak recommendation (2B) against. Effectiveness of postural drainage alone has not been sufficiently studied. Until further evidence becomes available, chest physiotherapy consisting in chest percussion, shaking, vibration should not be recommended as part of the treatment of acute bronchiolitis in the infant. Safety of such a technique has not been sufficiently evaluated.
Chest physiotherapy: directed, assisted	Physiotherapist	• Chest percussion in association with postural drainage followed by assisted coughing or gentle suction:	Low against	Weak recommendation (2B) against.

Physical therapy modality	Care provider	Evidence in the literature	Levels of evidence (1)	Grades of recommendations (2)
coughing, forced exhalation techniques		no statistically significant improvement of clinical score, length of hospital stay; (11) cited by (5)		Effectiveness of postural drainage alone has not been sufficiently studied. Until further evidence becomes available, chest physiotherapy consisting in directed, assisted coughing, forced exhalation techniques should not be recommended as part of the treatment of acute bronchiolitis in the infant. Safety of such a technique has not been sufficiently evaluated.
Chest physiotherapy: upper way clearance consisting in nasopharyngeal decongestion combined with local instillation of saline	Physician-nurse-physiotherapist	• Such a decongestion method is recommended as an upper airway clearance method that can be performed by physiotherapists (7)	Very low (expert consensus)	Until further evidence becomes available, such a therapeutic modality should not be recommended.
Chest physiotherapy: lower airway clearance consisting in slow, prolonged expiration including slow increase in expiratory flow and guided by auscultation	Physiotherapist	• In French-speaking European countries where chest physiotherapy is widely prescribed and recommended, the preferred techniques are mainly passive, slow expiration methods combined with directed cough (7)	Very low (expert consensus)	Until further evidence becomes available, such a therapeutic modality should not be recommended.
Chest physiotherapy: directed cough to promote expectoration	Physiotherapist	• In French-speaking European countries where chest physiotherapy is widely prescribed and recommended, the preferred techniques are mainly passive, slow expiration methods combined with directed cough (7)	Very low (expert consensus)	Until further evidence becomes available, such a therapeutic modality should not be recommended.

Physical therapy modality	Care provider	Evidence in the literature	Levels of evidence (1)	Grades of recommendations (2)
Respiratory care therapy: suction	Physician-nurse-physiotherapist	• Suction is recommended when clinically indicated as suction may improve respiratory status such that inhalation therapy is not necessary and as suction may improve the delivery of inhalation therapy (3) • Nasopharyngeal aspiration using a catheter is an invasive procedure, which should be used only in critical situations, usually in a hospital setting (7)	Very low (expert consensus)	Until further evidence becomes available, such therapeutic modalities should not be recommended.
Respiratory care therapy: Continuous negative extrathoracic pressure (CNEP)	Physician-nurse-physiotherapist	• There is insufficient evidence from randomized studies to conclude that CNEP is beneficial in acute hypoxemic respiratory failure in paediatric patients. Potential risks of CNEP have not been studied (6)	Very low	Weak recommendation for (2C). Effectiveness of CNEP has not been sufficiently studied. Safety of such a technique has not been evaluated.
Respiratory care therapy: non invasive continuous positive airway pressure (CPAP)	Physician-nurse-physiotherapist	• There is insufficient evidence from randomized studies to conclude that non-invasive CPAP is beneficial in acute hypoxemic respiratory failure in paediatric patients. Potential risks of non invasive CPAP have not been studied (6)	Very low	Weak recommendation for (2C). Effectiveness of CPAP has not been sufficiently studied. Safety of such a technique has not been evaluated.
Respiratory care therapy: oxygen supplementation	Physician-nurse-physiotherapist	• Oxygen supplementation is recommended when saturation is consistently below 91%. Weaning oxygen supplementation is recommended when saturation is consistently higher than 94%; NIH and local expert consensus cited by (3) • Scheduled spot checks of pulse oxymetry are recommended (3)	Very low (expert consensus) Very low (expert consensus)	Until further evidence becomes available, such a therapeutic modality should not be recommended. Until further evidence becomes available, such a therapeutic modality should not be recommended.
Respiratory care therapy: aerosol	Physician-nurse-physiotherapist	• Scheduled or serial albuterol aerosol therapies should not be routinely used (3) • Single administration trial inhalation of epinephrine or	High against High	Strong recommendations against (1B) most aerosol therapies except in the presence of allergy.

Physical therapy modality	Care provider	Evidence in the literature	Levels of evidence (1)	Grades of recommendations (2)
		albuterol may be considered when there is a family history of allergy, asthma or atopy (3) • Inhalation therapy should not be repeated nor continued in absence of clinical improvement between 15 to 30 minutes after the first trial inhalation (3) • Aerosol therapy with saline should not be recommended as it has not been found to be helpful (3) • Cool mist therapy should not be recommended as it has not been found to be helpful (3)	Moderate against High against Moderate against	Strong recommendation for (1A) a single administration trial inhalation of epinephrine or albuterol in case of a family history of allergy, asthma or atopy.
Family education	Physician-nurse-physiotherapist	• Educating the family on basic pathophysiology and expected clinical course of bronchiolitis is recommended (3) • Educating the family on suctioning the nose to make breathing easier is recommended (3) • Educating the family to call their primary care provider when objective signs of worsening clinical status are present is recommended (3) • Educating the family on eliminating exposure to tobacco smoke is recommended (3) • Educating the family on limiting exposure to contagious settings and siblings is recommended (3) • Educating the family on the importance on handwashing in all settings is recommended (3) • The physiotherapist does not just carry out repetitive technical procedures, but has an important role in monitoring the infant and educating the family (7)	Very low Very low (expert consensus) Very low (expert consensus) Very low Very low Very low Very low (expert consensus)	Weak recommendations for (2C) to educate the family on all issues regarding the infant with bronchiolitis.

4.2.2 Hemiplegia/hemiparesis due to stroke

4.2.2.1 Detailed search procedures for stroke and description of the retrieved references (See Appendix 3.B).

An overwhelming amount of references is available in the literature for stroke rehabilitation (2463 records found when searching for "Cerebrovascular Accident/rehabilitation"[MeSH] in PubMed). This search was therefore limited to clinical practice guidelines, systematic reviews and meta-analyses published in the five last years.

After a preliminary search of the literature, several references have been discarded (see appendix 3B for the search strategy and the summary table of the critical appraisal of the references).

The preliminary search identified five clinical practice guidelines: The U.S. Veteran Affairs, Ministry of Defence (VA/DoD) guideline by Duncan et al. has been summarized by Bates et al.. It was first published in 2003 then slightly updated and endorsed by the American Heart Association (AHA) and the American Stroke Association (ASA) in 2005. This recent update included the last edition of the Royal College of Physicians of London guideline and the Scottish Intercollegiate Guidelines Network (SIGN, 2002), as well as the Cochrane review by Price et al. on electric stimulation on post-stroke shoulder pain,

Three excellent guidelines had high scores when assessed by the AGREE instrument and Va form from the Cochrane collaboration

- The second edition (2004) of the guideline by the Royal College of Physicians of London (785 references). This guideline covers general evaluation and management of stroke including a large section on rehabilitation,
- The guideline "Life after stroke" of the Stroke Foundation of New Zealand endorsed by the New Zealand Guidelines Group (2003),
- The guideline by the Scottish Intercollegiate Guidelines Network (SIGN) (2002).

Finally, a clinical practice guideline by the Agence National d'Accréditation et d'Evaluation en Santé (ANAES,Fr) focuses specifically on paramedical evaluation and management of patients with stroke in the acute phase. Unfortunately this reference is has a low methodological quality and most recommendations specific to rehabilitation are based on expert consensus. As a consequence it discarded from the selected references presented in appendix.

The preliminary search for systematic reviews identified 6 Cochrane systematic reviews addressing several commonly used rehabilitation methods. They have all been included. Noteworthy, only one of these reviews had been included in the selected guidelines references.

Preliminary search for systematic reviews and meta-analysis also identified 40 references published in the last 5 years. Most of them were excluded as they were not relevant, were not systematic reviews or had already been included in the references of the previously selected guidelines and Cochrane reviews. A total of 11 remaining systematic reviews have been finally included. It must be pointed out that in the two references by Teasell et al. (14, 15), the references on which recommendations are based are not well described and documented. Their conclusions seem optimistic as compared to recommendations found in other high-quality references addressing the same issues. Hence, in our opinion, strengths of recommendations proposed by this author must be interpreted with caution.

At last, our search identified a scientific statement on physical activity and exercise to be recommended to stroke survivors by the AHA.

4.2.2.2 Discussion of the evidence available in the literature on stroke

Selected references address most of the commonly used rehabilitation methods used in our country such as massage, mobilizations (traditional techniques and specific movement therapies), strengthening exercises, electrotherapy, functional electric stimulation, biofeedback. In addition, more recent rehabilitation techniques such as treadmill gait training with partial support, constraint-induced movement therapy, mobilizations through robot-assisted devices are also addressed.

Detailed evidence for each rehabilitation method is presented in Table 3.4 and will be briefly discussed and summarized here below.

Timing, intensity, frequency and duration of rehabilitation after a stroke

There is strong evidence that rehabilitation should start as soon as possible after stroke, as soon as medically tolerated (16-18). There is also a large consensus among expert supporting daily rehabilitation care, which may be implemented in one or two smaller sessions. The patient should benefit of as much rehabilitation as tolerated as augmented exercise therapy (defined as extra rehabilitation time) leads to small favourable effect on ADL's and walking speed (19).

Aerobic exercise, physical fitness training

Cardiovascular training to improve aerobic fitness through large muscle exercises (walking, treadmill, stationary cycling…) is generally recommended by many authors as a strong to moderate evidence supports it (18, 20, 21). However, the content and effects (outcome measures studied) of such programs are generally not well defined. Hence, further research is needed to address several peculiar issues characterizing this type on intervention.

Mobilizations

Patients with stroke should clearly be mobilized as early as possible after stroke (16-18). Stretching and mobilizations seem particularly useful to treat and prevent shoulder pain in the affected upper limb (16).

Strengthening exercises

There is a strong to moderate evidence in favour of strengthening exercises of targeted weakened muscle groups (16-18, 20). Task-oriented exercises seem more effective for strengthening the lower paretic limb (21).

Traditional physical therapy modalities (massage, cold, heat…)

A moderate to weak evidence can be found in the literature supporting traditional physical therapy modalities to treat shoulder pain in the affected upper limb (16).

Electric stimulation, electrotherapy, functional electric stimulation, TENS…

Numerous electric stimulation methods have been described. Some of them are used to treat patients with stroke. Electricity can be used to activate paretic muscle and artificially generate contraction (functional electric stimulation: FES) to strengthen paretic muscles, to reduce paretic shoulder subluxation, to obtain a neuro-muscular retraining effect or to improve gait through an orthotic effect obtained through contraction of the stimulated muscles. Electricity can also be used to stimulate sensory nerve endings to obtain an analgesic effect (electrotherapy, TENS…).

Strong evidence is available suggesting that TENS is not recommended in post-stroke patients in general (18). However, strong to moderate evidence suggest that high-intensity TENS is effective to treat shoulder pain (18).

Conflicting recommendations can be found in the selected literature about FES. VA/DoD guidelines (16, 22) conclude that there is a moderate to weak evidence that FES should be recommended in patients with paretic muscles, shoulder subluxation and for gait training post-stroke. SIGN guidelines (17) favour FES in selected patients. However they underline that FES must not be assumed to have sustained effects. Likewise, the Royal College of Physicians (18) guidelines suggest that FES should not be routinely used in patients with stroke. On the other hand, Life After Stroke (23)

guidelines clearly states that FES should not be used. Pommeroy et al. recently reviewed the issue of the clinical use of electrostimulation for neuromuscular re-training in the frame of the Cochrane database of systematic reviews. They concluded that more research is needed to address specific questions about the type of electrostimulation that might be most effective, in what dose and at what time after stroke.

Gait rehabilitation

Strong evidence can be found in the literature supporting the implementation of gait rehabilitation techniques based on recognised therapy approaches. Task-specific approaches should be preferred to impairment-focused approaches. Again, conflicting recommendations can be found about treadmill training with or without partial body weight support. Recommendations of the VA/DoD and Royal College of Physicians guidelines are strong to moderate in favour of treadmill training with partial body weight support as an adjunctive therapy in selected patients, although such recommendations mention that such a rehabilitation method should not be used routinely in all patients. Moseley et al. (24) recently reviewed this topic in the frame of the Cochrane Database of systematic reviews. They concluded that no statistically significant effect of treadmill training with or without body weight support may be identified. Although individual studies suggest that treadmill training with body weight support may be more effective than treadmill training alone and that treadmill training plus task-oriented exercise may be more effective than sham exercises, further trials are required to confirm these findings.

Specific movement therapies

Numerous specific movement therapies have been described: Bobath (normal movement approach), PNF (proprioceptive neuro facilitation), task-specific training, NDT (neuro developmental training), motor relearning or "movement science", Brunnstrom, Rood, Johnstone… Several of them are very popular in our country (PNF, Bobath…).

Until further evidence is available, any one approach to treatment should not be assumed to be more efficacious than others in promoting effective rehabilitation (18, 23). Task-specific training should generally be preferred in order to improve performance of selected tasks (17)

One recent review focused specifically on Bobath therapy, which is quite popular in our country. It concluded that comparisons of the Bobath concept with other approaches do not demonstrate superiority of one approach over the other at improving upper limb impairment, activity or participation. The Bobath concept was found to reduce shoulder pain better than cryotherapy, and to reduce tone compared to no intervention and compared to proprioceptive neuromuscular facilitation (PNF) (25).

Biofeedback

Biofeedback can be provided under different forms during therapy (electromyographic biofeedback, kinetic feedback, kinematic feedback, or more simply, knowledge of results). It can be used to improve gait, motor function of the upper limb, postural control… Many studies have been conducted to study different biofeedback techniques on varied functions in the post-stroke patients. It can be concluded that there is insufficient evidence to support the routine use of EMG biofeedback in the rehabilitation of movement and function after stroke. A recent review by Barclay-Goddard (26) conducted in the frame of the Cochrane database of systematic reviews concluded that force platform feedback (visual or auditory), a very specific form of biofeedback combined with force platform balance training, improved stance symmetry but not sway in standing, clinical balance outcomes or measures of independence.

Rehabilitation of postural control

Although the here above mentioned Cochrane review by Barclay-Goddard et al. suggested that force platform feedback could improve stance symmetry, another review by Pollock et al. (27) conducted in the frame of the Cochrane database of systematic reviews concluded that there is insufficient evidence to conclude that any physiotherapy treatment approach is more effective than another in promoting the recovery of

postural control. In general, strong evidence exists in favour of task-oriented exercise training to improve balance (28).

