

International Encyclopedia of Rehabilitation

Copyright © 2010 by the Center for International Rehabilitation Research Information and Exchange (CIRRIE).

All rights reserved. No part of this publication may be reproduced or distributed in any form or by any means, or stored in a database or retrieval system without the prior written permission of the publisher, except as permitted under the United States Copyright Act of 1976.

Center for International Rehabilitation Research Information and Exchange (CIRRIE)
515 Kimball Tower
University at Buffalo, The State University of New York
Buffalo, NY 14214
E-mail: ub-cirrie@buffalo.edu
Web: <http://cirrie.buffalo.edu>

This publication of the Center for International Rehabilitation Research Information and Exchange is supported by funds received from the National Institute on Disability and Rehabilitation Research of the U.S. Department of Education under grant number H133A050008. The opinions contained in this publication are those of the authors and do not necessarily reflect those of CIRRIE or the Department of Education.

Evidence-Based Rehabilitation Medicine and Physiotherapy

Rob A.B. Oostendorp, PhD, PT, MT

**Research Director, Dutch Institute of Allied Health Care, Amersfoort, the Netherlands
Emeritus Professor Allied Health Sciences, Radboud University Nijmegen Medical
Centre, Nijmegen Centre for Evidence Based Practice, Scientific Institute for Quality of
Healthcare, Nijmegen, the Netherlands**

Maria W.G. Nijhuis-van der Sanden, PhD, PT

**Professor Allied Health Sciences, Radboud University Nijmegen Medical Centre,
Nijmegen Centre for Evidence Based Practice, Scientific Institute for Quality of
Healthcare, Nijmegen, the Netherlands
Head of Department of Paediatric Physiotherapy, Radboud University Nijmegen
Medical Centre, Nijmegen, The Netherlands**

Yvonne F. Heerkens, PhD

**Program Leader Classification & Coding, Dutch Institute of Allied Health Care,
Amersfoort, the Netherlands
Associate professor Occupation and Health, HAN-University, Nijmegen, the
Netherlands**

Erik J.M. Hendriks, PhD, PT

**Program Leader Clinical Guidelines, Dutch Institute of Allied Health Care, Amersfoort,
the Netherlands
Program Leader Clinical Guidelines, Centre for Evidence Based Physiotherapy and
Department of Epidemiology, Maastricht University Medical Centre+, Maastricht, the
Netherlands**

Peter A. Huijbregts, PT, DPT

**Assistant Professor, Online Education, University of St. Augustine for Health Sciences,
St. Augustine, FL, USA**

Abstract

Evidence-based practice (EBP) is the current undisputed predominant paradigm within rehabilitation medicine and physiotherapy. Guidelines for standardized reporting of research findings have facilitated critical evaluation of the relevant research literature. In addition, systematic reviews of the literature made available through computerized databases allow even busy clinicians and researchers rapid access to current best evidence. Despite the potential benefits of EBP to clinical practice, over the years various points of criticism with respect to EBP have been formulated. This chapter provides a critical appraisal of the EBP paradigm discussing perceptions of EBP as cookbook practice, inconsistency and contradiction in research findings, a proposed research pyramid not necessarily emphasizing the randomized controlled trial, a conceptual framework more relevant to the clinical and research needs of rehabilitation medicine and physiotherapy, the role of and impact on patients within the EBP paradigm, implementation of EBP, but also the current lack of evidence for increased efficacy of patient management based on EBP.

Key Words

Evidence-Based Practice, Rehabilitation Medicine, Physiotherapy, Critical Appraisal

Introduction

Since the introduction of evidence-based practice (EBP) in rehabilitation medicine and physiotherapy, clinicians in both fields have –some more willingly perhaps than others– increasingly been using current, research-based information for clinical decision-making in the care of individual patients (Law 2002). However, the basic concept in EBP that clinical procedures should be based on scientific data is anything but a recent advent. For some 20 years now this concept has gained momentum and credibility, as EBP has evolved into the undisputed predominant international paradigm within rehabilitation medicine and physiotherapy.

