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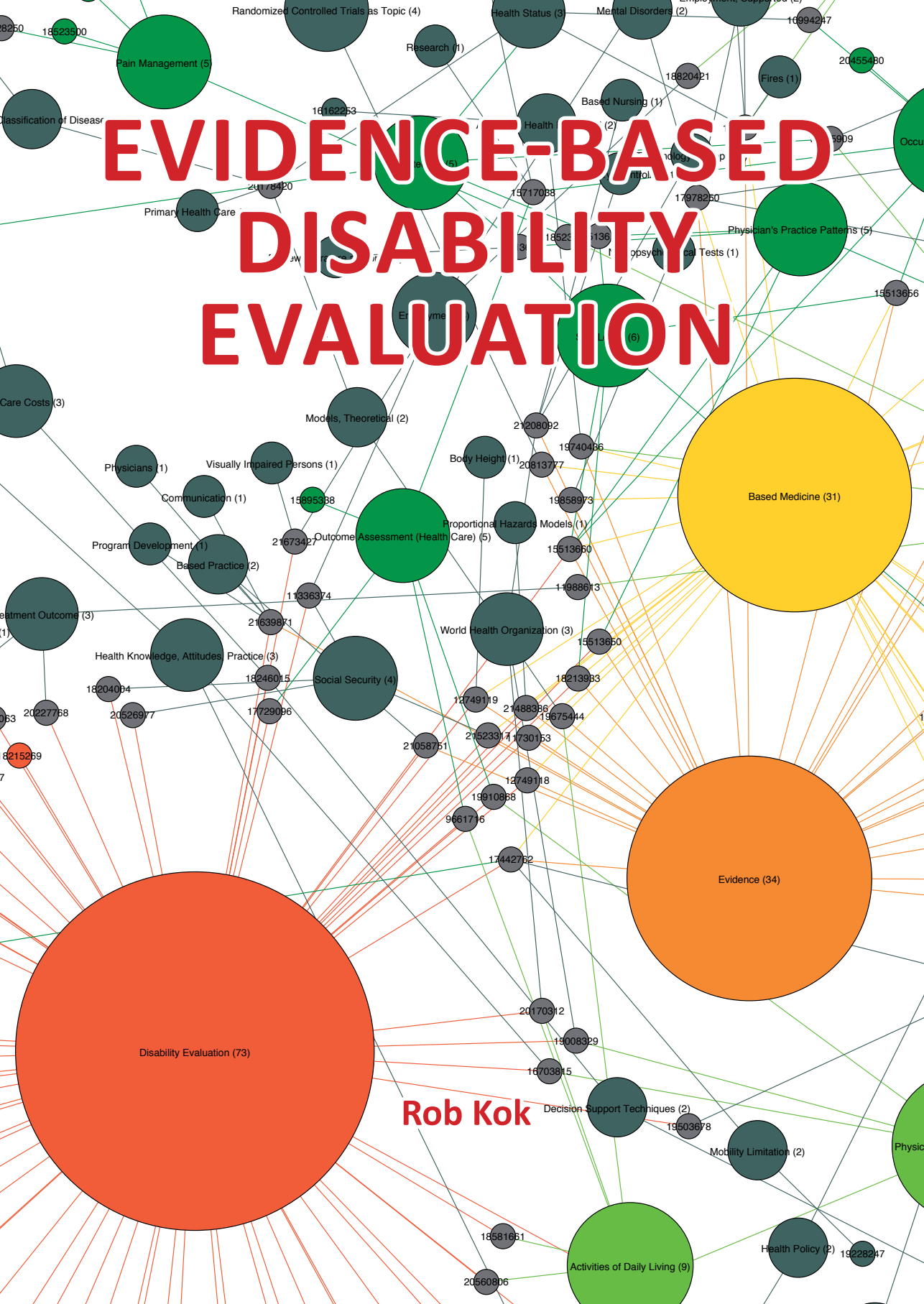
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EVIDENCE-BASED DISABILITY EVALUATION



Rob Kok

EVIDENCE-BASED DISABILITY EVALUATION

door Rob Kok

The studies in this thesis were carried out at the Academic Medical Center, University of Amsterdam, department: Coronel Institute of Occupational Health, Amsterdam, the Netherlands. The Coronel Institute of Occupational Health participates in the Dutch Research Center for Insurance Medicine, which is a joint initiative of the Amsterdam Medical Center (AMC), the Dutch Institute for Employee Benefit Schemes (UWV), the University Medical Center Groningen (UMCG) and the VU University Medical Center (VUmc). The studies and the educational training were funded by the Dutch Institute for Employee Benefit Schemes (UWV).

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Voor mijn kinderen door wie ik ook mijn vader heb leren kennen.

Sanne-Floor en Marijn, ik hou zielsveel van jullie.

Chapter 1

GENERAL INTRODUCTION

WORK DISABILITY AND DISABILITY EVALUATION

In many high-income countries and for workers in the formal economies in a growing number of mid-income and developing countries, financial consequences as a result of a handicap, disease or injury, are (partly) counterbalanced by social security legislation offering work disability benefits compensating for loss of income as a form of basic income security, and free or affordable access to appropriate health care and reintegration facilities. In the Netherlands, insurance physicians are responsible for assessing and evaluating the extent and prognosis of work disability and for determining whether the disability is a result of disease or injury. Work disability evaluations in the Netherlands in combination with assessment of labour experts, enable social security funds to allow a disability pension or to provide concrete rehabilitation and retraining facilities. Establishing the origin, of the disease, especially deciding if there is an occupational disease or not, does not form part of the evaluation in the Netherlands, unlike in, for example, Canada and USA in the evaluation of workers' compensation claims. In this thesis, we refer to the tasks of insurance physicians as 'disability evaluation'. In accordance with the framework of the International Classification of Functioning, Disability and Health [1], participation, including employment or work disability, is conceptualized as the result of interactions between a number of components. A central component in this model is the health condition, disorder or disease, a second component is the consequence of the health condition at the level of body functions and structures, such as limited blood flow in the heart muscle after a myocardial infarction. A third component is described as limitations in activities, e.g. limited ability to walk caused by impaired blood flow to the legs. External environmental factors such as healthcare consultations, rehabilitation and retraining programs followed and social support by the supervisor at the job or by family, but also personal factors such as motivation, present skills and job-related capacities, can have a great impact on the chances for work participation or – the opposite – work disability. See also figure 1.

The medical evaluation of work disability, which we define as 'disability evaluation', is accomplished by physicians in most countries in the world [2,3]. Our definition is somewhat different from the one used by de Boer (2007), who uses the term 'disability evaluation' as a term to describe processes in society, starting with a claim by a worker, the subsequent medical evaluation of this claim by the insurance physician and the subsequent assessment of the extent of work disability by the labour expert, ending with the eligibility (or not)

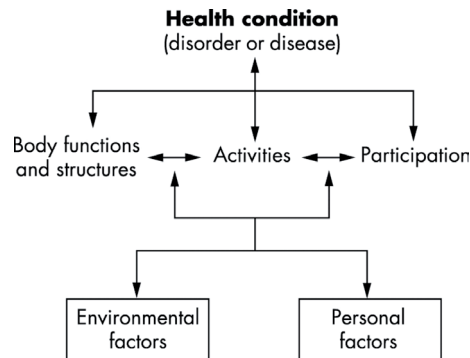


Figure 1: World Health Organization: International Classification of Functioning, Disability and Health (ICF, 2001).

for a disability benefit. He reserves the term ‘evaluation of work disability’ for the medical evaluation by a physician. Other authors use other terms when they refer to the medical evaluation of work disability: Slebus [4], Wind [5], and Dekkers [6] use the term ‘assessment of work ability’, Spanjer [7], Zwerver [8] and Cornelius [9] use the term ‘work disability assessment’.

In line with Anner [2], we prefer to use the term ‘disability evaluation’ in this thesis, congruent with terminology used by international organizations in social security such as the Social Security Agency and the International Social Security Agency.

To emphasize that the evaluation concerns disability related to (paid) work and to distinguish the application in this thesis and related articles from other evaluations such as disability evaluations to monitor the results of rehabilitation interventions, we sometimes use the term ‘work disability evaluation’. Disability evaluation by physicians typically involves the assessment or evaluation of: (1) the actual functional limitations or work capacity of the client; (2) the social and medical history of the client; (3) the feasibility of interventions; and (4) the prognosis of (work) disability [10]. In performing these tasks, a wide variety of medical questions can arise. The answers to these questions are not only vital for the disability evaluation by the physician, they can be crucial for the health, well-being, work participation and financial compensation of the patient, and they may have a substantial social and financial impact.

EVIDENCE-BASED MEDICINE AND EVIDENCE-BASED WORKING

Given the increasing number of medical articles, practising physicians are overloaded with information to substantiate their decision-making with evidence. For instance, PubMed alone comprises more than 23 million citations for biomedical literature. How can professionals search and find relevant literature they can trust? In 1992 Gordon Guyatt coined the term ‘evidence-based medicine’ (EBM) as a new paradigm/doctrine for the practice of clinical medicine [11, 12]. In the beginning the emphasis was on the use of evidence as the only guide to medical decision-making, *as if decision-making is only a rational process*, as Satterfield et al. point out nicely [13]. In 1996 Haynes and colleagues introduced the now renowned ‘three circle’ model depicting how distinct, but overlapping sources contribute to evidence-based practice [14]. Many, also in non-medical disciplines, have adapted this ‘three circle’ model. We appreciate most the picture introduced by Satterfield, first because the decision-making is depicted as a central component, second because the legal context in which disability evaluation takes place is accounted for in the picture showing the ‘environmental and organizational context’ component [13]. We adapted this accordingly into a model for evidence-based practice for disability evaluation, see figure 2.



Figure 2: a model for evidence-based practice for disability evaluation, adapted after Satterfield et al. [13].

Since 1996, EBM is often defined as “the conscientious and judicious use of current best evidence from clinical care research in the management of individual patients” [14]. In

practising and teaching how evidence in practice should be incorporated, a 5-step method has been developed [15]:

1. Ask an answerable question.
2. Acquire the evidence
3. Appraise the evidence
4. Apply the evidence to the patient
5. Assess (evaluate) the EBM process

As the name implies, the method of EBM is developed for finding answers, in the form of scientific evidence, to questions in different medical domains such as diagnosis/screening, therapy/rehabilitation/prevention, side-effects/etiology and prognosis.

We assume that this method is suitable for evidence-related questions of insurance physicians when they perform work disability evaluations. At the start of this research project however, the methods and principles of EBM were not yet being used in the field of disability evaluation in the Netherlands though its use was advocated in several governmental reports [16, 17]. Leading professionals in the field of disability evaluation emphasized the need to connect more with clinical medical disciplines, not only hospital-based disciplines, but also mental health care, primary health and occupational health care, by adopting the method of EBM [18], after strong recommendations for evidence-based occupational health care as early as in 1999 [19], and following several EBM studies at the Coronel Institute of Occupational Health at the Academic Medical Centre of the University of Amsterdam in the area of occupational health [20-29]. In a questionnaire survey in 2005 including 60 insurance physicians, the participants explicitly stated the need for more evidence-based working in their discipline [30]. However, at the start of this research project in 2006, just two guidelines existed in the field of disability evaluation [31, 32] and the Netherlands School of Public and Occupational Health (NSPOH) only introduced teaching EBM for insurance physicians in 2003. Prior to 2005, the absence of a scientific tradition in the field of disability evaluation in the Netherlands probably resulted in the start of EBM being delayed. For these reasons, from within the EBM research group of the Coronel Institute of Occupational Health, together with EBM teachers from the postgraduate training programme for insurance physicians (NSPOH) and in close collaboration with the departments of socio-medical affairs and the training department of the Dutch (National) Institute for (Employee) Benefit Schemes (UWV), we developed and evaluated a comprehensive postgraduate training programme. In

our efforts we strove for and found collaboration with parties outside the field of disability evaluation like the Dutch Cochrane Centre, the Finnish Institute of Occupational Health and information specialists from the Academic Medical Centre in Amsterdam.

We see EBM, propagating that decisions in medical care should (also) be based on the latest and best knowledge, as a necessary prerequisite for good health care. However, it cannot be equated with quality improvement. Paul Glasziou neatly pointed out that EBM and Quality Improvement (QI) are complementary to each other: 'EBM is about doing the right things' whereas QI is about 'doing things right'. In combination, they show us 'how to do the right things right' [12].

OBJECTIVES OF THIS THESIS

The focus of this thesis is on the application of the EBM method in the field of disability evaluation. The main objective of this thesis is to evaluate whether the EBM approach is feasible and effective for insurance physicians in the Netherlands. Specific objectives were the development and evaluation of an EBM postgraduate training programme tailor-made for this field.

OUTLINE OF THIS THESIS

The thesis consists of three parts that largely follow the aim of answering three main questions.

First, we study which questions insurance physicians have, which resources they use, and the applicability of EBM for disability evaluation.

- In chapter 2.1 we present the medical questions physicians have during disability evaluation and the sources they use to resolve these questions. In chapter 2.2 we explore the question if and how EBM, a method successfully used in other medical disciplines, is applicable and useful in the field of disability evaluation. Therefore we study the application of EBM to answer a number of common questions in disability evaluation.

Next, we evaluate whether education and training in EBM enhances evidence-based disability evaluation.

Part two presents the evaluation of two medical training programmes.

- In chapter 3.1 we evaluate the applicability and efficacy of a one-day postgraduate introductory EBM workshop for social insurance physicians working in the field of disability evaluation. The workshop is evaluated in terms of self-assessed knowledge, skills, attitude, self-efficacy and the intention to apply EBM. In addition, we evaluated the effect on social influences such as from supervisor and colleagues on EBM practice, self-efficacy related to EBM, and the actual application of EBM.
- In chapter 3.2 we present the evaluation of a clinically integrated post-graduate training programme in EBM of five days compared with no training. Evaluated outcomes were a higher frequency of evidence-based disability evaluations by physicians using more evidence in their disability reports. Moreover, we evaluated whether this training programme improves the same outcomes that we used in chapter 3.1.

Finally, we explore what conditions could improve the application of EBM and how additional tools for EBM uptake can be constructed

The third part of this thesis is on how physicians would like to proceed with EBM in the field of disability evaluation and on the development of a tool that could facilitate this.

- In chapter 4.1 we present a study in which we explored which visions, experiences and beliefs insurance physicians have towards the (continued) use of the acquired EBM skills in clinical practice.
- In chapter 4.2 a study is presented on the development and evaluation of a search strategy tailored to the task of assessing the prognosis of the disease, the impairments, activity limitations and participation restrictions. This search strategy has the aim to be used by either researchers or practitioners.

In the last chapter, chapter 5, main findings and future perspectives for practice and research are presented.

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Chapter 2.1

What knowledge questions do physicians have while performing disability evaluations and which sources do they use?

Submitted

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ABSTRACT

Background: It is unclear what type of knowledge questions are being asked by physicians performing disability evaluations and if Evidence-based Medicine can answer these.

Aims: We evaluated what type of knowledge questions physicians that perform disability evaluations ask, and what kind of information sources they use most frequently to find answers to these questions.

Methods: Sixty-six social insurance physicians who followed a one-day introductory EBM workshop were provided with a questionnaire including questions on how they kept their expertise up-to-date and what medical questions they had in daily practice in relation to a consult, how often they searched for answers and what sources they consulted. We were interested in a wide variety of sources such as asking a colleague, or checking electronic databases, reading guidelines, exploring websites and handbooks.

Results: Insurance physicians had on average 3.6 knowledge questions per month. Health-related questions were most frequently of a prognostic nature (39%), followed by questions on therapeutic, etiologic and diagnostic aspects of disability evaluations (26%, 17% and 17%). Colleagues were the most frequently used source for an answer (79%). International articles in PubMed/Medline were searched by 21% of the physicians.

Conclusion: Physicians performing disability evaluations would seem to have enough knowledge questions that can be answered using EBM by accessing the scientific literature.

INTRODUCTION

In 2004 the Dutch National Advisory Council on Health Research recommended that Evidence-based Medicine (EBM) should be applied in the area of disability evaluation [1]. Disability evaluation in the Netherlands implies that insurance physicians have the task of assessing and evaluating the extent and prognosis of work disability and of answering the question of whether the disability is a result of disease or injury. Work disability evaluations in the Netherlands contribute to the final decision of social security funds to grant a disability pension or to provide concrete rehabilitation and retraining facilities. The origin or work-relatedness of the disease and disability is not a part of the evaluation in the Netherlands as it is in e.g. Canada and USA in the evaluation of workers' compensation claims.

A national survey in 2005 showed that the physicians performing disability evaluations also wanted to work more in an evidence-based way and that they needed adequate knowledge and skills for a good professional performance [2]. However, it was unclear what type of knowledge questions are being asked by physicians performing disability evaluations and whether EBM can help in answering these questions.

In collaboration with the Netherlands School of Public and Occupational Health (NSPOH), we developed and evaluated a one-day workshop in EBM tailor-made for insurance physicians, the results of which are reported elsewhere [3]. Alongside the evaluation of the effectiveness of this workshop, we took the opportunity, by means of a questionnaire, to find out more about typical knowledge questions in daily practice of disability evaluation and about the types of sources used to resolve the questions. The aim of this study is to establish what type of knowledge questions physicians performing disability evaluations have, and what kind of information sources they use most frequently to find answers to these questions.

METHODS

All physicians (N=66) working in two offices of the Dutch Workers Insurance Authority (UWV) in the Amsterdam area attended a one-day introductory EBM workshop in 2006. We organized four workshops (14-18 physicians each time) that were focussed on the first two steps of the EBM method: formulating an answerable question and effectively searching the literature for an answer.

Questionnaire and outcome measures

Prior to attending the workshop, all participants completed a form including information on personal and work characteristics (e.g. age, years of work experience, and types of disability evaluation prevailing in the Netherlands that the participant was performing). By means of a questionnaire we tried to gain an impression of how the participants kept their knowledge up-to-date and the type of knowledge questions insurance physicians were asking: participants were questioned on how, and how often, they kept their (medical) knowledge and expertise up-to-date; how often, and what health-related questions they have in relation to a consult; how often they searched for answers to questions encountered in disability evaluation practice; and what sources they used such as asking a colleague, or exploring electronic databases, guidelines, websites and handbooks. Most questions had multiple choices as answers. Sometimes more than one answer could be given, e.g. which sources did you consult last month?

RESULTS

Prior to the EBM workshop, all participating physicians (n=66) completed the questionnaire. Characteristics of the participating insurance physicians are presented in Table 1.

Table 1: Baseline demographic characteristics of insurance physicians participating in an EBM workshop (n=66).

Age, mean (SD) in years	48.5	(7.1)
Male, n (%)	37	(57)
Experience as doctor in years, mean (SD)	20.2	(7.0)
Postgraduate qualification, n (%)	55	(85)
Experience as insurance physician in years, mean (SD)	14.4	(7.1)
Hours working on weekly basis, mean (SD)	34	(6.7)

Need for medical knowledge related to a patient consult

Physicians indicated that, on average, they required more information or knowledge during or after a consult 3.6 times a month. When asked what kind of health-related questions were involved, the physicians indicated that most of the time they had prognostic questions (39% of all questions), followed by therapeutic questions (26%), and etiologic and diagnostic questions (both 17%).

When asked what sources they used to resolve these health-related questions, 79% of the physicians asked a colleague for advice, or deferred them until formal meetings with colleagues (46% of the physicians). Handbooks and professional (national) journals were used as indicated by 70% of the participants. A percentage of 21% of the participants used PubMed to find international articles to resolve a specific question (Table 2).

General need for information, keeping-up-to-date

Physicians reported spending 2.2 hours per week in order to keep up-to-date. When asked what sources the participants used, colleagues turned out to be an important source: 89% indicated consulting a colleague when requiring information, while 46 % of the physicians did this more than four times a month. National journals were consulted by about two-thirds of the colleagues at least 1-2 times a month (Table 3). International peer-reviewed medical journals were seldom read during the last month before the workshop (only two of

Table 2: Sources used by insurance physicians when requiring health-related knowledge in relation to a patient consult (n=66).

	N (%)
No opportunity in practice to resolve these questions, look for a pragmatic solution	21 (32)
Ask advice from a colleague	52 (79)
Keep a request for a consultation or meeting with colleagues	30 (46)
Consult handbooks or professional literature (Dutch)	46 (70)
Look for article in PubMed (international)	14 (21)
Otherwise	16 (24)
I have no health-related questions	0 (0)

the 66 colleagues did this). Of the guidelines used, Dutch professional guidelines in the area of disability evaluation were consulted most often (53 % did so at least 1-2 times a month).

Table 3: Number and percentages of insurance physicians (n=66) consulting a number of information sources for their work in the month prior to the EBM workshop.

Sources consulted in times per month	0 times	1-2 times	3-4 times	≥ 5 times
Dutch Journal of Medicine (NTvG), n (%)	23 (35)	22 (33)	20 (30)	1 (2)
Journal for Occupational and Insurance Physicians (TBV; Dutch), n (%)	21 (32)	41 (63)	3 (5)	0 (0)
Medisch Contact (Dutch general journal with mostly policy and common medical practice-oriented articles and opinions), n (%)	22 (33)	23 (35)	21 (32)	0 (0)
Three renowned international occupational health journals (Occupational and Environmental Medicine, Occupational Medicine, Scandinavian Journal of Work, Environment and Health, n (%)	64 (97)	2 (3)	0 (0)	0 (0)
Colleague(s), n (%)	7 (11)	10 (16)	17 (27)	29 (46)
Guidelines for insurance physicians, n (%)	31 (47)	29 (44)	5 (8)	1 (2)
Guidelines for primary health care physicians (family physicians or general physicians), n (%)	52 (79)	13 (20)	0 (0)	1 (2)
Guidelines for occupational physicians, n (%)	43 (65)	20 (30)	3 (5)	0 (0)
Guidelines for medical specialists, n (%)	60 (91)	4 (8)	1 (2)	0 (0)
Other guidelines /handbooks, n (%)	54 (86)	3 (5)	2 (3)	4 (6)

DISCUSSION

Physicians working in the field of disability evaluation indicated having knowledge questions on average 3.6 times per month in relation to a patient consult. In the case of health-related questions, almost two-thirds were of a prognostic or therapeutic origin, and to a lesser extent questions of an etiologic and diagnostic nature. Consultations with colleagues, respectively searching in handbooks or Dutch professional journals, were frequently used sources for answering these questions (79%, respectively 70%). A percentage of 21% of the physicians reported looking for an international article in PubMed/Medline.

Physicians in our study asked on average 3.6 questions per month, which is comparable to the findings of Schaafsma et al. that occupational physicians reported having about one question per week [4].

Interestingly, in an observational study, occupational physicians appeared to have 0.7 questions in one half-day period of consultations, which is more than 5 times higher than in the self-assessment questionnaire. After possible questions were brought to their attention by an observer, another 8.7 questions, called 'latent' questions, were identified for the same time period of half a day [5]. In a study among general internists, general paediatricians and general practitioners, Ely et al. found 5.5 clinical questions per half-day period [6]. We could not find a good reason to explain why insurance physicians would differ in this respect from the other medical disciplines, except that the number of consultations per day may be lower in their practice.

Like many physicians do, the physicians in our study asked their colleagues for advice when they had a knowledge question [7]. This is not without risk, as Schaafsma et al. showed that advice from colleagues and other 'experts' was only reliable when the given advice was actually based on evidence from the literature [7]. The limited value of asking experts for advice was demonstrated in other studies as well [8, 9].

In our study, 21% percent of the participating insurance physicians reported using PubMed in a search for answers in the international literature, which in our opinion is quite high. This may partly be explained by the fact that as many as 95% of the insurance physicians in our study had direct access to scientific databases and articles at the workplace, which is in great contrast to the 39% of the occupational physicians in the earlier study of Schaafsma et al. and a study from McGoll et al. among general practitioners who only had 20% access in the late 2000s for example [4,10]. However we believe an element of social desirability possibly also plays a role here, which is strengthened by the fact that only two physicians

indicated having read three renowned international journals in the occupational health field during the month prior to the workshop.

Although the results of our study are based on self-report data, we conclude that insurance physicians have many knowledge questions that potentially can be answered using the EBM method. The next step will be to provide guidance on how this can best be done.

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Chapter 2.2

Integrating evidence in disability evaluation by social insurance physicians

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ABSTRACT

Objective The aim of this study was to explore applying the method of evidence-based medicine (EBM) to resolve common questions in the field of disability evaluation.

Methods We used three clinical questions corresponding with problems encountered by insurance physicians in daily practice to explore opportunities and barriers. The questions fell under two topics: the prognosis of work ability and the effectiveness of interventions to enhance work participation. We used the four-step EBM strategy: (i) formulation of a clinical question, (ii) searching the literature, (iii) appraisal of the evidence, and (iv) implementation of the findings into clinical practice. We restricted the searches to PubMed (Medline).

Results For rheumatoid arthritis, we found evidence on the prognosis of work disability over a long-term period. For remaining sciatica after lumbar discectomy, we found evidence for the stability of the limitations at this stage. For depression with co-morbid alcoholism, we found evidence that treatment of both conditions would enhance work participation. The searches were effective and efficient. The interpretation of the findings was hampered by a lack of consensus in the literature about outcomes such as the concept of a poor prognosis of work ability.

Conclusions The EBM strategy and methods can be used by social insurance physicians to find and apply evidence for common questions in disability evaluation. The World Health Organization's International Classification of Functioning, Disability, and Health (ICF) model is instrumental in this, although more consensus on central outcome measures is needed. Further research is needed on the translation of evidence into practice. Development of valid specific search strategies for physicians in disability evaluation would improve the implementation of EBM.

BACKGROUND

Restricted participation in social roles is generally considered an adverse consequence of disease. In many cases, restricted work participation results in a loss of economic independence and is a heavy burden for both workers, families, companies, and society. In most industrialized countries, financial consequences are at least partly counterbalanced by disability benefits based on social security legislation. Assessment of entitlement to a disability benefit usually includes a medical examination to evaluate the nature and extent of disability [1–2]. The literature suggests that these work ability evaluations or assessments are usually based on expert judgments of a specified physician and based on administrative rules of the social security organization. Most assessments are not or only limitedly supported by scientific evidence [3–5].

Evidence-based medicine (EBM) is a widely adopted method in clinical medicine of systematically finding, appraising, and using up-to-date research findings as a basis for clinical decisions. It has been shown to be instrumental in clinical specialties, occupational medicine, and general practice [6–8]. The method urges practitioners to find the best evidence for clinical questions by searching literature databases such as Medline, Embase, and PsycInfo, using validated search methods to find appropriate original studies, systematic reviews, and guidelines [9]. However, disability evaluations carried out by insurance physicians differ from clinical evaluations in that the former mainly address the social consequences of a disease. The main task of insurance physicians is to evaluate health-related work disability. Given this focus, it is still unclear if and how the method of EBM can be applied in this field.

Disability evaluations by insurance physicians typically involve the following four tasks: (i) evaluate the social and medical history of the client (ie, make an analysis of the stagnation of recovery and return to work), which is the basis for the next three tasks; (ii) assess the actual activity limitations that arise as a consequence of structural and functional aspects of physical or mental impairments and assess how and to what extent these limitations restrict a patient's work participation; (iii) assess the prognosis of the impairments and the limitations in activities and work participation; and (iv) evaluate ongoing medical treatment, rehabilitation, and guidance given for returning to work, and initiate appropriate interventions if indicated [10]. Physicians worldwide are involved in similar assessments even though national practices can vary considerably in accordance with country-specific social insurance schemes and workers' compensation legislation [1]. The logical coherence between physical and mental impairments, activity limitations, and

restrictions in work participation is a key concept in this assessment, which is in accordance with the World Health Organization's International Classification of Functioning, Disability and Health (ICF) [11] (see also Figure 1).

The ICF visualizes various components and the interaction between them in the development of problems in functioning and disability as a consequence of disease. The added value of the ICF model is that it provides a description of situations with regard to human functioning and disability that can serve as a scheme to organize information and decision-making. In this schematic functioning, we think the ICF model can be instrumental in applying the EBM method: defining the answerable questions and selecting which terms to use in searching especially. Work disability is considered to be a part of the core concept in ICF called "participation". Participation including work disability is seen as the result of complex interactions between various components. A central component is the "health condition", the disorder or disease. A second is the resulting consequence of a disease at the level of "body functions and structures" such as limited blood flow in the heart muscle after a myocardial infarction. A third component is described as (limitations) in activities (eg, limited ability to walk caused by impaired blood flow to the legs). External environmental factors such as healthcare and social support, and personal factors such as motivation and all kinds of skills and capacities can have a great impact on all other components and therefore on work disability.

The objective of this study was to explore whether the method of EBM can be applied to the resolution of common questions in the field of disability evaluation and, further, to explore if the ICF model can be instrumental in this process.

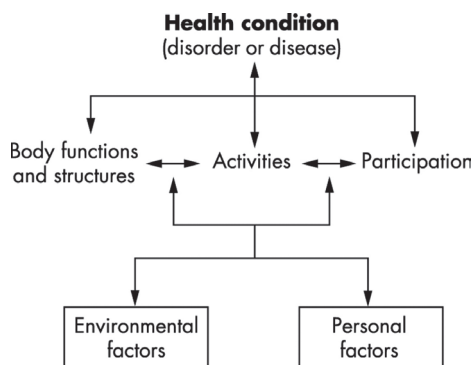


Figure 1: World Health Organization: International Classification of Functioning, Disability and Health (ICF, 2001).

METHODS

Clinical problems and formulating answerable questions

We selected three common case studies and subsequent clinical decision-making that are considered to be representative of the core tasks of social insurance physicians. These case studies are a summary of the most relevant findings according to the physician. On the basis of these problems, questions were formulated using the **Patient-Intervention-Control-Outcome PICO** method, an often used EBM search tool [12] for intervention and prognostic questions. The use of this PICO method has two distinct advantages: first, it is helpful in formulating a question more precisely and, second, it facilitates the identification of good search terms that can lead to useful scientific articles [13].

The case studies fell under two topics: (i) prognosis of work disability and (ii) effectiveness of interventions to enhance work participation.