Rehabilitation of the upper limb function

Many rehabilitation methods aiming at improving function of the upper paretic limb have been described. Some new techniques have emerged. In general, strong evidence exists in favour of early, intensive rehabilitation of the upper limb function. Bilateral arm training may improve motor performance. For specific functional objectives (reaching objects…) a task-specific approach should be preferred (18).

Among newer methods, constraint-induced movement therapy may prove beneficial for a small subset of stroke patients. Benefit has only been shown in patients with specific degrees of active wrist and finger extension on the involved upper extremity. Candidates for constraint-induced movement therapy must meet or exceed minimum motor criteria: 20 degrees extension of the affected wrist and 10 for each finger and who have no sensory or cognitive deficits. Constraint-induced movement therapy may not be recommended as a preferred treatment for every patient (29, 30) cited by (16, 22) as the high intensity constraint-induced therapy delivered in research trials may be difficult to deliver in routine practice and has only been proven for the upper limb in certain well-defined situations (18). Robot-assisted movement therapy could be considered as an adjunct to conventional therapy in patients with deficits in arm function, who are at least 6 months post stroke (18).

Rehabilitation of the lower limb function

There is insufficient evidence to conclude that any physiotherapy treatment approach is more effective than another in promoting the recovery of lower limb function (27). Strong evidence was found in favour of task-oriented exercise training for strengthening the lower paretic limb (21).

Key messages for stroke rehabilitation

- **There is high evidence that stroke rehabilitation should start early and intensively as soon as medically tolerated by the patients,**
- **The patient should be positioned to minimize complications such as aspiration, respiratory complications, shoulder pain, contractures, pressure sores. His arm should be positioned using foam supports to prevent shoulder pain,**
- **There is moderate evidence that patients with stroke should benefit from mobilization as soon as possible. Arm mobilization techniques using overhead pulleys should be avoided to prevent shoulder pain. There is no evidence that any specific mobilization method is superior to any other one.**
- **Traditional physical therapy (massage, ice, heat…) modalities may be used as an adjunctive therapy to treat shoulder pain,**
- **High evidence supports the recommendation to use strengthening exercises and progressive resistance training in order to reduce musculoskeletal impairment after stroke.**
- **No specific movement therapy (Bobath, PNF, NDT…) should be assumed to be more efficacious than others. There is some evidence that Bobath therapy may be superior to cryotherapy in reducing shoulder pain post stroke,**
- **There is strong evidence that task-specific training generally can be preferred in order to improve performance of selected tasks, to induce strengthening of the lower limb, or to improve balance and gait.**
- **Hence, during gait rehabilitation, a task-specific approach together with external auditory rhythms should be favoured. Gait may also be improved by strength training, and strong evidence exists in favour of task-oriented exercise training to improve balance.**
- **Conflicting recommendations can be found about treadmill training with or without partial body weight support. Although treadmill training will have positive cardiovascular effects, further trials are required to confirm findings of a specific positive effect on gait function of treadmill with partial bodyweight support,**
- **Strong evidence exists in favour of early, intensive rehabilitation of the upper limb function. Overhead mobilizations with pulleys should be avoided to prevent hemiplegic shoulder pain. Task-specific approaches should be preferred. Effectiveness of constraint-induced movement therapy must be further studied before routine implementation but might improve outcome in selected patients.**
- **High evidence exists against the use of TENS to improve muscle control. There is insufficient evidence to recommend for or against the use of TENS to treat post-stroke shoulder pain. High evidence is available that functional electric stimulation (FES) should not be routinely recommended in the treatment of stroke. FES might be considered in individual patients to use as orthosis in upper or lower limb, but its use in neuromuscular retraining is unclear and needs more studies. More research is also needed to address specific questions about the type of electrostimulation that might be most effective, in what dose and at what time after stroke,**
- **Further studies are needed to evaluate the effectiveness of the numerous available biofeedback rehabilitation methods. In general, routine use of biofeedback should not be recommended,**

- **There is high evidence that most patients with stroke should benefit from cardiovascular training (aerobic exercise, physical fitness training) through walking, treadmill training, stationary cycling… However, the content of such programs is not well defined in the literature.**

Table 3.4. Evidence available in the literature on rehabilitation for hemiplegia, hemiparesis due to stroke

Physical therapy modality	Evidence in the literature	Levels of evidence (1)	Grades of recommendations (2)
Rehabilitation in general	• Rehabilitation improves functional outcome (15), • Rehabilitation does not reduce mortality for all strokes (15), • Rehabilitation reduces mortality for more severe stroke patients (15), • Strong evidence that rehabilitation reduces length of hospital stay (15), • Rehabilitation does not reduce rate of institutionalization (15), • Rehabilitation improves combined death and dependency outcome for patients with moderate to severe strokes (15), • Greater functional improvement is achieved by patients rehabilitated on specialized stroke units vs. general medical ward and that improvements are maintained up to 1 year (15), • Hospital-based outpatient rehabilitation results in improved functional outcomes when compared to routine care over the short term (15), • Conflicting evidence that hospital-based outpatient rehabilitation is superior to home-based outpatient rehabilitation (15).	High High against Moderate High High against Moderate High High Very low, conflicting	Strong recommendation for rehabilitation in patients post stroke (1A)
Planning, timing, intensity, duration of rehabilitation	• Patients with stroke should be mobilized as early as possible after stoke, as soon as medically tolerated (16-18), • Because of the heterogeneity of the studies, no specific recommendations can be made about the intensity and duration of rehabilitation (16), • All people with acute stroke, whether admitted to hospital or not, should have a rehabilitation assessment within the first 24 to 48 hours. The appropriateness and type of rehabilitation intervention will be determined by the results of this assessment (23), • Rehabilitation may be appropriate over long periods of time following stroke, depending on the specific goals being addressed. Withdrawal of rehabilitation team management may occur	High Very low evidence (expert consensus) Very low evidence (expert consensus)	Strong recommendation for intense rehabilitation after stroke as soon as medically tolerated (1A). No specific recommendations can be made about timing and duration of rehabilitation.

Physical therapy modality	Evidence in the literature	Levels of evidence (1)	Grades of recommendations (2)
	appropriately when ○ the person with stroke wishes to exit from a formal rehabilitation programme ○ no new achievable goals can be identified by the person with stroke and/or their caregivers (23), • Local guidelines need to optimise the use of nursing and other trained staff to ensure that every person with stroke is involved in the maximum daily amount of goal-focused activity they can tolerate (23) • All stroke inpatients should be involved in 7 days per week of goal-focused activity, whether or not this involves a therapist (23) • Augmented exercise therapy (providing extra rehabilitation time) has a small but favourable effect on ADL's and walking speed, particularly if therapy input is augmented at least 16 hours within the first 6 months after stroke. Augmented therapy has no effect on dexterity (19), • Strong evidence that greater intensity of rehabilitation results in improved functional outcomes (15).	Very low evidence (expert consensus) Very low evidence (expert consensus) Moderate High	
Positioning	• The patient should be positioned, whether lying or sitting, to minimize the risk of complications such as aspiration, respiratory complications, shoulder pain, contractures and pressure sores (18) • Patients with stroke who have musculoskeletal pain should be assessed by specialist therapists for potential alleviation through better seating (18) • Arm positioning using foam supports is recommended to prevent shoulder pain (18), • Prolonged positioning does not influence shoulder range of motion or pain (15).	Low Very low (expert consensus) Moderate Moderate against	Strong recommendation (1C) for positioning the patient to minimize complications such as aspiration, respiratory complications, shoulder pain, contractures, pressure sores. Strong recommendation (1B) for positioning the arm using foam supports to prevent shoulder pain.
Aerobic exercise, physical fitness training	• Patients should participate in cardiovascular training (aerobic activity) (18) • An aerobic exercise program at home or in an appropriate community program is recommended in patients	High High	Strong recommendation (1A) for physical fitness ("aerobic", cardiovascular training)

Physical therapy modality	Evidence in the literature	Levels of evidence (1)	Grades of recommendations (2)
	after stroke (22) • There are few data available to guide clinical practice at present with regard to fitness training interventions after stroke. More general research is needed to explore the efficacy and feasibility of training, particularly soon after stroke. In addition more specific studies are required to explore the effect of content and type of training. Further research will require careful planning to address a number of issues peculiar to this type of intervention (33), • Large muscle exercises (walking, treadmill, stationary cycling, combined arm-leg ergometry, arm ergometry, seated stepper) are recommended for stroke survivors to increase independence in ADL's, walking speed and efficiency, to improve tolerance to prolonged physical activity and to reduce risk of cardiovascular disease (20), • Strong evidence was also found for aerobics (21),	Very low High High	
Exercise in general	• Patients with stroke who have musculoskeletal pain should be assessed by specialist therapists for potential alleviation through exercise (18), • Stretching exercise are recommended in stroke survivors to improve range of motion and to prevent contractures (20) • Coordination and balance exercise are recommended in stroke survivors to improve level of safety in ADL's (20), • Exercise therapies do not improve arm function (15).	Very low (expert consensus) Low Moderate High against	Strong recommendations (1C) for exercises in general
Mobilizations	• Patients with stroke who have musculoskeletal pain should be assessed by specialist therapists for potential alleviation through passive movement (18) • Mobilization techniques and stretching focusing especially on external rotation and abduction are recommended to prevent frozen shoulder and shoulder-hand-pain syndrome (22), • Mobilization techniques using overhead pulleys should be avoided in the treatment of the paretic upper limb of	Very low (expert consensus) Low Moderate against	Strong recommendations (1B) for early mobilization. Strong recommendations (1B) to avoid mobilization techniques using overhead pulleys. Weak recommendations (2B)

Physical therapy modality	Evidence in the literature	Levels of evidence (1)	Grades of recommendations (2)
	patients with stroke (16, 22), • Patients with stroke should be mobilized as early as possible after stoke (17, 18) • Stretching and mobilizations should be considered in post stroke patients with shoulder pain (16) • No recommendation for a particular form of movement re-education can be made (18, 23)	Moderate Low	for mobilizations to prevent or treat shoulder pain.
Massage	• Soft tissue massage is recommended to treat shoulder pain of post-stroke patients (16, 22),	Very low	Weak recommendation (2C) for soft tissue massage to treat shoulder pain
Ice, cold, heat…	• Ice, heat are recommended to treat shoulder pain of post-stroke patients (16, 22),	Very low	Weak recommendation (2C) for ice or heat to treat shoulder
Strengthening for patients with muscle weakness following stroke	• Resisted exercise should be considered to improve muscle strength in targeted muscles (18) • Strengthening exercises are recommended in the acute rehabilitation of patients with muscle weakness following stroke (16, 22) • Strengthening exercises of the paretic shoulder and of the shoulder girdle are recommended to treat shoulder pain of post-stroke patients (16, 22), • Strengthening exercises (circuit training, weight machines, free weights, isometric exercises) are recommended to improve independence in ADL's (20), • Strong evidence exists in favour of task-oriented exercise training for strengthening the lower paretic limb (21), • Progressive resistance strength training programmes reduce musculoskeletal impairment after stroke. Whether strengthening enhances the performance of functional activities or participation in societal roles remains unknown. Few negative effects of strength training were reported, and these were minor (38), • There is either strong or moderate evidence to support the use of strength training as an adjunctive therapy in gait training (14),	High Very low (expert consensus) Low Moderate High High Moderate	Strong recommendation (1A) for progressive resistance training to reduce impairment after stroke.

Physical therapy modality	Evidence in the literature	Levels of evidence (1)	Grades of recommendations (2)
Gait rehabilitation	• For the specific objectives of improving walking speed, a task-specific approach should be used rather than an impairment-focused approach (18)	Low	Strong recommendation (1A) for a task-specific approach and external auditory rhythms during gait rehabilitation.
	• Gait rehabilitation techniques to improve walking ability based on recognised therapy approaches should be proposed (18)	Low	
	• The additional value of visual feedback therapy in bilateral standing compared with conventional therapy shows no statistically significant effects on symmetry of weight distribution between paretic and non-paretic leg, postural sway in bilateral standing, gait and gait-related activities (28)	High against	Strong recommendation (1A) against the additional value of visual feedback therapy in bilateral standing, gait and gait-related activities.
	• Strong evidence exists in favour of task-oriented exercise training to restore balance and gait and in favour of external auditory rhythms during gait (21),	High	Strong evidence (1B) for strength training to improve gait.
	• No or insufficient evidence in terms of functional outcome was found for functional and neuromuscular electrical stimulation aimed at improving gait performance (21),	Very low	Conflicting evidence about functional electrical stimulation to improve gait.
	• A positive orthotic effect of functional electrical stimulation on walking speed is probable (37),	-	
	• There is either strong or moderate evidence to support the use of strength training, EMG/biofeedback, and functional electrical stimulation as an adjunctive therapy in gait training (14),	Moderate	
	• Combined therapies improve hemiplegic gait (15),	Low	
Gait rehabilitation through treadmill training	• Treadmill training with partial bodyweight support should not be used on a routine basis (18)	High against	There are conflicting results about the effectiveness of treadmill training with or without partial body weight support. Some studies suggested that treadmill training with body weight support may be more effective than treadmill training alone and that treadmill training plus task-oriented exercise may be more effective
	• For patients who can walk independently, treadmill training with partial bodyweight support (<40%) between 30 days to three months post stroke should be considered as an adjunct to conventional therapy (18)	Low	
	• Treadmill training with partial bodyweight support is superior to non-body weight supported treadmill training and is, therefore, recommended as an adjunct to	Moderate	

Physical therapy modality	Evidence in the literature	Levels of evidence (1)	Grades of recommendations (2)
	conventional therapy in patients with mild to moderate dysfunction resulting in impaired gait (42, 43) cited by (16, 22), • A small number of studies suggest that treadmill training, particularly with partial (30-40%) body weight support with a harness, may be effective as an adjunct to other conventional methods (16, 17). There is no evidence suggesting that this method is more beneficial than conventional physiotherapy (17). The subgroups of subjects that benefited most were those who were non-ambulant late after stroke, and those with co-existing pathologies affecting cardiovascular fitness (17), • Overall no statistically significant effect of treadmill training with or without body weight support was detected. Although individual studies suggested that treadmill training with body weight support may be more effective than treadmill training alone and that treadmill training plus task-oriented exercise may be more effective than sham exercises, further trials are required to confirm these findings (24), • Strong evidence was also found for treadmill training with or without body weight support (21), • There is either limited or conflicting evidence to support the use of treadmill training with or without partial body-weight support (14, 15),	Low Very low High Very low, conflicting	than sham exercises in selected patients. Further trials are required to confirm these findings.
Functional electric stimulation	• Functional electric stimulation should not be used on a routine basis (18) • Individual patients should be considered for functional electric stimulation as an orthosis in certain circumstances such as improving arm movement, ankle dorsiflexion to improve gait performance (18) • Functional electric stimulation is recommended in patients who present with impaired muscle contraction (specifically with patients with ankle/knee/wrist motor impairment) (22) and in patients who have shoulder subluxation (22) and for gait training following stroke (16, 22)	High against High Moderate	Strong recommendation (1A) against routine and systematic use of functional electric stimulation. Strong recommendation (1B) against functional electrical stimulation to improve dexterity and gait in selected patients.