With regard to this increasing role of EBP, there is often talk of a paradigm shift. In other words, EBP is said to have led to the introduction and adoption of a whole set of values, techniques, and convictions in rehabilitation medicine and physiotherapy distinctly different from those present before the introduction of EBP. There is a greater quantity of scientific information and the availability of this information has also increased considerably. Where formerly insights into pathophysiological mechanisms were the most important source for clinical decision-making, now a multitude of epidemiological, diagnostic, prognostic, therapeutic, and other relevant research is available and accessible in the form of systematic reviews of the literature. Whereas previously many publications were written based solely or predominantly on author authority, now authors are required to clearly indicate the path that was followed to reach the results presented. Research should be reported in a transparent manner, such that readers may follow along in the planning, implementation, results, and conclusion stages. The credibility of research depends on a critical assessment of strengths and weaknesses in study design, conduct, analysis, and conclusion. Transparent reporting is needed to allow critical assessment but also to determine if and how results can be included in systematic reviews of the literature.

To accomplish the goal of transparent reporting, various checklists have been developed that contain recommendations on the reporting of research with the aim of improving reporting quality.

The CONSORT statement (an acronym for CONSolidated Standards Of Reporting Trials) endorses a 22-point checklist to ensure important methodological components of clinical trials are reported. It was developed in 1996 and revised five years later (Altman 2005). Many medical and physiotherapy journals have supported this initiative, which has helped to improve the quality of reporting of randomized controlled trials. Similar initiatives have followed for other research areas, e.g., for diagnostic studies in form of the STARD criterion list (STAndards for Reporting of Diagnostic accuracy) (Bossuyt et al. 2003a; 2003b). Recently guidelines have also been developed for reporting observational studies (STROBE statement [Strengthening the Reporting of Observational studies in Epidemiology]) (Von Elm et al. 2007, Rothwell and Bhatia 2007). The STROBE statement is a checklist of items that should be addressed in articles reporting on cohort, cross-sectional, and case-control studies. The requirements outlined in these checklists make the literature increasingly transparent and contribute to a more systematic approach to the production and dissemination of scientific insights into clinical practice. This is perhaps the greatest value of the EBP paradigm.

However, transparent and standardized reporting of relevant research is only one step when it comes to integrating current research-based evidence into clinical practice. With the ever-increasing multitude of relevant research available, busy clinicians and researchers may find it hard to keep up-to-date. Making large amounts of research more readily available, the *Cochrane Collaboration* has played an important pioneering role in the field of the systematic collection of research data. The *Cochrane Library* currently consists of over 2,200 systematic reviews of the literature, of which several hundred are in the area of rehabilitation medicine and physiotherapy. Thus, the *Cochrane Library* is one of the most useful references with regard to the scientific validation of daily clinical practice in physiotherapy and rehabilitation medicine.

Another such useful reference, but more specific to physiotherapy, is the *Physiotherapy Evidence Database (PEDro)*, which is maintained by the Centre for Evidence Based Physiotherapy of the University of Sydney in Australia and the University of Maastricht in the Netherlands. Randomized trials included in the *PEDro* database are rated to help physiotherapists quickly assess methodological quality and thereby discriminate between trials. These ratings help therapists to judge the usefulness of the results of trials to inform clinical decision-making.

More recently the BMJ Publishing Group and the Health Information Unit at McMaster University in Canada have teamed up to provide *bmjupdates*⁺. The goal for this service is to provide clinicians with the best new evidence concerning important advances in health care, tailored to their interests. For clinicians such as physicians and physiotherapists, aiming to keep up with the most relevant studies and reviews, the 2-step process used for the *bmjupdates*⁺ shrinks the number of articles they need to read from on average 100 articles in 10 different journals to only 2-3 per month, a reduction of about 99% in required reading. After consulting databases and initiatives such as *bmjupdates*⁺ that allow access to systematic reviews of relevant literature, the physician or physiotherapist then determines based on clinical expertise whether the results can be applied to the individual patient consulting the clinician with a health problem.

Despite the potential benefits of EBP to clinical practice, over the years various points of criticism with respect to EBP have been formulated. This goal of this chapter is to provide a critical appraisal of the EBP paradigm discussing perceptions of EBP as a cookbook approach to clinical practice, inconsistency and contradiction of evidence, a proposed research pyramid not necessarily emphasizing the randomized controlled trial (RCT), a conceptual framework more relevant to the clinical and research needs of rehabilitation medicine and physiotherapy, the role of and impact on patients within the EBP paradigm, implementation of EBP, but also the current lack of evidence for increased efficacy of patient management based on EBP.

Evidence-Based Practice: Cookbook Approach to Clinical Practice?