Prognosis of work disability. Case study A. Four years ago, a 53-year-old male nurse working on an orthopedic ward was diagnosed by his rheumatologist as suffering from rheumatoid arthritis (RA). Notwithstanding early and adequate intensive therapy, the functioning of his hands deteriorated slowly but steadily, which restricted him seriously in manual work such as injecting patients and lifting patients in bed. At the time of evaluation, he had been on sick leave for 20 months. The insurance physician had to decide whether the nurse's work disability would be permanent for the coming years, could subside, or even eventually improve. We searched recent literature for prognostic or predictive factors for work disability among rheumatoid arthritis patients. The clinical question formulated was: "In a 53 year old male nurse, what is the probability of being at work five years after diagnosis of rheumatoid arthritis?"

Prognosis of work disability. Case study B. Two years ago, a male (40-year old) laboratory assistant in a high school underwent a discectomy because of a lumbar disc herniation. Despite his wish to resume all his tasks at work, he was still unable to do so because the sciatica restricted him from lifting objects, an important part of his job. The insurance physician had to evaluate whether it is realistic to expect substantial beneficial change with respect to the patient's limitations in the forthcoming years. We searched the literature for scientific evidence that reflects on the course of sciatica and the various prognostic factors

involved. The clinical question formulated was: “In a 40 year old laboratory assistant, what is the probability of being at work 5 years after lumbar discectomy?”

Effectiveness of interventions to enhance work participation. Case study C. A 43-year-old woman who worked as a school nurse recently developed a mild depression in combination with a history of alcohol abuse for more than 15 years. Functioning well in her job has been proven difficult the last three years, even for limited tasks, mainly because of absenteeism due to excessive drinking. Attempts aimed at alcohol abstinence in the past had failed. To be able to judge her permanent work disability, the insurance physician needed to know if there is an effective therapy for depression in combination with alcohol abuse as a co-morbidity. The clinical question formulated was: “In a 43 year old nurse, is treatment of both alcoholism and depression more effective than treatment of depression alone or than no treatment, regarding return to work or retaining a job?”

General outline of the search strategy, critical appraisal and applied evidence

Search strategy. In this study, we confined our searches to Medline, using PubMed, as this database is relevant for most medical questions and provides easy internet access. Moreover, Medline also includes abstracts of systematic reviews from the Cochrane library, an important resource for evidence on treatment effectiveness. Furthermore, as has been recommended by Verbeek et al. [13] for occupational physicians, it is important for all practitioners in the field of disability evaluation to first become acquainted with the Medline database before using other literature databases. Searching Medline only can also be more cost-effective than previously thought, as was shown by Rollin et al. [14] for finding intervention studies with return to work as the outcome measure. We searched for high quality reviews and original studies, respectively. Although in the future, other sources such as evidence-based practice guidelines developed for social insurance medicine could be searched, at this moment such guidelines are not available or are mostly based on consensus and not on evidence, as was recently shown by de Boer et al. [15].

For the disease term (*patient* in PICO), we used the standard MeSH term in PubMed whenever available. For work participation (*outcome* in PICO), we used a search strategy that has proven useful for identifying articles in Medline on chronic diseases (eg, rheumatoid arthritis) and work participation. Haafkens et al. [16] recommended the following string: “work capacity OR work disability OR vocational rehabilitation OR occupational health OR

sick leave OR absenteeism OR return to work OR retirement OR employment status OR work status". These terms cover many essential aspects of work participation. We combined this string with the broad clinical queries filters in PubMed for prognosis and intervention effectiveness, respectively. If the search resulted in 10–50 articles, we considered this search sufficient [17]. If we had >50 hits, we limited the search to articles that had been published in the last 5 years. We selected articles based on relevant titles or abstracts. Fulltext article(s) were read before using the information for clinical decision-making. If no appropriate review article could be found for our purpose, we looked for original articles in the same search.

Critical appraisal. We performed critical appraisal using the common quality criteria specific to each type of research [12]. For prognostic and etiologic studies, this means especially verifying whether the patients in the research form a well-defined inception cohort, if follow-up was long enough, and if objective outcome criteria were applied in a "blind" fashion. For a systematic review, this means verifying whether the main question addressed was clearly stated, inclusion criteria for studies were clearly defined, the major bibliographic databases were searched, the quality of each study was independently assessed (by at least two reviewers), and the criteria for assessment were clearly described.

Applying the evidence, guidelines for decision-making. Regarding insurance physicians' prognosis of work ability, we could not find definitions in the literature of what constitutes a poor prognosis, either conceptually or in operational terms. Therefore, we defined what an insurance physician might call a "poor prognosis for work ability". For the purposes of this study, we agreed a poor prognosis would be similar to permanent work disability and defined it as <25% chance of recovery from the disease and the resulting work limitations after 5 years follow-up starting from the time of diagnosis. Moreover, for this study we decided that a risk is increased if the relative risk (or odds ratio) was at least 2, meaning that the risk factor would at least double the chance to become work disabled for the "exposed" versus "non-exposed" group. Considering the importance of the baseline risk in evaluating the consequences for an individual patient, this was taken into consideration in the interpretation of the research results where applicable.

Regarding therapy, methodologically, the randomized controlled trial (RCT) is the study design for intervention studies that is least susceptible to bias. Therefore we wanted the evidence to consist of one or more RCT or a systematic review of RCT.

In order to derive meaningful differences in means, Cohen worked out a dimensionless scale of effect sizes, analogous to his work on correlations [18]. Typically these are used in a systematic meta-analysis. He introduced thresholds for small-, moderate-, and large-effect sizes, which are 0.20, 0.50 and 0.80, respectively. This can be helpful as a rule of thumb for insurance physicians in interpreting the presented differences in means. A corresponding relative risk would be (i) 1.0–0.75=small, (ii) 0.75–0.50=moderate, and (iii) 0.5–0.25=large risk reductions [19]. The insurance physicians would decide that an intervention would be effective if there is any significant effect on the outcome symptoms or related work disability.

RESULTS

Table 1 summarizes the results of formulating answerable questions within the PICO format. For each question chosen, we present a description of the search process, the critical appraisal of the results, and finally, the use of the results to answer the clinical question.

Table 1. Answerable questions formulated for three clinical problems encountered in disability evaluation by insurance physicians.

Problem	Patient or worker	Intervention or exposure	Comparison	Outcome
Prognostic factors for impact of rheumatoid arthritis on work disability	53-year old male nurse with rheumatoid arthritis	Exposure to prognostic or predictive factors	No exposure	Work disability
Prognostic factors for impact of sciatica after discectomy on work disability	40-year old male laboratory assistant with sciatica	Exposure to prognostic or predictive factors	No exposure	Work disability
Appropriate therapy for alcohol abuse accompanied by depressive disorder, related to work disability	43-year old female teacher with a mild depression and alcohol abuse	Therapeutic intervention	No or other intervention	Work disability

Prognosis of restrictions for manual work with rheumatoid arthritis

Literature search. We searched for articles about prognostic or predictive factors for work disability among rheumatoid arthritis patients. Therefore, we started with the MeSH term for rheumatoid arthritis in combination with terms for work participation as validated by Haafkens [16], which yielded 856 articles (Medline 4 August 2010). Using the broad prognostic clinical queries filter in PubMed yielded 254 articles, and 20 systematic reviews. We selected four review articles by reading the titles, after which we proceeded to read their abstracts. We selected the article by Burton et al. [20] as the most relevant for our clinical question.

Critical appraisal. The study of Burton et al. [20] is a recent systematic review published in 2006 addressing a focused question: the relationship between rheumatoid arthritis and work productivity. Two authors performed the search for and selection of the articles. They searched in major databases, including Medline and CINAHL. Cohort and cross-sectional studies were included if they were primary studies reporting productivity loss measures such as work limitation, work loss, and work disability. The review dealt with adults diagnosed using strictly defined criteria for rheumatoid arthritis. The search for studies was well described. Individual studies were assessed for validity. The results of included studies were presented in summary tables. They only used simple summary statistics, no statistical pooling was attempted. We found the quality and relevance of this systematic review sufficient to be used as support for the clinical decision.

Clinical decision. Burton et al.'s review described the impact of rheumatoid arthritis on productivity loss – work limitation, work loss and work disability – and was therefore relevant. Patients in the studies were identified via a physician diagnosis of rheumatoid arthritis, comparable to our patient. The article depicts a survival analysis which showed that the period between the onset of rheumatoid arthritis to the point with 50% probability of being work disabled varied between 4.5–22 years. It was stated that the largest increase in work disability occurred in the first year after diagnosis. For reasons of generalization to our Dutch patient, we also read the study by Albers et al. [21] performed in the Netherlands, published in 1999, which was referred to in Burton et al.'s review. Albers et al found that after 5 years, <30% of the patients were still working. As we determined our cut-off percentage to be 25 %, we could not conclude that the course of the work ability in this patient is poor although

the difference is small. However, the systematic review indicated that in cohort studies the baseline variables that were consistently predictive of subsequent work disability were: (i) a physically demanding work type; (ii) greater severity of rheumatoid arthritis [expressed as score measured by the Health Assessment Questionnaire (HAQ) which measures functional disability in the activities of daily living]; (iii) a high number of affected joints count; and (iv) older age. Applying these findings to our patient who performed physically demanding work and was of older age, we assumed these factors to cause another 5–10% elevation in risk, which would make the chance for recovery <25% within a period of 5 years. So we decided that our patient had a poor prognosis (in advance defined as a chance of <25%) for future work ability within a period of 5 years. We concluded that a re-evaluation in the future to judge if his work ability has improved would not be necessary and that the disability for his own work was considered to be permanent.

Prognosis of sciatica after surgical management of lumbar disc herniation

Literature search. When searching for MeSH terms for “lumbar disc herniation” in the PubMed MeSH database, no relevant MeSH terms were found (search 4 September 2010). Limiting the search to “disc herniation”, the suggestion of “herniated disc” was offered which leads to the MeSH term “intervertebral disk displacement”. On the page of the last term, the suggestion of “sciatica” was given as a related MeSH term. The combination of both seemed most appropriate for our purpose as we were interested in the course of the symptom sciatica after surgery for lumbar disc herniation. Combining both MeSH terms with the terms from Haafkens et al. [16] for “work disability” yielded 46 articles. Reading the titles of the original articles, we found 12 potentially relevant articles, of which one was in the Norwegian language and one was >10 years old. After reading the abstracts of the remaining articles, we chose the publication of Atlas et al. [22], a prospective cohort study of 507 patients in the USA who underwent open surgery or received conservative treatment after lumbar disc herniation and were followed for 10 years.

Critical appraisal. Atlas et al. [22] used clear criteria for their inception cohort; all patients had symptoms for <6 months. There were 217 surgical patients and 183 non-surgically treated patients with available 10-year outcomes, a mean response rate of 84%. We considered a 10-year follow-up of 217 surgical patients sufficient. Thirty patients died during the follow-up period. Further exploration into the response rate would have enhanced the quality of the

article. The outcomes were based on patients' self-reports on questionnaires concerning leg and back pain, functional status, satisfaction, and work and disability compensation status. The impact of prognostic factors predicting symptoms and functional status was adjusted for baseline values using a logistic regression analysis. We concluded that the quality of the study was sufficient to be of use in our clinical decision.

Clinical decision. The study of Atlas et al. [22] showed that after two years post-discectomy, no further significant improvement in the Roland Morris disability questionnaire (a widely used measure for the consequences of low-back pain) could be observed. Our patient was referred by his general practitioner to a neurosurgeon and was of comparable age to the study population in the USA. We had no reason to believe that the effect of a lumbar herniation procedure would be different for a Dutch patient than an American patient. Therefore, we concluded that two years after surgery, further beneficial change in the physical limitations of our patient was not to be expected. At this stage efforts to promote return to work could better be directed at other objectives such as the realization of workplace accommodations supporting the lifting of objects as was also suggested in the discussion of the American study.

Depression and alcoholism: where to start?

Literature search. We searched for articles about treatment of patients with mild depression in combination with alcohol abuse, preferably including work-related outcomes.

First we used the term "alcohol abuse" in the MeSH database of PubMed, which brought us the term "alcoholism" which best covered our concept of "alcohol abuse" (search 4 August 2010). Using the term "depression" in the MeSH database led us to the MeSH term "depressive disorder" that is more in accordance with the health status of our patient than the broader term "depression". Combining "depressive disorder" with "alcoholism" resulted in 1762 articles. The combination with the terms from Haafkens et al. [16] for "work participation" yielded 14 articles, unfortunately none of these were relevant to our question. In a new search, entering both MeSH terms in the clinical query function "systematic reviews" in PubMed, 19 articles were found. After reading the titles, we were left with four articles. Of these, one was about bipolar disorder, one appeared to be a narrative review, and the other two were systematic reviews. We chose the systematic review of Nunes & Levin [23] on the treatment of depression among patients with alcohol or

other drug dependence, because it had the most up-to-date search (completed in December 2003) and included a meta-analysis. Although this review was oriented on disease-related outcomes and not explicitly on work participation, the content was most relevant to the prognostic and therapeutic questions and fitted well with the concept of ICF [11].

Critical appraisal. This systematic review and meta-analysis of placebo-controlled RCTs addressed two focused questions: first, whether depression responds to anti-depressant medication treatment among substance-dependent patients and, second, what the impact is of such treatment on concurrent substance abuse. Two authors independently performed the search for and selection of the articles. They searched in Medline and Cochrane databases, which was regarded as sufficient for our purpose. RCTs were included if they met well-defined criteria. Most importantly, patients had to meet the standard diagnostic criteria set forth in the Diagnostic and Statistic Manual of Mental Disorders for both a current drug or alcohol-use disorder and a current unipolar depressive disorder. Individual studies were independently and rigorously assessed for validity and reliability. Eight trials recruited alcohol-dependent patients. The review critically tested for heterogeneity of the studies included in the meta-analysis. The results were clearly presented in tables. We regarded the information on quality and relevance as sufficient to consider this a good systematic review.

Clinical decision. Applying Cohen's thresholds [18] in the meta-analysis, we found there was a small-to-modest effect of anti-depressant medication on depressive symptoms among patients with alcohol or drug dependence, as measured by the Hamilton depression scale (the overall pooled effect size was 0.38 [95% confidence interval (95% CI) 0.18–0.58]. For those cases where the depression effect size was >0.50, there was also a small positive pooled effect on diminishing alcohol or drug intake of 0.25 (95% CI 0.08–0.42). There was no reason why our patient would be different from those in this review such that results could not apply. Therefore the decision was that treatment of the depression with anti-depressant medication was recommended, but we agreed with Nunes & Levin [23] that another recommendation should be treatment of the alcohol abuse as the effect of the anti-depressant on substance abuse outcomes was only small at best. Although the results of this review do not explicitly pertain to work participation, the information on improvement of disease-related symptoms could indeed help the insurance physician in deciding what treatment should be recommended.

DISCUSSION

In this study, we showed that the method of EBM is applicable to common questions in the field of disability evaluation. As an overall guiding principle in defining which answerable questions can be formulated and selecting which terms to select for searching, the ICF model was helpful. For finding studies on (work) participation, an existing occupational health search tool – developed to support searches on the topic of chronic diseases and work participation [16] – proved to be instrumental in providing clinically relevant answers in two out of three cases. We also suggest that social insurance institutions and other decision-makers should adopt a policy that would allow for more scientific evidence to be incorporated in “evidence-based/informed decision-making”, in addition to the development of professional guidelines and continuing medical education.

The case study on prognosis and rheumatoid arthritis illustrates that many work-related articles can be found that are relevant to social insurance physicians. The case clarified the need to develop new “rules” in order to facilitate the transfer of knowledge to practice: we had to specify what an insurance physician would consider a poor prognosis for work ability. The search on rheumatoid arthritis demonstrated that specific information in the articles found can contribute to the knowledge of the disease and therapy.

The cases study of sciatica after surgical management of lumbar disc herniation illustrates that searching requires some skills, like exploring the tree structure of a MeSH term in the MeSH database. The evidence found strengthens the decision not to refer this patient for any further treatment. Instead alternatives (eg, workplace accommodations) were suggested which can be helpful in clinical decision-making during disability evaluation. In addition, the case study shows that reading articles allows one to learn about measurement tools such as the Roland Morris disability questionnaire, which can be used in insurance practice as well.

In the case study of depression and alcohol, contrary to longstanding therapeutic beliefs, the start of concurrent anti-depressant therapy and treatment of addiction can be worthwhile. Although the review especially discussed evidence at the level of disease, it was judged nonetheless to be useful in our decision-making regarding the enhancement of work participation.

In this study, we confined ourselves to questions about prognosis and effectiveness of therapies. As outlined in the ICF framework we used, disability assessment includes more topics such as the assessment of the severity of the disorder and how this influences

the ensuing disability. However in our experience, these aspects of disability assessment raise less questions in the practice of social insurance physicians. Nonetheless evidence pertaining to all major components in the ICF model can be used in the assessment of work ability. Slebus et al. [24] also explicated both analytical and integrative function of the ICF model. They showed that when insurance physicians have to determine work ability, they predominantly consider aspects relating to the “body functions and structures” and “participation” components of the ICF model to be important. However, based on the work of Krause et al. [25], the authors commented that “environmental” and “personal” factors should more often be considered in the assessment because of their impact on the duration of disability. The comment implies that all aspects that can be categorized in the various components of the ICF model and their inter-relationships can be or even have to be utilized in the assessment of work ability. Finally, the professional has to integrate all the components and the interactions in the final determination of the work ability of a patient. So we believe it is ill-advised to restrict the search to evidence that directly relates a specific disease to work participation issues such as work ability, work functioning, and sickness absence alone. And like in all decision-making in medicine, some subjective interpretation is unavoidable especially when applying results from research to an individual case.

The strength of our study is that we showed how evidence can be incorporated in the decision-making process of disability evaluation. As such it is an additional method to improve the quality of decision-making during disability evaluations. We like to emphasize that the decision itself is always an integration of all the relevant information including the evidence at hand. Moreover the EBM method does not free social insurance physicians from the painstaking work of getting familiar with and integrating all the relevant data that is available. One can argue that using this EBM method would take a practitioner too much time or effort. And while it is certainly true that a certain amount of training in applying the method of EBM in disability evaluation is needed, we believe that questions could be answered within a reasonable time period. So, while this might not be feasible for every question in practice, the method is certainly worthwhile to consider when one is in serious doubt or when cases are used as exemplary models for other practitioners.

Further research on search tools and strategies and further operationalization of the decision-making process of social insurance physicians could encourage the use of EBM. Insurance physicians would ideally incorporate evidence if available in their assessments. Especially when practice guidelines become more evidence based for insurance physicians,

the evidence included can be applied with the distinct advantage that this would take a practitioner substantially less time and effort. Asking insurance physicians to be explicit in their reports about the use of evidence in their decision-making might add to the implementation of new practices.

In showing how decision-making in disability evaluation can be underpinned by using scientific evidence, we hope to encourage practitioners in the field of disability evaluation to make more and better use of the available evidence.

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Chapter 3.1

Evaluation of a workshop on Evidence-Based Medicine for social insurance physicians

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ABSTRACT

Background: Evidence-Based Medicine (EBM), a comprehensive method to support clinical decision-making by using evidence, has been instrumental in clinical specialties but not yet in insurance medicine.

Aims: We developed and evaluated a workshop on EBM for Dutch social insurance physicians who perform disability evaluations.

Methods: Sixty-six social insurance physicians followed a one-day introductory workshop that focused on teaching two EBM core skills: to ask answerable questions and to search for the best evidence. All outcomes were measured before, immediately after and three months after the workshop by means of self-assessment. The primary outcomes were knowledge, skills, attitude and intention to apply EBM in practice. The secondary outcomes were social influence, self-efficacy and behaviour.

Results: Immediately after the workshop, a marked and significant improvement was seen in self-assessed skills (mean difference 4.2, 95% CI 3.7, 4.6) and in self-efficacy to apply EBM (mean difference 0.7, 95% CI 0.6, 0.8). For attitude, knowledge and intention the improvements were small. Three months after the workshop, the improvements in skills (mean difference 2.3, 95% CI 1.8, 2.9) and self-efficacy (mean difference 0.5, 95% CI 0.3, 0.6) remained significant.

Conclusion: The workshop improved self-assessed EBM skills and self-efficacy both in the short and long term. The workshop also resulted in limited short-term improvements in self assessed knowledge and in the intention to apply EBM in practice. The EBM approach can be successfully taught to social insurance physicians working in the field of disability evaluation.

INTRODUCTION

Evidence-Based Medicine (EBM), as a comprehensive method to support clinical decision-making by using evidence, is instrumental in many clinical specialties [1]. EBM is now recognized as a medical milestone and the question has moved beyond “why is evidence-based medicine important?” to “why is it not already a reality?” and “how can we all work together to make it a reality quickly?”[2]. Recently, the Dutch National Advisory Council on Health Research has recommended that EBM should be applied in the area of insurance medicine and disability evaluation [3]. However, it is unclear how successful EBM methods can be taught to physicians who work in this area.

Disability evaluation can best be described as the assessment of the degree of a physical, mental or emotional handicap. An important aspect of the assessment in the Netherlands is the prognosis of the limitations. Social insurance physicians in the Netherlands evaluate disabilities; they assess if claimants medically qualify for a benefit under the Disability Benefit Act. These physicians are all employed by the Dutch Workers Insurance Authority UWV. Worldwide, physicians are involved in similar assessments even though the national practices can vary considerably under social insurance or workers’ compensation legislation [4]. For various diseases, much evidence has been gathered on the limitations resulting from them and the course of the limitations over time (e.g. see 5). As in other medical specialties, physicians in the field of disability evaluation should keep up-to-date and search for the best evidence to support their decision-making.

A recent national survey also showed that social insurance physicians need education in the area of EBM [6]. Although postgraduate EBM courses are available to physicians from other medical specialties, their applicability and efficacy within the context of disability evaluation is unknown. Systematic reviews on the effectiveness of post-graduate EBM teaching report improvements in knowledge of EBM methods, but evidence on other outcomes such as EBM related skills, attitude and behaviour is less convincing [7].

The aim of this study was to evaluate the applicability and efficacy of a one-day introductory postgraduate EBM workshop for social insurance physicians working in the field of disability evaluation. Applicability and efficacy were evaluated in terms of self-assessed knowledge, skills, attitude and intention to apply EBM. In addition, we evaluated the effect of the workshop on social influences on EBM practice, self-efficacy related to EBM and behaviour i.e. the application of EBM.

METHODS

All physicians (N=66) working in two offices of the Dutch Workers Insurance Authority (UWV) in the Amsterdam area attended a one day introductory workshop on EBM, tailored to the specific content area of disability evaluation. The workshops were held in June 2006 and involved 14-18 social insurance physicians at a time. The workshop tutorials included knowledge questions encountered in daily practice such as “what is the prognosis of a person with active RA to remain at work in the long term?” The workshop included tutorials and practical exercises with an emphasis on two EBM core skills [8]: how to ask and write answerable questions (Patient Intervention Control Outcome: PICO) and how to search for the best evidence in PubMed. Also included was a short tutorial on another EBM core skill: how to critically appraise the literature. This tutorial focused on principles for the interpretation of statistics and various study designs. Applying the evidence, another EBM core skill, was not included in this introductory workshop. The workshop was given by teachers experienced in EBM. We have added some text to the description of the workshop content in electronic format.

The questionnaires were distributed before (T0) and immediately after the one-day workshop (T1), and after three months by mail (T2). All physicians completed a form which recorded information on personal and work characteristics (e.g. age, work experience, the specific types of disability evaluation); how (often) they kept up-to-date, searched for answers to questions in their daily practice and what resources they used such as electronic databases, guidelines, web sites and hand books.

The main outcomes of the study were measured using a self-assessment questionnaire on EBM, used in a study on occupational physicians [9]. The questionnaire was modified for use in disability evaluation and included questions using the underlying construct of the Attitude-Social Influence- (Self) Efficacy model (ASE), which aims to explain change in behaviour [10]. In this model behaviour, e.g. using the EBM approach in practice, is thought to be directly influenced by the “intention” towards that behaviour, which in turn is influenced by the constructs “attitude”, “social influence”, and “self-efficacy”. Using the adapted pyramid model of Miller [11], questions on “knowledge” and “skills” related to EBM were included as primary outcomes, as these are frequently used in the evaluation of educational interventions. Other primary outcomes were attitude towards EBM and intention to apply EBM. As secondary outcomes we included social influence on doing EBM, (self)-efficacy in doing EBM and applying EBM (behaviour).

At three months follow-up three open-ended questions were added to the questionnaire: 1) describe any search questions used in the past three months. 2) What was the practical use of the evidence which was found, and 3) which measures could be taken to improve the use of EBM in daily practice, i.e. how could disability evaluations be more evidence-based.

We calculated the mean score for the questions on attitude (ten questions), social influence (seven questions), self-efficacy (eight questions) and intention to apply EBM (seven questions) which were scored on a five-point Likert scale (ranging from “I fully disagree”=1 to “I fully agree” = 5). Similarly, we calculated a sum score for the dichotomous questions on “behaviour” (six questions, max score 6), “knowledge” (seven questions, max score 7) and “skills” (six questions, max score 6). Paired t-tests were used to compare outcomes between baseline and follow up, i.e. directly after the work shop and after three months.

RESULTS

Before and after the workshop all 66 physicians completed the questionnaire. After three months 15 physicians (23%) did not complete the questionnaire despite several reminders: reasons were unknown (n=13), medical reasons (n=1) and lack of motivation (n=1). The values of the main outcomes at baseline and directly after the workshop showed similar results for the responders and the non-responders. We have therefore no strong reason to suspect that loss to follow up reflected a major source of reporting bias.

Characteristics of the participating social insurance physicians (n=66) can be seen in Table 1. Almost all social insurance physicians indicated a need for more information about the assessment of a patient in their routine practice and 35 % used PubMed in the past month.

Table 1: Baseline demographic characteristics of participating social insurance physicians (n=66), their information need and electronic resources used

Age, mean (SD) in years	48.5	(7.1)
Male, n (%)	37	(57)
Experience as doctor in years, mean (SD)	20.2	(7.0)
Postgraduate qualification, n (%)	55	(85)
Experience as insurance physician in years, mean (SD)	14.4	(7.1)
Hours work on weekly basis, mean (SD)	34	(6.7)
Hours per week to keep up to date, mean (SD)	2.2	(1.8)
Information need on monthly bases, mean (SD)	3.6	(2.5)
- 0 times, n (%)	1	(2)
- 1-4 times, n (%)	42	(74)
- More than 4 times, n (%)	14	(25)
Access to PubMed at work, n (%)	59	(89)
Internet access at home, n (%)	64	(97)
Work-related internet use in past month, mean frequency (SD)	3.4	(4.6)
- 0 times, n (%)	18	(29)
- 1-4 times, n (%)	33	(52)
- More than 4 times, n (%)	12	(19)
Work-related use of PubMed in last month, mean frequency (SD)	0.9	(1.6)
- 0 times, n (%)	42	(65)
- 1-4 times, n (%)	20	(31)
- More than 4 times, n (%)	3	(5)

The results for the primary and secondary self-assessment outcome measures are shown in Table 2. A marked improvement was seen after the workshop on skills, i.e. from 1.5 to 5.7 (mean difference 4.2, 95% CI 3.7, 4.6). After three months this improvement from baseline remained significant (mean difference 2.3, 95% CI 1.8, 2.9). Significant but small improvements were observed for the outcomes attitude, knowledge and intention to behaviour after the workshop, which returned to baseline levels after three months.

The results for the secondary outcome measures are also shown in Table 2. The outcomes social influence, self-efficacy and EBM behaviour showed small improvements from baseline directly after the workshop, but only those for self-efficacy were significant (mean difference 0.7, 95% CI 0.6, 0.8) and remained so after three months (mean difference 0.5, 95% CI 0.3, 0.6) (Table 2). Scores for the outcomes social influences on EBM practice and EBM behaviour in practice did not change at follow up.

Examples of answers to the open-ended questions by social insurance physicians after three months are shown in Table 3. In the three months after the workshop 32 out of 51 respondents searched PubMed to find information for a question. Of the 19 social

Table 2: The mean sum scores and difference in mean sum scores of the primary and secondary self-assessed outcome measures before (T0), directly after (T1) and three months (T2) after the EBM workshop.

	Before workshop (T0) Mean (SD)	After workshop (T1) Mean (SD)	3 months after workshop (T2) Mean (SD)	Difference (T1-T0) (95% C.I.)	Difference (T2-T0) (95% C.I.)
Primary outcomes					
Attitude (1-5)	3.7 (0.4)	3.8 (0.4)	3.6 (0.5)	0.1 (0.0, 0.2)	-0.1 (-0.2, 0.0)
Knowledge (0-6)	5.2 (1.3)	5.4 (1.0)	5.3 (1.2)	0.3 (0.0, 0.5)	0.0 (-0.5, 0.4)
Intention (1-5)	3.6 (0.4)	3.7 (0.5)	3.5 (0.5)	0.1 (0.0, 0.2)	-0.2 (-0.3, 0.0)
Skills (0-7)	1.5 (1.7)	5.7 (0.7)	3.9 (2.0)	4.2 (3.7, 4.6)	2.3 (1.8, 2.9)
Secondary outcomes					
Social influence (1-5)	3.0 (0.5)	3.1 (0.5)	3.1 (0.5)	0.1 (0.0, 0.1)	0.0 (-0.2, 0.1)
Self-efficacy (1-5)	2.6 (0.6)	3.3 (0.4)	3.0 (0.5)	0.7 (0.6, 0.8)	0.5 (0.3, 0.6)
Behaviour (0-6)	2.7 (1.6)	2.9 (1.6)	3.0 (1.7)	0.2 (0.0, 0.5)	0.4 (0.0, 0.8)

C.I: Confidence Interval. N=66 at T0 and T1, N=51 at T2.

insurance physicians who did not perform any search, lack of time was reported as the most important reason. Examples of suggested improvements for daily practice are summarized.

Table 3: Examples of questions on EBM practice by social insurance physicians three months after the EBM workshop.

Examples of questions for searching:

- What is the relation between repetitive strain injury and lifting capacity
- What is the prognosis for remaining employed in case of a positive RA factor?
- Is L-carnitine effective in treatment of chronic fatigue syndrome?