Physical therapy modality	Evidence in the literature	Levels of evidence (1)	Grades of recommendations (2)
	• There is insufficient evidence to recommend for or against using multi-channel functional electric stimulation for severe hemiplegic patients with gait impairment (44) cited by (22),	Very low	Strong recommendation (1B) for functional electrical stimulation as an orthosis in certain circumstances such as improving arm movement (preventing shoulder subluxation, improving wrist dorsiflexion…) and ankle dorsiflexion (to improve gait performance) in selected patients. Functional electrical stimulation and neuromuscular retraining: no recommendation possible; more good quality studies needed.
	• At present, there are insufficient robust data to inform clinical use of electrostimulation for neuromuscular re-training. Research is needed to address specific questions about the type of electrostimulation that might be most effective, in what dose and at what time after stroke (31),	Very low	
	• Functional electric stimulation is recommended in the treatment of shoulder pain in the involved upper limb of post-stroke patients (16, 22),		
	• Electrical stimulation should be considered for use in improving muscle force, strength and function in selected patients. This method must not be assumed to have sustained effects (17),	Moderate	
	• The evidence from randomised controlled trials so far does not confirm or refute that electrical stimulation around the shoulder after stroke influences reports of pain, but there do appear to be benefits for passive humeral lateral rotation. A possible mechanism is through the reduction of glenohumeral subluxation. Further studies are required (32),	Moderate Very low	
	• Functional electric stimulation to improve lateral rotation of the paretic upper limb is recommended to prevent shoulder pain in the involved upper limb in post-stroke patients (22),		
	• Functional electric stimulation is recommended in patients who have shoulder subluxation (16).	Moderate	
	• Functional electrical stimulation post stroke is not recommended (23),		
	• Strong evidence exists for neuromuscular stimulation for glenohumeral subluxation (21),	Moderate	
	• A positive orthotic effect of functional electrical stimulation on walking speed is probable (37),	High against	
	• No or insufficient evidence in terms of functional outcome was found for functional and neuromuscular electrical stimulation aimed at improving dexterity or gait performance (21),	High	
	• There is either strong or moderate evidence to support the use of		

Physical therapy modality	Evidence in the literature	Levels of evidence (1)	Grades of recommendations (2)
	functional electrical stimulation as an adjunctive therapy in gait training (14, 15).	Very low Moderate	
TENS	• Routine TENS for improving muscle control should not be used (18) • High intensity TENS should be used to treat shoulder pain when traditional therapeutic modalities failed (18) • TENS post stroke is not recommended (23)	High against Moderate High against	Strong recommendations (1A) against routine use of TENS to improve muscle control. Strong recommendations (1A) for TENS to treat shoulder pain when traditional therapeutic modalities failed.
Specific movement therapies - Bobath: normal movement approach - PNF: Proprioceptive neuro facilitation - NDT: neuro developmental training - Motor relearning or "movement science" - Brunnstrom, Rood, Johnstone…	• There is insufficient evidence and sometimes conflicting results to support the recommendation of neuro developmental training (therapeutic approach focusing on a progression of movement through the developmental sequence, inhibition of primitive reflexes/spasticity, and facilitation of higher-level control) versus conventional treatment approaches to promote motor re-training in patients with stroke (22), • Until further evidence is available, any one approach to treatment should not be assumed to be more efficacious than others in promoting effective rehabilitation. Task-specific training can be used in order to improve performance of selected tasks (17), • No recommendation for a particular form of movement re-education can be made (18, 23), • Comparisons of the Bobath concept with other approaches do not demonstrate superiority of one approach over the other at improving upper limb impairment, activity or participation. The Bobath concept was found to reduce shoulder pain better than cryotherapy, and to reduce tone compared to no intervention and compared to proprioceptive	Very low, conflicting Very low Very low High against	Strong recommendation (1B) against any specific movement therapy as only rehabilitation technique post stroke until further evidence is available. Weak recommendation (2B) for Bobath therapy to reduce shoulder pain post stroke.

Physical therapy modality	Evidence in the literature	Levels of evidence (1)	Grades of recommendations (2)
	neuromuscular facilitation (PNF) (25), • No major influence of Bobath and Motor Relearning Programme techniques on long-term function (40), • No or insufficient evidence in terms of functional outcome was found for traditional neurological treatment approaches (21), • Limited evidence that Bobath techniques are beneficial in improving gait in relatively high-level patients (15).	Very low Very low Very low	
Task-oriented exercise training	• Strong evidence exists in favour of task-oriented exercise training to restore balance and gait and for strengthening the paretic lower limb (21), • Task-specific training can be used in order to improve performance of selected tasks (17), • For the specific objectives of improving reaching for objects, a task-specific approach should be used rather than an impairment-focused approach (18).	High High Low	Strong recommendation (1A) for task-oriented exercise training to improve performance of selected tasks.
Spasticity	• Spasticity should not limit the use of strength training (18) • Additional electrostimulation should be considered to increase the effectiveness of botulinum toxin injections (18), • Antispastic positioning, range of motion exercises and stretching performed several times daily are recommended to treat spasticity (16, 22), • There are very few trials that assessed the efficacy of the physical management of spasticity and these are too small and inconclusive to lead to specific recommendations (17), • Physical therapy improves spasticity in the hemiplegic upper extremity (15).	Low High Very low (expert consensus) Moderate	Weak recommendations (1B) for rehabilitation to reduce spasticity in the upper extremity. Strong recommendation (1A) for electrostimulation to increase the effectiveness of botulinum toxin injections to treat spasticity.
Biofeedback	• No firm evidence was found of effectiveness regarding the use of augmented feedback (electromyographic biofeedback, kinetic feedback, kinematic feedback, or knowledge of results) to improve motor function of the upper extremity in rehabilitation patients. Future studies	-	No recommendation can be made about visual biofeedback in relation with very limited evidence and conflicting findings.

Physical therapy modality	Evidence in the literature	Levels of evidence (1)	Grades of recommendations (2)
	should focus more on the content, form and timing of augmented feedback concerning the therapeutic intervention (36),		
	• Biofeedback should not be used on a routine basis (18),	Very low	
	• No recommendations can be made for or against the use of biofeedback in post-stroke patients on the basis of the conflicting evidence that can be found in the literature. More research should be done to assess the efficacy of biofeedback in post-stroke patients (22),	Very low	
	• There is insufficient evidence to support the routine use of EMG biofeedback in the rehabilitation of movement and function after stroke. There is no evidence that such a method may be detrimental for the patient. EMG biofeedback should not be used routinely in the rehabilitation of function and movement following stroke (17),	Low	
	• No or insufficient evidence in terms of functional outcome was found for biofeedback (21),	Very low	
	• There is either strong or moderate evidence to support the use EMG/biofeedback as an adjunctive therapy in gait training (14),	Moderate	
	• Strong evidence that biofeedback training improves hemiplegic gait and standing post stroke (15),	Moderate	
	• Force platform feedback (visual or auditory) improved stance symmetry but not sway in standing, clinical balance outcomes or measures of independence (26),	Very low	
	• The additional value of visual feedback therapy in bilateral standing compared with conventional therapy shows no statistically significant effects on symmetry of weight distribution between paretic and non-paretic leg, postural sway in bilateral standing, gait and gait-related activities (28).	High against	
Rehabilitation of postural control	• The additional value of visual feedback therapy in bilateral standing compared with conventional therapy shows no statistically significant effects on symmetry of weight distribution between paretic and non-paretic leg, postural sway in bilateral standing, gait and gait-related activities (28),	High against	Strong recommendation (1A) for task-oriented exercise training to restore balance. No recommendations

Physical therapy modality	Evidence in the literature	Levels of evidence (1)	Grades of recommendations (2)
	• There is insufficient evidence to conclude that any physiotherapy treatment approach is more effective than another in promoting the recovery of postural control (27), • Walking sticks should be considered to increase standing stability in patients with severe disability (18) • Strong evidence exists in favour of task-oriented exercise training to restore balance and gait (21), • Force platform feedback (visual or auditory) improved stance symmetry but not sway in standing, clinical balance outcomes or measures of independence (26), • Moderate evidence that balance training post stroke is not effective (15).	Very low Low High High against Moderate against	can be made about any other particular rehabilitation method to improve postural control.
Rehabilitation of upper limb function	• Intensive therapy for the upper limb should be considered to improve arm function in patients with mild impairment (18), • Bilateral arm training may improve motor performance of the upper limb (18), • For the specific objectives of improving reaching for objects, a task-specific approach should be used rather than an impairment-focused approach (18), • Education of staff and care givers about correct handling of the hemiplegic arm is recommended to prevent shoulder pain (16, 18), • No firm evidence was found of effectiveness regarding the use of augmented feedback (electromyographic biofeedback, kinetic feedback, kinematic feedback, or knowledge of results) to improve motor function of the upper extremity in rehabilitation patients. Future studies should focus more on the content, form and timing of augmented feedback concerning the therapeutic intervention (36), • Comparisons of the Bobath concept with other approaches do not demonstrate superiority of one approach over the other at improving upper limb impairment, activity or participation. The Bobath concept was	High Low Low Low - Very low	Strong recommendation (1A) for intensive rehabilitation to improve upper limb function in patients with mild impairment. Weak recommendation (2B) for bilateral arm training and task-specific approach. Weak recommendation (2B) for education of staff and care givers about correct handling of the hemiplegic arm. Strong recommendation (1B) against mobilizations with overhead pulleys. Strong recommendation (1B) for gentle range of motion exercises to prevent shoulder pain

Physical therapy modality	Evidence in the literature	Levels of evidence (1)	Grades of recommendations (2)
	found to reduce shoulder pain better than cryotherapy, and to reduce tone compared to no intervention and compared to proprioceptive neuromuscular facilitation (PNF). However, no difference was detected for changes in tone between the Bobath concept and a functional approach. (25), • No or insufficient evidence in terms of functional outcome was found for exercises for the upper limb and neuromuscular electrical stimulation aimed at improving dexterity (21), • Strong evidence that exercise therapies do not improve arm function (15), • Strong evidence that physical therapy improves spasticity in the hemiplegic upper extremity (15), • Moderate evidence that overhead pulleys result in hemiplegic shoulder pain (15), • Moderate evidence that gentle range of motion exercises result in less hemiplegic shoulder pain (15), • Strong evidence that functional electrical stimulation improves muscle function, pain, subluxation and range of motion of the hemiplegic shoulder (15).	Very low High against High Moderate Moderate High	
Rehabilitation of upper limb function through constraint-induced movement therapy Constraint-induced movement therapy involves restricting the use of the non-stroke upper limb while at the same time encouraging active use of the stroke-affected upper limb	• Constraint-induced movement therapy may prove beneficial for a small subset of stroke patients. Benefit has only been shown in patients with specific degrees of active wrist and finger extension on the involved upper extremity. Candidates for constraint-induced movement therapy must meet or exceed minimum motor criteria: 20 degrees extension of the affected wrist and 10 for each finger and who have no sensory or cognitive deficits. Constraint-induced movement therapy may not be recommended as a preferred treatment for every patient (29, 30) cited by (16, 22), • The high intensity constraint-induced therapy delivered in research trials may be difficult to deliver in routine practice and has only been proven for the upper limb in certain well-defined situations. Constraint-induced therapy to increase the use of the affected arm should be considered in patients with at least 10 degrees of active wrist and finger extension, who are more than a year	Low Low	Weak recommendation (2B) for constraint–induced movement therapy in selected patients.

Physical therapy modality	Evidence in the literature	Levels of evidence (1)	Grades of recommendations (2)
	post stroke and who can walk independently without an aid (18), • The effectiveness of constraint-induced movement therapy is not yet conclusive as the learned non-use theory requires further exploration (34), • Strong evidence was also found for therapies that were focused on functional training of the upper limb such as constraint-induced movement therapy (21), • Strong evidence that constraint-induced movement therapies improve outcomes vs. traditional therapies (15).	Very low High High	
Rehabilitation of the upper arm function through robot-assisted movement therapy	• Robot-assisted movement therapy should be considered as an adjunct to conventional therapy in patients with deficits in arm function, who are at least 6 months post stroke (18).	Moderate	Strong recommendation (1A) for.
Rehabilitation of lower limb function	• There is insufficient evidence to conclude that any physiotherapy treatment approach is more effective than another in promoting the recovery of lower limb function (27), • Strong evidence was found in favour of task-oriented exercise training for strengthening the lower paretic limb (21).	Very low High	Strong recommendation (1A) for task-oriented exercise training for strengthening the lower paretic limb.
Shoulder strapping	• Shoulder strapping (sling) is recommended to prevent and treat painful shoulder in post-stroke patients (16, 22), • Overhead arm slings should be avoided as it encourages uncontrolled abduction. Instead, arm positioning using foam supports is recommended (18, 23), • Moderate evidence that shoulder strapping does not improve shoulder mobility, function and does not reduce shoulder pain (15).	Low High against Moderate against	No recommendations about shoulder strapping due to limited and sometimes conflicting evidence available.
Intermittent compression for oedema	• Intermittent compression should not be used routinely for a swollen hand (18).	High	Strong recommendation (1A) against.

4.2.3 Gait rehabilitation in the elderly

4.2.3.1 Detailed search procedures and description of the references for gait rehabilitation in the elderly (see appendix 3.C)

The retrieved references on gait rehabilitation in the elderly are presented in the table in appendix 3.C.The literature search found that gait disorders in the elderly are generally studied in the context of more specific conditions (falls, balance training…). Only a paucity of studies focus on gait disorders in relation with aging in general. As no practice guidelines, only one meta-analysis and very few systematic reviews were found, the search was extended to RCTs and some CTs. The selection of the references was made using the title and the abstract. Several papers also focus on light exercise programs to improve fitness and balance as an intervention in the context of gait disorders.

Overall a total of 16 references were retrieved: 1 Cochrane Review, 1 meta-analyses, 7 systematic reviews or reviews, 6 RCTs and 1 CT.

4.2.3.2 Discussion of the evidence available in the literature on gait rehabilitation in the elderly

Table 3.5 presents a brief description of the main characteristics of the 14 selected references. Most of them were RCTs or CTs which do not always specifically focus on gait rehabilitation in the elderly.

Obviously exercise programs in general seem efficacious in improving walking performance and more specifically gait speed, walking independence and step height. Moreover, exercise programs to improve gait in the elderly seem safe although no study specifically focusing on safety of gait rehabilitation has been identified. Likewise, no reference studying optimal frequency, intensity and duration of exercises to improve gait and balance in the elderly were found.