One of the commonly raised objections with regard to EBP is the so-called loss of therapeutic freedom and professional autonomy of physicians and physiotherapists. EBP is suggested as limiting clinician choice thereby placing the clinician in a kind of “scientific straitjacket.” Those critical of EBP propose that the “cookbook practice” approach, that in their opinion EBP forces upon them, insufficiently meets the expectations, concerns, and needs of the individual patient and clinician.

Whether EBP indeed leads to cookbook practice is, of course, determined by one's definition of the concept of therapeutic freedom. Therapeutic freedom never did mean that the clinician has the freedom to do or not do as he or she pleases. Clinicians have an ethical obligation to provide the best possible care for every patient. This implies that as a clinician one is required to continually search for diagnostic tests and measures and also therapeutic interventions that are tailored to the individual patient.

Further invalidating this criticism is the definition of EBP as the integration of best available research evidence with clinical expertise and patient values (Sackett et al. 2000). In this same context, these same authors defined clinical expertise as the ability to use clinical skills and past experience to rapidly identify each patient's unique health status and health problem, their individual risks and benefits of potential interventions, and their personal values and expectations. Physicians and physiotherapists will not always find a research-based answer to the clinical problem of their individual patients. In this situation –but as indicated above relevant in all clinical decision-making within the EBP paradigm- clinical expertise remains one of the cornerstones for answering clinical questions. A cookbook for rehabilitation medicine and physiotherapy does not exist and there will probably never be such a hypothetical book.

There are other arguments against EBP as cookbook practice. Although clearly and rapidly developing, research evidence even for commonly used interventions in physiotherapy and rehabilitation medicine is still often limited or even absent. Illustrating this observation on the state of the evidence, Taylor et al. (2007) updated a best-evidence synthesis of systematic reviews by Smidt et al. (2005) on the level of evidence for therapeutic exercise. They reported strong evidence that therapeutic exercise was effective for patients with osteoarthritis, chronic obstructive pulmonary disease, intermittent claudication but noted only moderate or limited evidence for therapeutic exercise in patients with cerebrovascular accident, cerebral palsy, Parkinson's disease, and neuromuscular disorders. In fact, there is remarkably little research evidence with regard to diagnosis and management of patients with chronic neurological disorders, e.g., neuromuscular diseases (Cup et al. 2007, Law 2002). So in the absence of relevant evidence, clinical expertise and the preferences, concerns, and expectations of patients are the cornerstones of physiotherapy diagnosis and management of patients with chronic neurological disorders. A similar lack of evidence needs to be acknowledged in the area of prognosis: Beattie and Nelson (2007) published a clinical update to provide a framework for identifying, appraising, and utilizing research findings intended to help evaluate prognosis. In the example above related to neurorehabilitation, but more generally in rehabilitation medicine and physiotherapy, it is obvious that a cookbook does not exist! As in many areas of both these fields, the patient needs an individualized rehabilitation and therapeutic exercise program based on clinical expertise of rehabilitation physicians and physiotherapists, patient preference, and the best available evidence (which at times is and may always remain limited at best).

Inconsistency and Contradiction of Evidence

One of the other criticisms often brought to bear against EBP is that relevant evidence is often inconsistent and at times even suggests almost diametrically opposed management choices. But we need to realize that in any type of research one can almost always find examples of inconsistencies and contradictions between studies. And these are not limited only to primary studies but also extend to the systematic reviews and clinical practice guidelines based on these studies. Developed in at least 12 countries (Koes et al. 2003) clinical practice guidelines to improve the management of acute low back pain (LBP) can serve as an example. In general

these guidelines provide similar information including the recommendation that acute LBP should be managed in primary care, that recovery tends to be rapid and complete, and that the few cases of non-mechanical LBP requiring referral, that a clinician can expect to see in the primary care setting, can be detected with a clinical assessment. However, one statistic on prognosis widely reported in these guidelines is that 90% of patients will recover within 6 weeks. Interestingly, the guidelines provide no specific reference as supporting evidence for this information. Contradicting this information, systematic reviews have suggested that the risk of LBP persisting longer than 3 months is uncertain and may range from 2-56% (Hestbaek et al. 2003a; 2003b). Dionne et al. (2008) implicated methodological shortcomings of prognostic studies and randomized trials, operational definition of LBP, and methods of patient recruitment for this inconsistency. Relevant to the management of patients with acute LBP is that the notion that this condition has a favourable prognosis may have to be reconsidered because of the inconsistency in the outcomes reported and the long-term follow-up data. Acute LBP may not be a benign, self-limiting condition. What is the accurate information to the individual patient with regard to the prognosis of acute LBP? We don't know. A thorough understanding of research methodology is required of the truly evidence-based clinician if he or she is to make sense of such inconsistencies and contradictions.