Examples of the practical use/gain:

- I could not find any information
- Prognostic information improved
- Information about treatment improved
- The disability assessment became more precise

Examples of recommendations for future EBM use:

- I need more time to perform an electronical search
 - It could be used in peer group discussions
 - Access to relevant evidence should be improved (e.g. full text articles)
-

DISCUSSION

Our results suggest that a one day introductory workshop on EBM methods is applicable and effective for social insurance physicians as evident from the improvements in self-assessed EBM skills and self-efficacy, directly after the workshop and after three months. Directly after the workshop there was a slight increase in self-reported knowledge of EBM, positive attitude to EBM and intention to apply EBM, but differences were small.

Our study is the first that investigated the effectiveness of an EBM workshop for social insurance physicians. We were able to evaluate the workshop measuring dimensions of the ASE-model and the adapted pyramid model of Miller, describing the process of learning and implementing the EBM approach. Since we used a prospective single arm intervention study design, it is possible that a trend in time could explain our results. However, no other events happened during the study period that could bring about a substantial increase in knowledge and skills related to EBM. Therefore, we assume that the effects found can be attributed to the workshop.

We found favourable results for the EBM workshop on two core EBM skills: asking answerable questions and finding literature in PubMed. This outcome has also been reported in studies with different settings and different medical specialties, like internal residents, paediatric residents and occupational therapists [12-14]. Although we found a modest increase in knowledge of EBM directly after our workshop other studies have reported more favourable and sometimes longer lasting improvements [14,16].

We found no significant improvement in attitude towards EBM directly after the workshop. Other studies evaluating the concept of “attitude” reported mixed results [15]. We interpret this lack of improvement as a ceiling effect in our study, e.g. attitude towards EBM was positive and remained positive.

The intention to practice EBM directly after the workshop, only marginally changed after three months. Studies that use intention to change behaviour as an outcome measure are rare. We agree with Schaafsma et al. [17] who concluded that the construct of “intention”, an intermediate factor in the ASE model, may not have added value outside this model. It will be interesting to see whether behavioural change, which in our view is the ultimate goal of any EBM teaching, can be achieved in the setting of disability evaluation.

Self-efficacy is a construct related to that of skills, which might explain the parallel improvement over time of both of these measures, since most of the questions on self-

efficacy dealt with the confidence experienced by social insurance physicians in practising EBM skills. The fact that skills were self-assessed only adds to this.

In accordance with some studies we did not find a substantial effect on behaviour [14, 15]. It is difficult to change behaviour and many barriers for implementing EBM in daily practice have been identified [18]. However, we should not be discouraged in developing a future EBM intervention as examples of successful EBM implementation do exist [19].

In this study we showed that the EBM approach was successful in changing self-assessed EBM skills and self-efficacy of insurance physicians and that it could be successfully adapted to questions of physicians performing disability evaluations. In order to promote the use of EBM in daily practice, attention will be given to potential (organisational) barriers which limit its use. It seems particularly important to deal with lack of time, a commonly reported barrier to apply EBM both in the literature [18] and in our study. Given the short duration of our workshop and the limited workshop focus on the first two EBM steps, i.e. on asking questions and searching the literature, we see opportunities for the development of a more thorough EBM educational intervention, which will incorporate strategies on how and when to apply EBM in busy daily practice.

Key points:

A workshop on EBM for social insurance physicians improves self-assessed EBM skills and self-efficacy both in the short and long term.

The EBM approach can be successfully adapted to the field of disability evaluation.

We see opportunities for the development of a more thorough EBM educational intervention, which will incorporate strategies on how and when to apply EBM in the busy daily practice of insurance physicians.

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ADDITIONAL FILES

Appendix 1: Workshop “Introduction to EBM for social insurance physicians”.

The duration of the workshop was one day. During this day there were theoretical sessions and practical sessions. Interactivity was stimulated in all lectures. The primary goal of the workshop was to become familiar with the first two steps in EBM and critical appraisal, the third step in EBM. The course schedule was divided in a morning session (1-4) and an afternoon session (5-8):

- 1) Lecture: Theoretical considerations around EBM (45 min).
Goal: To get an overview of the theoretical concepts in EBM.
Key slides:
 - Definition of EBM by Sackett et al. 2001.
 - Five steps in EBM.
 - The concept of background vs. foreground questions.
 - EBM as a method suited for health related questions, not for juridical or statistical questions.

- 2) Break-out sessions / practical session (30 minutes).
Goal: To practise how to formulate answerable questions with help of a PICO.
Clinical scenario's:
 - A case of a firemen with rheumatoid arthritis.
 - Cases from participant's own practice as insurance physicians.

- 3) Lecture: a short overview of study designs and how to recognize them (45 min).
Goal: To provide a theoretical background for critical appraisal.
 - Discussion of the appropriate designs in diagnostic, therapeutic, etiologic and prognostic research.

- 4) Break-out sessions / practical session (30 minutes).
Goal: To practise critical appraisal
This was done by:
 - Critically appraising an article.
 - Assign level of evidence.

- 5) Lecture: using PubMed (30 minutes):
Goal: To explain the basics of PubMed, including like Boolean operators, MeSH terms, filters, etc.
 - This was done by showing an online example.

- 6) Break-out sessions / practical session (90 minutes).
Goal: To practise how to search in PubMed.
 - This was done in groups of 2-3 with a common case and cases from participant's own practise.

- 7) Lecture (10 minutes):
Goal: To show some useful (teaching) EBM resources in the Netherlands.

- 8) Questions and Answers.

Chapter 3.2

A clinically integrated post-graduate training programme in evidence-based medicine versus 'no intervention' for improving disability evaluations: a cluster randomised clinical trial

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ABSTRACT

Background: Although several studies have shown that teaching EBM is effective in improving knowledge, at present, there is no convincing evidence that teaching EBM also changes professional behaviour in practice. Therefore, the primary aim of this study was to evaluate the effectiveness of a clinically integrated post-graduate training programme in EBM on evidence-based disability evaluation.

Methods and Findings: In a cluster randomised controlled trial, fifty-four case-based learning groups consisting of 132 physicians and 1680 patients were randomly assigned to the intervention or control groups. A clinically integrated, post-graduate, 5-day training programme in evidence-based medicine, consisting of (home) assignments, peer teaching, interactive training in searching databases, lectures and brainstorming sessions was provided to the intervention group. The control group received no training. The primary outcome was evidence-based disability evaluation, as indicated by the frequency in use of evidence of sufficient quality in disability evaluation reports. There are no general EBM behaviour outcome measures available. Therefore, we followed general guidelines for constructing performance indicators and defined an a priori cut-off for determination of sufficient quality as recommended for evaluating EB training. Physicians trained in EBM performed more evidence-based disability evaluations compared to physicians in the control group (difference in absolute proportion 9.7%, 95% CI 3.5 to 15.9). The primary outcome differences between groups remained significant after both cluster-adjusted analysis and additional sensitivity analyses accounting for subjects lost to follow-up.

Conclusions: A EBM programme successfully improved the use of evidence in a non-hospital based medical specialty. Our findings support the general recommendations to use multiple educational methods to change physician behaviour. In addition, it appeared important that the professional context of the intervention was very supportive in the sense that searches in databases, using and applying guidelines and other forms of evidence are considered standard practice and are encouraged by colleagues and management.

INTRODUCTION

Evidence-based medicine (EBM) is widely recognised as a useful tool for improving the quality of health care by supporting clinical decision-making [1,2]. Moreover, the use of evidence is considered good clinical practice [3]. The EBM approach has also become increasingly acknowledged in non-hospital settings, such as rehabilitation and public health [4,5]. For insurance medicine, we showed in a previous study how the quality of decision-making in disability evaluation can be improved using evidence [6].

Worldwide, disability evaluations are performed by physicians, either in addition to other clinical work or as one of their main tasks. Although the settings, insurance and legislative systems, and clinical backgrounds are different in each nation, all disability evaluations have *in common* the use of medical and non-medical information, as described in the WHO-ICF classification, and include a judgment of an individual's functioning or capacity to perform work [7]. In the Netherlands, social-insurance physicians employed by the Dutch National Institute for Employee Benefit Schemes perform disability evaluations. These physicians systematically evaluate whether workers who apply for a disability benefit are impaired in one or more mental or body functions due to health problems. The evaluation also includes an assessment of the prognosis and of the therapeutic and return to work options. To date, most of these evaluations are based on expert judgment. However, because expert judgment is known to be prone to biases [8], these evaluations ought to be underpinned with up-to-date information from studies on work disability, diagnosis, treatment effectiveness, and prognosis [6].

Although several studies have shown that teaching EBM is effective in improving knowledge, at present, there is no convincing evidence that teaching EBM also changes professional behaviour in practice or improves health care outcomes. The evidence is especially lacking in the field of disability evaluation. In a systematic review by Coomarasamy and Khan in 2004, two Randomised Controlled Trials (RCTs) of post-graduate teaching in EBM integrated with clinical practice revealed improvements in physicians' behaviour, whereas standalone teaching was not effective [9]. Since then, three other RCTs [5,10,11] of post-graduate EBM training have been performed, of which one showed an enhanced use of evidence by physicians [11]. Two other trials among public health and primary care physicians did not identify an effect on professional behaviour [5,10]. These results show that there is still a lack of evidence of the effect of post-graduate teaching of EBM on physician behaviour.

Recently, we developed an EBM course that included training material to improve evidence-based disability evaluation. In a pilot study, we showed that a short training session improved physicians' knowledge and skills in using medical evidence [12], but we did not measure physician behaviour. We then developed a comprehensive, multifaceted and clinically integrated post-graduate training programme in EBM. We paid special attention to educational (not specifically teaching the EBM method) intervention components known to be successful in influencing physician behaviour, such as high attendance, mixed interactive and didactic sessions, use of multi-media, multiple exposures, needs assessment and small-group learning [13-15]. By modelling these components, we aimed to motivate the physicians to incorporate evidence from scientific research in their decision-making and to use this evidence in their disability evaluation reports, which we termed evidence-based disability evaluation.

We evaluated this intervention in a cluster-randomised controlled trial of physicians working for the Dutch National Institute of Benefit Schemes. These physicians were members of a network of case-based learning groups. Teaching members of these groups has the potential advantage that available organisational structures are utilised and that knowledge and skills can be disseminated easily by physicians amongst colleagues in their groups. For the above reason but especially because we used multiple reports from each physician which leads to probable clustering at the level of physicians, we chose a cluster-randomised controlled study design to control for this

The primary aim of this trial was to evaluate if a clinically integrated post-graduate training programme in EBM compared with no training leads to more evidence-based disability evaluation. The secondary aim was to evaluate if this training programme improves several intermediate factors, such as knowledge, skills and self-efficacy, in the EBM method.

PARTICIPANTS, INTERVENTION AND METHODS

Design

We used an assessor-blinded, cluster-randomised controlled design with two arms: a group of physicians from case-based learning groups who received our clinically integrated post-graduate training in EBM and a waiting list control group from case-based learning groups who practiced as usual. Equal allocation ratio was applied. Ethics approval for this study was sought from the research ethics committee of the Academic Medical Center. However, as this constituted the evaluation of an educational intervention with physicians, the committee secretary deemed it could be suitably exempt from the need for ethics approval. This exemption was confirmed in writing.

Sample size calculation

For the power calculation, made in advance, we made the following assumptions for the effect size: we assumed that we could increase our primary outcome, the use of evidence in disability evaluation, by 80%. We based this on Kok et al. [12] who showed an increase of 80% of the baseline rate in the use of PubMed after an introductory EBM course in disability evaluation. The control rate of the use of evidence was estimated, based on the same study, at 6.7% of the disability evaluations. This leads to an assumed intervention group rate of slightly above 12%. To have 80% power to detect an increase in the use of evidence of 80% with $\alpha = 0.05$, we needed 465 disability evaluations in each group. We assumed the cluster effect would be strongest for the disability evaluation reports at the physician level and that the effect of being in the same case-based learning group would be negligible. We assumed that each physician would contribute 10 disability evaluations to the study on average and that there would be an intra-cluster correlation coefficient of 0.1, as determined in implementation research [16]. Based on these data, we multiplied the sample size with an inflation factor of 1.9 to adjust for the cluster effect [17]. This led to a required sample size of 884 disability evaluation reports in each group or 88 physicians. With three physicians per cluster, we needed 30 case-based learning groups in each arm of the trial.

Participants

Participants were selected from approximately 700 physicians working for the Dutch National Institute of Benefit Schemes. The task of these physicians is to evaluate the disability of workers who apply for a disability benefit. Their evaluation is written down in a disability evaluation report. Besides this report, where the substantiating of their evaluation takes place, and which is considered the main output for these physicians, they also use a checklist with the most important mental and body functions and rate the impairments due to the health problem presented by the patient (see Appendix S1). This checklist is comparable with the Personal Capacity Assessment in the United Kingdom [18]. The impairment rating is subsequently used by labour experts who then assess if and to what extent these impairments lead to a theoretical loss of earnings. Based on this assessment, the patient is then granted or denied a disability benefit.

All of these physicians have to take part in so-called case-based learning groups, located in all regions in the Netherlands, with an average of eight to ten colleagues, with the aim to increase the quality of professional performance. Leaders from these groups invited two to three physicians per group as volunteers to participate in the study. The physicians were informed about the goal of the study and the random assignment of the case-based learning groups to either the intervention or the control group. Except for belonging to a case-based learning group, no further eligibility criteria were used. All participating physicians signed an informed consent form. All groups had agreed to participate before randomisation took place.

Randomisation and blinding

The case-based learning groups were the unit of randomisation. Randomisation was performed by an independent researcher who was not involved in the study and was provided with a sequentially numbered list of 54 case-based learning groups, to ensure blinding for participants of each group. With the computer program nQuery Advisor (nQuery Advisor® 6.0), he produced a random list of intervention or control assignments based on a mixed-block (size 4) sequence and pre-stratification in three strata based on group size. Except for group size, no further pre-stratification variable was used. The independent researcher applied these assignments to the list of groups and provided the result to a research assistant not involved in scoring. Subsequently, the research assistant invited

participants to the training or control condition groups, and changes to the participants list were not allowed.

Two independent assessors blind to treatment allocation scored the outcome measures that were not based on self-assessment, including the primary outcome (evidence-based disability evaluation) and the Fresno Test of Evidence-Based Medicine. Obviously, no physicians in either group were blinded.

Intervention

On the basis of earlier experience and needs assessment [12], we developed a comprehensive, multifaceted and clinically integrated EBM educational programme to teach the use of all EBM steps in the context of disability evaluation. The course included 5 contact days over a six-month period, with multiple exposures to the EBM method. During the programme, feedback was provided in between course days, a component considered important in changing the behaviour of the physicians [13]. The course consisted of mixed interactive and didactic sessions, use of multi-media, multiple exposures, needs assessment and small-group learning mentioned in reviews as effective in changing physicians' behaviour [13-15]. Table 1 presents the objectives, content and educational format. The participants had to study a comprehensive syllabus and received an EBM handbook; they practiced the well known EBM steps [19]: formulating questions, searching for evidence, critically appraising the literature, and applying the evidence to their case evaluations. Moreover, they could practice an EBM introductory e-lesson [20], thereby introducing an extra medium to assist the aim of changing physicians' behaviour in our intervention. Experts and teachers from the Dutch Cochrane Center, the Netherlands School of Public and Occupational Health, the Coronel Institute of Occupational Health and the Library of the Academic Medical Center were involved in the course development and teaching. Specific tools were developed, such as a model introducing key knowledge questions in the field of disability evaluation, and instructions were developed for the study subjects on how to search for evidence. The course emphasised using aggregated evidence, if possible, such as evidence-based guidelines, before using evidence from primary studies, in accordance with current common practice in EBM teaching [21]. In between course days, participants did homework assignments that served as training in the four steps of this method [19] using both case scenarios that were provided and their own cases. A logbook with all EBM steps [11,22] was adapted for this course. The intervention group had full access to the electronic library of the Academic

Table 1: Characteristics of the clinically integrated post-graduate training programme in EBM for insurance physicians.**EBM course content**

Day 1: *Refresher of EBM* - general EBM knowledge; formulating answerable questions; searching for aggregated evidence.

Day 2: *Systematic reviews and guidelines* - methodology, critical appraisal and searching in Medline.

Day 3: *Therapy and prevention* - methodology, critical appraisal and searching for intervention studies.

Day 4: *Prognosis and aetiology* - methodology, critical appraisal and searching for prognostic and aetiological studies.

Day 5: *Diagnostic studies & implementation* - methodology, critical appraisal, implementation of evidence-based decision making in daily practice, personal development plans .

Objectives

For the participants in the EBM training programme:

1. Know which questions are suitable for the EBM method.
2. Can transform daily questions into answerable questions (with help of the PICO method).
3. Can develop and execute a search strategy in different databases.
4. Know how to use the concept of 'levels of evidence'.
5. Can critically appraise articles, guidelines and reviews.
6. Can formulate an answer to the original question and apply it in daily practice.
7. Can execute all EBM steps and can record these steps in written format, including the use of a logbook (such as a 'CAT').
8. Are able to support colleagues with knowledge questions in practice.

Educational format

Several assignments and interactive educational formats were used:

1. *Assignments for training programme preparation:* Every participant completed two assignments in advance: an interactive EBM e-course (internet) and reading the course syllabus.
2. *Peer teaching:* Participants prepared a presentation about one EBM step in a group (2-3) on the course day, which was presented to the rest of the participants (12).
3. *Interactive training in searching electronic databases:* Hands-on searches were practiced in Medline and in databases with aggregated knowledge such as Cochrane database, Guidelines Clearinghouse and TRIP database. A short plenary introduction was offered in advance by clinical librarians who were also tutors during these (computer) sessions.
4. *Lectures:* Lectures in critical appraisal / methodology of intervention, prognostic, aetiological and diagnostic studies were given by lecturers of the Dutch Cochrane Collaboration.
5. *Practical exercises:* Participants practised critical appraisal in small tutor groups (a maximum of 12 persons), building on the other educational formats. Two experienced tutors per group who were knowledgeable in EBM, epidemiology and disability assessments facilitated this process.
6. *Brainstorming sessions:* Brainstorming sessions took place during interactive group discussions, allowing for the exchange of physicians' suggestions and beliefs of how to report evidence in daily practice. These sessions were organised with two experienced tutors acting as facilitators.
7. *Homework assignments:* For each EBM day (days 1 – 5), a homework assignment was prepared by the physicians that followed the themes of the next EBM day Both constructed case studies and practical cases from the physician's own workplaces were used.
8. *Feedback:* Feedback (e.g., on assignments or lectures, etc., and as requested by the physicians) were integrated in between course days in the educational formats 1 through 7.

Medical Center, Amsterdam, thereby lowering a well-known barrier for the use of evidence in the literature [23]. High attendance at this programme, a positive factor in reviews for changing physicians' behaviour [13] was achieved both by the reward of CME points and the formal obligation that went along with this: 100% attendance was necessary to get accreditation.

In contrast, the control group had none of the above education and facilities. They knew that they would be provided with the same course one year after the start of the trial.

OUTCOMES

At baseline, all participants completed a form on personal and work characteristics: age, sex, work experience, experience in specific types of disability evaluations and their experience with EBM and research. The primary outcome measurements in this study were performed three months after completing the six-month course for practical reasons (i.e., 9 months after start of the intervention). The secondary outcome measurements took place at baseline, 7 months and 12 months.

Primary outcomes

The primary outcome was evidence-based disability evaluation, as indicated by the frequency in use of evidence of sufficient quality in the disability evaluation reports. The quality of the evidence was measured using quality indicators [24,25] reflecting the well-known EBM steps [19]. We defined the following quality indicators: 1) presence of evidence; 2) discernible EBM question; 3) search strategy; 4) EBM source; 5) evaluation of the quality of the evidence, and 6) actual use of evidence in underpinning of the conclusion. For each quality indicator, we developed criteria that determined whether the performance was sufficient for this indicator. Based on this judgement, a report could achieve a maximum score of 6 points. The criteria for these quality indicators were developed by the authors and were refined in 3 consensus meetings. The scores on 3 reports were compared among the researchers, and adaptations in the criteria were made until sufficient agreement was reached. The quality indicators with their criteria are listed in Appendix S2.

The participating physicians knew in advance when the reports were demanded and provided all disability evaluation reports on all their patients during the first two weeks in February 2010. We needed their help in collecting the reports because it was not feasible to just extract the reports from an administrative system. To measure the quality of the

disability report, we applied the quality indicators to all disability evaluation reports from all participating physicians that we collected during these two weeks.

We asked the participating physicians to note for each report if they had used evidence as part of their professional judgement. If evidence was used, these reports were selected, and two research assistants who were trained in research methods and in the scoring of the indicators independently scored the quality indicators of these reports. When scores differed, discussion ensued until consensus was reached.

Among the reports in which the physicians indicated they had not used evidence, two of the authors (SK and RK) independently checked a sample of 50 randomly selected reports and verified that there was no use of evidence. All reports for which the physicians indicated that they had not used evidence were scored zero on 'quality of disability report'.

Thus, a report could obtain a score ranging between 0 and 6 for the 'quality of disability report'. An a priori cut-off of 3 points was rated as sufficient 'quality of disability report'. Finally, our primary outcome was measured by calculating the percentage of reports in each group (intervention vs. control) in which quality was assessed as sufficient. And more specifically we were interested in the absolute difference in proportions between these two groups as the potential reflection of the effect of this large EBM intervention.

Before the assessments, the personal details of physician and patient were removed from each report.

Secondary outcome measures

Knowledge and skills in EBM were assessed by the validated Fresno test [26,27]. We adapted the test so that the scenarios were applicable to the context of disability evaluation. We maintained the standardised grading system of the Fresno Test (scores ranged from 0-212).

Intention to change behaviour was assessed with 22 statements that could be answered using a 5-point Likert scale [11,12]. The statements referred to five constructs within the attitude-social influence-(self)-efficacy (ASE) model [28]: attitude towards EBM, influence of social context on EBM, self-efficacy in performing EBM, intention to use evidence and the self-reported use of evidence. We calculated a mean score for each of the constructs (scores ranged from 0 to 5).

We hypothesised that the physicians' appreciation of their own profession would become more favourable as a result of the training in EBM. We measured this attitude with

10 statements on a visual analogue scale (VAS) ranging 0-10 points, with the anchors as 'fully disagree' (0 points) and 'fully agree' (10 points). Sum scores were constructed.

In line with earlier research, we defined professional performance as the self-reported practice of keeping up with and using evidence-based knowledge in daily practice [29], summarised in one sum score (0-27 points). The scale included questions to determine the amount of time spent on keeping current with research and the extent of use of the Internet and literature databases.

Process variables

At the end of each day of our intervention, different aspects of the education programme were evaluated with a questionnaire.

Statistical analysis

For our primary binary outcome measure, logistic multilevel analysis was used to analyse if there was a difference in the use of evidence of sufficient quality in the disability evaluation reports between the intervention and control groups. We distinguished several levels of data: the first level was the disability evaluation report, the second level was the writing of the disability report by the physician, and the third level was the case-based learning group representing several physicians writing disability evaluation reports. This clustering of our data was adjusted using a generalized linear mixed model (GLMM) analysis for binary outcomes in SPSS 19.0 and was performed in close collaboration with a statistician. In this model, we used intervention or control group membership as a fixed effect. Membership of case-based learning group was treated as random effect. Scores of patient disability evaluation reports from one physician were entered as repeated measurements at a single moment. The variance-covariance matrix, modelling the correlation structures of the measurements, with the optimal score on Akaike's information criteria (AIC), was chosen [30]. We calculated intra-cluster correlations using a proportion of variance interpretation, and we used Swiger's formula to calculate the concomitant confidence intervals [31].

For all secondary continuous outcome measures, a two-level linear regression analysis with a similar Linear Mixed Model (LMM) in SPSS 19.0 was based on repeated measurements in time (level 1), with clustering at level 2 for the case-based learning groups. In this model, we focused on the group x time interaction as a fixed effect, as this would demonstrate a learning effect. All of the outcome measures were analysed according to the

original randomisation scheme as a so-called intention-to-treat-analysis. The intra-cluster correlation was calculated using an ANOVA procedure, and Swiger's formula was used to calculate the concomitant confidence intervals [31].

We performed a missing-value analysis by comparing participants who did not send in reports to those who did using baseline prognostic variables, such as previous experience with EBM, experience with critical appraisal and experience with research. Moreover, a sensitivity analysis was performed using best- and worst-case scenarios. In the best-case scenario, we substituted all missing values with the mean score in the highest quartile of the physicians who did send in reports, whereas in the worst-case scenario, we supposed that the missing reports all scored '0'.

We used the items of the CONSORT statement for improving the quality of reporting cluster-randomised trials [32].

RESULTS

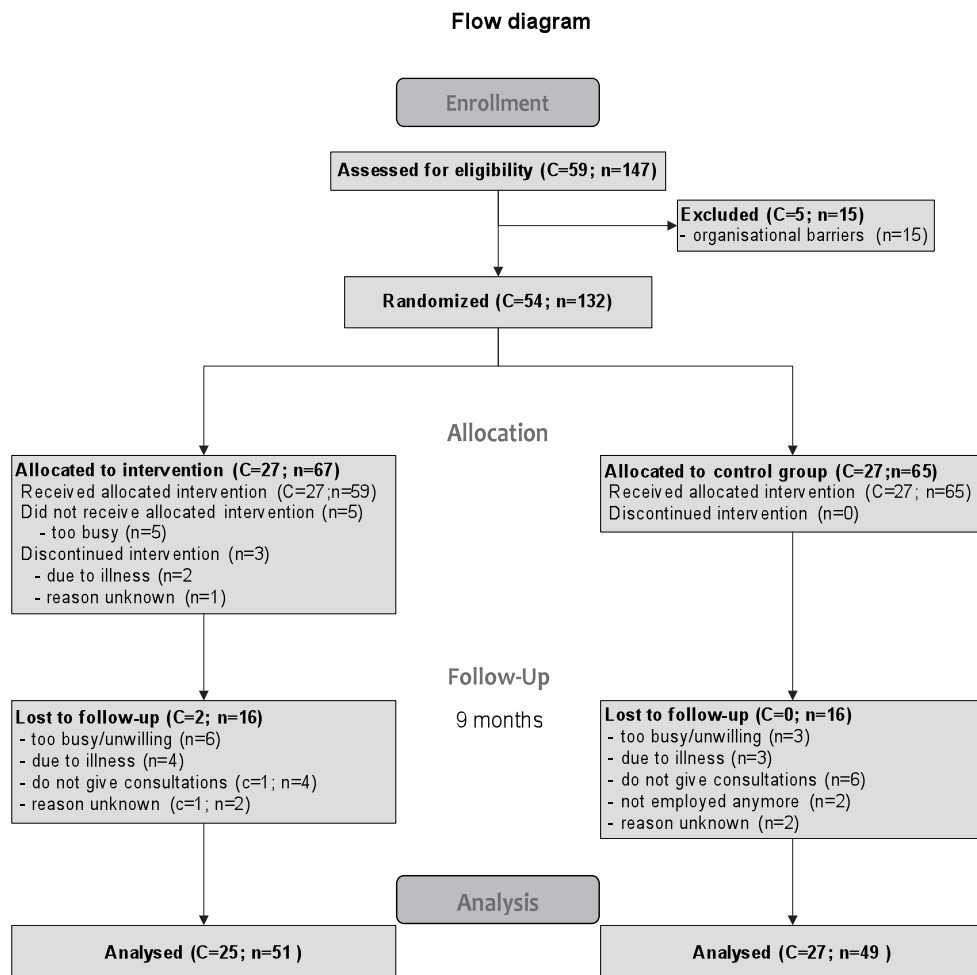
Recruitment took place between January and April 2009. Seventy-eight teams consisting of approximately 700 physicians existed in the Netherlands. However, 14 teams had a group leader that led more than one group. Because of the risk of contamination, this was not allowed; therefore, only sixty-four teams consisting of approximately 574 physicians were potentially eligible for this trial. Five teams did not respond to our invitation for unknown reasons. Thus, fifty-nine teams consisting of 147 physicians were eligible for the trial and were invited to participate. Five teams (15 physicians) declined participation because of organisational barriers unrelated to the study.

After cluster randomisation, 27 teams consisting of 67 physicians were assigned to the intervention 'EBM' group, and another 27 teams consisting of 65 physicians were assigned to the waiting list control group, yielding a total of 132 participating physicians. The first day of the EBM course started in May 2009.

Four physicians assigned to the intervention group declined participation before the start of the EBM course because they felt they were too busy, and another three physicians had to discontinue the course during the intervention period due to illness or unknown reasons. In the control group, at baseline, one physician was excluded due to illness, one was unwilling and the third was not employed anymore.

Loss to follow-up varied depending on the outcome measure used. More physicians completed the secondary outcome measurements (n=125 at baseline, n=117 at 7 months and n=111 at 12 months) compared to the primary outcome measurements (n=100 at 9 months). The overall number and reasons for loss to follow-up for the primary outcome measurements were similar (see Figure 1). The main reason for the lower number of physicians available for the primary outcome analyses was that some physicians (n=12) did not consult during the evaluation period, which made it impossible for them to send in any reports. Another reason was that physicians were too busy (n=9). In total, 32 physicians, equally divided among both groups, did not provide disability evaluation reports, resulting in data from 100 physicians being available for the intention to treat analyses of the primary outcome 'evidence-based disability evaluation' (see Figure 1).

Table 2 shows the baseline characteristics of the groups and the physicians. The number of clusters (N=27) and mean cluster size (a mean of 2.44 in the control group and 2.48 in the experimental group) were comparable. We did not observe relevant differences

Figure 1: Flow of clusters (c) and physicians (n) through the trial for primary outcome analysis.

in socio-demographic characteristics or in baseline outcome measurements between groups.

Primary outcome

In the intervention group, 16.7% of the reports indicated that physicians performed evidence-based disability evaluations (a 'quality of disability report' score of three or more), compared to 7.0% of the reports of the physicians in the control group, a statistically significant absolute difference of 9.7% (95% CI of 3.5 to 15.9) (see also Table 3) with the fixed effect for intervention statistically significant at $p=0.002$. The intra-cluster correlation (ICC)

Table 2: Baseline characteristics of case-based learning groups (clusters) and physicians in intervention and control groups.