Key messages on gait rehabilitation in the elderly

- **Progressive resistance training in combination with cardiovascular training may benefit elderly people in numerous ways including improvement of gait performance,**
- **Balance training in elderly people seems to improve balance both objectively and subjectively.**
- **However, no reference was found to determine the optimal frequency, intensity and duration of exercises to improve gait and balance in the elderly.**

Table3.5 Evidence available in the literature on rehabilitation of gait rehabilitation in the elderly

Physical therapy modality	Evidence in the literature	Levels of evidence (1)	Grades of recommendations (2)
Exercises in general	• Progressive resistance training exercises (movements performed against a specific external force that is regularly increased during training) has a strong positive effect on strength. However some functional limitations measures like gait speed only show modest improvement (45),	Moderate evidence of a modest effect	Strong recommendation (1B) for resistance training exercises in combination with cardiovascular training ("aerobic" exercises) to improve gait performance (modest effect).
	• It is widely accepted that increased mechanical loading of the musculoskeletal system (e.g. resistive exercise) can have a beneficial effect (49),	Very low	
	• There is conflicting evidence that physical training can improve gait, activities of daily living, balance and endurance. More studies are needed to evaluate the effectiveness of physical training exercises on gait performance, activities of daily living, balance and endurance (47),	-	
	• Exercise preserves the ability to walk, maintains gait speed, independent ambulation and improves step height (60),	Very low	
	• Benefits of exercise for older people appear to be great enough to justify widespread efforts at the community (51),	Very low	
	• A short-term effect of exercise on strength has been demonstrated; however, no convincing evidence of an effect of exercise on factors associated with mobility and falls (48),	Low	
	• Exercise or principally strength training and combination training (aerobic plus other exercise) had significant effects on habitual gait speed (46),	Moderate	
	• The most consistent positive effects of exercises are observed in strength, aerobic capacity, flexibility, walking and standing balance (53),	Low	
	• Regular walking exercise and particularly Tai-Chi may preserve a high-automated level of motor control necessary for the gait regularity (59),	-	
Balance training	• Balance training improves both	Very low	Strong recommendation (1B) for a short

Physical therapy modality	Evidence in the literature	Levels of evidence (1)	Grades of recommendations (2)
	objective and perceived balance (56), • Older adults may be able to improve their balance under dual-task conditions (57), • There is contradictory evidence that physical training can improve gait, activities of daily living, balance and endurance. More studies are needed to evaluate the effectiveness of physical training exercises on gait performance, activities of daily living, balance and endurance (47), • A short individualized exercise programme can improve balance in people aged 75 years and older (54), • The most consistent positive effects of exercises are observed in strength, aerobic capacity, flexibility, walking and standing balance (53),	Very low - Moderate Low	individualized exercise programme to improve balance.
Balance training on treadmill	• Gait training with unexpected perturbation seems to have a beneficial impact on physical function in disabled elderly individuals (58),	Very low	Weak recommendation (2C) for balance training using unexpected perturbation on a treadmill.
Vibrating insoles	• Noised-based devices, such as randomly vibrating insoles, could improve age-related impairments in balance control (52),	Very low	Weak recommendation (2C) to support randomly vibrating insoles to improve balance.

4.2.4 Ankle sprain

4.2.4.1 Detailed search procedures and description of the references for ankle sprain (See Appendix 3.D)

A total of 13 references have been retrieved: 5 practice guidelines, 4 Cochrane reviews, 4 systematic reviews and one review.

The ICSI Health care Guideline on ankle sprain scored relatively low on Agree as reference search and selection methods specific for this guideline are not described in the document. Moreover, only a small section focuses on rehabilitation. It should probably considered more as an expert consensus. The recent update of the Dutch KNGF guidelines (2005) has a high methodological quality. It focuses specifically on rehabilitation issues relevant for the physiotherapist. On the opposite, the quality of the WVVH guideline inspired by the KNGF guideline is low. The ANAES guideline should be considered as an expert consensus.

The four Cochrane reviews address most of the important issues relevant for physiotherapists in the context of ankle sprain rehabilitation. The sections on immobilisation and prevention are particularly relevant for the physiotherapists dealing with patients with sprained ankles in relation with sports.

Five systematic reviews and reviews were finally selected (see the summary table in appendix 3.D). The review by Struijs A.A. and Kerkhoffs G.M.M.J. published in Clinical evidence for the first time in 2002 and regularly updated (last time in 2005) can be considered as a good-quality practice guideline.

4.2.4.2 Discussion of the evidence available in the literature on ankle sprain

Available evidence on most common physical therapy modalities is presented in Table 3.6.

Early stage treatment options: immobilization, "functional treatment", weight bearing

Rigid immobilization (1 to 6 weeks according to injury severity; with or without an initial period on non-weight bearing) followed by physiotherapy and surgery, have long been considered as the traditional treatments for acute ankle sprain. When new semi-rigid ankle braces (Aircast®…) have been developed, so-called "functional treatment" (early mobilization allowing rapid progressive weight-bearing and physiotherapy) has been proposed and became widely used, especially in sport participants. Weight bearing should be allowed as soon as tolerated. Normal walking should be encouraged allowing some discomfort (61).

Whether functional treatment is better than traditional treatment with a period of rigid immobilization has long been debated. There is a consensus that rigid immobilization is better than no treatment. Functional treatment may be an interesting alternative to traditional treatment with rigid immobilization in selected patients. However, when choosing for functional treatment, ankle protection with a specific semi-rigid brace should be maintained long enough to allow ligament healing (as long as the rigid immobilization period: 1 to 6 weeks according to the severity of injury). There is some evidence indicating that, compared with immobilization, functional treatment may allow quicker and better functional recovery at short- and intermediate-term (within the year following injury) (62). The pitfall related to functional treatment is to minimize the injury and to interrupt the treatment too soon. It must be pointed out that available good-quality evidence is very limited for immobilization, and functional treatment. More good quality-studies studies must be conducted to increase the strengths of the recommendations.

Passive traditional physical therapy modalities such as compression, massage, passive mobilizations…

Compression and massage may have a short-term analgesic effect and may be efficacious to reduce oedema in the early stage (63).

There is an expert consensus that passive mobilizations should be performed as soon as tolerated (63, 64). However, active mobilizations should be preferred and performed as soon as possible to recover the range of motion (61, 65).

Cryotherapy

There is limited evidence about the efficacy of cryotherapy (cold-packs, cold and warm baths…) to reduce pain and oedema in the early stage of an ankle sprain. More studies are needed.

Electrotherapy, TENS, Lazer, Ultra-sound

Those modalities should not be routinely implemented during the initial phase of ankle sprains. Ultrasound has been found ineffective. This consensus is based on a relatively small number of low-quality studies that generally failed to identify any efficacy of such physical therapy modalities to alleviate pain and/or reduce oedema.

Strengthening exercises

It has not been well established whether strengthening exercises have a positive effect on recovery of functional instability (limited evidence due to low-quality trials).

Coordination, proprioception exercises

Coordination exercises have probably a positive effect on recovery of functional instability (63, 65). Likewise, it is probable that proprioception training including exercises on a wobble-board are effective in the prevention of recurrence of ankle sprain (64). However, the levels of evidence are low due to the low-quality of available studies.

Key messages on ankle sprain rehabilitation

- **It has not been well established yet when patients should be able to bear weight and progressively resume normal walking,**
- **Traditional treatment of ankle sprains (rigid immobilization followed by rehabilitation) seems efficacious to recover function and stability in most cases and allows to avoid possible complications related to surgery. However, the level of evidence supporting such an intervention is low. More good-quality studies are needed to establish the effectiveness of immobilization followed by rehabilitation,**
- **Well-conducted functional treatment of ankle sprains (protection with a semi-rigid ankle brace and early rehabilitation) is an interesting alternative to traditional treatment in selected patients as it often allows faster functional recovery. However, the level of evidence supporting such an intervention is low. More good-quality studies are needed to better establish the effectiveness of functional treatment,**
- **Effectiveness of massage, compression, cryotherapy, lazer, TENS, magnet therapy has not been well established yet. More good-quality studies should be conducted before reliable recommendations can be made about such therapeutic modalities,**
- **Ultra-sound should not be recommended,**
- **Coordination and proprioception exercises are most probably are effective in the prevention of recurrence of ankle sprain but the level of evidence supporting such interventions is low,**
- **Semi-rigid ankle orthoses are effective to prevent recurrence of ankle sprain in athletes with ankle instability. They could be proposed during high-risk sporting activities (soccer, basketball…) in athletes with a history of recent sprain.**

Table 3.6 Evidence available in the literature on rehabilitation of ankle sprain

Physical therapy modality	Evidence in the literature	Levels of evidence (1)	Grades of recommendations (2)
Protection, weight bearing in the acute phase	• Encourage walking with a normal gait as soon as possible, allowing for some discomfort (61),	Very low	Weak recommendation (2C) for resuming walking as soon as possible.
Massage	• Massage has an analgesic effect and helps treating oedema. It improves foot proprioception (63),	Very low (expert consensus)	Weak recommendation (2C) for massage.
Compression therapy	• Pressure therapy with mechanical devices is effective to reduce oedema. However, manual massage is more effective (63)	Very low (expert consensus)	Weak recommendation (2C) for compression therapy.
Cryotherapy	• Ice is used to control swelling and to relieve pain and muscle spasms. It may be needed for 1-3 weeks. Do not use heat if swelling is present. Place a wet towel over the ankle. Place ice or cold pack on the towel. Leave for 15-20 minutes. Ice 3 times daily (61), • Cold-and-warm baths are not effective to reduce oedema (63), • Few studies assessed the effectiveness of ice on closed soft-tissue injury, and there was no evidence of an optimal mode or duration of treatment. Many more high-quality trials are needed to provide evidence-based guidelines in the treatment of acute soft-tissue injuries (73), • One RCT found no significant difference in symptoms between cold pack placement and placebo (simulated treatment). One RCT found less oedema with cold pack placement compared with heat or a contrast bath at 3-5 days after injury (62).	Very low Very low Very low Very low	Weak recommendations (2C) for cryotherapy. Limited low-quality evidence. More studies needed.
Electrotherapy, lazer…	• The use of electrotherapy, lazer therapy is not recommended (65), • There is no evidence that TENS is effective in treating ankle sprain. It may however be used to alleviate pain (63), • Lazer therapy is not effective to treat ankle sprain (63), • Diathermy, magnet-therapy are not effective to treat ankle sprain (63), • Insufficient evidence on the effects of	Very low (expert consensus) Very low (expert consensus) Very low against (expert consensus) Very low against (expert consensus) Very low	No specific recommendations can be made about the use of electrotherapy, TENS, Lazer, magnet therapy due to limited low-quality and sometimes conflicting evidence. Until good quality evidence becomes

Physical therapy modality	Evidence in the literature	Levels of evidence (1)	Grades of recommendations (2)
	diathermy compared with placebo on walking ability and reduction in swelling (62).		available, routine use of such therapeutic modalities should not be recommended.
Ultra-sound	• The use of ultra-sound therapy is not recommended (65), • Ultra-sound therapy should not be used (63), • The extent and quality of the available evidence for the effects of ultrasound therapy for acute ankle sprains is limited. The results of four placebo-controlled trials do not support the use of ultrasound in the treatment of ankle sprains. The magnitude of most reported treatment effects appeared to be small, and may be of limited clinical importance. As yet, only few trials are available and no conclusions can be made regarding an optimal and adequate dosage schedule for ultrasound therapy, and whether such a schedule would improve on the reported effectiveness of ultrasound for ankle sprains (62, 68).	Very low against (expert consensus) Very low against (expert consensus) Moderate against	Strong recommendations (1B) against ultrasound.
Immobilization	• There is consensus that immobilisation is more effective than no treatment; however one systematic review and one subsequent RCT found that, compared with functional treatment, immobilisation was associated with less improvement in symptoms and functional outcomes at either short- (< 6 weeks), intermediate (6 weeks to 1 year), or long-term (1 year) follow up. Effects were less marked at long-term follow up. One systematic review found no significant difference between immobilisation and surgery in pain, swelling, recurrence, or subjective instability. However, the review found that compared with immobilisation, surgery improved stability and increased the proportion of people able to return to sports. One RCT identified by a systematic review provided insufficient evidence to compare ultrasound versus immobilisation (62).	Very low	Weak recommendation (2C) for due to limited evidence. More studies needed.
Functional treatment Semi-rigid immobilization (bracing, taping…)	• Functional treatment (early mobilization with use of an external support) appears to be the favourable strategy for treating acute ankle sprains when compared with immobilisation. However, these results should be interpreted with	Very low that functional treatment is better than immobilization	Strong recommendation (1B) for functional treatment. Weak recommendation (2C) to prefer

Physical therapy modality	Evidence in the literature	Levels of evidence (1)	Grades of recommendations (2)
	caution, as most of the differences are not significant after exclusion of the low quality trials. Many trials were poorly reported and there was variety amongst the functional treatments evaluated (70),	Low	functional treatment over immobilization. Strong recommendation (1B) for patients with a history of ankle sprains to use ankle supports in the form of semi-rigid orthoses or air-cast braces to prevent ankle sprains during high-risk sporting activities.
	• The long-term use of taping or semi-rigid bracing may have deleterious effects in terms of functional stability. It should be discouraged as well-conducted rehabilitation should lead to recovery of functional stability and progressive avoidance of bracing and taping (65),	Very low	
	• Semi-rigid bracing or taping may be recommended when patients resume walking or playing sports (63),	(expert consensus)	
	• The use of an elastic bandage has fewer complications than taping but appears to be associated with a slower return to work and sport, and more reported instability than a semi-rigid ankle support. Lace-up ankle support appears to be effective in reducing swelling in the short-term compared with semi-rigid ankle support, elastic bandage and tape. However, definitive conclusions are hampered by the variety of treatments used, and the inconsistency of reported follow-up times. The most effective treatment, both clinically and in costs, is unclear from currently available randomised trials (69),	Very low Moderate	
	• This review provides good evidence for the beneficial effect of ankle supports in the form of semi-rigid orthoses or air-cast braces to prevent ankle sprains during high-risk sporting activities (e.g. soccer, basketball). Participants with a history of previous sprain can be advised that wearing such supports may reduce the risk of incurring a future sprain. However, any potential prophylactic effect should be balanced against the baseline risk of the activity, the supply and cost of the particular device, and for some, the possible or perceived loss of performance. Further research is indicated principally to investigate other prophylactic interventions, their cost-effectiveness and general applicability (71),(73),		
	• One systematic review and one subsequent RCT found evidence that functional treatment (early mobilization with use of an external	Moderate for functional treatment	

Physical therapy modality	Evidence in the literature	Levels of evidence (1)	Grades of recommendations (2)
	support) reduced the risk of the ankle giving way compared with minimal treatment. One systematic review and one subsequent RCT found that, compared with immobilisation, functional treatment improved symptoms and functional outcomes at short-term (< 6 weeks), intermediate term (6 weeks to 1 year) and long-term (> 1 year) follow up. However, effects were found to be less marked at long-term follow up. One systematic review and one subsequent RCT provided insufficient evidence to compare functional treatment versus surgery. One systematic review and two additional RCTs provided insufficient evidence to compare different functional treatments (62).		
Passive mobilizations	• Recovery of range of motion should preferably be obtained through active exercises. If this is mot possible, passive mobilizations may be performed (65), • Passive mobilizations should be performed as soon a tolerated (63), • Manual mobilisation has an (initial) effect on dorsiflexion range of motion, but the clinical relevance of these findings for physiotherapy practice may be limited (64),	Very low (expert consensus) Very low (expert consensus) Low	Weak recommendation (2C) for.
Active exercises	• Begin flexibility range of motion exercises as soon as tolerated without pain. In the acute phase, have the patient (61): o Move the foot up and down as tolerated as though pressing on a gas pedal, o Make circles with the foot, both clockwise and counter clockwise, o As tolerated, begin bearing weight on the foot. In either a sitting or a standing position, shift weight from front to back and from the inside to the outside of the foot, o Begin non-weight-bearing Achilles stretch. • In the late acute phase (> 1 week), therapeutic exercise should be initiated; a slight and tolerated amount of pain is acceptable, however, if the patient experiences extreme pain or	Very low Very low (expert consensus)	Weak recommendation (2C) for active exercises due to limited good-quality evidence. More studies needed.