Randomized Clinical Trials: The Highest Level of Evidence?

Another criticism levelled against EBP is the overemphasis on the RCT as the highest level of evidence within the evidence hierarchy. To some extent this criticism is unfounded. Researchers are well aware that, for example, observational designs (cohort studies) are better suited to study reliability of a diagnosis, to understand prognosis, to derive and validate risk factors relevant to management, to monitor the safety of treatments, and to identify (mainly adverse) treatment effects that are not easily detected in trials. The importance of designs other than the RCT including cohort studies is reflected in the evidence hierarchy pivotal to EBP (Centre for Evidence-Based Medicine 2009).

However, the dominance of the randomized clinical trial as the gold standard –in analogy with pharmacological research- for providing data on the efficacy of therapeutic interventions in rehabilitation medicine and physiotherapy is meeting with increasing and justified resistance. On the one hand this is because interest of rehabilitation physicians and physiotherapists often focuses on estimating treatment effects in real-world settings, outside the tightly controlled confines of a randomized clinical trial. Observational studies arguably are more likely to provide an indication of what is achieved in clinical rehabilitation practice. Observational studies may also be particularly valuable for answering questions relevant to longer-term outcomes in neurological rehabilitation such as the long-term impact of the currently available disease-modifying drugs in preventing disability progression (Trojano 2007).

In the context of an overemphasis on the RCT in matters of establishing treatment efficacy we also need to consider whether the RCT is in fact the most appropriate research design even for studies on the efficacy of therapeutic interventions. Relevant to establishing clinically relevant treatment-based subgroups, Spratt (2002) described the Assessment-Diagnosis-Treatment-Outcome or ADTO-research model consisting of three distinct stages:

1. Assessment-Diagnosis: This first stage is the fundamental step of establishing intra- and interrater reliability of the identification of a proposed subgroup characterized by a cluster of clinical findings.

2. **Diagnosis-Treatment:** Once it is shown that a subgroup within a treatment-based classification system can be reliably identified, the next stage determines if this subgroup indeed responds consistently and favorably to one (or more) proposed matched interventions.
3. **Treatment-Outcome:** In this final stage, it is determined which of the interventions shown efficacious in the second step is in fact the most efficacious or whether the proposed matched treatment is more efficacious than the current standard of care.

Linked to these three phases are specific study designs. Whereas the AD-stage requires reliability research, the DT-stage would be best served with observational cohort studies using one but conceivably also two groups, and only the last step is where the RCT design has its place (Donelson 2007). The resultant homogenous populations in such trials will most likely show the results that clinicians have been observing in everyday clinical practice but which used to be “washed out” in the older trials used in earlier systematic reviews and meta-analyses with their massive heterogeneity with regard to study subjects (Huijbregts 2007).

Realizing that that within the evidence hierarchy there are multiple evidence pyramids depending on the question being answered, the challenge for EBP is to critically evaluate especially the evidence pyramid for treatment efficacy currently used in rehabilitation medicine and physiotherapy. This should result in innovative research that de-emphasizes the RCT design and uses observational cohort designs but also case reports and case studies to explore and answer questions where the current level of evidence does not yet allow for an RCT (Oostendorp 2007a; 2007b). Not starting at the top of the treatment efficacy evidence pyramid but rather using research designs based on the current level of evidence and realizing that different study designs are best suited for different types of clinical questions will effectively address the criticism that EBP overemphasizes the RCT design as the highest level of evidence.

Conceptual Framework for Rehabilitation and Physiotherapy Research: Disease versus Functioning

The conceptual framework under which research is done determines the questions asked and answered. For EBP to become more relevant to the clinical and research needs of rehabilitation medicine and physiotherapy, there is need of a conceptual framework other than the traditional medical pathoanatomical framework. After all, the health problems with which patients present in the daily clinical practice of physicians and physiotherapists are often complex, affected by co-morbidity, and cannot be adequately captured using only a medical diagnostic frame of reference, such as the *International Classification of Diseases* (ICD). However, research to date often has not acknowledged this diagnostic complexity and defines populations by applying exclusion criteria based on the ICD and demographic data. As a result, answers to clinical questions on the treatment providing the highest level of evidence often simply cannot be found within the results of currently available randomized trials.