Characteristics of case-based learning groups (clusters)	Intervention	Control
Clusters, N	27	27
Mean cluster size	2.5	2.4
Characteristics of physicians		
N*	62	63
Age, mean (SD)	49.7 (7.1)	48.7 (6.3)
Male, N (%)	41 (66.1)	35 (55.6)
Experience as MD in years, mean (SD)	21.6 (6.8)	21.5 (6.7)
Postgraduate qualification, N (%)	59 (90.8)	59 (93.7)
Work experience as insurance physician in years, mean (SD)	16.4 (6.7)	16.0 (7.5)
Hours work on weekly basis, mean (SD)	34.6 (6.9)	33.0 (6.7)
Previous experience with EBM, N (%)	45 (72.6)	44 (69.8)
Previous experience with critical appraisal, N (%)	17 (27.9)	15 (23.8)
Previous experience with research, N (%)	51 (83.6)	53 (84.1)

* For the various parameters numbers varied due to missing values

for disability evaluation reports per physician was 0.5 (95% CI of 0.42 to 0.58), and the ICC for physicians per case-based learning group was negligible.

Secondary outcomes

Knowledge and skills in evidence-based medicine, as measured by the Fresno test, improved more over time in the intervention group than in the control group (Mixed model analyses, $p=0.000$) (Table 2). At 7 months, the physicians in the intervention group had a mean Fresno score of 128.2 (SD 22.6) compared to 95.2 (SD 30.4) in the control group, a mean difference of 33.0 (95% CI 23.2 to 42.9). This difference declined only slightly at 12 months to a mean difference of 29.2 (95% CI 18.2 to 40.2) (Table 3).

The physicians' attitude towards EBM was similar in both groups after the intervention at 7 months (4.0 vs. 3.9) and at 12 months (4.0 vs. 3.8). The perceived influence of the social context was also similar (3.0 vs. 2.9 at 7 months and 3.1 vs. 2.9 at 12 months) and showed no differences in improvement between groups.

The physicians in the intervention group were more confident in using EBM compared to the control group (self-efficacy mean 3.2 vs. 2.7 at 7 months and 3.1 vs. 2.6 at 12 months), but intention to behaviour was not influenced (Table 3). The self-reported use of evidence in daily practice was higher in the intervention groups compared to the control

Table 3: Primary and secondary outcome measures: results for intervention (I) and control (C) group from baseline up to 12 months, and differences between groups.

Primary outcome: measured at 9 months	Intervention, % (sd)	Control, % (sd)	Mean difference (95% CI) Intervention - Control	Mixed model analyses: Fixed effect 'intervention'; ICC physicians (95%CI)
Evidence-based disability evaluations across physicians (n=100 physicians, n=1680 disability evaluations)	16.7 (19.0)	7.0 (11.2)	9.7 (3.5; 15.9)*	F=9.2; df=1678; p=0.002 ICC=0.5 (0.42;0.58)
Secondary outcomes: measured at baseline (n=125 physicians), 7 months (n=117), 12 months (n=111)	Intervention, mean (sd)	Control, mean (sd)	Mean difference (95% CI) I - C	Mixed model analyses: Fixed effect 'intervention x time'; ICC groups (95% CI)
Knowledge/skills in EBM (0-212)	0m 93.7 (25.9)	88.7 (33.8)	5.0 (-5.6;15.7)	F=18.8; df=110.4; p=0.000 ICC = -0.043 (-0.24;0.15)
	7m 128.2 (22.6)	95.2 (30.4)	33.0 (23.2;42.9)*	
	12m 121.7 (25.1)	92.6(32.9)	29.2 (18.2; 40.2)*	
Attitude towards EBM(1-5)	0m 4.0 (0.3)	3.9 (0.5)	0.06 (-0.08; 0.2)	F=0.8; df=115.5; p=0.5 ICC=0.028 (-0.18;0.23)
	7m 4.0 (0.4)	3.9 (0.5)	0.1 (-0.04; 0.3)	
	12m 4.0 (0.4)	3.8 (0.5)	0.2 (-0.01; 0.3)	
Influence Social context on EBM (1-5)	0m 2.9 (0.5)	2.9 (0.6)	0.05 (-0.1;0.2)	F=0.2; df=117.4; p=0.8 ICC=0.001 (-0.20;0.20)
	7m 3.0 (0.5)	2.9 (0.6)	0.05 (-0.1;0.2)	
	12m 3.0 (0.5)	2.9 (0.5)	0.1 (-0.1;0.3)	
Self-efficacy in performing EBM(1-5)	0m 2.6 (0.5)	2.8 (0.5)	- 0.1 (-0.3;0.04)	F=33.1; df=114.5; p=0.000 ICC=0.003 (-0.20;0.21)
	7m 3.2 (0.5)	2.7 (0.6)	0.5 (0.3;0.7)*	
	12m 3.1 (0.5)	2.6 (0.5)	0.5 (0.3;0.7)*	

Intention to EBM behavior (1-5)	0m	3.9 (0.4)	3.8 (0.5)	0.03 (-0.1;0.2)	F=0.5; df=115.8; p=0.6 ICC=-0.091 (-0.28;0.10)
	7m	3.9 (0.4)	3.8 (0.5)	0.1 (-0.07;0.3)	
	12m	3.7 (0.5)	3.6 (0.5)	0.08 (-0.09;0.3)	
Self-reported use of evidence (1-5)	0m	3.2 (0.6)	3.2 (0.6)	-0.05 (-0.3;0.2)	F=4.3; df=115.7; p=0.02 ICC=0.15 (-0.056;0.36)
	7m	3.5 (0.5)	3.3 (0.6)	0.2 (-0.06;0.4)	
	12m	3.6 (0.6)	3.3 (0.7)	0.3 (0.02; 0.5)*	
Appreciation own profession (0-100)	0m	68.3 (9.5)	66.0 (11.9)	2.4 (-1.5;6.2)	F=3.5; df=112.6; p=0.04 ICC=-0.019 (-0.22;0.18)
	7m	70.8 (10.2)	69.2 (12.1)	1.6 (-2.5;5.7)	
	12m	70.5 (8.9)	64.0 (13.2)	6.4 (2.2;10.7)*	
Professional performance (0-27)	0m	20.0 (1.5)	20.0 (3.1)	-0.09 (-0.9;0.8)	F=1.0; df=85.7; p=0.4 ICC=-0.098 (-0.29;0.093)
	7m	21.5 (2.1)	20.9 (2.2)	0.7 (-0.09;1.5)	
	12m	21.6 (2.2)	21.1 (2.2)	0.5 (-0.3;1.3)	

*p<0.05 with t-test and mixed model analysis.

group at 12 months (3.6 vs. 3.3). The 'appreciation of own profession' did not change directly after the intervention but was higher in the intervention group at 12 months follow-up (70.5 vs. 64.0). Professional performance was not significantly different between groups.

Sensitivity analysis

We observed no differences in baseline prognostic variables such as previous experience with EBM, experience with critical appraisal or experience with research between physicians who did not send in reports (n=32) and those who did (n=100). In the best-case scenario in our sensitivity analysis, the estimated mean difference between the control and intervention group was somewhat reduced to 6.9% (95% CI of 1.0 to 13.0). In the worst-case scenario, the estimated mean difference became 6.5% (95% CI of 2 to 11%).

DISCUSSION

A clinically integrated post-graduate training programme in EBM results in more evidence-based disability evaluation. This outcome was accomplished by a concurrent increase in knowledge and skills in EBM and a higher rating of self-efficacy.

Strengths and limitations of the study

A strength of our study is that we applied the EBM model in a non-hospital setting and evaluated it in a randomised controlled trial that used a large sample of physicians and disability evaluation reports.

Furthermore we measured a very concrete behavior of physicians: whether they used evidence to support their decisions or not. We believe that our outcome is therefore important for health care and patients. Work and work ability are important aspects of quality of life and, thus, their assessment by physicians is important as well. Physicians all over the world make judgments about work ability and work capacity of their patients [7]. Where this can be underpinned with evidence from scientific research, it will improve the quality of care.

In our intervention, we used components known to be successful in influencing physicians' behaviour [13-15]. The participating physicians were enthusiastic about the EBM course and rated it at a mean of 8.1 on a scale of 0-10. An increase from 7.0 % to 16.7% in evidence-based disability evaluation in favour of the intervention group may not seem impressive; however, one has to take into account that this is based on the proportion of all disability evaluation reports. The majority of these reports are routine cases, and the insurance physicians do not see a need to use evidence to underpin their decisions [12]. Thus, the proportion of reports in which sufficient evidence is used and where it was needed is much higher, but we felt that it was too difficult to develop valid criteria to assess this aspect.

In terms of the appreciation of the educational programme, we believe we did exceptionally well; the participants were very enthusiastic. Compared to other experiences, the satisfaction ratings were very high; given the considerable travelling time that many participants had, the attendance rate was high.

This enthusiasm can also be a drawback in that these (insurance) physicians were probably the more enthusiastic colleagues for using EBM (pioneers). Therefore the generalization of this results to all (insurance) physicians working for the Dutch National

Institute of Benefit Schemes, should be taken with caution. However we did include 1 out of 7 (insurance) physicians working for this institute, which is considerable enough to assume that not everyone was a pioneer in advance. Another limitation of our study is that no validated relevant general outcome measures were available; thus, our primary outcome had to be constructed for this study. However, we followed general guidelines for constructing performance indicators and defined an a priori cut-off for determination of sufficient quality as recommended by Shaneyfelt for evaluating EB training [24-26]. Therefore, we believe that the outcome is a valid and relevant indicator of physicians' behaviour in using evidence for disability evaluations.

We also had a considerable loss to follow-up (24%) for our primary outcome measure. In educational research, it is not easy to randomise and retain participants in the intervention and control groups. Participants know to which group they belong, and it is often more convenient for them to change groups. To prevent losing the benefits of randomisation, we strictly adhered to the allocation to the intervention and control groups. That is one reason why we lost participants. However, our sensitivity analysis showed that it is unlikely that this has influenced our main findings.

Even though the intervention group increased considerably in knowledge, the mean score on the Fresno test was approximately half of the maximum score. However, with an effect size of 1.10 (MD/SD baseline), our course compares favourably with the results of other EBM courses that on average yielded an effect size of 0.44 [33]. Ramos reports a mean Fresno score of 95.6 for novices and of 147.5 for experts. This means that our course brought the participants on average more than half-way from novice to expert-level [27]. Nevertheless, many EBM concepts remain difficult to understand for the participants, such as the difference between relative risk and probability in prognosis or the difference between odds ratios and relative risks when the prevalence of the disease is high. It also takes time for participants to feel that they are confident in making a judgement of the quality of an article. This means that a continued effort in learning about EBM is needed but we need also better information management tools to make EMB more feasible [34].

As a limitation we could further add that we are not able to differentiate which educational element was effective in effectuating the improved use of evidence in the disability reports.

Theoretically, one could argue that the attention resulting from the intervention and not the intervention itself would have led to the effect. Even though this might be the

case in drug studies, we believe that educational interventions are different and that just giving attention to persons will not increase their knowledge and skills. This does not mean that asking for all of their reports in advance, is not having an effect. We strongly believe, that if physicians are capable to use EBM, asking for their reports, leads to improved use of evidence. Moreover we found a parallel improved score change in the adapted Fresno questionnaire which further supports our strong belief that improved knowledge and skills in EBM are responsible for the improved use of evidence in disability reports.

Comparison with other studies

As in other studies in which the educational intervention was integrated in routine practice, our intervention significantly improved knowledge [9]. Other studies report also changes in behaviour but most of them are based on self-reported behaviour which is notorious for being misjudged and the participants are residents and not practising physicians [9,26]. We know of only three other randomised studies that measured behaviour change among practising physicians as a result of EBM training integrated in routine practice. One study, among public health physicians, objectively measured behaviour change but did not find an effect on behaviour, which was possibly due to extreme loss to follow-up [5]. Another randomised study among primary care physicians did not find a significant difference in a variety of clinical behaviours such as drug prescription, test ordering or clinical examinations between an EBM trained and a control group [10]. This might have been due to the baseline rate of clinical behaviour being low, as argued by Glasziou and thus the study is underpowered for these outcomes [35]. A third study also showed that a training programme in EBM changed occupational health physicians' behaviour and led to more frequent high-quality advice regarding return to work interventions and prognoses [11]. However, the outcome measure in their study differed from our study in that the authors only measured the quality of a limited, self-selected number of cases, whereas we sampled all reports in a certain period of time. In both their and our study, the EBM course was practice-based, with real cases, experienced teachers and opportunities to interact; this may have contributed to the increase in self-efficacy, an important step for implementing new practices [5].

The lack of an increase in positive attitude towards EBM in this study is in line with our earlier finding in a one-day workshop [12]. We believe that this is due to a ceiling effect because insurance physicians are already very motivated to use evidence in their reports. They feel that it prevents appeals against their decisions and makes their cases

stronger compared to the opinions of other experts such as medical specialists in hospitals. We thought that this would also lead to a better appreciation of their profession, but the changes were small and only significant at 12 months follow-up.

Implications for practice and further research

We showed that a clinically integrated post-graduate training programme in EBM successfully improved knowledge, skills and self-efficacy of physicians and their use of evidence in a non-hospital based medical specialty. The educational components of our intervention are also applicable to physicians in other specialties and will enhance their use of evidence for clinical decision-making. In our study, we believe it was important that the professional context of the intervention was very supportive in the sense that searches in databases, using and applying guidelines and other forms of evidence are considered standard practice and are encouraged by colleagues and management. Thus, in helping doctors make better decisions, we believe that the context in which physicians work has to be supportive. In general, a good knowledge infrastructure, especially the availability of online full-text guidelines, reviews and articles, is a prerequisite [36]. As with all education, physicians should keep their knowledge up to date and practice their skills. For this reason all participants of this trial still have EBM refreshing days every year and are starting with EBM groups to ensure regularly practicing.

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ADDITIONAL FILES

Appendix S1: FUNCTIONAL ABILITIES LIST

*This list is an overview of an individual's **general** functional abilities during a full working day (minimum of 8 hours). **Restrictions** to these abilities with regard to **normal values** are given in a separate list if considered symptomatic of an illness, incapacity or accident in the opinion of the insurance company doctor. The standard functional levels required in daily life have been taken as the normal values. Unless expressly stated otherwise, incidental **peak demands** above the given functional levels are also possible.*

*This list should only be applied if accompanied by a **medical insurance physician's report** that, based on an analysis of the problem, evaluates, motivates and describes the correlation of functional abilities and limitations.*

Name:

National insurance number: sex: m/f

Diagnosis code:

Last/current work:
(hours per week:)

Resumed work:
(hours per week:)

Conclusion:

- The client has long-term capacities for work
- The client does not have long-term capacities for work

Explanation:

- The client is capable of fully functioning in his own job/function
- The client is capable of functioning normally (see headings)
- The client's normal functioning is impaired (see headings)
- Other, see report by the insurance company doctor

- The client's personal and/or social functioning is extremely limited (see headings I, II)
- The client has been admitted to a hospital or institution recognised by the Exceptional Medical Expenses Compensation Act (AWBZ)
- The client is bedbound (for most of the day, long-term)
- The client is highly dependent as regards performing daily living activities (ADL)
- The client has highly variable functional abilities/loss of functional abilities < 3 months - 1 year

Date: Insurance physician :

HEADING I: PERSONAL FUNCTIONING

1. Focusing attention

- 0 Normal, can concentrate on an information source (book, documentary on TV or radio) for at least half an hour)
- 0 Limited, cannot concentrate on an information source (newspaper, current affairs programme on radio or TV) for more than half an hour
- 0 Very limited, cannot concentrate on an information source (advertising brochure, TV or radio advert) for longer than 5 minutes

2. Dividing attention

- 0 normal, can concentrate for at least half on a number of information sources (can manage driving or cycling in busy traffic)
- 0 limited, cannot concentrate for at least half on a number of information sources (can manage driving or cycling in busy traffic)
- 1 Very limited, cannot concentrate for longer than 5 minutes on a number of information sources (crossing a busy street alone)

3. Memory

- 0 normal, can generally remember relevant things promptly, without resorting to unusual aids
- 0 limited, must frequently write things down as a memory aid to safeguard the continuity of his actions
- 0 very limited, constantly unable to remember essential everyday things (time, place, person, subject), and cannot compensate with memory aids

4. Insight into own abilities

- 0 normal, mostly estimates own abilities and limitations reasonably accurately
- 0 limited, generally highly overestimates own abilities
- 0 limited, generally highly overestimates own limitations

5. Effective action (task implementation)

(coordinated action, gears own activities to realising a goal)

- 0 normal, no specific limitations to his effective action. The routine of daily life (getting up on time, washing, dressing, preparing breakfast, breakfasting, locking up the house and arriving at appointments on time)
- 0 limited, does not commence activities on time in order to realise set goal
- 0 limited, does not conduct the necessary activities in a logical order
- 0 limited, does not check the course of the activities
- 0 limited, does not end the activities once set goal is reached or cannot be reached
- 0 otherwise limited in taking effective action, i.e.

6. Independent action (carrying out tasks autonomously)

- 0 normal, no specific limitations to independent action in daily life
- 0 limited, does not generally initiate action
- 0 limited, does not generally set himself goals
- 0 limited, does not generally think of variations on a task independently
- 0 limited, generally does not generally take an independent decision on the best approach to take
- 0 limited, does not generally realise when the decided approach falls short
- 0 limited, in those instances, does not generally take an independent decision to follow an alternative line of action or set a different goal
- 0 limited, does not generally continue, under own initiative, until goal is accomplished
- 0 limited, does not call on others promptly for help when the situation demands
- 0 otherwise limited in independent action, i.e.
- ...

7. Action tempo

- 0 normal, there are no specific limitations to the action tempo in daily life
- 0 limited, the action tempo is considerably slower

8. Other limitations to personal functioning

- 0 normal, no other specific limitations to personal functioning in daily life
- 0 limited, other specific limitations, i.e.

9. Specific conditions for personal functioning in a work situation

(is work functioning dependent on specific conditions because of the said limitations or the client's compensatory behaviour?)

- 0 no, there are no specific conditions for personal work functioning
- 0 yes, the client has been advised to follow a fully pre-structured work schedule: concrete, one-sided assignments (what, when, how long; one task per assignment) and to follow prescribed implementation orders (how)
- 0 yes, the client has been advised to follow fixed, familiar working methods (routine-dependent)
- 0 yes, the client has been advised to perform work under immediate supervision (consistent feedback) and/or to work under intensive supervision
- 0 yes, the client has been advised to work in a situation in which he is not distracted by the activities of others
- 0 yes, the client has been advised to work in a predictable working situation, cannot respond flexibly to highly varied situations in which in work s performed and/or varied work content
- 0 yes, the client has been advised to work in a work situation not susceptible to constant interruptions and disturbance
- 0 yes, the client has been advised to work in a work situation not susceptible to constant deadlines or production peaks

- 0 yes, the client has been advised to work in a work situation in which a high action tempo is not required
- 0 yes, the client has been advised to work in a work situation in which there is no increased personal risk
- 0 yes, there are other specific conditions, i.e.

Explanation: *see medical insurance physician's report*

HEADING II: SOCIAL FUNCTIONING

1. Vision

- 0 normal, no specific limitation in daily functioning
- 0 limited, i.e.

2. Hearing

- 0 normal, no specific limitation in daily functioning
- 0 limited, i.e.

3. Speech

- 0 normal, no specific limitation in daily functioning
- 0 limited, i.e.

4. Writing

- 0 normal, no specific limitation in daily functioning
- 0 limited, i.e.

5. Reading

- 0 normal, no specific limitation in daily functioning
- 0 limited, i.e.

6. Dealing with the emotional problems of others

- 0 normal, can generally empathise with the problems of others but can also distance himself in terms of behaviour and experience
- 0 limited, generally becomes involved in the problems of others; nevertheless, can distance himself sufficiently in terms of behaviour although not experience
- 0 very limited, generally identifies with the problems of others and cannot distance himself in terms of either behaviour or experience

7. Expressing personal feelings

- 0 normal, can generally express personal feelings in a way acceptable to others, both verbally and behaviourally
- 0 limited, confuses others with unpredictable or unconventional ways of expressing feelings
- 0 very limited, is generally incapable of expressing feelings (blocks himself) or expresses them in an uncontrolled way regardless of the feelings of others

8. Dealing with conflicts

- 0 normal, can directly deal with conflicts with aggressive or unreasonable people
- 1 limited, can only deal with conflicts with aggressive or unreasonable people by phone or in writing
- 0 very limited, cannot generally deal with conflicts

9. Working with others

- 0 normal, can jointly carry out a task with others (teamwork)
- 0 limited, can work with others but only with a task of his own, clearly defined beforehand
- 0 very limited, as a rule is unable to work with others

10. Transportation

- 0 normal, can drive or cycle or use public transport on his own
- 0 limited, is reliant on others for transportation

11. Other limitations to social functioning

- 0 normal, no other specific limitations to social functioning in daily life
- 0 limited, other specific limitations, i.e.
....

12. Specific conditions for social functioning at work

(is social functioning at work dependent on specific conditions because of the said limitations or the client's compensatory behaviour?)

- 0 no, there are no specific conditions for social functioning at work
- 0 yes, the client has been advised to work in a situation demanding no direct contact with clients (some occupations in the service sector)
- 0 yes, the client has been advised to work in a situation where little or no direct contact with patients or those needing help is required (some occupations in the health care sector)
- 0 yes, the client has been advised to work in a situation in which, if necessary, he can fall back on immediate colleagues or managers (no solitary job)
- 0 yes, the client has been advised to work in a situation which generally does not require direct contact with colleagues
- 1 yes, the client has been advised to work in a situation involving no managerial aspects
- 0 yes, there are other specific conditions, i.e.
....

Explanation: *see medical insurance physician's report*

HEADING III: ADJUSTING TO PHYSICAL ENVIRONMENT

1. Heat

- 0 normal, no specific limitations
- 0 limited, i.e.

2. Cold

- 0 normal, no specific limitations
- 0 limited, i.e.

3. Draught

- 0 normal, no specific limitations
- 0 limited, i.e.

4. Skin contact

- 0 normal, no specific limitations
- 0 limited, i.e.

5. Protective measures

- 0 normal, no specific limitations
- 0 limited, i.e.

6. Dust, smoke, gases and fumes

- 0 normal, no specific limitations
- 0 limited, i.e.

7. Noise nuisance

- 0 normal, no specific limitations
- 0 limited, i.e.

8. Vibration

- 0 normal, no specific limitations
- 0 limited, i.e.

9. Other limitations to physical adjustment abilities

- 0 normal, no other specific limitations to physical adjustment abilities
- 0 allergies, i.e.
- 0 increased susceptibility to infections, i.e.
- 0 weakened skin barrier, i.e.
- 0 other limitations, i.e.

10. Specific conditions for adapting to the physical working environment

(is adjustment to the working environment dependent on specific conditions because of the said limitations or the client's compensatory behaviour?)

- 0 no, there are no specific conditions for adapting to the physical working environment
- 0 yes, there are specific conditions for adapting to the physical working environment, i.e. . . .
.....

Explanation: *see medical insurance physician's report*

HEADING IV: DYNAMIC MOVEMENT

1. Dominance

- 0 not applicable
- 0 right
- 0 left

2. Localisation limitations

- 0 neither right nor left
- 0 right
- 0 left
- 0 both sides

3. Use of hand and fingers

- 0 normal, no specific limitations when using hands and fingers in daily life
- 0 limited, can hardly perform a ball grip, if at all
- 0 limited, can hardly perform a pen grip, if at all
- 0 limited, can perform a pincer grip, if at all
- 0 limited, can perform a key grip, if at all
- 0 limited, can perform a cylinder grip, if at all
- 0 limited, can use hand/fingers to squeeze or grip , if at all
- 0 limited, is hardly able to perform fine motor hand/finger movements
- 0 limited, is not able to perform repetitive hand/finger movements, if at all

4. Touch

- 0 normal, no specific limitations in daily life
- 0 limited, i.e.

5. Using a keyboard and mouse

- 0 normal, can perform all required movements
- 0 limited, i.e.

6. Working with a keyboard and mouse

- 0 normal, if required can use a keyboard and mouse most of the working day (professional word-processing, programming, CAD/CAM work, electronic sales)
- 0 slightly limited, if required can use a keyboard and mouse half the working day (roughly 4 hours) (policy worker)
- 0 limited, if required can use a keyboard and most for a small part of the working day (roughly 1 hour) (to send email)
- 0 very limited, can use a keyboard and mouse less than thirty minutes a working day

7. Twisting movement – hand and arm

- 0 normal, no specific limitations in daily life
- 0 limited, i.e.

8. Stretching arm

- 0 normal, can stretch arms (serve coffee)
- 0 slightly limited, can stretch arm slightly (shoulder-hand distance = 50-60 cm)
- 0 limited, can stretch arm slightly (shoulder-hand distance = less than 50 cm)

9. Can stretch arm frequently during work (roughly 20 times a minute)

- 0 normal, if required can stretch frequently during each hour of the working day (cashier work in wholesale company, packaging work)
- 0 slightly limited, if required can stretch frequently for roughly 4 hours of the working day
- 0 limited, if required can stretch frequently roughly one hour per working day
- 0 very limited, cannot stretch frequently during one hour of the working day

10. Bending

- 0 normal, can bend roughly 90 degrees (pick up a piece of paper from the ground)
- 0 limited, can bend roughly 60 degrees (pick up a bag from the ground)
- 0 very limited, can bend roughly 45 degrees (pick up crumbs from a chair)

11. Frequent bending during work (roughly ten times per minute)

- 0 normal, if required, can bend frequently during each hour of the working day
- 0 slightly limited, if required, can bend frequently roughly 4 hours per working day
- 0 limited, if required, can bend frequently one hour per working day
- 0 very limited, cannot bend frequently one hour per working day

12. Turning/twisting

- 0 normal, can turn torso at least 45 degrees (look behind while cycling, reach into the back seat of the car to get a bag while sitting in the front)
- 0 limited, i.e.

13. Pushing/pulling

- 0 normal, can push or pull roughly 15 kgf (remove a stubborn cork from a wine bottle)
- 0 limited, can push or pull roughly 10 kgf (full rubbish container)
- 0 very limited, can push or pull roughly 5 kgf (open door with door-closer)

14. Carrying/lifting

- 0 normal, can carry roughly 15 kg (toddler)
- 0 slightly limited, can carry roughly 10 kg (infant)
- 0 limited, can carry roughly 5 kg (bag of potatoes)
- 0 very limited, can lift roughly 1 kg (litre container of milk)

15. Frequently managing light objects at work (roughly 10 times per hour)

- 0 normal, if required can manage objects weighing around 1kg frequently during every hour of the working day (order book)
- 0 slightly limited, if required, can manage objects of 1 kg for roughly 4 hours per working day
- 0 limited, if required, can manage objects of around 1 kg for roughly one hour per working day
- 0 very limited, cannot manage objects of around 1 kg for one hour per working day

16. Frequently managing heavy loads at work (roughly 10 times per hour)

- 0 normal, if required, can frequently manage loads of roughly 15 kg for one hour per working day
- 0 limited, cannot frequently manage loads of roughly 15 kg during one hour per working day

17. Head movements

- 0 normal, can move head without hindrance
- 0 limited, can move head to a limited extent
- 1 very limited, can barely turn head to the side if at all
- 0 very limited, can barely move head up and down if at all

18. Walking

- 0 normal, can walk for roughly one consecutive hour (a walk)
- 0 slightly limited, can walk for roughly 15-30 consecutive minutes (a stroll)
- 0 limited, walk for roughly 5-15 consecutive minutes (to the letterbox)
- 0 very limited, can walk for less than 5 consecutive minutes (indoors)

19. Walking while at work

- 0 normal, if required, can spend most of the working day walking (postal worker)
- 0 slightly limited, if required can walk half the working day (roughly 4 hours)
- 0 limited, if required, can walk a limited part of the day (roughly 1 hour)
- 1 very limited, can walk for less than half an hour per working day

20. Stairclimbing

- 0 normal, can walk at least 2 flights of stairs up and down in one go (2 floors of a house)
- 0 slightly limited, can walk at least up and down a flight of stairs in one go (1 floor of a house)
- 0 limited, can walk at least down stairs in one go (1 floor of a house)
- 0 very limited, can only walk on or off the curb in one go

21. Climbing

- 0 normal, can at least climb up and down a ladder (1 floor)
- 0 slightly limited, can at least climb up and down a household stepladder
- 0 limited, can at least get up and down from a stool (50 cm, elephant foot)
- 0 very limited, cannot climb up and down

22. Kneeling or squatting

- 0 normal, can touch the ground with hands when kneeling or squatting (picking up a coin)
- 0 limited, can barely touch the ground with hands when kneeling or squatting, if at all

23. Other limitations to dynamic movement

- 0 normal, no other specific limitations to dynamic movement in daily life
- 0 other specific limitations, i.e.

24. Specific conditions for dynamic movement at work

(is dynamic movement at work dependent on specific conditions because of the said limitations or the client's compensatory behaviour?)

- 0 no, there are no specific conditions for dynamic movement at work
- 0 yes, there are specific conditions for dynamic movement at work, i.e.