Physical therapy modality	Evidence in the literature	Levels of evidence (1)	Grades of recommendations (2)
	discomfort then exercises should be stopped and be re-evaluated. Continue flexibility exercises throughout the day to improve circulation and to regain normal range of motion. Add standing Achilles and gastroc/soleus stretches. (61), • An exercise program that should be as varied as possible is recommended during rehabilitation of ankle sprain (65), • Active mobilization exercises should be implemented as soon a tolerated (63), • It is likely that exercise therapy, including the use of a wobble board, is effective in the prevention of recurrent ankle sprains (64),	Very low Very low (expert consensus) Low	
Strengthening	• Once the patient can walk without pain, have him/her rise up on the toes, then try walking on his/her heels and on his/her toes 10-20 feet, two or three times a day. Add isometrics and Theraband® strengthening. For additional strengthening, continue range of motion exercises with a cuff weight around the forefoot (61), • Strengthening exercises have a positive effect on recovery of functional instability of the ankle (65), • Strengthening exercises must be sufficiently intense and repeated to generate a positive effect on muscle endurance capacity (65),	Very low (expert consensus) Very low Very low (expert consensus)	Weak recommendation (2C) for strengthening due to limited good-quality evidence. More studies needed.
Coordination, balance training, proprioception	• The patient may also begin balancing on the injured leg. When he/she can do this comfortably for 30 seconds, he/she should challenge on the affected leg. Try 5-10 repetitions for 30 seconds each, two or three times a day. Alternatively, a balance board can be used, (61), • Coordination and balance exercises have a positive effect on recovery of functional instability of the ankle (65), • Proprioception must be trained in full range of motion in order to train all mecano-receptors of the ankle. Proprioception must not be limited to board training but should also include functional rehabilitation and sport-specific movements (65), • Proprioception ("reprogrammation neuro-musculaire") should be	Very low (expert consensus) Low Very low (expert consensus) Very low (expert consensus)	Weak recommendation (2B) for due to limited good-quality evidence. More studies needed.

Physical therapy modality	Evidence in the literature	Levels of evidence (1)	Grades of recommendations (2)
	implemented as soon as possible as it allows early return to normal level of activity and reduces the risk of recurrence (63), • It is likely that exercise therapy, including the use of a wobble board, is effective in the prevention of recurrent ankle sprains (64),	Low	
Rehabilitation before resuming athletic activity	• The patient should hop up and down and side to side with feet together. He or she should do 10 repetitions twice a day. The patient should progress to hopping on the affected side only, up and down, side to side, and turning in clockwise and counter clockwise circles. Do 10 repetitions twice a day. The patient should then progress to jogging in a straight line on level ground as tolerated. Endurance can be built by gradually increasing the distance as the patient tolerates. When the patient can tolerate jogging one mile, he or she should progress to sprinting in a straight line, running in large circles decreasing into small (both clockwise and counter clockwise circles), running figure eights, and cutting back and forth at 45- and 90-degree angles. Sport-specific activity: The patient may return to structured team practice or individual sport, starting with a limited practice and increasing participation as tolerated. For example, a soccer player would start in a game at 5 to 10 minutes per half and slowly increase participation time depending on pain level and endurance. A tennis player might begin by hitting balls against a wall and progressing first to doubles play, then to singles. The patient should consider using functional bracing as soon as jogging is begun and continue to use the brace throughout the progression to sport specific activity. Competitive athletes should be encouraged to wear the brace for the rest of the sports season. Use of supportive devices such as semi-rigid casts or lace-up braces should be continued up to 4-8 weeks, particularly when engaging in strenuous or competitive activity (61).	Very low (expert consensus)	Weak recommendation (2B) for due to limited good-quality evidence. More studies needed.
Prevention of ankle sprain in sports	• Good evidence for the beneficial effect of ankle supports in the form of semi-rigid orthoses or air-cast braces to prevent ankle sprains during high-risk sporting activities (e.g. soccer,	Moderate	Strong recommendation (1B) for patients with a history of ankle sprains to use ankle supports in the form of semi-rigid

Physical therapy modality	Evidence in the literature	Levels of evidence (1)	Grades of recommendations (2)
	basketball). Participants with a history of previous sprain can be advised that wearing such supports may reduce the risk of incurring a future sprain. However, any potential prophylactic effect should be balanced against the baseline risk of the activity, the supply and cost of the particular device, and for some, the possible or perceived loss of performance (71). • Athletes with a sprained ankle complete supervised rehabilitation before returning to practice or competition, and those athletes suffering a moderate or severe sprain should wear an appropriate orthosis for at least 6 months. Both coaches and players must assume responsibility for prevention of injuries in sports (74).	Low	orthoses or air-cast braces to prevent ankle sprains during high-risk sporting activities.

4.2.5 Total knee replacement

The common physical therapy modalities usually include continuous passive mobilisation, clinical pathways, home exercises, preoperative physiotherapy, electric stimulation, functional exercises, transcutaneous electrical nerve stimulation, cryotherapy, preoperative information education. Some treatments with few underlying evidence are proposed in the literature: Robert Jones bandage, osteopathic manipulative treatment, eccentric contractions. The aim of these different treatments are to improve patient outcomes (decrease length of the hospital stay, cost, blood loss, anxiety, pain relief, walking speed, functional capacity....).

4.2.5.1 Detailed search procedures and description of the references for total knee replacement (see Appendix 3.E.)

A brief description of the main characteristics of the 28 references (1 position statement, 2 Cochrane review, 6 systematic reviews and reviews, 19 RCTs or CTs) is presented in the appendix 3.E.

The NIH Position statement (75) mentions that rehabilitation after total knee arthroplasty is the most understudied aspect of the peri-operative management of such a condition. As a consequence, there is no evidence supporting the generalized use of any specific preoperative or postoperative rehabilitation intervention even if there are several theoretical reasons why the treatment of preoperative and postoperative physical impairments (such as muscle weakness and atrophy, joint contractures, abnormal joint mechanics and gait patterns) should lead to improved short- and long-term outcomes of surgery,

Four reviews focus on a very specific mobilization technique (robot-assisted continuous passive motion), which has been studied quite extensively and recently reviewed in the context of the Cochrane Collaboration Reviews (76). One focuses on the utility of pre-operative physiotherapy (77) and the second one addresses sport after total knee arthroplasty (78).

The paucity of reviews on the topic in the literature led to extend the search to RCTs and CTs on specific physical therapy modalities that are often used during rehabilitation of total knee arthroplasty. Only a relative small number of references could be retrieved from the literature. Moreover, most available reviews and RCTs presented important methodological limitations which led to recommend a cautious implementation of their conclusions.

4.2.5.2 Discussion of the evidence available in the literature on total knee replacement

Evidence available in the literature on rehabilitation before or after total knee arthroplasty is briefly presented in table 3.7. As evoked above, rehabilitation after total knee arthroplasty is the most understudied aspect of the peri-operative management of such a condition. As a consequence, only a paucity of evidence can be found in the literature about traditional physical therapy modalities that are commonly used in that context. Hence it is often impossible to propose reliable recommendations either for or against commonly used therapeutic modalities.

Pre-operative physiotherapy

Six references were found on the utility of pre-operative physiotherapy. Although most studies had low methodological quality, they all led to the same conclusion that pre-operative physiotherapy is not effective in improving outcome after total knee arthroplasty. However, in selected patients with complex need (co-morbid conditions…) pre-operative physiotherapy may possibly reduce hospital stay (79).

Outpatient extra-physiotherapy

In uncomplicated cases, outpatient extra-physiotherapy after hospital discharge is not necessary, as it can be replaced by a well-conducted home-exercise program that can be self-administered (80, 81). This finding should however be implemented with caution in our country where financing of hospital stay duration is limited by national

regulations. More studies are needed to better establish the effectiveness of pre-operative physiotherapy.

Continuous passive motion

Continuous passive mobilisation (CPM) is widely used following total knee arthroplasty. CPM combined with physiotherapy, may offer beneficial results (increased active knee flexion, reduction of hospital stay, decreased need for post-operative manipulation) compared to physiotherapy alone in the short-term rehabilitation following total knee arthroplasty. CPM did not significantly improve passive knee flexion and passive or active knee extension. Although statistically significant the effects of CPM as an adjunct to physiotherapy seem clinically small (76).

Compression combined with cryotherapy

Compression combined with cryotherapy using a Cryo/Cuff (Aircast®) device is an interesting, well-tolerated, risk-free and low cost modality to reduce pain and analgesic usage short-term after arthroplasty (82). Other cold-compression techniques may also be implemented. However, evidence supporting such treatments is very fragile. More studies are needed to better establish the effectiveness of such interventions.

TENS and osteopathy

When TENS and osteopathic manipulative therapy in addition to standard care did not appear effective to reduce pain and improve functional outcome after total knee arthroplasty, some limited evidence can be found suggesting that muscle electrical stimulation may be effective in improving walking speed (83) and reducing extensor lag and duration of hospital stay (84). More studies are needed to establish the effectiveness of such interventions.

Miscellaneous

Some studies focused on specific techniques (electrostimulation, eccentric exercises, functional exercises…) and led to varied conclusions that seem questionable as methodology of most such studies was of low-quality. More good-quality studies should definitely be conducted before recommendations on such modalities can be proposed.

Key message for rehabilitation for primary total knee arthroplasty

- **Pre-operative physiotherapy is probably not effective to improve outcome after primary total knee arthroplasty and pre-operative education is probably not useful in most patients,**
- **Continuous passive mobilization (CPM) as an adjunct to physiotherapy is effective in improving short-term active knee flexion and reducing length of hospital stay and need for post-operative manipulation. However, its effects are clinically modest,**
- **Compression combined with cryotherapy using a commercially available device such as Cryo/Cuff (Aircast®) is a risk-free and well-tolerated physical therapy modality that allows pain reduction and decreases analgesics consumption after total knee arthroplasty (very low level of evidence due to paucity of studies of low-quality),**
- **Osteopathic manipulative treatment in addition to standard care and TENS are not effective,**
- **More good-quality trials should be conducted to study numerous specific techniques that are often used during rehabilitation after total knee arthroplasty (electrostimulation, eccentric exercises…). However, the paucity of evidence found on such techniques suggests that they should not be recommended as their effectiveness has not been sufficiently well established.**

Table 3.7 Evidence available in the literature on rehabilitation of total knee replacement

Physical therapy modality	Evidence in the literature	Levels of evidence (1)	Grades of recommendations (2)
Rehabilitation in general	• The use of rehabilitation services is perhaps the most understudied aspect of the peri-operative management of total knee arthroplasty patients. Although there are several theoretical reasons why the treatment of preoperative and postoperative physical impairments such as muscle weakness and atrophy, joint contractures, abnormal joint mechanics, and gait patterns should lead to improved short- and long-term outcomes of surgery, there is no evidence supporting the generalized use of any specific preoperative or postoperative rehabilitation intervention. Similarly, the site of post-acute care of total knee arthroplasty patients (home versus acute rehabilitation unit versus skilled nursing facility) is currently determined by local practice patterns and insurance reimbursement policies and not by available data. Finally, no evidence-based guidelines exist for promoting or limiting post-arthroplasty physical activity (75)	Very low (expert consensus)	No recommendations can de made due to limited good-quality evidence. Good-quality studies are needed.
Pre-operative physiotherapy	• Pre-operative physiotherapy programmes are not effective in improving outcome after total knee replacement (77),	Low against	Weak recommendations (2C) against.
	• Additional pre-operative home physiotherapy did not improve patient-perceived health outcomes (99),	Low against	All studies on this topic were found to be of similar methodological quality with design flaws, which limit the interpretation of the findings.
	• Pre-operative general cardiovascular conditioning exercises did not improve outcome after total knee arthroplasty (101),	Low against	
	• Although Health service utilization was less in the treatment group, an exercise/education intervention did not alter functional recovery or Health Related Quality of Life following knee arthroplasty. However, this study was underpowered to attain statistical significance for these measures (97),	Very low	
	• Pre-operative individually tailored multi-disciplinary rehabilitation to optimize functional capacity, education about the in-hospital phase and early discharge planning was effective in reducing hospital stay in patients with	Very low	

Physical therapy modality	Evidence in the literature	Levels of evidence (1)	Grades of recommendations (2)
	complex needs (co-morbid conditions or limited social support) after total knee replacement (79), • A mini-review concluded that is no possible to answer to this question (methodological weaknesses) (87).	Very low	
Pre-operative education	• There is little evidence to support the use of pre-operative education over and above standard care to improve postoperative outcomes in patients undergoing hip or knee replacement surgery, especially with respect to pain, functioning and length of hospital stay. There is evidence that preoperative education has a modest beneficial effect on preoperative anxiety. There may also be beneficial effects when preoperative education is tailored according to anxiety, or targeted at those most in need of support (e.g. those who are particularly disabled, or have limited social support structures) (85).	Very low	Very weak recommendation (2C) for preoperative education to improve function after total knee arthroplasty.
Home exercises instead of extra physiotherapy after hospital stay	• There is no clinically important difference in the final range of movement obtained following total knee arthroplasty with and without outpatient physiotherapy. In selected patients following primary total knee arthroplasty, inpatient physiotherapy with good instructions and a well-structured home exercise regime can dispense with the need for extra outpatient physiotherapy (81), • After primary total knee arthroplasty, patients who completed a home exercise program (home-based rehabilitation) performed similarly to patients who completed regular outpatient clinic sessions in addition to the home exercises (clinic-based rehabilitation). Additional studies need to determine which patients are likely to benefit most from clinic-based rehabilitation programs (80).	Moderate against need for extra outpatient physiotherapy after inpatient physiotherapy with good instructions and a well-structured home exercise regime can dispense with the need for extra outpatient physiotherapy	Important limitations and no recommendation as best action may differ depending on circumstances or patients or societal values.
Programs implementing shorter hospital stay	• Rehabilitation outcomes are not compromised by reduced length of hospital stay (92).	Very low	No recommendation possible due to the low-quality of the study.
Traditional versus functional exercise	• There were trends in favour of the home-based functional exercises as compared to home-based more traditional exercises that were of clinical relevance. However, due to lack of statistical power conclusions of this studied should be considered with	Very low	No recommendation possible due to the low-quality of the study.