In 2001 the World Health Organization (WHO) published the *International Classification of Functioning, Disability, and Health* (ICF). Its predecessor, the *International Classification of Impairments, Disabilities and Handicaps* (ICIDH), had already been in use in rehabilitation medicine and physiotherapy. The process of revision of the ICIDH and the subsequent development of the ICF are the reflection of a conceptual shift from a “consequence of disease” classification to a “components of health status” classification (Heerkens et al. 2006).

Rehabilitation medicine and physiotherapy are not focused on the disease itself but rather on functioning of patients. Functioning as a universal human experience can be classified from the perspective of the body (body functions and structures), but also from the perspective of the individual and the society (personal activities and participation). Up until now, no randomized trials have been done that used inclusion and exclusion criteria based on the ICF. To facilitate increased use of ICF-based functional criteria in clinical trials, international projects are in the process of developing core sets of impairments, limitations in activities, and restrictions in participation for various patient groups using Delphi analysis (Cieza et al. 2004, Stucki et al. 2004, Finger et al. 2006). The next step is to select tests and measures with adequate psychometric properties that reflect these ICF core sets (Swinkels and Oostendorp 2004). To increase clinical relevance of EBP to rehabilitation medicine and physiotherapy, it is very important to make a shift away in research from a medical conceptual model exemplified by the ICD to a functional conceptual framework as is provided by the ICF.

Evidence-Based Practice and the Patient

As part of the critical appraisal of the EBP paradigm we cannot ignore the impact this paradigm has on the patient as, of course, the most important stakeholder. Misperceptions with regard to the role of and impact on the patient within this paradigm center on the perceived irrelevance -or at least limited importance- of patient input and preferences but also on the seemingly decreased importance and opportunity for patient-clinician interaction.

The suggested de-emphasis under the EBP paradigm of patient preferences and expectations in the clinical decision-making process is not only in direct contrast to the above-mentioned definition of EBP as the integration of best available evidence with clinician expertise and patient values (Sackett et al. 2000) but is also made unlikely by the fact that increasing attention is given to making results from scientific research available to the general public. This likely will prove to be a major catalyst for the emancipation or empowerment of patients with regard to cooperative clinical decision-making. *Medline*, one of the most important reference databases used also by clinicians and researchers, is freely accessible to everyone. There are other initiatives that emphasize the importance of making full-texts of scientific articles freely accessible. The rationale is that patients themselves should be able to check the diagnostic and management approach proposed by physicians or therapists against published research evidence. In addition, physicians and physiotherapists are required by law and medical ethics to obtain informed consent from their patients before initiating treatment. The basic prerequisite for a valid informed consent is disclosure of appropriate information to a competent patient, who is permitted to make a voluntary choice (Appelbaum 2007). Fulfilling all aspects of this definition of informed consent obviously is wrought with practical and often insurmountable obstacles, but at the very least it should serve to stimulate clinicians to base their decisions to the greatest extent possible on scientific information and to communicate this information to their patients in a cooperative decision-making model.

Haslam (2007) argued that clinical practice is increasingly dehumanised, as it has become dominated by EBP, impersonal technologies, and economic imperatives. Contradicting this perception of EBP is an emerging body of research that indicates that empathy -defined as the capacity to take the patient perspective, to be sensitive to the patient's inner experience, and to engage with the patient in a compassionate manner- is associated with a variety of positive clinical outcomes (Elwyn et al. 2007, Haslam 2007). Patients consider empathy to be very important in consultations and show better treatment adherence and greater enablement with more empathic doctors and allied health providers. The EBP paradigm clearly indicates the

importance of the patient input in the clinical decision-making process but also emphasizes the importance of empathic patient-clinician interaction.

Implementation of Evidence-Based Practice

A critical appraisal of EBP is incomplete without actually discussing how to best implement EBP in clinical practice. Grol et al. (2005) described implementation as the planned process and systematic introduction in practice of innovations and/or changes of proven value, the aim being that these are given a structural place in professional practice, in the functioning of organizations, or in the health care structure. We need to acknowledge that even though the production of new knowledge on patient care is progressing at an ever-increasing pace, the percentage of valuable new insights subsequently introduced into routine patient care in the short term is considerably lower. Barriers identified with regard to the implementation of EBM include lack of time and practice logistics, lack of clinician research competency, no or limited access to high-quality information sources, different conceptual models of theory and clinical practice held by clinicians, inconsistencies and contradictions with the expertise of clinicians but also colleagues and patients, who insist on certain treatment approaches not supported by EBP (Grol et al. 2005). We will address the role of changes in entry-level educational curricula, the possible role of expert clinicians, and the need for expanding clinician skills in finding and critically evaluating relevant research evidence.