Explanation: *see medical insurance physician's report*

HEADING V: STATIC MOVEMENTS

1. **Sitting**

- 0 normal, can sit for roughly 2 consecutive hours (car journey)
- 0 slightly limited, can sit for roughly one consecutive hour (film)
- 0 limited, can sit for roughly 30 consecutive minutes (meal)
- 0 very limited, can sit for less than 15 consecutive minutes (TV news)

2. **Sitting at work**

- 0 normal, if required, can sit for almost the whole working day (assembly work, cashier work, administrative work)
- 0 slightly limited, if required can sit for most of the working day (6-8 hours)
- 0 limited, if required can sit for half the working day (roughly 4 hours)
- 0 very limited, can sit for less than 4 hours per working day

3. **Standing**

- 0 normal, can stand for roughly 1 consecutive hour (spectator at sports events)
- 0 slightly limited, can stand for roughly 15-30 consecutive minutes (waiting in line for theme park attraction)
- 0 limited, can stand for roughly 5-15 consecutive minutes (washing up)
- 0 very limited, can stand for less than 5 consecutive minutes (brushing teeth)

4. **Standing during work**

- 0 normal, if required, can stand for almost the whole working day (sales jobs, production line jobs)
- 0 slightly limited, if required can stand for half the working day (roughly 4 hours)
- 0 limited, if required can stand for a limited part of the working day (roughly 1 hour)
- 0 very limited, can stand for less than 30 minutes per working day

5. **Active kneeling or squatting**

- 0 normal, can perform activities kneeling or squatting for at least 5 minutes (gardening)
- 0 limited, can perform activities for less than 5 consecutive minutes (cleaning kitchen cupboard door)

6. **Active bending and/or twisting**

- 0 normal, can perform activities bending or twisting for at least 5 minutes (sweeping steps)
- 0 limited, can perform activities bending or twisting for less than 5 consecutive minutes (tying shoelaces)

7. Active above shoulder level

- 0 normal, can perform activities above shoulder level for at least 5 minutes (hanging up curtains)
- 0 limited, can perform activities bending or twisting for less than 5 consecutive minutes (changing a light bulb)

8. Keeping head in a certain position during work

- 0 normal, if required, can keep head in a certain position for almost the whole working day (screen work, quality control)
- 0 slightly limited, if required, can keep head in a certain position for half of the working day (roughly 4 hours)
- 0 limited, if required, can keep head in a certain position for a limited part of the working day (roughly 1 hour)
- 0 very limited, can keep head in a certain position for less than thirty minutes per working day

9. Changing position

- 0 normal, no specific sequence of different positions required
- 0 specific requirements of various positions required, i.e.

10. Other limitations to static movement

- 0 normal, no other specific limitations in daily life
- 0 other specific limitations, i.e.

11. Specific conditions for static movement at work

(are static movements at work dependent on specific conditions because of the said limitations or the client's compensatory behaviour?)

- 0 no, there are no specific conditions for static movements at work
- 0 yes, there are specific conditions static movements at work, i.e.

Explanation: *see medical insurance physician's report*

HEADING VI: WORKING HOURS

1. Periods in a day (24 hours)

- 0 normal, if required can work at any hour of the day, night included
- 0 limited, cannot work nights (00.00 - 06.00)
- 0 limited, cannot work evenings (18.00 - 24.00)

2. Hours per day

- 0 normal, can work at least 8 hours per day
- 0 somewhat limited, cannot work on average more than 8 hours per day
- 0 slightly limited, cannot work on average more than roughly 6 hours per day
- 0 limited, cannot work on average more than roughly 4 hours per day
- 0 extremely limited, cannot on average work more than roughly 2 hours per day

3. Hours per week

- 0 normal, can work an average of at least 40 hours per week
- 1 somewhat limited, can work an average of roughly 40 hours per week
- 0 slightly limited, can work an average of roughly 30 hours per week
- 0 limited, can work an average of roughly 20 hours per week
- 0 extremely limited, can work an average of roughly 10 hours per week

4. Other limitations with regard to working hours

- 0 normal, there are no other specific limitations regarding working hours
- 0 other specific limitations, i.e.
.....

Explanation: *see medical insurance physician's report*

Appendix S2: List of quality indicators with criteria for the primary outcome ‘evidence based disability evaluation’.

Quality Indicator (QI)	Score	Criteria
1. The presence of evidence	Yes (1)	Score Yes if the information reported refers to specific written external information (evidence). <i>E.g. in the report the following is written (example): “A systematic review on EMDR was found in PubMed” and/or this article was attached to the report</i>
	No (0)	No evidence reported, or the information in the report reflected the physician’s own professional judgment and/or information from a colleague
2. A discernible EBM question	Yes (1)	Score Yes if a medical question was formulated and/or in the report an answer is given to a medical question: Therapeutic, Etiologic, Prognostic, Diagnostic, Background, Incidence, Risk or Other*: <i>*for example: “EMDR has been found to have a favorable effect”, which is an answer to a therapeutic question.</i>
	No (0)	No question and/or answer.
3. The presence of an adequate search strategy	Yes (1)	Score Yes if at least two (specific) search terms were formulated from different PICO domains, or from one PICO domain in combination with the study design, e.g. “PTSD” is mentioned in the P domain and “EMDR” in the I domain, or “PTSD” in the P domain and RCT design studies.
	No (0)	Score No if no adequate search strategy is used.
	N/A(-)	N/A: the QI is removed from the denominator (see the last line of this table) if reference is made to the use of a (desktop) guideline, or desktop handbook Work and Workload “Handboek Arbeid en belastbaarheid”.
4. A clear EBM source	Yes (1)	Score Yes if the source that was used is verifiable, e.g. (CBO) guideline anxiety disorders, “Handboek Arbeid en Belastbaarheid” (Handbook Work and Workload), title of the article and name of journal, and/or the EBM source is added to the report, e.g. an article on treatment of PTSD with EMDR.
	No (0)	Score No if a clear EBM source is absent or formulated too general, for example when reference is made to “a guideline”, “a book”, or “an article”.

Quality Indicator (QI)	Score	Criteria
5. An evaluation of the quality of the evidence	Yes (1)	<p>Score Yes if a clear identifiable guideline (e.g. SIP guideline) or Cochrane review was used</p> <p>OR Score Yes if one or more of the following five aspects are mentioned:</p> <ul style="list-style-type: none"> * the <u>quality</u> of the EBM source (for instance an article), is shown by substantive good use of one of the following concepts: appropriate study design; adequate blinding; randomization; comparability with the control group; follow-up was long enough; the power/sample size was adequate. * the <u>applicability/relevance</u> of the evidence for this patient, which is shown by substantive good use of one of the following concepts: comparability of the specific patient with the research population; feasibility of the intervention; patient or illness oriented outcome; the information is up to date/of a recent date. * the <u>level</u> of the evidence that was used, e.g. level 1 evidence exists for the effect of EMDR on PTSD symptoms. * the <u>size</u> of the findings/estimates, which is shown by substantively good use of the concept 'clinical relevance' with an example of effect size, such as specificity, sensitivity, LR, NNT, RR, ARR, PPV, NPV. * the <u>(statistical) significance</u> of the findings, using at least two of the following concepts adequately: p-value, confidence interval, power, precision of estimates, type 1 or 2 errors.
	No (0)	Score No if no reference is made to quality of the evidence or the statement is too general, or without explanation, for example "the validity of the research is good".
6. The actual use of evidence in the underpinning of the conclusion	Yes (1)	<p>Score Yes if the evidence that was found is referred to in the underpinnings of the conclusion, explaining the evidence is 'weighted'. This should be in a distinct section of the report, such as below the caption 'medical judgment'. <i>For example: "as the (CBO) guideline for anxiety disorders shows, EMDR is an important treatment method for PTSD, which is why I recommend this client to follow an EMDR treatment, in consultation with his general physician.</i></p>
	No (0)	Score No if no evidence is referred to in the underpinnings of the conclusion.

Chapter 4.1

Improved quality and more attractive work by applying EBM in disability evaluations: a qualitative survey

Submitted

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ABSTRACT

Background: The uptake of evidence in practice by physicians, even if they are trained in the systematic method of Evidence-Based Medicine (EBM), remains difficult to improve. This also applies to physicians who perform disability evaluations. Therefore we studied the opinions and experiences of these physicians regarding the continued use of EBM skills in clinical practice.

Methods: This qualitative study was nested in a cluster RCT evaluating the effects of training in EBM. The forty-five physicians that participated received a comprehensive 6 months training program in EBM of which the last course day included an evaluation. During this evaluation, group interviews were held with the participating physicians who discussed opinions and experiences regarding EBM application in daily practice. In an iterative process we searched for common motivators or preconditions promoting or hindering implementation of EBM.

Results: Three main concepts emerged after analyzing the discussions: 1) Improved quality of physicians' actions, such as clients benefiting from the application of EBM; 2) Improved work attractiveness of physicians; and 3) Preconditions that have to be met in order to work in an evidence-based manner, including professional competence, facilitating material conditions and organizational support and demands.

Conclusions: Physicians trained in EBM are motivated to use EBM because they perceive it as an improvement in the quality of their work and as a factor making their work more attractive. In addition to personal investments and gains, organizational support should further facilitate the uptake of evidence in practice.

INTRODUCTION

Although the use of evidence is considered good clinical practice [1], the uptake of evidence in practice by physicians, even if they are trained in the systematic method of Evidence-Based Medicine (EBM), remains difficult to improve [2]. This is also a problem during and after Continuous Medical Education, where the final aim is to change professional behavior [3-5].

Recently, it was shown that the use of evidence in the daily practice of physicians performing disability evaluations can be improved through the application of a clinically integrated comprehensive postgraduate EBM training program [6-8]. At the end of this program, we evaluated whether the participating physicians could picture themselves as being active EBM practitioners in the future, exploring the perceived motivators and preconditions to support us in the promotion of a more evidence-based disability evaluation practice in the Netherlands. We were also curious to know whether their answers and perceptions would shed light on what aspects our future training and implementation efforts could be improved. In a similar educational EBM program among general practitioners developed by Shuval these physicians reported that EBM enhanced the quality of their practice by justifying decisions and selecting best treatment for patients. However, using EBM resources during consultation hours was perceived as difficult and impractical by general practitioners in busy practices [9].

However, general practitioners focus on diagnosis and treatment decisions, whereas physicians involved in disability evaluation mainly focus on limitations in work or work disability resulting from a chronic disease or handicap, how these limitations will evolve and how adverse effects on work ability can be minimized [6,7]. Given these differences in tasks, we wanted to study if the themes mentioned above are similar for physicians performing disability evaluations after participating in a EBM course [6,8]. In this survey, nested in an RCT, we wanted to explore experiences and opinions regarding EBM practice in disability evaluation, by physicians who participated in a comprehensive formal education in EBM. This group of physicians was not only aware of the theoretical possibilities of EBM, but also had time to experience opportunities and problems in practice. The central question in this study is: which opinions do these physicians have on motivators and preconditions promoting or hindering implementation of EBM in clinical practice?

METHODS

Design and participants

This survey study was nested in a cluster RCT in which we evaluated a clinically integrated training program in Evidence-Based Medicine which successfully improved the use of evidence in disability evaluation in the intervention group compared to the control group without a training program [6]. In this cluster RCT approval was sought from the research ethics committee of the Academic Medical Center. However, as this constituted the evaluation of an educational intervention with physicians, the committee secretary deemed it could be suitably exempt from the need for ethics approval. This exemption was confirmed in writing. All participating physicians in this trial signed an informed consent form (Trial registration NTR1767). They were all working for the Dutch National Institute for Employee Benefit Schemes (UWV) and performed disability evaluations as a substantial part of their job. The participants were selected by their peer group leaders. They came from all different parts of the Netherlands.

In this study 45 out of a total of 59 physicians participated in the intervention group, who were present on the last day of a six months training program including five contact days and several assignments. We organized nine group discussions, each group consisting of five to eight physicians. The mean age in the complete intervention group was 49.7 years (sd 7.1). They had been employed for a mean of 16.4 years in their current job and only one quarter had previous experience with EBM, mostly consisting of a one-day introductory course [6].

Group discussions

Group interviews using focus group methodology were used to discuss opinions and experiences regarding EBM. Experienced tutors (JH, PS, RK) supervised these nine group meetings, facilitating the process and encouraging participants to engage in the discussions. Two questions were used to focus the group discussions: *“How would I like to see myself as a physician practicing EBM in six months time?”* and *“What do I need to realize this?”*. The physicians had prepared the discussion in advance writing a personal action plan at home, which served as a starting point for the group discussion (see Appendix 1). In every group, participants read out their plans, discussed experiences and opinions, asked clarifying questions and gave feedback to each other. Additionally, notes were taken during

the meetings so that findings could be introduced into the plenary discussion following the group discussions.

During two plenary discussions, one person from each group reported on the group's findings, which allowed the members of the other groups to further question, add to, or explain perspectives and to clarify ideas. The plenary discussions allowed for alternative opinions that had not been expressed before to be put forward.

Analysis

In total, nine out of 12 group discussions (average duration 1 hour) and two plenary discussions (average duration 1.5 hours) were audio recorded. These 11 discussions were transcribed verbatim in Microsoft Word by one of the researchers (SMK); the software program MaxQDA was used to analyze the data. Coding of themes was performed by two researchers (SMK and RK) and checked by a third member of the research team (JLH).

The analysis was performed in phases. In the first phase – the open coding phase – every text fragment that could provide an answer to the research question was given a code. In the axial coding phase, relations between codes and larger concepts were sought. When necessary, new codes were added. Finally, in the selective coding phase, themes were organized to formulate an answer to the research question. Iteratively, three main concepts evolved along which the opinions and discussion elements could be categorized. The content, descriptions, titles and final selection of the concepts were checked and discussed by the research team in each phase. We used the items of the COREQ checklist for improving the quality of reporting qualitative research [10].

RESULTS

Three main concepts or themes emerged after analyzing the group discussions representing both motivators and preconditions for implementation: 1) Improved quality of physicians' actions; 2) Improved work attractiveness and 3) Preconditions to work in a evidence-based way: professional competence, facilitating material conditions and organizational support and demands. In the following paragraphs and in Table 1 we present the main concepts and corresponding quotes.

1. Improved quality of physicians' actions

The following concepts all relate to the quality of the care by the physicians. Some quality aspects are related to a perceived improved quality of the input according to Donabedian's scheme [11] such as a more up-to-date knowledge of the physicians, others on improved process characteristics such as improved consultation with other medical disciplines, or

Table 1: Main concepts contributing to continued use of EBM as perceived by physicians

<p>1) Improved quality of physicians' actions.</p> <ul style="list-style-type: none"> • Keeping up-to-date improves • Services of the organization improve • Consultation of colleagues improves • Better able to underpin their decisions with evidence • Clients will benefit from the application of EBM
<p>2) Work attractiveness of physician improves.</p> <ul style="list-style-type: none"> • Work becomes more attractive • More appreciation and job satisfaction
<p>3) Preconditions to work in a evidence-based way.</p> <ul style="list-style-type: none"> • <i>Professional competence:</i> efficacy, motivation and collaboration on EBM • <i>Facilitating material conditions:</i> access to literature, education in EBM, helpdesk, databases and tools for EBM • <i>Organizational support and demands:</i> sufficient time and managerial support, adequate quality assurance policy

better processing of the evaluations in favor of the organization. Again other themes are related to the output such as a better advice to the client, or to the final outcome such as improvement of health of the client, improved work ability, faster or sustainable return to work, or a lower number of disability pensions.

Keeping up-to-date improves

Applying EBM in practice assists physicians in keeping up with developments in the field of disability evaluations because it enables them to search for relevant evidence to fill gaps in their knowledge in a more focused way. They see EBM (inter 5, para 451): *“... as something to help me keep up to date, to supplement my knowledge, and then perhaps it’s not always for the sake of underpinning a case study but so that you know just that little bit extra about a certain syndrome in terms of treatment, prognosis, or whatever. That you say, well instead of having my head buried in books, I can still come up with up-to-date information...”* and (inter 1, para 302): *“... you’ve graduated in medicine but you can’t rely on that knowledge for the next 40 years”*.

Services of the organization improve

Due to better prognostic estimates by physicians, applying EBM in practice also increases the efficiency and effectiveness of organizations providing (social) insurance benefits such as the Dutch insurance authority: scheduling more realistic re-examinations leads to a better use of capacity and a higher degree of customer satisfaction.

(inter 1, para 138-140): *“... that you’re able to say, right after the first assessment, well yes the chance that this will improve is zero. So if that man or woman is then assessed as being 100% unfit to work, so be it. It doesn’t make any sense at all to continue to invite them year in, year out And that saves time too, which is also an advantage for the organization. A better prognostication results in more efficient working”*.

Consultation with colleagues improves

Since physicians performing disability evaluations have access to the same and up to date knowledge (evidence), they consider themselves better able to engage in written or oral discussions with colleagues from the curative sector, such as general practitioners or medical specialists: (inter 7, para 52) *“... sometimes you want to discuss things with a treating physician, for example that you believe that the therapy being used has had absolutely no*

effect for the past two years, and in such a case it's extremely useful if you underpin that through EBM. This puts you in a much stronger position during the discussion..."

Discussions with fellow physicians of other disciplines, but also with labor experts and reintegration counselors, can be improved by making use of evidence: (inter 8, para 379) *"... so you do that by giving examples, which increases your power of persuasion, or you get evidence through EBM. And you can convince your colleague with it"*

Better decisions because underpinned with evidence

Physicians consider it important to continue to use EBM and to maintain and improve the corresponding skills since this raises the quality of their work: through the EBM methodology they are better able to substantiate their disability assessment, which in their perception is also what would be expected of them by the most important stakeholder, the client: (inter 11, para78): *"... we see evidence-based primarily as a means to an end. A means for achieving a better claim assessment. Actually, we also believe that our clients deserve that, that we perform our claim assessment in a more professional manner, be better able to underpin it through evidence."*

Clients will benefit from the application of EBM

The physicians found that in a number of cases, the client benefits from the application of EBM in the disability evaluation, leading to better health care. Examples given were that EBM enables a more critical look at whether the correct interventions had been applied during the long period of sickness absence, consequently conclusions based on EBM can facilitate new interventions completed by the treating physician or by others: (inter 7, para 58) *"...sometimes, when you see that recovery is stagnating, for example, then you have the tendency to talk to each other and say, hey is that really the right treatment, and you really want to try to motivate the (treating) physician to do something. And if you have powerful arguments, backed up by a good story, then maybe you can achieve more ..."*

Occasionally, physicians feel the need to look up evidence to counterbalance information that clients bring with them that they have gained from the Internet, which ultimately works in the clients' favor : (inter 11, para 178) *"... our clients are getting more and more vocal, they look things up on the internet, but these sites are often fairly dubious. And in that case, it's comforting to be able to say that, based on our professional expertise, and from the research that is available to us, the opposite appears to be the case, for example,*

or even to confirm what the client is claiming. That certainly adds significant value. For our clients too”.

Estimating the duration of an illness or the corresponding course of the work ability can be performed better if there is good prognostic evidence at hand, which also contributes to the quality of life: (inter 5, para 376-399)“... And you get a totally different picture of certain problems... ... an older man with metastatic rectal cancer (visiting me) during surgery hours who was still working (there were) more metastases I looked that up, interesting... ... that even then there’s a chance of being cured when it’s recidivistic metastasis... ...And he really wanted to carry on working... ...if he’s lucky then he’ll be one of the 30% that survives... ... And in that case he’ll also keep his job”. The above provides information improving the evaluation of the future work capacity of the client; allow him or her to retain their job or supporting a more optimistic perspective on the chances on the job market.

2. Improved work attractiveness for physicians

We identified two concepts that both improve the work attractiveness for physicians, one in a more direct, intrinsic way, and the other indirectly through the appreciation from colleagues of other disciplines or from managers.

Work becomes more attractive

By applying EBM in practice, and thus being able to make quick use of knowledge sources, the learning process of the physician is encouraged and their understanding is enriched, which results in their work becoming more enjoyable and wide-ranging: (inter 11, para 60): “... why do we do what we do, we want to be able to find relevant literature quickly for the questions we have. These are questions that we particularly need in the context of case treatments. But also out of personal interest, I think that if the physician is only interested in what he is served up on a daily basis, that’s not quite enough. So where there are gaps in our own personal knowledge, we have to be able to find the relevant literature quickly...”

More appreciation and job satisfaction

By applying and sharing this knowledge, a physician may receive more appreciation from colleagues, clients, and possibly from their manager.

(inter 1, para 169-172): *“... so if you can be a missionary for EBM, through case studies, or via health care peer review, or via... ... showing what you can achieve as an individual at some point it will be picked up on a larger scale what we call the snowball effect”.*

Because EBM-trained physicians like to consider themselves as authorities on EBM issues, colleagues, senior staff physicians and supervising managers will become more positive toward applying EBM in practice. This then enhances work satisfaction: (inter 11, para 60) *“We also want to be a kind of missionary for EBM, so we want to be seen to be applying the EBM vision in our direct environment, for example in the case study groups, where we want to show how we are working with EBM, what you can achieve with EBM. And we want to pass on our enthusiasm to our colleagues so that they also get working with it”.*

3. Professional competence, facilitating material conditions and organizational support and demands.

Other concepts that were identified were professional competence (3.1), and facilitating material conditions (3.2) and organizational support and demands (3.3) that need to be fulfilled to be able to apply EBM.

3.1 Efficacy, motivation and collaboration on EBM

A factor that does not encourage evidence-based working is that some physicians, even after a 5-day course, do not feel competent to apply EBM in practice, e.g. do not consider themselves able to assess the evidence in a critical manner: (inter 10, para 440-452): *“... We haven’t even talked ABOUT the appraisal of the articles that always gets pushed to the back of the queue, and then you don’t get around to it. Just like that article today, I really had to tell everybody at home to keep quiet, no noise, no radio, because otherwise I just can’t read it. Is that just me or...”*

Physicians observe that it is necessary to continue to apply EBM in practice so that the acquired skills and knowledge do not become outdated: (inter 7, para 26-28) *“... in which case you could of course agree to meet up with each other once every two weeks for an hour, maybe discuss part of an assignment, and for the next meeting you do some studying beforehand, so that you’re forced to do something in the period between meetings. But you arrange to do this in agreement with each other, so there’s more of a commitment If I don’t do that then I know for sure that it just won’t work”.* And (inter 5, para 278): *“... you have to carry on doing it use it or lose it”.* At the same time, some physicians are simply

not motivated to continue applying EBM:(inter 5, para 59): *“And well, to say that I’m going to work on it in a structural way, that I schedule it in, no idea when I’m going to find the time, but that’s beside the point, no, I just haven’t got that motivation at the moment”.*

The need to practice EBM is met primarily by collaborating with other EBM colleagues in case study groups, preferably utilizing already existing systems available like case protocol groups, because this approach inspires and motivates the participants and sets actions in motion more quickly: (inter 3, para 14): *“If you do it with others, it’s much more efficient because, well, you inspire each other and you think of things that you otherwise wouldn’t have considered. Or just the fact that you agree to do it with someone else, or other people, means you end up doing it earlier than if that wasn’t the case. It’s just like going to the gym – you keep going if you arrange to do it with someone else.”* One of the prerequisites mentioned in this context is that the persons concerned have to enjoy doing EBM: (inter 3, para 89) *“... the main thing is that you have people who enjoy it. Because once you have a couple of people who have fun doing it, it’ll spread. If it becomes a case of feeling forced to do it, then it won’t work at all”.*

3.2 Access to literature, education in EBM, helpdesk, databases and tools for EBM

An essential condition for being able to work in an evidence-based manner is having online access to a medical library. Some physicians and offices consider setting up a close collaboration with the regional university, for example via facilities for supporting students of medicine during their internship, as a way to guarantee future facilities from the university.

(inter 11, para 98): *“... this access to the library, that’s necessary, and something like that search pyramid tool that the medical library at the academic medical center recently supplied, that can have a lot of added value searching in an aggregated way”.* And (inter 10, para 50): *“... in exchange for (giving education to) the students of medicine from city Q, we could arrange a connection (to the literature) via the University of city Q.”*

In their efforts to continue working in an evidence-based manner, physicians are considering the possibility of support from EBM teachers, through the organization of EBM refresher days as a follow-up to the basic course: (inter 7, para 249): *“... the refresher day, I think you’d need to do that at regular intervals. Where you can exchange experiences, perhaps you’ve heard of new developments, and that you can perhaps add some body to it in conjunction with each other”.*

The facility of an EBM helpdesk is another option proposed as support for evidence-based working: (inter 11, para 147): *".. If we're then looking for information, and we get zero hits for a search query, we could have a helpline to the EBM teachers, who can tell us what we're doing wrong. Otherwise, you're just going round in circles"*.

Additionally, having students of medicine looking for answers to questions via the EBM methodology is considered as supportive and educational: (inter 7, para 46-47): *"... .. These students of medicine doing their internship feel more at home in this area Much more at home than we do. Then I would hand over my problem to them. Generally speaking they're competent. It's a good system, and fun too. You can learn a lot that way"*.

Many physicians mention that, once evidence has been found for a case, results of these EBM efforts should be included in a central database, so that the knowledge gained in this way can be shared, and work efforts will not have to be duplicated: (inter 8, para 636-644): *"Building an anonymized database is a very good idea. It's not that complicated, if all your EBM findings if you've looked for something, that it can be retrieved later"*.

Google is sometimes mentioned as an alternative, time-efficient resource for acquiring knowledge, which can be seen as a potential threat for evidence-based working: (inter 2, para 145-147) *"Of course Google is much more efficient, and your job's done much quicker. Well, actually I think it's a pity, when I come to think of it How efficient is it, in what way? Time-efficient"*. Of course time-saving tools in EBM would counterpart this threat.

3.3 Time and managerial support, adequate quality assurance policy.

Consulting guidelines and other forms of aggregated evidence enables a physician to come up with quick answers: (inter 1, para 358): *"... you just look things up and in 15 minutes you've got the answer..."*. This enhances the willingness to work in an evidence-based manner, or to continue working that way. However, some recently trained physicians remark that applying EBM costs time, with the results often being disproportionate to the time and effort spent: (inter 5, para 6): *"... I have to get up to all sorts of tricks to find the time, plus the fact that once you've spent all that time, the results are unfortunately not always worth it"*.

Though EBM takes time, some physicians want to keep up to date and schedule time for it: (inter 11, para 147) *"... you just have to allocate blocked time for it because otherwise it just won't happen..."*. Additionally, for the application of EBM, also in everyday practice, it would help if more time was available for reporting evidence-based disability

evaluations, in which evidence is sought as underpinning for decision making: (inter 1, para 202-203) *“That you acknowledge, particularly, that that’s an element we have to pay far more attention and energy to, that’s really important if we want to raise the quality, and that definitely makes a difference, and having the time you need to be able to tell your story effectively”.*

Not surprisingly physicians indicate that to work in an evidence-based way, time must be facilitated in a structural manner, in addition to the physician’s own time: (inter 11, para 52) *“... if you want to do it, you need the time for it. And of course it can also be a combination, for me in any case, or for us, it can be a combination of leisure time and work time”.*

In order to encourage evidence-based working, and also to acquire the resources, such as time and opportunity necessary for this, it is suggested that it is also important to create ‘allies’ among the management and the senior staff physicians (inter 6, para 16): *“... And when I consider lobbying I mean also among the management team, to make clear how important it is, for the client of course, for our own professional sector, that we do have some say in the matter, including towards treating physicians, so that we really are a sparring partner for treating physicians, but also for society as a whole, that you can also now and then support the opinion that someone may perhaps have a complication that can still be treated and that you can then ensure that action plans are set into motion and that therefore the damage to health can be limited, as well as the resources that will need to be used”.* And (inter 1, para 151): *“Yes but it’s all about whether the management team is convinced that it has added value. If you simply say, well yes, we are able to make better prognoses, manage the dossier stream better, and therefore also save time. And it (better underpinned decisions) probably results in less clients who appeal against the decision, which is also time saved of course. So that could also be an argument for claiming it as work time”.*

Working in an evidence-based manner could be further encouraged if, for example, the evidence is specified in a separate heading in the disability evaluation report: (inter 7, para 129) *“... Yes and I find also that you have to use it (evidence) in your reports, which is also now being proposed.... ... Even if you’re only referring to the protocol, that’s evidence too Just as a standard thing in your reports You mean just like a standard heading (in the report itself)... .. information from third parties EBM. (proposed subheadings).”* And

including the degree of substantiation through evidence as a part of the standard quality check, would probably act as a stimulus for evidence-based working: (inter 10; para 253-257) “... quality test (of the report)... ... Would you include this (evidence) as a chapter there then, or could you take it (evidence) into consideration there... ... as a controlling function. Indeed, that acts as a stimulus for physicians a little ... Yes, and of course you’re not just checking (evidence), you’re also encouraging”.

DISCUSSION

In this study we found several motivators and preconditions promoting or hindering implementation of EBM in clinical practice. Physicians indicated that EBM improved the quality and attractiveness of their work. Physicians were also clear about what needed to be done to improve the application of EBM in terms of professional competence needed, material conditions facilitated and support and demands from the organization.

Strengths and limitations

A strength of this study is that we examined the opinions and experiences of physicians who received formal education in EBM, and who not only participated in EBM training but also had recent practical experience of its opportunities and problems. Furthermore, verbatim reports of focusgroup sessions and meetings were made, a qualitative analysis program was used, two researchers coded the concepts and all steps were performed in an iterative team process. A limitation of our study is that we only analyzed opinions and experiences of physicians in relation to two explicit questions. However, we believe that the most important concepts related to the use of EBM for this group of physicians has been reported.

Comparison with other studies

Similar to the studies by Shuval with general practitioners [9], or by Hugenholtz with occupational physicians [12], we also found that physicians who perform disability assessments believed that EBM enhanced the quality of their practice: keeping up to date with relevant developments, decisions are better underpinned with evidence and patients ultimately benefit from the application of EBM. Unlike Shuval and Hugenholtz, we also found that physicians perceive that the services of their organization could be improved as a consequence of using evidence, another aspect of quality of their practice. In line with Hugenholtz consultation with medical colleagues improved and job satisfaction increased as well [12]. We think that when physicians are able to raise the level of medical content of their profession by using the medical literature, this enhances their job satisfaction [12]. Some physicians perceived themselves as not sufficiently skilled or motivated for EBM practice. Considering the mean increase in self-efficacy in our RCT, and even a consequent change in behavior, this finding deserves attention. Likely a subgroup felt less confident. A similar finding was observed in the study of Hugenholtz, despite it's overall favourable results

including enhanced evidence-based advice after training [13]. Hugenholtz found that peer group sessions facilitated the sharing of knowledge [12], a concept that is reflected in our concepts 'more appreciation and job satisfaction' and 'collaboration', in which knowledge exchange is thought to facilitate evidence-based practice. Like-wise, Shuval mentions the need to meet regularly with colleagues who are experienced in information retrieval, and to jointly look for answers to medical questions [9]. In line with Shuval, Hugenholtz and others [2,14], physicians in our study perceived lack of time as a barrier. Recently, a study in this journal about opinions of Norwegian doctors towards EBM confirmed that both the organization and the physicians themselves should invest [15], similar to our finding. A novel aspect in our opinion is the finding that physicians often regard the output of their EBM efforts as being disproportionate to the time invested. This may have to do with a lack of experience in information retrieval as our physicians recently completed their course. In another study general practitioners achieved an efficient trade-off between maximizing search success and information reliability, and minimizing search time [16]. We think another explanation may be a poor visibility and not receiving a reward from management or colleagues for the extra efforts.