Physical therapy modality	Evidence in the literature	Levels of evidence (1)	Grades of recommendations (2)
	caution (98).		
Continuous passive mobilisation (CPM)	• CPM did not further reduce knee impairments or disability or reduce the length of the hospital stay (90, 93), • Home self-delivered CPM is an valuable alternative to traditional physiotherapy delivered by a trained physiotherapist as it leads to comparable results and is quite less expensive (100), • CPM is effective in avoiding development of subsequent joint stiffness in the first few hours or days after total knee arthroplasty (86, 89), • CPM combined with physiotherapy, may offer beneficial results compared to physiotherapy alone in the short-term rehabilitation following total knee arthroplasty. CPM combined with physiotherapy was found to statistically significantly increase active knee flexion (WMD 4.30 degrees, 95% CI: 1.96, 6.63) and decrease length of stay (WMD -0.69 days, 95% CI: -1.35, -0.03). CPM was also found to decrease the need for post-operative manipulation (RR 0.12, 95% CI: 0.03, 0.53). CPM did not significantly improve passive knee flexion and passive or active knee extension (76). • CPM has not been found to be effective yet. The potential benefits of CPM still need to be carefully weighed (88).	Moderate against Very low Low Moderate for recovery of active knee flexion, reducing length of stay and need for post-operative manipulation Moderate against recovery of passive knee flexion and passive or active knee extension No evidence	Strong recommendation (1B) for. However, effect size related to CPM is modest. In the Cochrane Review by Milne et al., the median methodology quality score was two out of a maximum of five points. Further studies are required to assess the differences in CPM effectiveness with different characteristics of application such as total duration of treatment of intensity of CPM interventions, different characteristics of patients and of disease. In addition, the effect of CPM when combined and compared to various physiotherapy regimes should be studied further.
Cryotherapy combined with compression (Cryo/Cuff, Aircast®)	• Cryo/Cuff seems to be a rational, effective, risk-free, and well-tolerated alternative to epidural anaesthesia to reduce pain and morphine after unicondylar knee arthroplasty (82), • As compared to a modified Robert Jones bandage, cold compression dressing (Cryo/Cuff, Aircast, UK), a led to less blood loss (91).	Very low Very low	Weak recommendations (2B) for due to limited evidence (paucity of studies of low-quality).
Eccentric contractions	• Low-velocity submaximal eccentric exercises of the hamstring muscles allows better recovery of full extension (102).	Very low	Weak recommendations (2B) for due to limited evidence (paucity of studies of low-quality).
Electric stimulation	• Electrostimulation resulted in a statistically significant improvement in patients' walking speed. There was also a carry-over effect after the discontinuation of treatment. No effect was observed on HSS knee	Low	Weak recommendations (2B) for due to limited evidence (paucity of studies of low-quality).

Physical therapy modality	Evidence in the literature	Levels of evidence (1)	Grades of recommendations (2)
	score and on PCI (83), • Electrical stimulation in combination with physiotherapy can effectively reduce extensor lag and decrease the length of hospital stay (84).	Low	
Transcutaneous electrical nerve stimulation (TENS)	• TENS is not effective in reducing pain in the postoperative management after knee arthroplasty (96).	Moderate against	Strong recommendation (1B) against
Sport after total knee arthroplasty	• Patients should be encouraged to remain physically active for general health and also for the quality of their bone. There is evidence that increased bone quality will improve prosthesis fixation and decrease the incidence of early loosening. Since load will influence the amount of wear exponentially, only activities with low joint loads such as swimming, cycling or possibly power walking should be recommended. If an activity is carried out on a low intensity and therefore recreational base, activities with higher joint loads such as skiing or hiking can also be performed. It is important to distinguish between suitable activities following total knee and total hip replacement. To recommend suitable physical activities after total knee replacement, it is important to consider both the load and the knee flexion angle of the peak load, while for total hip replacement, which involves a ball and socket joint, the flexion angle does not play an important role. It is prudent to be more conservative after total knee arthroplasty than after total hip arthroplasty for activities that exhibit high joint loads in knee flexion (jogging, ball sports…) (78).	Not applicable	Not applicable
Osteopathic manipulative treatment	• The osteopathic manipulative treatment in addition to standard care does not appear to be efficacious in this hospital rehabilitation population after knee or hip arthroplasty (94).	Moderate against	Strong recommendation (1B) against.

4.3 GENERAL CONCLUSION ON THE LITERATURE REVIEW

The trade-off between possible benefits and risks, burden, costs… must be evaluated before implementing any physiotherapy technique. Possible risks, burden and costs related to physiotherapy are usually minor compared to other treatments such as surgery, medications… This phenomenon partly explains why so many varied empirical physical therapy techniques are still used. Likewise, sizes of effects of numerous physiotherapy treatments are relatively modest, which renders the assessment of the efficacy more difficult for the physiotherapist and for the patient. Finally, estimating the effect of a physical therapeutic modality is also difficult due to the presence of many confounding effects: natural recovery, association with other therapeutic modalities, positive psychological effect…

When reviewing literature on commonly used physical therapeutic modalities, it is striking to see the amount of low-quality trials that have been conducted aiming at establishing the efficacy of such treatments. Hence, only few physiotherapy techniques may be considered as evidence-based. On the other hand this review pointed out some techniques that should clearly be abandoned due to good evidence against their effectiveness. In the vast field of physiotherapy the major need for good-quality research is obvious.

Nevertheless, "The absence of evidence should not be interpreted as an evidence against". In other words, evidence-based techniques should definitely be preferred. If no evidence is available, experts' opinions might help before evidence becomes available. Such a situation is not satisfying as it often leads to the multiplication of varied cost-consuming ineffective and possibly dangerous techniques. The only way to avoid this is to promote good-quality research and to ensure that physiotherapy practice becomes more and more evidence-based in the future.

5 SURVEY OF PATHOLOGIES TREATED IN BELGIAN PHYSIOTHERAPY, TREATMENT MODALITIES AND FUNCTIONAL TESTS USED (OUTPATIENT CARE)

5.1 BACKGROUND

Physiotherapy (outpatient care) is delivered in Belgium mainly within a fee-for-service financing scheme. In 2004, a total of 17,630 physiotherapists billed at least one session to the national compulsory health insurance (INAMI/RIZIV); 15,874 (90%) of them billed at least one service that took place in an outpatient setting (i.e., sessions of type Ia, II, and VI) (Source: INAMI/RIZIV data). No quantitative data did exist on the type of pathologies treated by physiotherapists in outpatient care, nor on physiotherapeutic treatment modalities applied, nor on the functional tests used to determine the patients' evolution. Indeed, an analysis of INAMI/RIZIV databases of billing codes does not permit any analysis in these respects. The objective of this study was therefore to establish a "picture" of the current state of community physiotherapeutic practice in Belgium, namely to determine which pathologies are the most frequently treated, which treatment modalities are generally applied and whether they are evidence-based , and which standardised functional assessment tools are used to determine the patients' evolution. Only selected results are presented here; the complete report and more detailed data can be found in the appendix of the chapter 4 (4.A).

5.2 METHODS

5.2.1 Sampling

The *universe* of the study (i.e., the population of interest) was all physiotherapists (15,874) in Belgium who billed to INAMI/RIZIV at least one session in outpatient care in 2004. Outpatient care is defined here as care that took place either at the physiotherapist's private practice, or at the patient's home, or at the patient's nursing home (billing codes within INAMI/RIZIV categories Ia, II, and VI). This definition excludes physiotherapy in day care centres or residential care for handicapped persons as these ones fall under a different funding mechanism in Belgium. However, for practical reasons, the *sampling frame* was made up of all physiotherapists in Belgium who billed at least 1000 sessions in outpatient care in 2004 (10,440 physiotherapists or 66% of the universe of the study) to insure that each respondent would contribute to a sufficient number of sessions. Sampling was done by INAMI/RIZIV. Note that these 10,440 physiotherapists account for 93% of all sessions billed in outpatient care in 2004 (Source: INAMI/RIZIV).

We calculated that 138 respondents would be needed to estimate practices reported by 10% of the participants with a desired statistical precision of at least 5%. Given the expected low response rate, a simple random sample of 2000 physiotherapists was drawn from the sampling frame. Each physiotherapist can be considered as a cluster of sessions (i.e., simple random sampling of physiotherapists and cluster sampling of sessions).

5.2.2 Questionnaire development

The questionnaire was initially developed in French by UCL and KCE, and pre-tested with 15 French-speaking physiotherapists for clarity, acceptability, and feasibility, as well as for timing (target was no more than 30 minutes needed to fill out the questionnaire). The final version was then translated into Dutch. French and Dutch versions of the questionnaire can be found in Appendices 4.A and 4.B. The questionnaire included:

- Basic demographic data of the respondent.
- A record of all patients seen on one day: age, sex, reason(s) for treatment (*motif de consultation / motief van raadpleging,* open question), and Belgian nomenclature codes of the sessions. The day to be recorded was randomly assigned and could not be chosen by the physiotherapist itself.
- Treatment modalities for 5 common pathologies: acute low back pain, knee total replacement, hemiplegia/hemiparesis, gait disorders in the elderly, and bronchiolitis in infants/children. These questions were applied to the last patient treated by the physiotherapist for that problem, if he/she was seen in the previous week.
- Functional tests for the 5 common pathologies described just above.
- Knowledge of the International Classification of Functioning, Disability, and Health (ICF) concepts.

5.2.3 Data collection and data analysis

Data were collected between April and May 2006 through a mail survey without reminder. Data entry and analysis were done with SigmaStat for Windows Version 3.11. The 'reason(s) for treatment' were classified by two certified physiotherapists into the main chapters of 1) the International Classification of Primary Care, 2nd edition (ICPC-2) and 2) the International classification of diseases, 10th revision (ICD-10). ICPC chapters are based on body systems and follow the principle that localization has precedence over aetiology; only ICPC classification is presented here. Statistical tests used are mentioned where appropriate.

5.3 RESULTS

Out of 2000 questionnaires mailed, 367 (18%) were returned completed and 34 (2%) were returned not completed (wrong address or ineligible physiotherapist). Questionnaires returned but not completed were analysed as non-respondents. On average, each of the 367 respondents recorded 14 sessions (total: 5300 sessions). As not all records had usable information for all variables, the denominators can differ slightly from one table to another[b].

5.3.1 Demographic data: physiotherapists

Mean age of 367 respondents was 43 years old (SD: 10) and was similar to that of non-respondents (Man-Whitney rank sum test, p=0.25). Respondents did not differ significantly from non respondents as regards gender (see table1), language, (see table 1), and geographical distribution (data shown in Annex).

[b] Billing codes are available for 5244 sessions. Information about the 'reason(s) for treatment' was available for 5210 sessions but 5416 reasons for treatment ('*motif de consultation / motief van raadpleging*') were considered as there can be more than one reason for the treatment.

Table 1. Gender and language of physiotherapists: respondents and non-respondents

Variable	Respondents N = 367	Non-respondents N = 1633	p-value*
Gender			0.33
Males	219 (60%)	926 (57%)	
Females	148 (40%)	707 (43%)	
Language			0.71
French	153 (42%)	661 (40%)	
Flemish	214 (58%)	972 (60%)	
Total	**367 (100%)**	**1633 (100%)**	

* χ^2 test

5.3.2 Demographic data: patients

Table 2. Distribution of patients per age and gender (N = 5170 sessions)

Age category	Males	Females	Missing values	**Total**
18 years	189 (04%)	169 (03%)	0 (00%)	358 (07%)
18-59 years	923 (18%)	1254 (24%)	1 (00%)	2178 (42%)
60 years	875 (17%)	1737 (34%)	1 (00%)	2613 (51%)
Missing values	7 (00%)	14 (00%)	0 (00%)	21 (00%)
Total	**1994 (39%)**	**3174 (61%)**	**2 (00%)**	5170 (100%)

5.3.3

5.3.4 Setting of sessions

Table 3. Distribution of sessions per setting: survey data (N = 5244 sessions with billing codes) compared with INAMI/RIZIV data (2004)

Rehabilitation setting	Survey data N (%)	INAMI/RIZIV (2004)* N (%)
Private practice (Ia)	3369 (64%)	17,030,198 (58%)
Patient's home (II)	1530 (29%)	9,789,962 (34%)
Nursing home (VI)	345 (07%)	2,378,265 (08%)
Total	**5244 (100%)**	**29,198,425 (100%)**

* Source: INAMI/RIZIV

Table 4. Distribution of sessions per type of pathology: survey data (N = 5244 sessions with billing codes) compared with INAMI/RIZIV data (2004)

Type of pathology	Survey data N (%)	INAMI/RIZIV (2004)* N (%)
C: common pathology	2170 (41%)	11,687,511 (40%)
E: Heavy pathology	1488 (28%)	10,711,831 (37%)
P: Perinatal pathology	36 (01%)	224,337 (01%)
FA: pathology of acute FA list	1083 (21%)	4,737,490 (16%)
FB: pathology of chronic FB list	467 (09%)	1,837,256 (06%)
Total	**5244 (100%)**	**29,198,425 (100%)**

* Source: INAMI/RIZIV

5.3.5 Reasons for treatment

Table 5. Reasons for physiotherapeutic treatment per ICPC-2 chapter (N = 5416 reasons for treatment)

ICPC-2 chapter	N	% total
Musculoskeletal	**2696**	**50%**
Fracture (all locations)	333	6%
Low back pain	332	6%
Shoulder syndrome (e.g., adhesive capsulitis, rotator cuff syndrome, shoulder lesions)	240	4%
Cervicalgia	204	4%
Sprain/strain of joint (all locations)	177	3%
Back syndrome (e.g., lumbago with sciatica, dorsal/lumbar arthrosis, collapsed vertebra, intervertebral disc displacement)	174	3%
Osteoarthrosis	165	3%
Bursitis/tendonitis/synovitis	152	3%
Neck syndrome (e.g., cervical arthrosis, cervicobrachial syndrome)	145	3%
Dorsalgia	91	2%
Rheumatoid/seropositive arthritis	89	2%

Table 5. Reasons for physiotherapeutic treatment per ICPC-2 chapter (N = 5416 reasons for treatment)

ICPC-2 chapter	N	% total
Muscle pain	58	1%
Other	536	10%
Neurological	**1158**	**21%**
Gait, balance disorders	262	5%
Hemiplegia/hemiparesis	200	4%
Parkinson	174	3%
Multiple sclerosis	83	2%
Peripheral neuritis/neuropathy	77	1%
Cerebral palsy	69	1%
Other	290	5%
General and unspecified conditions	**506**	**9%**
Total hip replacement	134	2%
Total knee replacement	120	2%
Other	252	5%
Cardiovascular	**466**	**9%**
Stroke/cerebrovascular disorder	231	4%
Lymphoedema/oedema (including post-mastectomy)	192	4%
Other	43	1%
Respiratory	**279**	**5%**
COPD	137	3%

Table 5. Reasons for physiotherapeutic treatment per ICPC-2 chapter (N = 5416 reasons for treatment)

ICPC-2 chapter	N	% total
Bronchitis/bronchiolitis	66	1%
Other	76	1%
Psychological	**132**	**2%**
Child: delayed milestone	60	1%
Other	72	1%
Urological	**044**	**1%**
Pregnancy, childbearing, family planning	**034**	**1%**
All other chapters	**101**	**2%**
TOTAL	**5416**	**100%**

5.3.6 Treatment modalities and functional tests for selected pathologies

Physiotherapists who had treated one patient in the previous week for selected pathologies, reported how they had treated this particular patient. As one objective of this study was to assess practices against evidence-based physiotherapy, only practices where strong or moderate evidence does exist for or against the practice are presented here. The use of standardised functional assessment tools is also reported. (For literature reviews on evidence-based practices and standardised functional tests, see the relevant parts of this report).