Implementation of EBP is a prolonged process that requires paradigm shifts implemented in entry-level and post-graduate educational curricula (Darrah et al. 2006). However, even with such changes implemented in entry-level education, no novice professional is fully prepared to meet all of the responsibilities required of an evidence-based clinician (Boonyasai et al. 2007). We need to realize that no matter how carefully the search for and analysis of scientific literature during the development of, for example, clinical guidelines is carried out the literature can provide evidence with regard to only a limited portion of current clinical actions and decisions (estimated to be less than 40-50%). There is a large grey area in rehabilitation medicine and physiotherapy, in which the experiences and preferences of those involved play a far more important role than any guidelines in determining what constitutes good clinical care again underscoring the importance of clinical experience and expertise (Rutten et al. 2006). Clinical experience provides professionals with a personal database of patient encounters. This allows the experienced professional to evaluate the efficacy of selected interventions based on this personal database but in these clinicians educated under the EBP paradigm this now occurs based not solely on a pathophysiologic rationale and authority-based knowledge but also on a solid understanding of the relevance of research evidence.

In the expert professional period, professionals also tend (and should be encouraged by the academic community) to participate in more formal clinical research. The knowledge gained through this participation in research allows these experienced professionals to make findings more globally available to other clinicians. When expert clinicians share in more public forums, they can impact evidence-based knowledge development by inviting less experienced colleagues to benefit from their insights. In rehabilitation medicine and physiotherapy there is a growing number of expert clinicians available to participate in workgroups to enhance the implementation of EBP in clinical practice.

The implementation of EBP in clinical practice also requires a number of new or increased competencies of physician and physiotherapist providers, including the ability to:

- Formulate keywords for a search strategy

- Search in relevant databases
- Critically assess results found
- Make a correct translation/transfer from scientific insights to the clinical practice

For a great number of currently active clinicians, these competencies were not addressed in their entry-level professional education. Although many clinicians have access to a computerized system with access to scientific information sources, finding relevant information is still no easy task. Searching for literature requires a lot of training. Although between-group differences are likely smaller for clinicians now, McGibbon et al. (1990) found information specialists, experienced, and less-experienced clinicians to be 72%, 48%, and only 29% effective, respectively, with locating literature by way of Medline searches. One might also introduce clinicians to the literature search and appraisal central to EBP by way of a number of “pre-treated” sources, such as “*Critically Appraised Topics*”, “*Selected Topics*”, and “*Article Alert*” now available as columns in various medical and physiotherapy journals in which experts summarize recent relevant literature. Systematic reviews and clinical guidelines are another way to introduce clinicians to the current best evidence within the EBP paradigm. Initiatives such as *bmjupdate*⁺, the *Cochrane Library*, and *PEDro* also allow busy clinicians relatively easy access to current best evidence.

A large number of different strategies and interventions are aimed at implementing changes in patient care consistent with the current best evidence approach of EBP. Some focus on individual professionals, others on patients, groups, or specific aspects of the organization of care. The growing body of systematic reviews about the effectiveness of different implementation methods can help select appropriate change strategies (Grol and Grimshaw 2003). As of yet, the evidence is unclear as to whether single or combined strategies should be used. The right choice for implementation interventions depends on the topic, setting, target group, and problems encountered indicating the need for a rigorous analysis of such variables prior to choosing any particular implementation strategy (Mayor 2007). Introducing the EBP paradigm in educational curricula, engaging expert clinicians in producing and disseminating relevant research findings, and addressing deficits in clinician literature search and critical inquiry skills, however, seem necessary basic prerequisites to successful implementation of the EBP paradigm in rehabilitation medicine and physiotherapy.

Evidence for the Increased Efficacy of Evidence-Based Practice?