Implications for practice and further research

In order to further increase the competency and motivation of physicians they formulated the wish to receive EBM refresher courses and to create a helpdesk for EBM questions, also mentioned in the study of Shuval [9]. As a result the requested EBM refresher courses after the training program have started and form input for further refinement in our EBM program towards more evidence-based disability assessment in the Netherlands. The possibilities of a helpdesk or consulting team to facilitate initiatives from the professionals themselves, as requested, is still under consideration within the Dutch National Institute for Employee Benefit Schemes (UWV). A similar facility in two other studies, which were set up for general practitioners in the UK and the Netherlands, was evaluated positively [17,18].

Involving more medical internship students who, in general, are better skilled in EBM can help physicians learn from EBM assignments done by these interns. The expressed need, also in other disciplines [9,12], for collaboration with other colleagues to practice EBM, should be embraced in order to further implement EBM in the field of disability evaluations. A number of groups already started after the course. Evidence-based practice could be

facilitated if the organization, manager and medical colleagues all see the application of EBM as a priority. Conversely, the increased expertise of these physicians could also help the organization in their efforts in improving products and collaboration with other organizations. This contributes directly and explicitly to the ambition of the Dutch National Institute for Employee Benefit Schemes to become the leading expert organization in disability evaluation in the Netherlands, competing with the best institutes in other countries. Needless to say, a good knowledge infrastructure – and its maintenance – with online access to requested evidence, is an absolute prerequisite [19]. For future research it would be interesting to evaluate if the introduction of new EBM tools, such as online access to up-to-date search strategies and search engines, EBM case-based tutorials, online pre-appraised literature or even an EBM question repository, would further facilitate evidence-based working. Furthermore it would be interesting to evaluate if the application of the foraging approach that aims at an efficient trade-off between maximizing search success and information reliability, and minimizing search time motivates physicians to work more evidence-based [16].

Conclusion: Physicians are inclined to use EBM because they perceive it as improving the quality of their work and as a factor making their work more attractive. In addition to personal investments and gains by physicians performing disability evaluations, organizations that employ these physicians should further facilitate the uptake of evidence in practice.

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ADDITIONAL FILES

Appendix 1: Assignment for physicians prior to group discussion: creating a personal action plan

How can I keep using my EBM skills?

In order to proceed with evidence-based practice we would like to encourage you to make a personal action plan. The questions *“How would I like to see myself as a practicing EBM physician in six months time?”* and *“What do I need to realize this?”* are central in this.

Answer these questions in your action plan for the upcoming six months, approximately one page and a half. Do this based on the following pattern: purpose, resources, actions. See the next page. Fill in this form electronically.

On behalf of all EBM teachers and tutors: thank you and good luck with your plan!

Mail this plan to RK a week before the start of the course, at the latest.

Please bring a printout of your plan and three extra copies for the discussion on course day 5.

Personal action plan

Name:

In formulating this personal action plan, two questions should be kept in mind:

- How would I like to see myself as a practicing EBM physician in six months time?
 - What do I need to realize this vision?
-
1. Formulate your personal goals.
 2. Which resources (instruments) will you use?
 3. What are you actually going to do? What are your personal actions?
-
- Describe terms of: When? Why? How often? Where? In which situation? i.e. measurable
 - Use as much space as you need

Chapter 4.2

A search strategy to identify studies on prognosis of work disability

Submitted

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ABSTRACT

Purpose: Searching the medical literature for evidence on prognosis is an important aspect of evidence-based disability evaluation. To facilitate this we aimed to develop and evaluate a comprehensive and efficient search strategy in PubMed, to be used by either researchers or practitioners, that identifies articles on the prognosis of work disability.

Methods: Using a diagnostic test analytic framework we created a reference set of 225 articles on the prognosis of work disability by screening a total of 65,692 titles and abstracts from 10 journals in the period 2000-2009. Included studies had a minimum follow-up of 6 months; participants in the working age of 18-64 with minimum sick leave for 4 weeks or longer or having serious activity limitations in 50% of the cases; outcome measures that reflect impairments, activity limitations or participation restrictions. Using text mining methods, search terms were extracted from the reference set and, according to sensitivity and relative frequency, consecutively combined in different search strings.

Results: Both the research and the practice search filter outperformed existing filters in occupational health, all combined with Yale-prognostic filter. The Work Disability Prognosis filter for Research (WDP-R) showed a comprehensiveness of 90% and efficiency with NNR=20, and the filter for Practice showed a comprehensiveness of 68% and efficiency with NNR=13 (WDP-P).

Conclusions: The Work Disability Prognosis filters will help practitioners and researchers who want to find prognostic evidence in the area of disability evaluation. However, further refining of these filters is needed, especially for the practitioner with little time in daily practice.

INTRODUCTION

In many countries in the world, disability evaluation, involves an examination by physicians to evaluate the nature and extent of the disability [1, 2]. An important objective of this examination is to evaluate the prognosis of the disease, the impairments and activity limitations, and especially the participation restrictions of the patient [3-6]. Consequently, a substantial number of health-related uncertainties and related search questions of insurance physicians are of a prognostic nature (39%) [7].

Making a prognosis of the chances of still being disabled after a period of time implies rather complex predictions that can generate complex search questions related to the natural course of a disease and to a multitude of factors that can have an impact on the future course of that disease. These factors include not only common determinants such as the severity of the disease, physical and mental condition, age, gender, level of education and having manual/non-manual work, but also the impact of a new therapy, rehabilitation efforts or other medical interventions, the willingness of an employer to support the impaired worker in return to work, or social support from relatives.

Up till now, considerable effort has been put into developing search strategies, including the development of new filters for EBM questions in different medical domains such as diagnosis, prognosis and therapy. These methodological strategies are now integrated into PubMed to facilitate searching in Medline. These search strategies include also the topic of prognosis or prediction [8].

In their study on prognostic factors for work ability in sick-listed employees with chronic diseases, Slebus et al. [9] used the Yale University's methodological research filter for prognosis and natural history available in PubMed but they did not have a clearly outlined search strategy for disability evaluation to combine with the prognostic filter. In occupational health, although several search filters have been developed to locate studies on return to work [10], occupational health interventions [11] and work participation in workers with a chronic disease [12], these are not specifically targeted toward the topic of disability evaluation.

As none of these occupational health filters or existing available prognostic filters [13, 14] suffice to identify studies on prognosis in the setting of disability evaluation, we set out to develop an adequate strategy to identify these studies. As a point of departure, knowing that sufficient efforts have been put into developing a search string for prognosis, we determined to use the Yale methodological research filter for prognosis and natural

history to identify prognostic studies [14]. Since there is no search strategy available for disability evaluation, we decided to develop a new search string to use in combination with the Yale prognostic filter. Subsequently, we planned to evaluate how the new combined search filter performs in terms of comprehensiveness, finding all relevant studies, and efficiency, in terms of optimising the ratio of relevant to non-relevant studies in the yield [15]. Comprehensiveness and efficiency will be judged for two different purposes. First, as a search strategy for the researcher, who does not want to miss too many relevant hits and cares less about finding many non-relevant articles. Second, as a search strategy for the practitioner, who has limited time and therefore does not want to find too many non-relevant articles [10, 11, 16]. The search strategies should enable the identification of articles about the prognosis of not only disease-related impairments, but also of activity limitations and participation restrictions.

The objective of this study is therefore to develop and evaluate a comprehensive and efficient search strategy, including search filters in PubMed, to be used by either researchers or practitioners, which identifies articles about the prognosis of work disability.

METHODS

For our study we used a diagnostic test analytic framework procedure [10, 17, 18] with the following four steps to develop and test the search strategy in PubMed:

1. First we developed a reference set of highly relevant prognostic articles in the field of disability evaluation that we would like our search to find. We did so based on clear inclusion criteria.
2. Next, we collected potential search terms both from these articles and based on our own expertise. We tested how well these search terms and combinations of terms were able to identify the articles of the reference set developed in step 1.
3. Based on the best-performing individual search terms, we developed various strings of search terms, termed *search filters*, which we used in combination with the Yale prognostic filter. We determined the comprehensiveness and efficiency of these filters in identifying articles in the reference set.
4. Finally we compared the performance of our search filters with those of other search filters developed for occupational health [10-12] to see whether they really improved performance. In addition, we illustrated the use of the new filters for three common diagnoses in the field of disability evaluation to show and explore what their use means in daily practice. We use the word ‘search strategy’ to refer to the comprehensive process of deciding on the resources or databases needed for the search and on the search terms and filters. The word ‘search filter’ is used for a concrete string of search terms used to identify studies in a database. Filters often consist of terms relating to study type and/or terms associated with the subject of the study. Examples are the ‘clinical queries’ filters in Medline [13], but also the search strings developed by Gehanno and Verbeek [10-11].

Construction of the reference set

Journals that publish both studies in the field of disability evaluation and studies on ten prevalent chronic diseases, frequently subject to disability evaluation, were used for the reference set. First we selected three general medical journals publishing on a wide spectrum of diseases: British Medical Journal (BMJ), Plos One and the Journal of the American Medical Association (JAMA). Next we selected three journals often publishing in the field of disability evaluation: Journal of Occupational Rehabilitation (JOR), Occupational and Environmental Medicine (OEM) and Scandinavian Journal of Work Environment and Health (SJWEH). Finally

we included four high-impact disease-specific journals: *Spine*, *Journal of Anxiety Disorders*, *Stroke*, and *Cancer*. We decided to select the ten-year period 2000-2009 to ascertain that all articles included would have been indexed for Medline at the time of searching (2013), and screened all articles in this time period.

To develop inclusion criteria for the selection of articles most relevant for the prognosis of work disability, we considered the following PICO, adapted from Cornelius [19]:

1) type of studies: we included prospective and retrospective follow-up studies with a minimum follow-up period of 6 months. So studies with an inception cohort studying either prognostic factors or the so-called 'natural' course of a disease (with or without taking therapy into account) were included. Furthermore, we included studies reporting an RCT presenting data on a control group (usual care or 'without treatment') that enabled evaluation of the course of a disease or disease-related functioning. Reviews were excluded as we wanted to develop a search strategy for original studies.

2) type of participants: we wanted the patients included in the studies to be more or less similar to the practice of work disability evaluation: workers with any chronic disease, chronic or otherwise, claiming a work disability pension. Therefore we included studies with participants aged 18-64 years that were fully or partially work disabled at the start of the study. For studies that reported only a mean age, we took a maximum of 60 years. Where no information about work disability was provided, we included studies for which we judged the consequences of disease to be so severe that this would nearly always lead to serious problems with work ability, such as for late stages of cancer. At baseline the participants had to be on sick leave for at least four weeks or had to present serious activity limitations in 50% of the cases in the population.

3) type of outcome measures: to support a professional quality disability evaluation, we are especially interested in studies in which the outcomes are measured in line with concepts presented in the *International Classification of Functioning, Disability and Health* (ICF) model of WHO [4, 20, 21]. These concepts and related terms are frequently used in studies in the field of rehabilitation, occupational medicine, insurance medicine and vocational training. The following outcomes were considered relevant for the prognosis of work disability: level of functioning at work, level of disability, level of work disability, level of work participation such as return to work rates. We also included the level of recovery or deterioration of symptoms and signs where these symptoms or signs are more or less equivalent to the level of functioning such as in patients with a major depressive disorder.

These patients have, by definition, substantial mental limitations and, typically, work functioning problems. To be included, a study had to measure either an outcome according to the ICF or a symptom or sign that could be considered equivalent. See Table 1 for an overview of the inclusion criteria.

To select the articles for the reference set, we applied a two-step procedure. In the first step, two of the authors (RK and BF) separately analyzed all the titles and abstracts of the years 2008 and 2009 of the ten journals and excluded all articles that obviously did not fulfil the inclusion criteria, based on a judgment of title and abstract. Subsequently, both authors judged the remaining articles after reading the full-text article (about 20-30 articles per year). Where the authors' opinions differed, both (RK and BF) discussed independently the deviances until consensus was reached.

In the second step, we were able to improve the efficiency of the search process. First we checked whether all articles identified by screening the volumes 2008 and 2009 (a total of 40 articles) were included when only using the Yale methodological research filter for prognosis and natural history [14]. When this was the case, we used the Yale filter for the remaining eight volumes to pre-select the references for further screening. After this preselection, both authors continued the procedure described in step 1. The results of both steps produced the final reference set.

Table 1: Criteria for inclusion of articles in reference set.

1) types of studies:

- follow-up studies AND
- with a minimum follow-up period of 6 months AND
- original studies, no reviews

2) types of participants:

- age between 18-64 years, mean age max 60 years AND
- humans AND
- ill AND
- consequently they must be on sick leave for a longer period (4 weeks) OR have serious activity limitations in 50% of the cases

3) types of outcome measures:

- improvement of functioning OR reduction of disability OR increase of work participation OR return to work OR symptom/sign recovery (when equivalent with functioning like recovery of cognitive limitations in major depression).
-

Creating search strategies and search filters

In the final reference set of articles, discriminating text words, phrases and MeSH terms in titles and abstracts were identified and evaluated by an independent experienced information specialist, using two different approaches [18]. First, we used the program *GoPubMed/PubReminer* [22] to identify the most frequently occurring single-text words and MeSH terms both in the relevant and all non-relevant sets of articles [18]. Second, we used the program *Termine* [23] from the National Centre for Text Mining (NaCTem) to identify the frequency of phrases (2-5 terms) in titles and abstracts in the same sets of articles

We considered a search term, respectively, a phrase, as discriminating when it fulfilled both the following selection criteria: 1) it occurred in at least 5% of the articles in the reference set; and 2) it occurred five times more often in relevant articles as in non-relevant articles.

To determine the ranking order of the selected search terms, we used a cross-product of both selection criteria [16]. Finally, this method resulted in ranking lists of discriminating text words, MeSH terms and phrases.

The terms in these three lists were, in ranking order, subsequently combined with the Boolean operator “OR” in order to create search filters with a high comprehensiveness and efficiency for the next phase [10, 15].

Performance criteria for search filters.

We calculated the comprehensiveness, efficiency, specificity and accuracy. See Table 2 for an overview of formulae for calculating these operating characteristics. Please note that

Table 2: Formulae for the calculation of operating characteristics for a search filter for locating studies in Medline.

	Relevant articles	Non-relevant articles	Total
Search term +	a (true positive)	b (false positive)	a+b
Search term -	c (false negative)	d (true negative)	c+d
Total	a+c	b+d	a+b+c+d

Comprehensiveness = Sensitivity = Recall = $a/(a+c)$

Efficiency (=Precision = $a/(a + b)$), measured as Number Needed to Read (= $1/\text{precision}$)

Specificity = $d/(b+d)$

Accuracy = $(a+d)/(a+b+c+d)$

various terms are used for comprehensiveness such as sensitivity and recall. Although efficiency and precision are used as equivalent terms, we choose to measure efficiency as the Number Needed to Read ($\text{NNR} = 1/\text{precision}$) to identify one relevant article.

We prefer the terms comprehensiveness and efficiency because they are intuitively easier to understand. For the search string to use in practice, we decided that the efficiency (NNR) had to be 10 at most, in combination with a comprehensiveness of $\geq 65\%$ [16]. For the search string to use in research, we decided on an efficiency (NNR) of 60 at most in combination with a comprehensiveness of $\geq 90\%$.

We compared the performance of the new search filter in two versions (research version and practice version, R and P) with other occupational health search filters [10, 11, 16], all in combination with the Yale methodological research filter for prognosis and natural history [14]. In case of the filter from Verbeek [11], developed to identify occupational health interventions, we only used the work component of this filter and not the intervention component, for better comparison.

In practice, for a disability evaluation, search filters are often used for a search when literature information can support the assessment of work disability of a patient with one specific disease. As the total number of relevant articles available for a specific disease, given a certain time period, is different for various diseases, the number of titles that has to be screened after using a filter also depends on the specific disease. So, in order to illustrate the use of the new filters in practice, we applied these on three different diseases, with respectively high, moderate and low numbers of relevant articles in Medline: rheumatoid arthritis, depressive disorders and cystic fibrosis.

RESULTS

The total number of articles in Medline for the 10 journals in 10 years was 65,692 of which 225 were included in the reference set (Table 3).

We identified 16 search terms or combinations of search terms that occurred in 5% or more of the relevant articles and also occurred five times more often in the relevant articles than in the non-relevant ones. These terms were combined one by one, and for each combination, together with the Yale methodological research filter for prognosis and natural history, we calculated the performance characteristics (see appendix 1). When a term could be replaced by an overarching term, it was omitted, eg “sick leave” was omitted when the term “sick” was added, since all articles with the term “sick leave” in title or abstract are also identified by the term “sick”. Also ‘sick leave’ as a MeSH term was omitted, because it did not add any relevant or non-relevant article, which reduces the total number of combinations of search terms to 14 (see Appendix 1).

The best-performing search strings, in combination with the Yale methodological research filter for prognosis and natural history, were named as the Work Disability Prognosis – Research filter (WDP-R) and the Work Disability Prognosis – Practice filter (WDP-P) having

Table 3: Total number of articles and articles included in the reference set from ten selected journals in the publication years 2000 – 2009.

Name journal	Total articles	% of total articles	Relevant articles	% of reference set
SJWEH	679	1	6	2.7
JOR	328	0.5	10	4.4
OEM	1,654	2.5	4	1.8
Spine	6,092	9.3	167	74.2
Stroke	6,200	9.4	12	5.3
Cancer	7,804	11.9	13	5.8
J Anx Dis	742	1.1	0	0
JAMA	11541	17.6	8	3.6
PlosOne	8,489	12.9	0	0
BMJ	22,163	33.7	5	2.2
Total	65,692	100	225	100

as characteristics, respectively, a comprehensiveness of 90% and efficiency with NNR= 20, and a comprehensiveness of 68% and efficiency with NNR=10.

Compared to other occupational health search filters, the new WDP-R and WDP-P filters performed considerably better in comprehensiveness (90% and 68%) compared to a maximum of 41% of the other filters (see Table 4). The practice filter developed by Gehanno had a relatively high score on efficiency with NNR = 5, compared with an NNR = 20 and NNR = 13 for the WDP-R respectively the WDP-P. Unfortunately the comprehensiveness was rather low (17%), making this filter inappropriate for our goal.

To illustrate the use of our filters for a patient with a specific disease, we planned to apply both our search filters (WDP-R and WDP-P) in combination with the Yale methodological research filter for prognosis and natural history [14] to the three diagnostic groups. However, as the WDP-P filter missed 3 out of the 5 relevant articles, we only present the results for the WDP-R filter. For one month of publications in PubMed for rheumatoid arthritis, applying the Yale prognostic filter and our WDP-R filter 72 titles were identified (Table 5). Given an efficiency of NNR = 20 of this filter, we expected to find about 3-4 relevant articles. In reality we found only one relevant article, which could be the result of coincidence. However, the corresponding number of titles to be screened in a period of three years for this disease would be about 2,500. This implies an excessive workload for the practitioner, who may

Table 4: Comparison of search filter performance scores on comprehensiveness and efficiency measured as the Number Needed to Read (NNR = 1/precision), related to the capability to identify relevant articles on prognosis of work disability. A research (R) and practice (P) search filter on prognosis of work disability are compared with five other occupational health search filters developed by Haafkens, Verbeek (work component only of R and P) and Gehanno (R and P). All filters were applied in combination with the Yale methodological research filter for prognosis and natural history.

	Comprehensiveness (%)	Efficiency (NNR)
Work Disability Prognosis filter (R)	90	20
Work Disability Prognosis filter (P)	68	13
Filter Haafkens	35	19
Filter Verbeek (R)	41	57
Filter Verbeek (P)	16	39
Filter Gehanno (R)	31	11
Filter Gehanno (P)	17	5

Table 5: Number of total articles in PubMed in a restricted time period on rheumatoid arthritis, major depression and cystic fibrosis (using MeSH terms), and total number by subsequently adding only the Yale methodological research filter for prognosis and natural history, and also adding the new search filter work disability (WDP-R), resulting in the number of relevant articles.

Diseases selected by MeSH terms	Number of articles in PubMed in restricted time period	Adding only Yale filter	Adding also WDP-R	Number of relevant articles
Rheumatoid arthritis	624 (1 month)	262	72	1
Major depression	473 (2 months)	260	80	2
Cystic fibrosis	682 (7 months)	265	42	2

therefore be advised to filter on review articles. For cystic fibrosis, following the same procedure, we found 42 titles in a 7-month period, corresponding to about 200 titles over a three-year period. The above examples nicely illustrates that the performance of a search filter is indeed dependent on the total number of publications of the disease involved.

DISCUSSION

We developed and evaluated a search filter to be used in PubMed in combination with the Yale methodological research filter for prognosis and natural history [14] to identify articles about the prognosis of work disability. For the researcher, we developed a version with a comprehensiveness of 90% and efficiency with $\text{NNR}=20$ (WDP-R). For the practitioner, we developed a version with a comprehensiveness of 68% and efficiency with $\text{NNR}=13$ (WDP-P). Our strategies show that in practice, to identify about 20 % more relevant articles than practitioners do, researchers have to screen nearly twice as many articles.

Strengths and limitations of our study

This is the first study describing the development and evaluation of a search strategy and search filters for the prognosis of work disability. Disability evaluation is a common task for a variety of medical disciplines all over the world, with a high impact for the work participation and financial compensation of working patients involved. Therefore, a better scientific foundation of this task should receive a high priority. A validated search strategy for identifying studies on the prognosis of work disability may contribute to a more evidence-based medical practice.

A strength of our study is that we used a reference set, or gold standard, of articles that could be identified in a following step through a newly developed search strategy and filters. The set was constructed based on inclusion criteria for studies relevant to the topic chosen, selecting all relevant studies from a large set of studies present in Medline, deemed relevant for evidence-based disability evaluation. We used a comprehensive text mining method to find potentially relevant search terms. Next, we decided on clear criteria to determine the minimum performance of our new search filter in two versions for two groups of users with differences in demands and needs: researchers and practitioners. We simulated the use in practice of the new strategy and filters for three disorders with low, medium and high numbers of relevant studies in Medline, and for which physicians frequently perform a disability evaluation.

As with any study on search filters, the construction of a reference set of articles has been based on a deliberately chosen but restricted sample of journals available in Medline. Although the reference set included sufficient numbers of relevant articles, a topic that is not well studied will have had a low chance of being included in this sample. However, we believe that the choices made represent a good compromise. The number of 225 relevant

articles is large enough to yield credible results, and the number of journals is sufficiently diverse to represent the most relevant journals in Medline. However, we had not expected the large number of articles in the reference set published in Spine with 167 out of the 225 articles (74%). We decided not to change the choices made, realizing that musculoskeletal disorders like chronic low back pain, chronic complaints of arm, neck and shoulder, and rheumatoid arthritis are frequent causes of work disability and are among the best studied diseases in relation to the prognosis of work disability. To avoid the development of a disease-specific search filter instead of a more generic filter for the prognosis of work disability, we removed disease-specific words during the development of the new search filters. The fact that the filter performed so well e.g. in the use for a worker with cystic fibrosis or with a major depressive disorder, is proof that this was a successful method.

Comparison with other studies

A systematic review of search filters applied in reviews of prognostic studies showed that no prognostic filter was more comprehensive than 95% with an efficiency with NNR around 10 [24], illustrating the less satisfactory operating characteristics of prognostic filters in comparison with therapeutic filters. Against this background, the prognostic search strategy and filter in the research version (WDP-R) with a comprehensiveness of 90% and an efficiency with NNR=20 is not unusual. Both new filters perform better in comprehensiveness than other occupational health search filters, demonstrating the advantage of developing specific filters for prognostic studies related to work disability.

On the other hand, with our research filter researchers would still miss 10% of the relevant studies, and practitioners would need to show persistence in going through 120 references to identify four relevant studies. In diseases such as rheumatoid arthritis, with a large number of relevant hits, practitioners will need to select reviews to reduce the workload of going through too many titles after applying our filter.

It could be that a more sophisticated process for search filter development would have produced better results. Garg et al. [25] used an automated process for combining and testing filters by using a computer algorithm. It would be worthwhile to see if such an algorithm could create search filters with higher comprehensiveness (>95%) and an acceptable efficiency with NNR around 10. Or to create a search filter with acceptable comprehensiveness (>65-70%) and very good efficiency with NNR around 1-2, which would make it more attractive for a practitioner to search for evidence.

Practical implications for science and practice

To researchers starting new studies, and all those experts and practitioners who are preparing systematic reviews or developing knowledge products such as evidence-based guidelines and recommendations, we recommend using our strategy and filter (research version), as the comprehensiveness is superior to existing occupational health filters and the NNR is satisfactory.

For practitioners, we advise using our strategy and filter (practice version) to underline work disability evaluations with results from scientific studies. Especially to improve the feasibility for practice, new efforts are needed to enhance search filter performance with the ultimate goal of improving patient care [15]. Since better tagging of randomised controlled trials in Medline has greatly increased the comprehensiveness of searches for RCTs, one aspect could be to better tag studies on prognosis and work disability evaluation in Medline.

For researchers and practitioners alike, it is worthwhile to enlist the help of information specialists in developing and running search strategies. We recommend the development of expert centres with a helpdesk to improve knowledge translation in practice.

Conclusion: The Work Disability Prognosis filters will help practitioners and researchers who want to find prognostic evidence in the area of work disability evaluation. However, further refining of these filters is needed, especially for the practitioner with little time in daily practice.

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ADDITIONAL FILES

Appendix 1: Comparison of search terms, which were combined one by one (in ranking order of sensitivity). For each combination of search terms, together with the Yale methodological research filter for prognosis and natural history, we calculated the comprehensiveness (%) and efficiency (NNR).

Combination of search terms	Compre- hensiveness	Effi- ciency
VAS	11	5
VAS OR "disability index"	31	4
VAS OR "disability index" OR disability evaluation[mh]	52	6
VAS OR "disability index" OR disability evaluation[mh] OR "visual analog"	55	7
VAS OR "disability index" OR disability evaluation[mh] OR "visual analog" OR improvement	68	13
VAS OR "disability index" OR disability evaluation[mh] OR "visual analog" OR improvement OR recovery of function[mh]	71	14
VAS OR "disability index" OR disability evaluation[mh] OR "visual analog" OR improvement OR recovery of function[mh] OR "sick leave"	76	14
VAS OR "disability index" OR disability evaluation[mh] OR "visual analog" OR improvement OR recovery of function[mh] OR "sick leave" OR "functional outcome"	77	14
VAS OR "disability index" OR disability evaluation[mh] OR "visual analog" OR improvement OR recovery of function[mh] OR "sick leave" OR "functional outcome" OR sick	78	14
VAS OR "disability index" OR disability evaluation[mh] OR "visual analog" OR improvement OR recovery of function[mh] OR "functional outcome" OR sick OR "physical function"	78	14
VAS OR "disability index" OR disability evaluation[mh] OR "visual analog" OR improvement OR recovery of function[mh] OR "functional outcome" OR sick OR "physical function" OR "quality of life"	86	16
VAS OR "disability index" OR disability evaluation[mh] OR "visual analog" OR improvement OR recovery of function[mh] OR "functional outcome" OR sick OR "physical function" OR "quality of life" OR sick leave[mh]	86	16
VAS OR "disability index" OR disability evaluation[mh] OR "visual analog" OR improvement OR recovery of function[mh] OR "functional outcome" OR sick OR "physical function" OR "quality of life" OR "functional status"	87	16
VAS OR "disability index" OR disability evaluation[mh] OR "visual analog" OR improvement OR recovery of function[mh] OR "functional outcome" OR sick OR "physical function" OR "quality of life" OR "functional status" OR "health status"	87	18

VAS OR "disability index" OR disability evaluation[mh] OR "visual analog" OR improvement OR recovery of function[mh] OR "functional outcome" OR sick OR "physical function" OR "quality of life" OR "functional status" OR "health status" OR functioning	88	18
VAS OR "disability index" OR disability evaluation[mh] OR "visual analog" OR improvement OR recovery of function[mh] OR "functional outcome" OR sick OR "physical function" OR "quality of life" OR "functional status" OR "health status" OR functioning OR activities	90	20

Chapter 5

General discussion

MAIN FINDINGS AND FUTURE PERSPECTIVES

The focus of this thesis is on the application of the EBM method in the field of work disability evaluation. As stated in the introduction, it was considered useful to develop and evaluate an EBM postgraduate training programme tailor-made for this field. The main specific objective of this thesis is to evaluate whether EBM training is feasible and effective for Dutch insurance physicians who perform disability evaluations. In this concluding chapter, we present the main findings of our studies by answering the three main questions presented in our introduction. Finally we discuss future perspectives on practice and research, taking into account the positive impact of EBM training and practice.

MAIN FINDINGS

First, we studied which questions insurance physicians have, which resources they use, and the applicability of EBM for disability evaluation (chapter 2).