5.3.6.1 Acute low back pain

Out of 367 respondents, 255 (69%) reported treating a patient in the preceding week.

Table 6. Practices when treating a patient with acute low back pain (N = 255 physiotherapists)

Treatment modality	Reporting practice N (%)	Level of evidence
Education of the patient (no information on content)	220 (86%)	**Moderate to strong evidence for** educational interventions (advice to stay active and avoid bed rest).

Massage	192 (75%)	**Moderate evidence for** superior positive effect compared with passive therapeutic modalities such as relaxation, acupuncture and self-care education.
Mobilizations	188 (74%)	All classified as "exercise therapy". **Moderate to strong evidence for** a positive but modest short-term effect of exercise therapy. Low intensity exercises seem ineffective but no clear evidence on the frequency, duration and intensity of exercises that should be recommended. Muscle strengthening is no more effective than other types of exercises.
Home exercises	157 (62%)	
Stretching	139 (55%)	
Muscle strengthening	111 (44%)	
Spinal manipulations	98 (38%)	**Moderate evidence for** spinal manipulations as they are more effective than no treatment, and as effective as traditional physiotherapeutic treatments. Safety is poorly documented.
Spinal tractions	46 (18%)	**Moderate to strong evidence against** spinal tractions as intermittent and continuous traction is ineffective to treat low back pain in general, with or without sciatica.

Out of 367 physiotherapists, 325 (89%) who answered the questions on functional assessment of low back pain, 10 (3%) reported the use of a standardised tool (i.e., Roland-Morris Low Back Pain and Disability questionnaire, Dallas-Pain questionnaire, and SF-36 scale).

5.3.6.2 Total knee replacement

Out of 367 respondents, 172 (47%) reported treating a patient in the preceding week.

Table 7. Practices when treating a patient with total knee replacement (N = 172 physiotherapists)

Treatment modality	Reporting practice N (%)	Level of evidence
Home exercises	123 (72%)	**Moderate evidence** that patients who completed a home exercise program performed similarly to patients who completed regular outpatient clinic sessions in addition to the home exercises.
TENS	4 (02%)	**Moderate evidence against** TENS as it is not effective in reducing pain in the postoperative management after total knee replacement.

Overall, 263/367 respondents (64%) answered the questions on functional assessment of total knee replacement; 8/263 (3%) reported using the Lower Extremity Functional Scale (LEFS), one of the few validated functional assessment tools.

5.3.6.3 Hemiplegia/hemiparesis

Out of 367 respondents, 255 (69%) reported treating a patient in the preceding week.

Table 8. Practices when treating a patient with hemiplegia/hemiparesis (N = 255 physiotherapists)

Treatment modality	Reporting practice N (%)	Level of evidence
Mobilizations	241 (95%)	**Moderate evidence** that patients with stroke should be mobilized as soon as possible after stroke.
Gait rehabilitation	212 (83%)	**Strong evidence for** the implementation of gait rehabilitation techniques. Task-specific techniques should be preferred to impairment-focused approaches (**weak to strong evidence**).
Muscle strengthening	200 (78%)	**Strong to moderate evidence for** strengthening exercises of targeted weakened muscle groups. **Moderate evidence** that strengthening exercises improve independence in activities of daily life.
Balance rehabilitation	195 (76%)	**Moderate evidence for** coordination and balance exercises as they improve level of safety in activities of daily life. **Strong evidence for** task-oriented exercise training to improve balance.
Functional rehabilitation (ADL)	135 (53%)	**Strong evidence for** task-specific training to improve performance of selected tasks.
Aerobic exercises	51 (20%)	**Strong evidence for** cardiovascular training to improve fitness through large muscle exercises (e.g., walking, treadmill, stationary cycling). Aerobic exercises is thus recommended to increase independence in activities of daily living, walking speed and efficiency, to improve tolerance to prolonged physical activity and to reduce risk of cardiovascular disease.
TENS	2 (01%)	**Strong evidence against** the use of TENS in post-stroke patients. **Strong to moderate evidence** for high-intensity TENS as it seems effective to treat shoulder pain.

Overall, 294/367 respondents (80%) answered the questions on functional assessment of hemiplegia/hemiparesia. Use of a validated functional assessment tool (i.e., Functional Independence Measure, Berg Balance Scale, Functional Assessment Measure, Fugl-Meyer Test, SF-36 scale, and Barthel Index) was reported by 29/294 (10%) physiotherapists.

5.3.6.4 Gait disorders in elderly patients

Out of 367 respondents, 266 (72%) reported treating a patient in the preceding week.

Table 9. Practices when treating an elderly patient with gait disorders (N = 266 physiotherapists)

Treatment modality	Reporting practice	Level of evidence

	N (%)	
Muscle strengthening	241 (91%)	**Weak to moderate evidence for** a beneficial effect in gait ability.
Aerobic exercises	79 (30%)	**Weak to moderate evidence for** a beneficial effect in gait ability.
Tai Chi Quan	3 (01%)	**Weak to moderate evidence for** Tai Chi Quan as it preserves a high-automated level of motor control necessary for the gait regularity.

Overall, 309/367 respondents (84%) answered the questions on functional assessment of gait disorders in elderly patients. Use of Tinetti Balance and Gait Evaluation test was reported by 250/309 (81%) physiotherapists, and Six-Minutes Walk Test by 123/309 (40%) physiotherapists. These tests are requested by the compulsory health insurance to justify treatment. Use of at least another standardised functional assessment tool (i.e., One-Leg Balance Test, Timed Get-Up-and-Go Test, "Tests d'Anticipation Posturale", Functional Reach Test, Berg Balance Scale, "Test minimum moteur", and Modified Gait Abnormality Rating Scale) was reported by 89/309 (29%) of respondents.

5.3.6.5 Bronchiolitis in infants and children

Out of 367 respondents, 90 (25%) reported treating a patient in the preceding week.

Table 10. Practices when treating an infant/child with bronchiolitis (N = 90 physiotherapists)

Treatment modality	Reporting practice N (%)	Level of evidence
Chest percussion	67 (74%)	**Weak to moderate evidence** that it is **not helpful**.
Assisted coughing	60 (67%)	**Weak to moderate evidence** that it is **not helpful**. It is however recommended by experts' consensus from French-speaking European countries.
Aerosol	58 (64%)	**Moderate to strong evidence against** aerosol, except in specific situations.
Postural drainage	55 (61%)	**Weak to moderate evidence** that it is **not helpful**.
Chest vibration	55 (61%)	**Weak to moderate evidence** that it is **not helpful**.

To our knowledge, no standardised and validated functional assessment tool does exist for bronchiolitis.

5.3.6.6 Knowledge of ICF concepts

Table 11. Knowledge of ICF concepts according to years in practice (N = 346 physiotherapists)

Years in practice	Do you know the ICF concepts?		Total	p-value*
	Yes	No		
	N (row %)	N (row %)	N (col %)	
0-9 years	20 (34%)	39 (66%)	59 (17%)	OR = 4
≥ 10 years	32 (11%)	255 (89%)	287 (83%)	< 0.001
Total	**52 (15%)**	**294 (85%)**	**346 (100%)**	

* χ^2 test

5.4 DISCUSSION

This is the first study in Belgium documenting pathologies seen by physiotherapists in outpatient care. Unsurprisingly, musculoskeletal or neurological disorders account for the majority of the reasons why patients visit physiotherapists (50% and 21% of the reasons for treatment). Hemiplegia/stroke (8%), fractures (6%), low back pain (6%), and gait/balance disorders are the most frequent single reasons for treatment. Shoulder syndrome, cervicalgia, and lymphoedema/edema are also common but to a lesser extent (4%). However, the range of problems seen by physiotherapists is very large.

More than two third of physiotherapists report having treated at least one patient with acute low back pain, one patient with hemiplegia/hemiparesis, and one elderly patient with gait disorders in the preceding week; 47% treated a patient with total knee replacement, and 25% one infant/child with bronchiolitis. Evaluating treatment practices against the evidence-base is limited by the weakness of this evidence-base, as documented elsewhere in this report. For instance, the majority of physiotherapists practice one form or another of 'exercise therapy' when treating acute low back pain, but evidence is lacking as regards the frequency, duration, and intensity of exercises that should be recommended. 'Education of the patient' (in case of acute low back pain), 'gait rehabilitation' or 'balance rehabilitation' for patients with hemiplegia/hemiparesis, are 'generic' practices; their effectiveness depends on which techniques are used (content of the educational information, techniques used for 'balance rehabilitation'…). As this survey did not go into such details, no conclusion can be drawn about the quality of care provided, but the fact that most physiotherapists report using these 'generic practices' make them a potential priority when defining the contents of a continuing education program. Practices where evidence does exist against the practices are still practiced by a minority of physiotherapists (TENS: only 2% of physiotherapists for total knee replacement and 1% for hemiplegia/hemiparesis; spinal tractions: 18% of physiotherapists for low back pain). Bronchiolitis is a difficult case: most traditional techniques learned in physiotherapy schools and thus used by most physiotherapists, do not seem to be helpful. Few physiotherapists are aware of the ICF concepts but a trend towards better knowledge among younger physiotherapists is encouraging.

Several factors could challenge the validity of these results. First, survey data exclude less active physiotherapists (i.e., with less than 1000 sessions billed per year). They represent one third of all physiotherapists practicing outpatient care but are responsible for only 7% of all sessions in outpatient care (Source: INAMI/RIZIV). Second, response rate was low (20%), and although respondents were similar to non-respondents as regards age, sex, language, and geographical distribution, selection bias cannot be excluded (for instance, respondents could be more dedicated physiotherapists, and on average provide a better quality of care than non-respondents). As usual in such a survey what is reported might not be what is done in practice. The proportion of sessions taking place in patient's home was less in the survey than in the whole INAMI/RIZIV database (29% vs. 34%). Similarly, the proportion of heavy pathologies was less encountered in the survey than in the INAMI/RIZIV database (28% vs. 37%). Thus, survey data underestimates pathologies treated in patient's home and heavy pathologies, creating a bias when analyzing reasons for treatment. Keeping in mind their limitations, these data can still be seen as the first ones describing the global features of community physiotherapy in Belgium, in terms of pathologies encountered, treatment modalities applied, and functional tests used in outpatient care.

5.5 CONCLUSIONS OF THE SURVEY

Physiotherapists in Belgium treat a wide range of different pathologies with hemiplegia/stroke, fractures, low back pain, and gait/balance disorders being the most frequent single reasons for treatment. Overall, evidence has been found in the literature for the most common treatment modalities applied by Belgian community physiotherapists to treat low back pain and hemiplegia/hemiparesis. Standardised functional assessment tools are rarely used by physiotherapists although they consider the patient's functional status as the key element in the establishment of the treatment planning. Finally, the ICF concepts are known only by a minority of Belgian physiotherapists. This information should be taken into account when developing the curriculum for a continuing education program aiming at improving evidence-based physiotherapy in Belgium.

6 CONSIDERATION ON THE DESIGN OF A PILOT STUDY TO BASE THE BELGIAN NOMENCLATURE ON THE FUNCTIONAL STATE OF THE PATIENT

On the basis of this scientific knowledge, is it possible to propose a survey design for collecting patient-related information in order to adapt the Belgian community physiotherapy reimbursement system to a system based on a functional evaluation of the patient? The answer will be split up into two parts. The first one deals with the technical aspects of the feasibility study itself, the second one analyzes the potential implications of the implementation at the policy level.

The main concern of this pilot study is to assess the relationship between the functional status of the patient and the estimated treatment duration.

Functional data could be analysed with the Rasch model. This model prescribes that the items of a test define increasing levels of achievement (e.g., functional independence) and allows the level of achievement of the patient to be estimated along the scale defined by the items. Thus the coherence of patient scores can be used as a data quality control tool since a patient should be able to achieve easy item and should be unable to achieve hard items, as compared to the patient's level of achievement. This model can be used to calibrate each functional scale (i.e. determine the level of achievement of each item) and also allows the metric properties of functional tests to be assessed for the particular patient sample (reliability, validity, measurement precision). Moreover, whenever the data fits the model, it allows raw functional scores to be converted on a linear scale in order to follow the patient's recovery on a linear scale and make quantitative comparisons of functional states over time. Once functional scales are calibrated, the relationship between the patient's functional status and the treatment length can be studied with regression techniques. Treatment duration can be expressed as the number of physiotherapy sessions. The regression will be studied for the whole patient sample in each diagnostic group and for sub samples in order to address each specific question of the study.

The estimated duration will then be applied as an intermediary to establish reimbursement levels. Function will be measured with selected scales in the body, activities and participation dimensions of the International Classification of Functioning, Disability and Health (ICF). Ideally, the analyzed treatment duration would relate to the highest (stable) improvement in functional outcome that can be attained through therapy. The most appropriate definition of "first treatment session" in the protocol would concur with the first physiotherapy session administered to the patient following initial diagnosis by the referring physician. The final treatment session would ideally be defined as the last session of "that session package allowing for maximum stable improvement in functional outcome".

As hinted at in the above phrase, the precise nature of the relationship between treatment duration and functional outcome will not only depend on how it is measured, i.e. the applied outcome tests, but also by what is measured. Consequently, it seems logical to lay down homogeneous treatment protocols, preferably evidence-based, for this prospective design. The content of the therapeutic sessions would therefore be standardized. This ideal prerequisite would imply that the selected EBM treatments fit to all patients of the study who are treated by physiotherapists with identical competences to apply the proposed therapeutic modalities.

Stroke and low back pain emerge as appropriate candidates for a pilot test as they were diagnostic groups for which the literature reviews found high quality functional scales and EBM treatments with moderate to high evidence.

Several questions arise with regard to the outline of this pilot study:

- The selection of proper functional scales is not straightforward. At present, we identified scales related to ICF dimensions. Ideally, to establish the degree of exhaustiveness for various scales (how well do scales cover relevant ICF items per dimension for a specific pathology), an item per item comparison at the lowest ICF level with an ex ante established "ICF pathology profile" would be required. It can, however, be assumed that validated and widely established scales implicitly address an "optimal" item set for a given diagnostic group. By "optimal set" we mean a limited set that nevertheless allows for sufficiently large health status differentiation. So-called "ICF core sets"[c], when available for selected diagnostic groups, can be applied to verify this correspondence. A further requirement is that metric tests should allow for proportional comparison of measured outcomes, e.g. by measurement on a linear scale (cf. the Rasch model). A final point of interest concerns the degree of precision selected scales should exhibit. Our research aims to identify maximum therapeutic outcomes. Simultaneously it aspires to discriminate between patients' functional performances and thus to avoid floor and ceiling effects. Consequently, the intrinsic trade-off between precision of measurement and practicality in implementation introduces a further element of uncertainty researchers will have to overcome.
- Determining the maximum stable outcome improvement therapy could achieve may require treating patients well beyond the treatment limits foreseen by current reimbursement. Many patients might need continuing treatment as they suffer from a chronic condition. Curbing the number of observed sessions to currently prevailing reimbursement, however, would only allow assessing whether the current reimbursement scheme is optimal. If this is found not to be the case, researchers would not be able to identify the actual optimal duration. An intermediary solution to this problem may be found in extrapolating outcomes for patients who attained a stable maximum outcome improvement within an a priori established period. Factors discriminating between this sub-sample of patients (e.g. severity of the condition) and the remaining patients could then be applied for simulating overall patient outcomes. Evidently, several far-reaching assumptions would underlie such estimates and supplementary demands on the (sub-)sample size will be raised. Another option should be to test the optimal duration of treatment without any limit in the number of sessions: the feasibility of this option also raises questions.
- The above paragraph assumes that the objective of physiotherapy sessions is always an improvement in the functional status of the patient. In chronic diseases, the objective might also be the stabilisation of the current functional state while in other cases, a functional decline will be slowed down by the treatment. For those patients, the application of functional improvement's curve should be interpreted differently.
- It is unlikely that we will have information on the "natural baseline" outcome scores for untreated patients would follow. Implicitly we would therefore assume all variations in functional outcome are caused by the ongoing therapy.

[c] "ICF core sets" have been developed in collaboration with the WHO for a variety of chronic conditions including low back pain and stroke.

- Many other disease and patient related factors influence the number of required treatment sessions. Hence, the relationship should be set up in a wider analytic framework to incorporate demographic and clinical variables. Questions, however, arise as to which extent such a detailed analysis would be feasible. The size of the sample should be large enough to take into account the variability of most confounding factors. The survey found 106 physiotherapists prepared to collaborate in this pilot study. These physiotherapists reported to have treated a total of 132 stroke patients and 96 low back pain patients during one working day. A standard protocol including patient demographic data, patient clinical data and (aggregate) functional test outcomes may prove to be too detailed for sound multivariate inference given the expected sample sizes.

Once our prospective research has allowed us to establish the required relationship(s) between therapeutic effect and treatment duration, the findings should be applied as a means to optimize current reimbursement for selected diagnostic groups, either by allowing for individualized test-dependent reimbursement or by setting overall treatment packages applying to similar patients.

The first approach would somehow involve physicians, physiotherapists and/or patients scoring functional outcomes and directly influencing reimbursement levels. This policy option falls short on various critical points:

- The number of scored items and possible scoring outcomes can be considerable, making for an unmanageable array of potential reimbursement categories. This nomenclature system could be even more complex than the current one, that the physiotherapists already criticize as entailing a high administrative workload:
- Our survey found a wide dispersion of physiotherapy care across various diagnostic groups. The extension of this system to a large number of other diagnostic groups would be required in order for it to cover real life physiotherapy practice. Consequently, the manageability of such a system would a fortiori be even more questionable.
- The consequence of this system should be that the prescriber of the sessions would be the same person as the provider of care. The potential consequences of this situation might be alike to those of the current French reimbursement system i.e. it implies a large scale control policy to verify the concordance between the results of the functional tests performed by the physiotherapist, the number of sessions and the patient's functional evolution. The implementation of this control system raises serious practical issues in France.

The second policy option would result in setting overall optimal numbers of treatment sessions for two sets of patients grouped according to broad diagnostic criteria. It would appear advisable to publicize the standardized treatment protocols that served to establish these optimal treatment levels, creating a natural incentive for physiotherapists to adopt uniform standards of care. This type of reimbursement system involves a relatively broad, but nevertheless intrinsically needs-based attribution of care provision. As such, it could constitute a valuable alternative to the current reimbursement scheme.

The optimal implementation of a reimbursement based on the functional status implies that all physiotherapists will apply optimal treatments as defined and used for the design of the pilot test.

Both policy options, however, suffer from one fundamental drawback. In a context of limited (and, consequently, perhaps insufficient) overall financial means, setting equitable reimbursement levels for patients belonging to various diagnostic groups, would require preliminary knowledge on the relationships between functional outcome and optimal treatment duration for all groups. As the combined stake of the selected diagnostic

groups in global physiotherapy care is estimated at less than 15%[d], a vast research effort would have to be undertaken to construct outcome scores and determine treatment protocols for the multitude of remaining diagnostic groups.

[d] Respectively 8,27% and 6,37% of attributed treatment sessions for "stroke" and "low back pain".

7 CONCLUSIONS

One main objective of this project was to study the feasibility of adapting the reimbursement system of outpatient physiotherapy in Belgium. In particular, this study analyzed the hypothesis of taking into account the functional status of the patient to reimburse physiotherapy.

7.1 INTERNATIONAL COMPARISON OF PHYSIOTHERAPY SERVICES

The first part of this study analyzed the organization of outpatient physiotherapy in selected countries: the results did not show any reimbursement system exclusively based on the functional assessment of the patient. In particular, none of the insurance schemes/benefit schemes in the observed countries formally relate to the ICF concepts, except for the coverage of a specific well defined condition. The countries with a fee for service system generally ceil the number of reimbursed sessions by setting various limiting rules. Only the French system is an exception, as the physiotherapists themselves can justify the number of sessions performed. The main drawback of this "prescriber/provider" system is the need for a strict control policy by the health insurers.

The analysis of the foreign systems highlighted that most countries have a growing interest for quality improvement initiatives. Quality standards for the physiotherapy profession are either linked to a voluntary registration system or compulsory for all practicing physiotherapists. Some countries are coupling the accreditation of physiotherapists to financial incentives.

In most countries the physiotherapist scientific organizations play a major role in the development of quality improvement initiatives. In Belgium, the Flemish scientific association for physiotherapists launch this year a quality management program that could be promising as a first step for future quality initiatives in Belgium. On a larger scale, one outstanding example of quality improvement initiative is the set of quality standards and the audit tools developed by the World Confederation for Physical Therapy.

The second part of the study analyzed the feasibility of a survey design for collecting information on the functional status of patients in order to use this status as a basis for the Belgian reimbursement system. The design of this survey required complementary information relating to three domains: the current activities of physiotherapists in Belgium, the availability of valid functional evaluation tests and the evidence for the treatment of conditions seen by the physiotherapist. This was achieved respectively through a survey among physiotherapists working in outpatient care, a literature review of functional tests and a literature review of evidence-based treatments.

7.2 LITERATURE REVIEW ON FUNCTIONAL ASSESSMENT IN PHYSIOTHERAPY

High quality instruments were identified for four diagnostic groups treated in outpatient physiotherapy. These functional tests covered essentially the body dimension and the activities dimension of the International Classification of Functioning, Disability and Health (ICF). Although these dimensions are the most pertinent to the current practice of physiotherapy, it is important to notice that in some diagnostic groups the treatment may be focused on just one dimension. For instance, the main goal of the treatment might be to recover mobility and strength (body dimension), the activities being not perturbed. The participation dimension of the ICF can partially be addressed by physiotherapists, but it is important to emphasize the role of other health care professionals in the rehabilitation of the patient's participation.

7.3 LITERATURE REVIEW OF PHYSICAL THERAPY TREATMENTS FOR SPECIFIC CONDITIONS

The literature review on evidence-based treatments concluded that only limited evidence is available for many physiotherapy techniques used in the daily practice. There is an obvious need for further scientific research in physiotherapy to provide sources of evidence relating to specific conditions and specific techniques currently used in physiotherapy. However, for specific conditions (stroke, low back pain), clear evidence-based treatments were identified whereas the literature provided evidence against a few other ones still seldom used.

7.4 RESULTS OF THE SURVEY AMONG PHYSIOTHERAPISTS WORKING IN OUTPATIENT SETTINGS

A major finding of the survey among physiotherapists in Belgium is the diversity of conditions treated in daily practice (the ten most frequent conditions did not represent half of all sessions recorded). A second finding is that the functional evaluation of the patient in Belgium seldom relies upon standardized functional scales: the major assessment tools used are elements of the clinical examination (e.g. anamnesis, muscular testing, palpation). Unfortunately, there is little evidence in the literature that this examination leads to an objective assessment of the functional status of the patient. Finally, few respondents knew about the ICF concepts and even less of them used it in their practice. This emphasizes the need for specific training and continuing education on the conceptual framework proposed by this classification and its relation to the functional evaluation scales.

7.5 LINKS BETWEEN THE RESULTS OF THE SURVEY AND THE LITERATURE REVIEWS

Three groups of diagnoses were identified in the literature reviews i.e.:

- diagnostic groups for which both evidence-based treatments and valid functional scales are available, such as stroke and low back pain;
- diagnostic groups with evidence-based treatments described in the literature but for which no valid functional scale was found as for example gait rehabilitation in the elderly;
- diagnostic groups for which neither evidence-based treatment nor valid functional scale is described in the literature such as bronchiolitis and total knee replacement.

For most conditions cited in the top ten conditions of the survey, the literature review did not identify any validated instrument to evaluate the patient's functional status. Low back pain and stroke were the only diagnostic groups for which both functional scales and evidence-based treatments were available. Interestingly, they are also the conditions most often treated in community physiotherapy in Belgium. The high quality functional tests found for low back pain and stroke cover essentially the body dimension and the activities dimension of the ICF. These dimensions are the most pertinent to the current practice of physical therapy.

The results of the survey also highlight the variability of use of EBM techniques by the physiotherapists: some techniques are reported by one of out five physiotherapists while other ones were mentioned by four out of five respondents. On the other hand, techniques for which there is clear evidence against their use are also reported by a proportion of the respondents. These findings among a selected sample of respondents raise questions about the implementation of EBM physiotherapy in the practice.

7.6 CONSIDERATIONS ON THE DESIGN OF A PILOT STUDY TO BASE THE REIMBURSEMENT SYSTEM ON THE FUNCTIONAL STATUS OF THE PATIENT

The results of this project were a prerequisite to reflect on a possible use of the functional status of the patient for reimbursement modalities. Currently, the nomenclature is only based on the duration of an individual treatment session. The number of reimbursed sessions is ceiled to 18 sessions, except for serious specific conditions (E and F lists). The main problem is that no link has been established so far between the functional status and a justifiable duration of treatment.

This project concludes that the ICF classification is not adapted to be used in any reimbursement system. This classification proposes a valuable conceptual framework for studying and assessing the consequences of a health condition in clinical practice. Unfortunately, the resulting classification is quite cumbersome and results in a sophisticated combination of items to describe accurately the functional status of the patient. The practical modality to use such a complex classification by different physiotherapists in a reimbursement system appears impossible: the survey showed that Belgian physiotherapists care for a huge number of conditions, with different degrees of severity and variable evolutions. The use of a unique score corresponding to a nomenclature code is unrealistic.

The design of a pilot study using functional scales could rely on other validated instruments than the ICF. This option has been analyzed in the last chapter of this report. It requires a selection of conditions for which functional evaluation scales and EBM treatments are available. Stroke and low back pain were the two conditions that answered to these requirements.

Many questions came up in relation with the feasibility of this pilot study and its implementation at the policy level i.e., the need for an homogeneous treatment scheme to all patients of the study, the cut off point to be set on the improvement curve, the difficulty of taking into account the natural disease history, the isolation of the effect of the treatment versus all other confounding factors. If those questions find an answer, the implementation of such a system also needs to reflect on its practical consequences in terms of dissemination on the field, manageability and potential complexity of the resulting nomenclature. Increased control policies will also result from this new reimbursement system if the health care provider himself decides on the length of the treatment.

The setting up of this pilot study is proposed for two specific pathologies: the extension of this experience to the whole reimbursement system involving more than hundred medical conditions should be the next step before a wide scale implementation in the Belgian health care landscape.

Key points of the study

- **Very limited evidence exists in the EBM literature to support the use of physiotherapy treatment modalities, although some evidence was found for or against some techniques used for treating specific conditions,**
- **The literature review identified a few valid functional scales relating to four groups of diagnoses, i.e., musculoskeletal conditions, stroke, elderly rehabilitation and brain injury,**
- **Physiotherapists in Belgium care for a high variety of clinical conditions using a large variety of treatment modalities. When the evidence is available, a large proportion use this treatment while some still use treatments for which evidence against has been demonstrated.**
- **The ICF classification is an interesting clinical tool but its use is out of question in a reimbursement system for well identified reasons,**
- **Stroke and low back pain emerge as potential conditions for a pilot study which should test the relation between the functional status and a potential reimbursement system (availability of EBM and valid functional scales),**
- **However this project identified many barriers to overcome before carrying out a study on the use of functional status for the reimbursement. These problems include the diversity of conditions and the difficulty to predict a treatment duration from a limited sample of patients. The policy implications of a reimbursement based on the functional status merit also further analysis,**
- **A new system based on the functional status can unfortunately not rely on any foreign experience as this option does not exist in the analyzed countries.**

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