In **chapter 2.1** we reported the finding that physicians working in the field of disability evaluation indicated that they had knowledge questions in relation to a patient consultation on average 3.6 times per month. In the case of health-related questions, almost two-thirds were of a prognostic (39%) or therapeutic nature (26%); questions of etiologic and diagnostic nature were reported to a lesser extent (both 17%). Consultations of colleagues respectively searching in handbooks or Dutch professional journals were frequently used sources for answering these questions (79%, respectively 70%). Some 21% of the physicians reported looking for an international article in PubMed. In **chapter 2.2** we showed that the method of EBM is applicable to common questions in the field of disability evaluation. The WHO International Classification of Functioning, Disability and Health was helpful as an guiding model in defining which answerable questions can be formulated, and selecting the terms for searching. For finding studies on (work) participation, an existing occupational health search tool – developed to support searches on the topic of chronic diseases and work participation – was helpful in providing clinically relevant answers in two out of three cases. The case study on prognosis and rheumatoid arthritis illustrated that many work-related articles could be found that are relevant to social insurance physicians. This case study clarified the need to develop new ‘rules’ or suggestions for preferred outcomes in studies in order to facilitate the transfer of knowledge to practice: for example, we had to specify what an insurance physician would exactly consider a poor prognosis for work ability. Finally

this search demonstrated that evidence from scientific studies could answer questions on therapy, prognosis and etiology, all potentially relevant to insurance physicians. The case study on sciatica after surgical management of lumbar disc herniation illustrated that searching electronic databases such as PubMed requires some skills, such as exploring the tree structure of a MeSH term in the MeSH database. The evidence found supports a clinical decision not to refer this patient for any further treatment. Instead, alternative solutions such as workplace accommodations were suggested, which could be helpful in clinical decision making as a consequence of disability evaluation. In addition, the case study shows that reading articles allows one to learn about measurement tools such as the Roland Morris disability questionnaire or others, which could be considered as useful for the practice of insurance medicine.

In the case study of depression and alcohol, contrary to longstanding therapeutic beliefs, the literature review showed that a concurrent anti-depressant therapy and treatment of addiction could be considered as an effective option. Although the review that answered our question especially focused on the evidence at the level of disease, the study supported our decision making regarding the encouragement of work participation.

Next, we evaluated whether education and training in EBM enhances evidence-based disability evaluation (chapter 3).

This part presents the results of an evaluation of two medical training programmes. In chapter 3.1 a before-after evaluation of a one-day introductory workshop on EBM is presented and in chapter 3.2 we present the findings of a randomized clinical trial that evaluated the effects of a five-day clinically integrated postgraduate training programme in EBM.

In **chapter 3.1** we show that a one-day introductory workshop on EBM methods is applicable and effective for insurance physicians as evident from the improvements in self-assessed EBM skills (mean scores before and directly after the workshop were 1.5, respectively 5.7 points, on a scale of 0-7; the mean difference was 4.2 (95% CI 3.7-4.6) and self-efficacy (mean score before and directly after the workshop was 2.6, respectively 3.3; the mean difference was 0.7 (95% CI 0.6-0.8). Three months after the workshop, the improvements in skills and self-efficacy were still significant: the mean score in skills before the workshop and after three months was 1.5, respectively 3.9; the mean difference was 2.3 (95% CI 1.8-2.9); the mean score for self-efficacy before workshop and three months after workshop was 2.6,

respectively 3.0; the mean difference was 0.5 (95% CI 0.3 - 0.6). For the attitude towards EBM, EBM knowledge and the intention to apply EBM, the improvements were small and non-significant. There was no effect of social influences on the use of EBM such as from supervisor and colleagues, and no effect on the self-reported actual application of EBM.

In **chapter 3.2** we showed that a clinically integrated postgraduate training programme in EBM results in a higher percentage of evidence-based disability evaluations: physicians in the intervention group trained in EBM showed a mean percentage of reports in which evidence of sufficient quality was used of 16.7% versus 7.0% in the control group without EBM training. The absolute difference in percentage was 9.7% (95% CI 3.5 - 15.9). This outcome was accomplished through an increase in knowledge and skills in EBM as measured with the validated Fresno test and a higher rating of self-efficacy. Therefore we concluded that an EBM training programme successfully improved the use of evidence by insurance physicians. Our findings support the general recommendations to use multiple educational methods to change physician behaviour. In addition, it appeared important that the professional context of the intervention was clearly supportive in the sense that searches in databases, using and applying guidelines and other forms of evidence were considered as future standard practice and were encouraged by colleagues and management.

Finally we explored what conditions could improve the application of EBM and how additional tools supporting EBM can be constructed (chapter 4).

The third part of this thesis reports how physicians would like to proceed with EBM in the field of disability evaluation and the development of a search tool that could facilitate EBM in practice.

In **chapter 4.1** we explore which visions, experiences and beliefs well-informed insurance physicians have towards the continued use of the acquired EBM skills in clinical practice. We found several motivators and preconditions promoting or hindering implementation of EBM in clinical practice. Physicians indicated that EBM improved the quality and attractiveness of their work. Quality improvement from applying EBM ranged from keeping up to date, an improved consultation with colleagues, and benefits to the client from applying EBM. Attractiveness of their work was enhanced by the appreciation of colleagues and increased job satisfaction. The physicians reported having more fun in their work by applying EBM. Physicians were clear about what needed to be done to improve the application of EBM in terms of professional competences and other professional characteristics needed. Factors

that were mentioned to improve the efficient use of EBM strategies included motivation of the physicians and good collaboration with other colleagues that apply EBM. Material conditions mentioned to facilitate the use of EBM included good access to literature, education in EBM, an EBM helpdesk, and the availability of databases and tailor-made EBM tools. Finally, from an organizational viewpoint support and mandates to apply EBM were mentioned, including sufficient time to practice EBM, managerial support and an adequate quality assurance policy.

In **chapter 4.2** we developed and evaluated a search strategy for finding studies on the prognosis of the disease, the impairments, activity limitations and participation restrictions. We constructed a search filter for PubMed, to be used in combination with the Yale prognosis and natural history filter, to identify articles about the prognosis of work disability. For the researcher, we developed a Work Disability Prognosis filter version (WDP-R) with a comprehensiveness of 90% and an efficiency measured as Numbers Needed to Read (NNR) of 20. For the practitioner, we developed a Work Disability Prognosis filter version (WDP-P) with a comprehensiveness of 68% and an efficiency of NNR=13. In practice, to identify about 20 % more relevant articles than practitioners do, researchers have to read nearly twice as many titles. We conclude that the Work Disability Prognosis filters will help practitioners and researchers who want to find prognostic evidence in the area of work disability evaluation.

FUTURE PERSPECTIVES

We observed that the impact of our 5-day EBM training programme, with subsequent refresher days each year for three years up till now, goes beyond the acquisition of skills and knowledge through which the physicians were able to incorporate evidence in their disability evaluations as we showed in our cluster RCT [1]. In addition to the increase in skills and knowledge, we noticed much enthusiasm in our participants, due to them 'going back to their medical roots' so to speak. With a mean age of 49, many participants had acquired their basic knowledge and skills more than 20 years previously. When work becomes a routine character, as is the case for many older physicians, this might lead to a lower quality of care [2]. We hypothesize that learning a new way of thinking and working, and being able to refresh one's knowledge by systematically searching for knowledge, contributes significantly to the enthusiasm at work and to adopting a positive professional attitude [3]. Mastering EBM can be seen as a form of empowerment by gaining control over the overload in medical information many physicians face everyday. This has also been described for other medical

and paramedical disciplines [4-6]. Especially in medical disciplines that are dealing with a wide spectrum of diseases, it is not easy to stay up to date. As a consequence of the course, EBM-trained physicians felt empowered when communicating with medical specialists or colleagues. This is reported in chapter 4.1: the communication with a medical specialist or another professional, improves considerably if you are aware of the latest evidence in the field [3, 4]. This empowerment encourages person-to-person knowledge transfer, which can further contribute to the implementation of evidence-based practice [7]. We believe that in addition to the recognition that evidence-based guidelines have to be based on systematic reviews, the appreciation of research and its use by insurance physicians really changed as a result of learning EBM practice. This might contribute to a more critical adoption and to striving for improvement of the guidelines. Finally, we expect that commonly seen standard sentences in disability reports such as ‘we adhered to the guideline’ will gradually be substituted by decisions in which the evidence, preferably from a guideline, review or article, is actually cited. By training 140 physicians in the EBM method and having refresher days every year, today a growing number of insurance physicians can participate in other important professional initiatives like academic orientation (AWP), activities within research or education, in guideline development or in updating of guidelines [8-10]. These EBM trained professionals might be the ideal linking pins between research and practice and thereby ensure that research results will be introduced in practice, and also that important practice questions become the focus of future research and development. In a broader sense, being able to critically interpret research findings and to integrate new research results into the work routine contributes to building organizational change capacity, a requirement for organizations with changing demands imposed by government [11]. The skills acquired are possibly useful as well for other organizations performing disability evaluations in compliance with social security policies that are continually developing.

PERSPECTIVES FOR PRACTICE

Case-based learning. Effective training and education in EBM has taken place on a substantial scale in the Institute of Disability Benefit Schemes, organizing training for 140 out of 900 insurance physicians currently employed. Nevertheless, in chapter 4.1 we found that some professionals who are trained still feel insecure about their ability to apply EBM in their daily work. Insurance physicians value practising and learning EBM in groups to further develop their EBM skills, which is comparable to physicians in other (medical) disciplines

that were trained in EBM [3, 4]. During one-day refresher courses, we consistently observed that when physicians organize themselves in case-based learning groups for the purpose of practising the EBM method, they are more enthusiastic about maintaining and developing their EBM skills compared to individual approaches. Bearing this in mind, and being asked to promote evidence-based working across the organization, we support several case-based learning groups. This experience has taught us that structuring the process of these meetings according to the basic principles of the EBM method proved very helpful for the participants and the tutors. We use an EBM log for this purpose, developed in the Coronel Institute of Occupational Health and further refined for the field of disability evaluation. See Appendix 1 for the different process steps. This EBM log has many similarities with a Critical Appraisal Topic (CAT), a well-known tool in EBM. However, an EBM log contains more general information and gives more structure for the process of applying EBM, e.g. organizing the search for aggregated evidence as a first step. A number of good examples demonstrating the use of evidence to answer etiologic questions in disability evaluation were described. Although some course participants were somewhat reluctant in reporting and sharing their search history, reporting the steps and results according to the EBM log has an added value for learning from each other. In reporting our results to the organization we could link our results with another important development within our profession: the creation of elaborated case descriptions as a form of good practice, also named case protocols. Serving as good practice examples for other physicians dealing with similar cases and questions, it was considered necessary to incorporate evidence in those cases for which EBM is much suited [12].

Determinants of successful case-based learning and support. As we were interested in the determinants of a successful training programme and factors that facilitate the use of EBM, we looked for studies that evaluated case-based learning, continuing medical education (CME) and (knowledge) translational research. Kiesling et al. [13] found in their pragmatic trial that case-based training with a trained facilitator promoting implementation of evidence-based care in general practice was associated with decreased mortality in patients with coronary heart disease. Active participation of physicians in three or four one-hour case-based seminars during a two-year period was enough to change critical aspects of clinical practice. For further implementation the method of EBM, we have 5-6 three-hour sessions a year, which seems appropriate in this respect, taking into account that many searches are completed during these sessions. Marinopoulos et al. showed in their review that

interactive educational strategies are more effective compared to non-interactive ones and that multiple exposures to these educational activities seem to be more effective than single exposure [14]. Both conditions are fulfilled in our case-based learning practice. Kiesling et al. [13] argued that the focus of their intervention, like ours, was not on knowledge of evidence per se, but on how and when to apply this evidence in the physicians' decisions in their everyday work, described by some authors as 'implicit knowledge' or 'mindlines', which are considered to be important for actual learning, and changing practice [15, 16]. Another similarity with our practice is that cases in the trial of Kiesling et al. [13] were kept short, and the material was simple and well organized, which permitted a greater focus on complex contextual and analytic dimensions, thereby intensifying the above-mentioned learning of implicit knowledge all in accordance with factors known to promote case-based training [17]. In our case-based learning groups, each case was introduced by one physician and took place in their own work setting, so that the details of the cases were contextualized, which is also considered to add to the learning of implicit or 'know how' knowledge [15, 16]. In line with this, outreach visits and academic detailing as done in our case-based training sessions have been shown to be effective [18, 19]. Feedback and small group learning are important factors for changing the behaviour of physicians, as shown in several reviews [20, 21], and are important ingredients in our case-based learning. Feedback in our case-based training groups encompasses the procedural steps of EBM that have to be followed, which appears particularly effective. Deenadayan et al. [22] found in their review of successful journal clubs that mandatory attendance, a trained journal club leader to lead the discussion, circulating papers prior to the meeting, using structured worksheets, and summarizing the findings are important; all characteristics that are more or less applicable to our case-based learning.

Knowledge infrastructure. We regard case-based learning groups, after an intensive EBM workshop, as a promising initiative for further implementation of the method of EBM in the field of disability evaluation, where a good knowledge infrastructure is a prerequisite [23, 24]. Easy access to online medical literature and guideline databases should be secured for the physicians who want to work in an evidence-based manner. Young new doctors entering the field of disability evaluation, being more familiar with the principles of EBM, are surprised that the sources of evidence they were used to in the hospital such as Clinical Evidence and Up-to-Date are not available in the Institute of Disability Benefit Schemes. This lack of infrastructure frustrates working in an evidence-based manner. Furthermore,

physicians indicate that there is a need for an EBM helpdesk within their organisation, where they can quickly check their searches when they are failing to find results or get expert advice on critical appraisal issues. Studies show that an EBM helpdesk could be helpful [25, 26]. Moreover, such a professional helpdesk with experts in EBM could also facilitate in providing EBM tools such as by updating existing search filters applicable in the field of disability evaluation or in developing new ones as shown in chapter 4.2 for the task of prognosis. In addition, such search filters could facilitate identification of relevant evidence to enable updating existing and developing new guidelines in the field of insurance medicine.

EBM-trained insurance physicians often mention the need for more social support in working in an evidence-based manner. They complain about the lack of urgency in the organization regarding the use of evidence in practice. The physicians argue that it would certainly help if the application of EBM is more appreciated by managers and taken into account in the supervision, including a quality check of their work, also as part of quality assurance procedures in the organization.

On the level of international collaboration, the creation of a task group on disability evaluation or insurance medicine, by analogy and preferably in collaboration with a Cochrane entity such as the Cochrane Occupational Safety and Health Review Group (<http://osh.cochrane.org>), should be explored [27] not only to increase the visibility of evidence relevant to this field, but also to encourage the development of systematic reviews and to stimulate research both at the national and international level. In such an initiative, one should consider also including etiologic or prognostic studies, as such evidence seems most needed in the daily work of insurance physicians.

PERSPECTIVES FOR RESEARCH

As we discussed in chapter 4.2, making a prognosis of the current and future health conditions and functional abilities of the clients is complex. Therefore, physicians use many different categories of information to support their decision, such as severity of the disease, physical and mental condition, age, gender, level of education and having manual or non-manual work, but also the impact of new therapy, rehabilitation efforts or the willingness of an employer to support the impaired worker in return to work. These sources of information, if well-chosen, correspond to the main determinants of the course of a disease and the course of functional abilities. To improve the understanding and control, these determinants can be

organized and visualized according to the ICF model [28], or perhaps better in such a model including in addition the factor of time [29]. In professional practice, the main categories of determinants have to be weighed against each other during the process of estimating what the actual course will be, with the option to include determinants that can have a substantial impact in the future such as a new effective treatment, rehabilitation, guidance and support. Finally, the physician will take a decision about what he or she estimates as the most probable course, the 'professional prognosis' conceptualized as the professional estimation and decision. Decisions based upon the professional prognosis established by the insurance physician, preferably in good contact with the client, can have major financial, social and even medical consequences for the client, and society, and should therefore be based on evidence whenever possible. This is the most crucial argument in favour of the development of well-designed search strategies, tools and decision aids to support the physicians and the clients in developing a better prognosis and, consequently, better decisions. The availability of evidence can be helpful in this process. Developments in EBM research, like incorporating knowledge from decision-making, can further tailor the method for these purposes. In conclusion, we recommend studying the prognosis of health and work functioning outcomes as a new topic in the research and development of disability evaluation.

Another research-related topic is the need to harmonize or to decide on preferred outcome measures in professional prognosis studies. It might be relevant to discuss the definition and related criteria of a 'poor course' as such an estimation is one of the basic criteria in the decision making process to grant a patient a disability benefit or not. This information is similarly needed when the physician needs to decide whether to plan future disability evaluations or not, as well as in the decision to recommend or to start a new treatment, rehabilitation or guidance. In the example of rheumatoid arthritis in chapter two, a cut-off point of (less than) 25% probability of recovery from disease and the resulting work limitations after 5 years, was implemented. By defining such a priori cut-off points, the evidence found, often also expressed in probabilities, becomes easier to apply in decision making. Research into how to define such important constructs in the daily work of physicians performing disability evaluations could be extremely valuable, adding to the desired equality and transparency of disability evaluations.

For good reasons research focussing on social participation of clients such as in paid or non-paid work, is much promoted nowadays and therefore we propagate research with such participation related outcome measures. However this does not necessarily mean that when an insurance physician wants to underpin his work participation advice, that he can only incorporate evidence with outcome measures on the level of participation. Outcome measures on e.g. work disability percentages given a disease can sometimes even be misleading when used without reflection. Many international studies or statistics reporting absolute figures on employment outcomes or return to work outcomes cannot be used directly in a specific country as they are heavily influenced by socio-economic factors, differences in medical or legislative systems, available interventions in health care, and differences in criteria and database systems regarding work participation data. Therefore it is vital that physicians benefit from disease related information and information on impairments and activities possible. Clinical reasoning then, helps physicians to conceive an advice at the level of participation. In addition we know how difficult such an advice sometimes can be, as factors other than disease play a role in this, which are more difficult to estimate by doctors. Decision-making in disability evaluation is complex, and evidence is needed pertaining to all different categories in the ICF model finally integrated into disability evaluation decision making as we showed earlier [30].

Finally, we believe that research embedded in practice has many advantages such as by fostering the potential to change practice by direct feedback and through a significant commitment on the part of physicians, other professionals, clients and the insurance organisation involved.

FINAL CONCLUSION:

We showed that an intensive EBM postgraduate training programme successfully enhanced evidence-based disability evaluation in the practice of insurance physicians, which was accomplished through an increase in knowledge and skills in EBM and a higher self-efficacy of insurance physicians. We are confident that the method of EBM is not going to disappear from the field of disability evaluation as it is already further implemented by successful case-based learning groups, refreshing course days every year and by starting research to support the application of this method for tasks in the work of insurance physicians that are most appropriate to be supported by EBM, like the prognosis. Furthermore patients, the

insurance organisations and society will increasingly demand for the usage of evidence. In addition, the EBM method is indispensable for the updating of guidelines. And last but not least an increasing number of young doctors employed in our organization in recent years, are already familiar with the method and philosophy of EBM. They will even contribute further to an evidence-based practice in insurance medicine, supported by new scientific studies, new tailor-made tools and an adequate knowledge infrastructure.

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ADDITIONAL FILES

Appendix 1: questions in logbook EBM with goal to describe systematically the EBM search in answering the practical question and present these results in such a way that they are accessible to others.

Topic case:	
1	Short summary of the practical question (the case)
2	What is the health-related knowledge question?
3	What is the domain of the knowledge question and why? (intervention, etiology, prognosis, diagnosis)
4	Formulate the PICO (Patient, Intervention, Control, Outcome)
5	Search for aggregated evidence 1 ^e : Search terms used. 2 ^e : Result of searching in EB sources (such as protocols, guidelines, systematic reviews).
6	Assess the quality of the <i>aggregated evidence</i> .
7	Can the conclusion of the source be used for answering your search question in your daily practice?
8	Does the aggregated evidence answer your question sufficiently? If so, what is the answer? (EBM search ends here then) If not, proceed with question 9 (PubMed).
	Search in PubMed
9	1 ^e : PubMed search terms used (disease, intervention/exposition factor, outcome, domain filter, SR filter) including MESH terms and terms in title or abstract (tiab). 2 ^e : Search results in PubMed (e.g. guidelines, systematic reviews, RCTs, cohort studies) and number of results. 3 ^e : Copy the search strategy and paste it below.
10	Choose the most relevant article(s) (Reference: author(s), title, journal, date). What type of study is this? (For example: systematic review, RCT, cohort study, case-referent study).
11	Assess the quality of the article(s), reviews etc. found in PubMed.
12	Can the conclusion of the source be used for your search question and in your daily practice?
13	Does the aggregated evidence give a sufficient answer to your question? If so, what is the answer? (EBM searching ends here).
14	Indicate whether and what you would advise or report, based on the EBM steps or evidence found in PubMed, to colleagues or others involved at the Dutch Institute of Disability Benefit Schemes (UWV). Advise: Report:
15	Which keywords/search terms do you assign to this case? Write down a maximum of 5.

SUMMARY

In many high-income countries and for workers in the formal economies in a growing number of mid-income and developing countries, financial consequences as a result of a handicap, disease or injury, are (partly) counterbalanced by social security legislation offering work disability benefits compensating for loss of income as a form of basic income security, and free or affordable access to appropriate health care and reintegration facilities. In the Netherlands, like in most countries in the world, (insurance) physicians are responsible for the medical evaluation of the extent and prognosis of work disability and for determining whether the disability is a result of disease or injury. In this thesis we define this medical evaluation of work disability as 'disability evaluation'. Disability evaluation by physicians typically involves the assessment or evaluation of: (1) the actual functional limitations or work capacity of the client; (2) the social and medical history of the client; (3) the feasibility of interventions; and (4) the prognosis of (work) disability. In performing these tasks, a wide variety of medical questions can arise, for which high quality answers must be found. The method of EBM is developed for finding answers, in the form of scientific evidence, to questions in different medical domains such as diagnosis, therapy, etiology and prognosis. We assume that this method is suitable for evidence-related questions of insurance physicians when they perform work disability evaluations. At the start of this research project however, the methods and principles of EBM were not yet being used in the field of disability evaluation in the Netherlands while it was strictly recommended to make use of EBM in several governmental reports. It was found necessary to develop and evaluate a comprehensive postgraduate training programme with the intention of closing the gap in education and in the use of the methods of EBM in the field of disability evaluation. The first objective of this thesis was to study which questions insurance physicians have, which resources they use, and the applicability of EBM for disability evaluation (Chapter 2.1 and 2.2). The second objective was to evaluate whether education and training in EBM enhances evidence-based disability evaluation in practice. We did this by evaluating two medical training programmes (Chapter 3.1 and 3.2). The third objective was to explore what conditions could improve the application of EBM and how additional tools supporting EBM practice can be constructed (Chapter 4.1 and 4.2).

Chapter 2.1 showed insurance physicians had on average 3.6 knowledge questions per month. Health-related questions were most frequently of a prognostic nature (39%), followed by questions on therapeutic, etiologic and diagnostic aspects of disability evaluations (26%,

17% and 17%). Consultations of colleagues respectively searching in handbooks or Dutch professional journals were frequently used sources for answering these questions (79%, respectively 70%). It was concluded that physicians performing disability evaluations would seem to have enough knowledge questions that could be answered using EBM by accessing the scientific literature.

In **Chapter 2.2** we showed that the method of EBM is applicable to three preselected cases representative for common cases in disability evaluation practice, each with one evidence question. Two of these questions were about the prognosis of work disability and one about the effectiveness for enhancing the chances for work participation. This demonstration study with the aim to encourage awareness and try-outs among insurance physicians included a detailed description of a literature search, a critical appraisal and decision making for each case. The WHO ICF framework was instrumental in defining answerable questions for each case and in selecting appropriate terms to use in searching. For rheumatoid arthritis, we found evidence from a systematic review on the prognosis of work disability over a long-term period. For remnant sciatica after lumbar discectomy, we found evidence from a prospective cohort study for the stability of the limitations at this stage. For depression with co-morbid alcoholism we found evidence from a systematic review that concurrent treatment of both conditions could enhance work participation. In addition we concluded that more consensus is needed on the main outcome measures in the studies and practice. Development of validated specific search strategies for physicians involved in disability evaluation could improve the actual use of EBM.

Chapter 3.1 describes the evaluation of a one-day introductory EBM workshop for 66 social insurance physicians, which we helped to develop. The workshop focused on teaching two EBM core skills: to formulate answerable questions and to search for the best evidence. Measurements were completed before, immediately after and three months after the workshop by means of a self-assessment questionnaire. Primary outcomes were EBM-related knowledge, skills, attitude and the intention to apply EBM in practice. Secondary outcomes were social influences on EBM use in practice, self-efficacy and behaviour in terms of self-assessed use of EBM in practice. All outcomes were measured with items on a 5-point Likert scale. Immediately after the workshop, a marked and significant improvement was seen in self-reported skills (mean score after workshop was 4.2 points higher than

before, with 95% CI 3.7-4.6) and in self-efficacy to apply EBM (mean score after workshop was 0.7 points higher than before with 95% CI 0.6-0.8). Improvements were small for attitude, knowledge and the intention to apply EBM. Three months after the workshop the improvements in self-reported skills and self-efficacy were lower but remained significant. We concluded that the EBM method can be successfully adapted and taught to physicians performing disability evaluations. Opportunities for the development of a more effective EBM training were considered such as incorporating strategies on how and when to apply EBM in the busy daily practice of insurance physicians.

In **Chapter 3.2** a study is presented on the evaluation of the effectiveness of a five-day clinically integrated post-graduate training programme in EBM on evidence-based disability evaluation. In a cluster randomized controlled trial, 54 case-based learning groups consisting in total of 132 physicians were randomly assigned to the intervention or control groups. The training programme for the intervention group, with duration of six months, consisted of (home) assignments, peer teaching, interactive training in searching databases, lectures and brainstorming sessions. The participants also received a generic search strategy presented as an online tool on how to use guidelines, synopses, reviews and original studies. Additionally they received search strings to find relevant literature more effectively, and finally, access to full text scientific articles was arranged at their own workplace.

The control group received no training and no other facilities. The primary outcome was the realization of evidence-based disability evaluations, as indicated by the frequency in use of evidence of sufficient quality in formal disability evaluation reports. Because no standardized EBM behaviour outcome measures are available, we followed available general guidelines for constructing performance indicators and defined an a priori cut-off point as recommended for evaluating EBM training, for the determination of sufficient quality. Physicians trained in EBM performed significantly more evidence-based disability evaluations compared to physicians in the control group. The differences between both groups remained significant after both cluster-adjusted analysis and additional sensitivity analyses accounting for subjects lost to follow-up. We concluded that this EBM-promoting programme resulted in increased use of evidence in insurance physicians. Our findings support the general recommendations to use multiple educational methods complemented with a programmatic approach offering appropriate strategies, tools and access to literature, to change physicians' behaviour. In addition, it appeared important that the professional context of the intervention was clearly supportive in the sense that searches in databases,

using and applying guidelines and other forms of evidence were considered standard practice in the organization and were encouraged by colleagues and management.

In **Chapter 4.1** we studied the opinions and experiences of physicians performing disability evaluation regarding the continued use of EBM skills in clinical practice. This qualitative study was nested in the cluster RCT presented in 3.2. The 45 participating physicians received a comprehensive six-month training programme in EBM, complemented by a number of facilities, as described in Chapter 3.2. On the last course day, an evaluation was organized including group interviews with the participating physicians, who discussed opinions and experiences regarding EBM application in daily practice. Using an iterative process, we searched for common motivators or preconditions promoting or hindering continuous use of EBM. Three main concepts emerged after analysing the discussions: 1) A primary motivator is the perceived improved quality of physicians' actions, such as clients benefiting from the application of EBM; 2) A secondary motivator is the perceived improved work attractiveness for the insurance physicians; and 3) Preconditions that have to be met in order to work in an evidence-based manner include a well-developed professional competence, EBM-facilitating material conditions and adequate organizational and managerial support and demands. It was concluded that physicians trained in EBM are motivated to use EBM because they perceive it as an improvement in the quality of their work and as a factor making their work more attractive. In addition to personal investments and gains, organizational support would further facilitate the uptake of evidence in practice.

In **Chapter 4.2** we describe the development and evaluation of a comprehensive and efficient search strategy in PubMed that identifies articles on the prognosis of work disability, to be used by either researchers or practitioners. Using a diagnostic test analytic framework, we created a reference set of 225 articles on the prognosis of work disability by screening a total of 65,692 titles and abstracts from 10 journals in the period 2000-2009. To be included, studies should have, amongst others, a minimum follow-up time of six months, participants in the working age of 18-64 years and a minimum sick leave of four weeks or longer. Using text-mining methods, search terms were extracted from the reference set and consecutively combined in a number of search strings. We found that both the newly created search filter for researchers (Work Disability Prognosis filter for Research, WDP-R) and the newly created search filter for practitioners (Work Disability

Prognosis filter for Practice, WDP-P) outperformed existing filters in occupational health, all combined with the existing Yale prognostic filter. The Work Disability Prognosis filter for Research showed a comprehensiveness (sensitivity) of 90% and a good level of efficiency with a number needed to read (NNR) of 20. The Work Disability Prognosis filter for Practice showed a comprehensiveness of 68% and a number needed to read of 13. We concluded that the filters will be of substantial help for researchers and practitioners who want to find prognostic evidence in the area of work disability evaluation. However, further refining of these filters is needed, especially for the practitioner with little time to spend and less expertise on searching and selecting literature.

In chapter 5, the last of this thesis, the main results are presented and discussed. Most importantly an intensive EBM postgraduate training programme successfully enhanced evidence-based disability evaluation in practice, which was accomplished through an increase in knowledge and skills in EBM and a higher self-efficacy of insurance physicians. Moreover as a result of this training we observed much enthusiasm and adopting a positive professional attitude. Physicians seemed empowered by learning this method and as a result their communication with other specialists and colleagues improved. Other developments like academic orientation or updating of guidelines might profit from their more professional attitude and increased skills. Also the organization (UWV) that employs these professionals, benefit as, besides quality improvement of the professional standard by applying the methods of EBM, these professionals contribute to building necessary organizational change capacity. For further implementing evidence-based practice we regard case-based learning as most promising, especially when combined with the Dutch initiative of creating case protocols. Using an EBM log, which structures the process of these case-based learning groups according to the basic principles of EBM, proved to be very helpful. A good knowledge infrastructure is a prerequisite for all this and especially a helpdesk could further facilitate evidence-based working. Another important facilitator is more appreciation of managers for evidence-based working of their professionals, also as part of quality assurance procedures. For research we recommend studying the prognosis of the health and work functioning outcomes as a new topic in the research and development of disability evaluation. Aligned to this is the need to decide on preferred outcome measures in studies on medical professionals constructing a prognosis. By defining a priori cut-off points such as the prognosis of a less than 25% chance to improve an existing poor work disability, decision-making could be further facilitated by evidence. Although more research with

participation related outcome measures is needed, the lack of these studies does not imply that an (insurance) physician cannot give any participation advice. Insurance physicians also use disease related information and information on the level of impairments and activities in accordance with the WHO ICF scheme. Clinical reasoning then, helps physicians to conceive an advice at the level of participation, how difficult this sometimes can be as other factors than disease play a role in this, which are sometimes difficult to estimate.

In conclusion, we showed that an intensive EBM postgraduate training programme successfully enhanced evidence-based disability evaluation in the practice of insurance physicians through an increase in knowledge and skills in EBM. The method of EBM will not disappear from the field of disability evaluation as it is already further implemented by successful case-based learning groups and refreshing courses. Skills in EBM are indispensable for the creation and updating of evidence-based guidelines. The patients or clients, insurance organisations and society will increasingly demand for the usage of evidence. Therefore, we expect that evidence-based practice in insurance medicine, supported by research and development, new tools and a good knowledge infrastructure, will grow in its positive impact on the quality of professional practice.

NEDERLANDSE SAMENVATTING

De gevolgen van een handicap, ziekte of ongeval worden in veel landen financieel gecompenseerd door regelingen voortkomend uit sociale zekerheidswetgeving. Meestal gebeurt dit in de vorm van een arbeidsongeschiktheidsuitkering als compensatie voor verlies van inkomen. Vaak gaat dit samen met een vrije of laagdrempelige toegang tot benodigde gezondheidszorg en faciliteiten die nodig zijn om weer te integreren in de werksituatie. In Nederland, net als in veel andere landen, zijn (verzekerings-)artsen verantwoordelijk voor de medische beoordeling van de mate van arbeidsongeschiktheid, voor de inschatting van het toekomstige beloop (prognose) en voor het bepalen of de ongeschiktheid voortkomt uit een ziekte of ongeval. In dit proefschrift noemen we dit proces 'de beoordeling van de arbeidsongeschiktheid', zonder hierbij afbreuk te willen doen aan de noodzaak om veel aandacht te geven aan de mogelijkheden die iemand juist wél heeft op het gebied van arbeid. In het Engels gebruiken we de term 'disability evaluation'.

De beoordeling van de arbeidsongeschiktheid door de verzekeringsarts bestaat uit de volgende vier taken: 1) het inschatten van de actuele mogelijkheden om bepaalde activiteiten en handelingen uit te voeren: de 'functionele mogelijkheden en beperkingen' van een cliënt; 2) het beoordelen van de sociaal-medische voorgeschiedenis van een cliënt; 3) het onderzoeken van mogelijkheden om maatregelen te nemen die tot een verbetering kunnen leiden: de 'interventies'; en 4) het inschatten van de toekomstige ontwikkeling van de ziekte en van de functionele mogelijkheden: de 'prognose'. Bij het uitvoeren van deze vier taken kunnen medische vragen opkomen. Om deze vragen te kunnen beantwoorden is hoogwaardige kennis vereist. Om antwoorden te zoeken en te vinden in de medische vakliteratuur en deze vervolgens goed te interpreteren is de zogenaamde evidence based medicine (EBM) methodiek ontwikkeld. Deze methodiek ondersteunt het zoeken naar antwoorden op medische vragen voor zover die gevonden kunnen worden in resultaten van wetenschappelijk onderzoek. Gesproken wordt van het zoeken naar 'evidence' (in de onderzoeksliteratuur). Bij de start van dit promotietraject was het belang van EBM nog nauwelijks onderkend, laat staan ingevoerd binnen de verzekeringsgeneeskunde, terwijl de methodiek al wel was ingevoerd in een aantal andere, meer klinisch georiënteerde medische specialisaties. Een stimulans om deze achterstand aan te pakken kwam van de Gezondheidsraad die de verzekeringsartsen en de organisaties waar zij voor werkten in 2004 adviseerde om de EBM methodiek voor de verzekeringsgeneeskunde aan te passen

en in te voeren. De ontwikkeling en evaluatie van een EBM training, met een accent op evidence-based protocollen en richtlijnen paste goed bij dit advies.

De eerste doelstelling van dit promotieonderzoek was om te onderzoeken welke medische kennisvragen gesteld worden door verzekeringsartsen tijdens hun werk, en welke bronnen voor 'evidence' gebruikt worden om deze vragen te beantwoorden. Hiermee kon een eerste antwoord verkregen worden op de vraag in hoeverre de EBM methodiek toepasbaar is voor deze beroepsgroep (hoofdstuk 2.1 en 2.2). De tweede doelstelling was om te onderzoeken of een training in EBM daadwerkelijk leidt tot meer gebruik van 'evidence' in de praktijk van verzekeringsartsen (hoofdstuk 3.1 en 3.2). De derde doelstelling was om te onderzoeken welke condities de toepassing van EBM zouden kunnen bevorderen en hoe additionele hulpmiddelen, 'tools', toepassing van EBM zouden kunnen ondersteunen (hoofdstuk 4.1 en 4.2).

In **hoofdstuk 2.1** wordt gerapporteerd dat verzekeringsartsen meldden ongeveer 4 kennisvragen per maand te hebben, waaronder veel medische vragen. De medische vragen zijn voornamelijk van prognostische aard (39%), gevolgd door therapeutische vragen, etiologische en diagnostische vragen (respectievelijk 26%, 17% en 17 %). Als bronnen voor de beantwoording van de medische vragen werden het meest genoemd collega's en Nederlandse vaktijdschriften (79% en 70%). Geconcludeerd wordt dat er voldoende kennisvragen zijn die zich lenen voor toepassing van de EBM methodiek.

In **hoofdstuk 2.2** laten we zien hoe de EBM methodiek toepasbaar is op drie gangbare klinische scenario's in de vorm van drie casussen uit de verzekeringsgeneeskunde. Elke casus die werd verkend kende een medische vraag waarbij naar 'evidence' kon worden gezocht. Twee van deze vragen gingen over de prognose van de arbeidsongeschiktheid van een zieke werknemer en één vraag betrof de effectiviteit van een interventie om de kansen op werkparticipatie te vergroten. Deze casuïstiekstudie had als doel om het bewustzijn over evidence-based werken bij verzekeringsartsen te verhogen en ze te verleiden er ook mee aan de slag te gaan. Daarom omvat het artikel een gedetailleerde beschrijving van het zoeken in de literatuur, de beoordeling van de kwaliteit van de gevonden onderzoeken en de besluitvorming door de arts bij elke casus. Het WHO-International Code of Functioning (ICF) model bleek nuttig bij het formuleren van een goede, beantwoordbare vraag bij elke casus en bij het selecteren van zoektermen. In de casus over reumatoïde artritis vonden we *evidence* in een systematische review over de prognose van arbeidsongeschiktheid over

een lange tijdsperiode. Voor het optreden van uitstralende pijn in het been, 'sciatica', na een hernia operatie (lumbale discectomie), vonden we *evidence* voor het blijven bestaan van deze pijnklachten in een prospectief cohort onderzoek. Ten aanzien van depressie met als comorbiditeit alcoholverslaving vonden we *evidence* in een systematische review dat het behandelen van beide aandoeningen tegelijkertijd positieve effecten heeft op de participatie in werk. Een algemene conclusie is dat meer consensus gewenst is over de belangrijkste uitkomstmaten en afkappunten in onderzoek, bijvoorbeeld om te spreken bij een kans kleiner dan 25% dat een matige arbeidsongeschiktheid nog hersteld (binnen 5 jaar) te spreken van een slechte prognose. Een belangrijke aanbeveling is het ontwikkelen en valideren van een zoekstrategie voor het vinden van *evidence* voor verzekeringsartsen zodat het gebruik van EBM in de praktijk minder tijd kost.

Hoofdstuk 3.1 bevat de evaluatie van een inleidende workshop over EBM met 66 verzekeringsartsen. De workshop had tot doel om de eerste twee EBM stappen te onderwijzen: het formuleren van een goede, beantwoordbare vraag en het zoeken naar de beste *evidence* in de literatuur. Uitkomsten werden gemeten direct vóór, direct na en drie maanden na afloop van de workshop door middel van vragenlijsten. Primaire uitkomstmaten waren veranderingen in EBM gerelateerde kennis en vaardigheden, de attitude ten aanzien van EBM en de intentie om EBM in de praktijk toe te passen. Daarnaast maten we invloeden uit de sociale omgeving op het gebruik van EBM in de praktijk, de ervaren competentie ('self-efficacy') in EBM en de zelfgerapporteerde toepassing van EBM in de praktijk. Alle uitkomstmaten werden gemeten met items op een 1-5 punts Likert schaal. Direct na de workshop verbeterden de zelfgerapporteerde EBM vaardigheden met 4,2 punten (95% betrouwbaarheidsinterval 3,7 tot 4,6) en de ervaren competentie om EBM te kunnen toepassen met 0,7 punten (95% betrouwbaarheidsinterval 0,6 tot 0,8). Gevonden verbeteringen in attitude, kennis en intentie om EBM toe te passen waren echter klein en niet significant. Drie maanden na de workshop waren de verbeteringen in vaardigheden en ervaren competentie in EBM minder hoog, maar de resultaten waren nog steeds significant hoger vergeleken met de resultaten vóór de workshop. We concluderen dat de EBM methodiek succesvol aangepast kan worden voor de verzekeringsgeneeskunde en effectief onderwezen kan worden aan verzekeringsartsen. Een belangrijke aanbeveling is om een nog effectievere EBM training te ontwikkelen door het inbouwen van strategieën die de beslissing ondersteunen over hoe en wanneer EBM in te passen in de drukke dagelijkse

praktijk van verzekeringsartsen en deze te evalueren in een gerandomiseerd gecontroleerd onderzoek.

In **hoofdstuk 3.2** worden de effecten beschreven van een postacademische training in EBM voor verzekeringsartsen. In een cluster-gerandomiseerd gecontroleerd onderzoek werden 54 casuïstiekgroepen met in totaal 132 deelnemende verzekeringsartsen, random toegewezen aan de interventie- of de controlegroep. Het trainingsprogramma voor de interventiegroep, 5 onderwijsdagen verspreid over periode van 6 maanden, bestond uit (huiswerk)opdrachten, interactieve training in zoeken in databases, plenaire interactieve sessies, brainstormgroepen en het leren van elkaar. Daarnaast kregen de deelnemers online les in het gebruik van richtlijnen, synopsis, reviews en originele primaire onderzoeken. De deelnemers werden in workshops met PCs getraind in zoekstrategieën voor het efficiënt vinden van literatuur en kregen op de werkplek toegang tot wetenschappelijke literatuur. De controlegroep kreeg bovenstaande interventies niet aangeboden. De primaire uitkomstmaat was de relatieve frequentie (percentage) evidence-based arbeidsongeschiktheidsbeoordelingen gemeten door de frequentie vast te stellen van het gebruik van evidence van voldoende kwaliteit in het medische deel van de verzekeringsgeneeskundige rapporten die gaan over mensen die een uitkering aanvragen vanwege arbeidsongeschiktheid. Ook definieerden we vooraf een afkappunt voor het vaststellen van ‘voldoende’ kwaliteit van de gevonden evidence. Dit gebeurde in overeenstemming met algemene richtlijnen en aanbevelingen voor het evalueren van onderwijs. Er bestaan geen gestandaardiseerde uitkomstmaten te gebruiken voor het meten van de daadwerkelijke toepassing van EBM in de praktijk, in termen van activiteiten uitgevoerd door de verzekeringsarts. Daarom hebben we zelf ‘performance indicatoren’ ontwikkeld.

Verzekeringsartsen in de interventiegroep gebruikten in hun verzekeringsgeneeskundige rapporten 9,7 procent meer evidence van voldoende kwaliteit dan de verzekeringsartsen in de controlegroep (95% betrouwbaarheidsinterval 3,5-15,9). De verschillen tussen beide groepen bleven statistisch significant na correcties voor het cluster design en na aanvullende sensitiviteitsanalyses. Bij de analyses hielden we rekening met verzekeringsartsen die zich in de loop van het project hadden teruggetrokken uit het onderzoek. Wij concluderen dat de training tot een toegenomen gebruik van evidence door verzekeringsartsen heeft geleid. Het positieve resultaat strookt goed met algemene aanbevelingen voor het veranderen van gedrag van artsen waarin het gebruik van verschillende onderwijsvormen wordt

aanbevolen. Het is ook belangrijk om aangepaste strategieën, tools en een goede toegang tot de literatuur aan te bieden. De professionele omgeving dient ondersteunend te zijn in de zin dat het zoeken in databases en het toepassen van richtlijnen en andere vormen van evidence als vanzelfsprekend worden gezien binnen de organisatie en worden toegejuicht door collega's en management. Deze laatste aspecten waren tijdens ons project gedeeltelijk aanwezig, maar zijn zeker nog voor verbetering vatbaar.

In **hoofdstuk 4.1** zijn de meningen en ervaringen te lezen van verzekeringsartsen over het blijven toepassen van de verworven kennis en vaardigheden in EBM. Dit kwalitatieve onderzoek is uitgevoerd bij 45 verzekeringsartsen die aan de in hoofdstuk 3.2 beschreven interventie deelnamen. Op de laatste dag van de training werd onder de deelnemers een evaluatie met groepsinterviews georganiseerd, waarbij meningen en ervaringen over het blijven toepassen van EBM in de dagelijkse praktijk werden bediscussieerd. Na het woordelijk uitschrijven van de gesprekken werd door middel van een stelselmatig herhalend proces in dit materiaal gezocht naar stimulansen en (rand)voorwaarden die het blijvende gebruik van EBM kunnen bevorderen. We beschrijven drie hoofdthema's die uit de verslagen naar voren kwamen. Een belangrijke stimulans voor gebruik van EBM in de perceptie van de verzekeringsartsen is de kwaliteitsverbetering door beter onderbouwde adviezen en oordelen.

Een tweede stimulans is de toegenomen aantrekkelijkheid van het werk van verzekeringsartsen door het toepassen van EBM. Als derde worden belangrijke randvoorwaarden genoemd zoals de aanwezigheid en bevordering van professionele competenties, zoals motivatie maar ook de ervaren competentie om EBM te kunnen toepassen, het realiseren van materiele voorwaarden die EBM gebruik ondersteunen zoals toegang tot literatuurdatabases op de werkplek en adequate ondersteuning door de organisatie en managers.

We concluderen dat EBM getrainde verzekeringsartsen gemotiveerd zijn om EBM te blijven gebruiken omdat zij de invoering van evidence-based werken zien als een verbetering van de kwaliteit van hun werk en als een factor die hun werk aantrekkelijker maakt. Ondersteuning vanuit de organisatie kan het gebruik van evidence in de praktijk verder bevorderen.

In **hoofdstuk 4.2** wordt de ontwikkeling en evaluatie van een voor verzekeringsartsen op maat gemaakte zoekstrategie in PubMed beschreven. Het doel van de zoekstrategie was om artikelen te vinden die gaan over de prognose bij arbeidsongeschiktheid. Deze zoekstrategie

is ontwikkeld voor onderzoekers en artsen in de praktijk. We selecteerden een referentieset van 225 artikelen die de prognose van arbeidsongeschiktheid tot onderwerp hadden, uit 65.692 titels en abstracts van artikelen uit tien tijdschriften in de periode 2000-2009. Om in de referentieset opgenomen te worden, dienden de studies een minimale follow-up periode van 6 maanden te hebben. Deelnemers aan het beschreven onderzoek dienden betaald werk te hebben, in de leeftijdscategorie van 18-64 jaar te vallen en minimaal 4 weken of langer te verzuimen door ziekte. Vervolgens produceerden we een eerste verzameling van zoektermen door middel van dataminingstechnieken in de referentieset van 225 artikelen. Deze termen werden daarna, in volgorde van frequentie van voorkomen, opeenvolgend gecombineerd tot combinaties van zoektermen. Op deze wijze hebben wij twee zoekstrategieën ontwikkeld: één voor onderzoekers waarbij zoveel mogelijk artikelen gevonden werden, een zoekstrategie met een relatief hoge sensitiviteit; en een andere voor praktiserende verzekeringsartsen met zo weinig mogelijk niet-relevante titels, een strategie met een relatief hoge specificiteit (efficiency). Beide zoekstrategieën werden gecombineerd met het bestaande Yale prognostische filter. De zoekstrategieën bleken beter te presteren dan bestaande zoekfilters op het terrein van arbeid en gezondheid. De zoekstrategie voor de onderzoekers had een sensitiviteit van 90% en bleek ook nog redelijk efficiënt waarbij één op de twintig gevonden artikelen relevant was. Voor de verzekeringsartsen in de praktijk was de sensitiviteit 68% en was één op de 13 gevonden artikelen relevant. We concluderen daarom dat de nieuwe zoekstrategieën nuttig kunnen zijn voor zowel onderzoekers als praktiserende artsen bij het zoeken naar evidence op gebied van de prognose bij arbeidsongeschiktheidsbeoordelingen. Wij bevelen aan deze zoekfilters verder te verfijnen, vooral de strategie voor de praktiserende artsen. Omdat efficiëntie in hun dagelijkse werk extra belangrijk is en zij een beperkte expertise in het zoeken en selecteren van onderzoeksliteratuur hebben, dient de opbrengst van de ontwikkelde zoekstrategie voor deze doelgroep nog verbeterd te worden.

In **hoofdstuk 5** worden de belangrijkste resultaten gepresenteerd en besproken. Het belangrijkste resultaat is dat een intensieve 5-daagse EBM training leidt tot een verbetering van de kennis en vaardigheden in EBM bij verzekeringsartsen. De training resulteerde daarnaast in een betere onderbouwing van arbeidsongeschiktheidsbeoordelingen in de praktijk. Daarnaast is enthousiasme over het leren van een voor de uitvoering van hun vak relevante methodiek en hierdoor ook kennismaken van voor hun vak relevante kennis

en verdere professionalisering bij de beroepsgroep vastgesteld als gevolg van de training. Verzekeringsartsen worden 'empowered' door het leren van de EBM methodiek met als gevolg dat de communicatie met specialisten en collega's verbeterd. Andere activiteiten binnen de academische werkplaatsen van het UWV en het updaten van richtlijnen kunnen naar alle waarschijnlijkheid ook profiteren van de toegenomen vaardigheden en professionalisering. De organisatie waar de verzekeringartsen in dienst zijn, heeft nog een voordeel bij de EBM training omdat getrainde verzekeringartsen meer kunnen bijdragen aan het noodzakelijke lerende vermogen van de organisatie. Voor het op grotere schaal invoeren van evidence-based werken, zien we bevordering van EBM casuïstiekgroepen als de meest veelbelovende aanpak, vooral wanneer deze groepen leiden tot het opstellen van mediprudentie die ook weer door andere verzekeringartsen gebruikt kan worden. Het structureren van deze bijeenkomsten volgens de stappen van de EBM methodiek, bleek bijzonder behulpzaam voor de deelnemende verzekeringartsen. Het verder ontwikkelen van een goede kennisinfrastructuur is wel een noodzakelijke voorwaarde voor genoemde innovaties waarbij in eerste instantie gedacht wordt aan een helpdesk met EBM expertise om evidence-based werken te bevorderen, maar ook aan het garanderen van de toegang tot full tekst artikelen vanaf de werkplek en aan de ontwikkeling van evidence-based richtlijnen. Hierbij dienen we wel in acht te nemen dat we met de groep van 132 getrainde verzekeringartsen waarschijnlijk wel de meeste gemotiveerden en voorlopers hebben getraind. Een andere belangrijke factor is daarnaast meer waardering door managers voor het feit dat de professionals hun werk meer evidence-based uitvoeren, mede als onderdeel van de kwaliteitscyclus.

We bevelen aan om meer onderzoek te doen naar de prognose van zowel gezondheids uitkomsten als maten voor werk functioneren en werk participatie. Het is belangrijk om daarbij goede uitkomstmaten te definiëren waarover consensus bestaat binnen het nationale en internationale werkveld van professionals werkzaam op het gebied van disability evaluation. De besluitvorming in de praktijk kan daarnaast worden ondersteund door relevante afkappunten en beslisregels te definiëren. Ter illustratie: welke beslisregel hanteren we wanneer er minder dan 25% kans is binnen 5 jaar op verbetering van de arbeidsongeschiktheid? Voor een uitspraak over de prognose van arbeidsongeschiktheid is het belangrijk vast te stellen wat we precies bedoelen. Als we afspreken dat er in dit geval sprake is van 'beperkte' kans op verbetering dan blijft de vraag wat de vertaling is naar bijvoorbeeld de duurzaamheid van de arbeidsongeschiktheid.

Verzekeringsartsen zullen ook bij gebrek aan evidence moeten handelen. Klinisch redeneren stelt een verzekeringsarts in staat om toch tot een advies te komen, bijvoorbeeld door gebruik te maken van informatie over de ernst van de aandoening en over aanwezige stoornissen en beperkingen in lijn met het ICF schema.

Concluderend: met het aanbieden van een intensief EBM onderwijsprogramma aan een grote groep verzekeringsartsen zijn we erin geslaagd om de kennis en vaardigheden in EBM en de ervaren competentie in het toepassen van EBM te vergroten. Dit leidt tot vaker en beter onderbouwen van arbeidsongeschiktheidsbeoordelingen met evidence. Verdere invoering van evidence-based werken vindt op dit moment plaats door enthousiaste EBM geschoolde verzekeringsartsen in EBM casuïstiekgroepen. Tijdens terugkomdagen voor verzekeringsartsen worden EBM vaardigheden ondersteund. Hierdoor heeft deze EBM methodiek, zij het nog niet in de hele organisatie, een blijvende plek gekregen bij arbeidsongeschiktheidsbeoordelingen. Naast de waarde van EBM voor de praktijk zijn er ook knelpunten die de invoer ervan bedreigen zoals een gebrekkige literatuur voorziening, onzekere randvoorwaarden zoals voldoende reflectie op voor- en nadelen van EBM, tijd voor het onderhouden van EBM vaardigheden en kennis, het gebrek aan up-to-date evidence-based richtlijnen, en beperkte aansluiting en samenwerking met professionals in de kliniek. Vaardigheden in de EBM methodiek zijn daarnaast waardevol bij het creëren en updaten van evidence-based richtlijnen door EBM getrainde verzekeringsartsen. Cliënten, verzekeringsorganisaties als het UWV en de maatschappij eisen in toenemende mate dat beoordelingen en adviezen, waar mogelijk, gebaseerd zijn op evidence. Wij verwachten dan ook dat het evidence-based werken in de verzekeringsgeneeskunde, ondersteund door onderzoek en innovaties, nieuwe EBM tools en een goede kennisinfrastructuur, een positieve invloed zal hebben op de kwaliteit van de professionele praktijk van verzekeringsartsen. Wij zien het als een positieve ontwikkeling dat er steeds meer jonge artsen komen waarbij het zoeken naar wetenschappelijk literatuur gemeengoed is: geen vraag maar een must.

PORTFOLIO

Name PhD student: Rob Kok
PhD period: 2006 – 2014
Name PhD supervisor: Prof. dr. F.J.H van Dijk

	Year	Workload	
		Hours	ECTS
1. PHD TRAINING			
General courses			
Clinical Epidemiology (EMGO VUmc)	2006	40	1.4
Project management	2006	16	0.6
Practical Biostatistics	2008	40	1.4
Advanced Biostatistics	2010	40	1.4
Specific courses			
Cochrane: EBM in klinische praktijk	2006	24	0.9
Clinical Data Management	2006	44	1.6
Reference Manager: Basic Course	2006	3	0.1
Scientific writing in English	2007	12	0.4
Seminars, workshops and master classes			
Oxford CEBM workshop EBP	2007	40	1.4
Presentations			
Presentaties ODP Coronel Instituut (3x)	2006-2014	24	0.9
KCVG: Wetenschap in uitvoering	2007-2008	16	0.6
Presentation KCVG werkoverleg (4x)	2006-2014	32	1.1
EUMASS congres (4x)	2006-2014	32	1.1
Muntendam symposium (2x)	2012-2014	14	0.5
AWP Rijnmond	2013	8	0.3
(Inter)national conferences			
Muntendam symposium (2x)	2009/2014	20	0.7
Verzekeringsgeneeskundige dagen	2006-2014	32	1.1
Cochrane symposium: Beyond the Evidence	2007	8	0.3
EASOM- Teaching Evidence-based Occupational Medicine	2008	24	0.9
Werkconferentie Kenniscentrum Verzekeringsgeneeskunde	2006-2014	64	2.3
Afscheidssymposium Prof. dr. Frank J.H. van Dijk: Connected with workers' health	2013	3.5	0.1
EBHC Joint Conference: Evidence, Governance, Performance	2013	24	0.9

Academiseringsmiddag Verzekeringsgeneeskunde Rijnmond	2013	4	0.1
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2. TEACHING

Lecturing

EBM Expert Cursus	2009-2013	36	1.5
Begeleiden EBM casuistiekgroepen	2013-2014	32	1.1
Practicum Functioneren met Ziekte - 3 rd year medical students	2011	3	0.1
Practicum Gevolgen van Depressie - 3 rd year medical students	2014	3	0.1
TOTAL (28 hr = 1 ECTS)		561	20

DANKWOORD PROEFSCHRIFT ROB KOK

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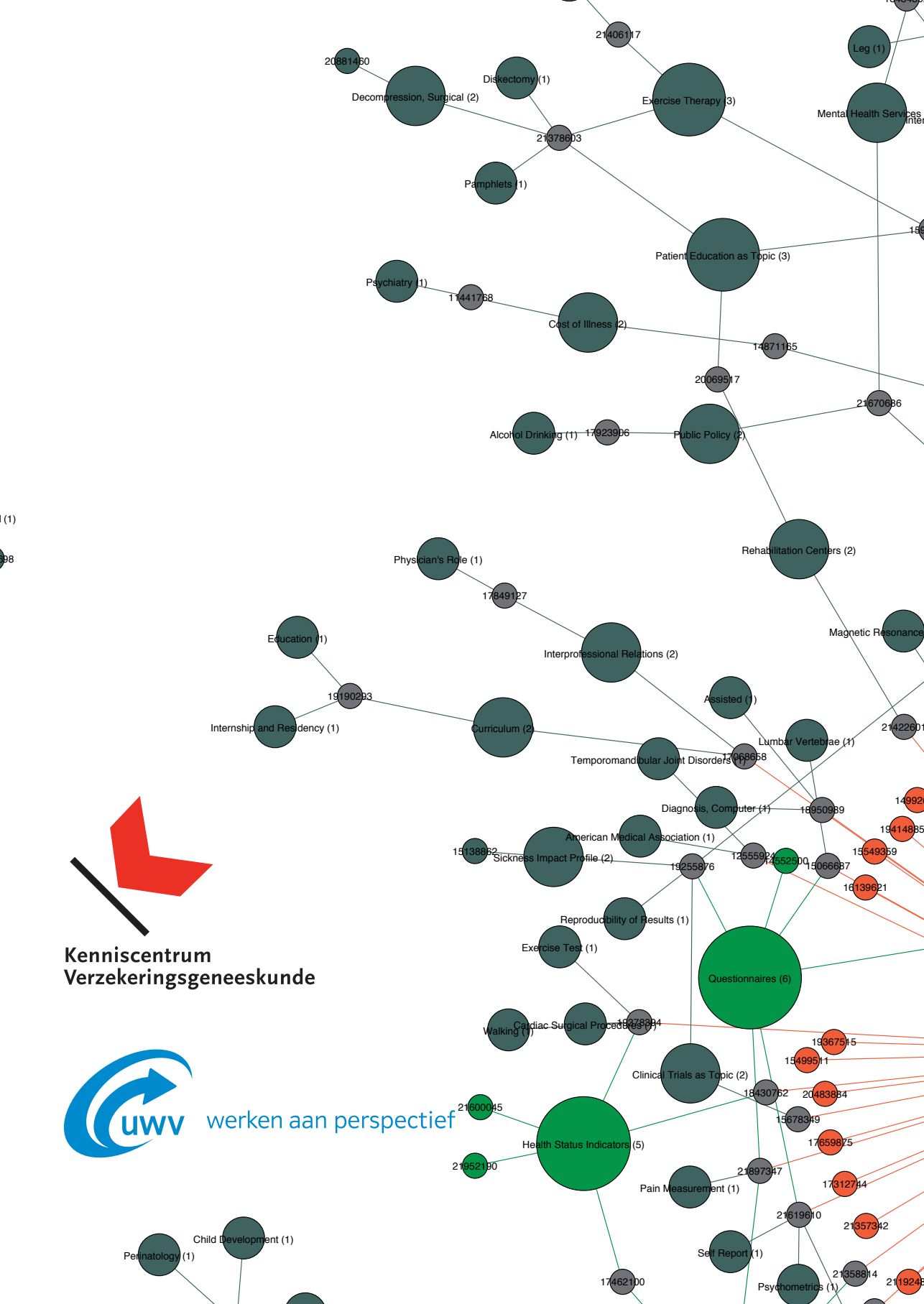
Zoals uit bovenstaande mogelijk wel blijkt is sporten en humor een niet onbelangrijk onderdeel in mijn leven. In dat kader wil ik hier ook mijn tennismaten op de 'heilige' dinsdagavond noemen, met sommigen tennis ik al 20 jaar. Hopelijk gaan we nog minimaal 20 jaar door!

Mijn paranimfen wil ik hier ook vermelden: Wilco, jou ken ik al vanaf mijn twaalfde, nog niet zo lang dus, en je bent een vriend in de ware zin van het woord, zo heb ik dikwijls mogen ervaren! Paul, jij bent een bijzonder mens, altijd optimistisch, vol humor en altijd enthousiasmerend naar je omgeving. Uit onze vele koffierondjes heb ik veel energie gehaald, bedankt! Hopelijk heb ik ook nog wat aan jullie tijdens de promotieplechtigheden.

Lieve Mariëtte, ik ben blij de komende 40 jaar met jou door het leven te gaan!

Last but not least, wil ik hier Gerda bedanken, zonder wie ik hier vast en zeker niet had gestaan.

En nu is het (bijna) tijd voor een feest!



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