Of course, the central question that remains to be answered is whether clinical outcomes are in fact improved as a result of implementation of EBP? At present, there is still insufficient evidence that clinical practice according to EBP is more effective in that patient outcomes are improved. The results of randomized clinical trials in which physicians or physiotherapists have treated patients according to the clinical guidelines as compared to a control group receiving the usual care are only now becoming available (Engers et al. 2005, Bekkering et al. 2005). In addition to outcome measures at the process level indicative of implementation of EBP-based care, evidence for management according to clinical guidelines will, of course, also have to be reflected in superior outcomes at the level of patient functioning. However, and despite the absence of evidence, we have to strongly assume that clinicians, who practice based on up-to-date research-based information with a continual critical evaluation of their clinical decisions will be better at making the correct clinical decisions, especially when compared to clinicians, who appeal to their clinical expertise not supported by scientific evidence.

Conclusion

The research competencies inherent in EBP are part of the clinician's arsenal on the pathway to an optimum provision of care but they are meant to complement rather than replace clinician expertise and patient preferences and expectations. The research base used in the EBP paradigm to support clinical decision-making is still far from complete and often provides inconsistent and contradictory information. This means that EBP will remain subject to criticism, more so because the implementation of the scientific insights according to EBM still encounters many barriers. In future debates with regard to EBP, attention must be given to how the professional acceptance of this paradigm can be increased and how the implementation of EBP can be promoted. However, to make optimum use of the available sources of scientific information in daily practice clinicians will also have to develop or enhance various competencies often currently not present at the level required of a truly evidence-based clinician. Demonstrating scientific evidence for EBP is a difficult task. Yet the EBP movement is of great importance for rehabilitation and physiotherapy to allow for increased insight for all involved including patients, clinicians, third-party payers, and government and health care organizations, into the clinical decision-making processes. The purpose of promoting this paradigm is optimum quality of care with conservation of professional autonomy.

References

- Altman DG. 2005. Endorsement of the CONSORT statement by high impact medical journals: Survey of instructions for authors. *BMJ* 330:1056-1057.
- Appelbaum PS. 2007. Assessment of patients' competence to consent to treatment. *New England Journal of Medicine* 357:1834-1840.
- Beattie PF, Nelson RM. 2007. Evaluating research studies that address prognosis for patients receiving physical therapy care: A clinical update. *Physical Therapy* 87:1527-1535.
- Bekkering GE, Van Tulder MW, Hendriks EJ, Koopmanschap MA, Knol DL, Bouter LM, Oostendorp RA. 2005. Implementation of clinical guidelines on physical therapy for patients with low back pain: Randomized trial comparing patient outcomes after a standard and active implementation strategy. *Physical Therapy* 85:544-55.
- Boonyasai RT, Windish DM, Chakraborti C, Feldman LS, Rubin HR, Bass E. 2007. Effectiveness of teaching quality improvement to clinicians: A systematic review. *JAMA* 298:1023-1037.
- Bossuyt PM, Reitsma JB, Bruns DE, et al. 2003a. Towards complete and accurate reporting of studies of diagnostic accuracy: The STARD initiative. *Clinical Chemistry* 49:1-6.
- Bossuyt PM, Reitsma JB, Bruns DE, et al. 2003b. The STARD statement for reporting studies of diagnostic accuracy: Explanation and elaboration. *Clinical Chemistry* 49:7-18.
- Centre for Evidence-Based Medicine. Levels of Evidence (March 2009). Available at: <http://www.cebm.net/index.aspx?o=1025>. Accessed November 3, 2009.
- Cieza A, et al. 2004. ICF core sets low back pain. *Journal of Rehabilitation Medicine* 44(Suppl):69-74.

- Cup EH, et al. 2007. Exercise therapy and other types of physical therapy for patients with neuromuscular diseases: A systematic review. *Archives of Physical Medicine and Rehabilitation* 88:1452-1464.
- Darrah J, Loomis J, Manns P, Norton B, May L. 2006. Role of conceptual models in a physical therapy curriculum: Application of an integrated model of theory, research, and clinical practice. *Physiotherapy Theory and Practice* 22:239-250.
- Dionne CE, et al. 2008. A consensus approach toward the standardization of back pain definitions for use in prevalence studies. *Spine* 33:95-103.
- Donelson R. 2007. *Rapidly Reversible Low Back Pain: An Evidence-Based Pathway to Widespread Recoveries and Savings*. Hanover (NH): Self Care First.
- Elwyn G, Buetow S, Hibbard J, Wensing M. 2007. Respecting the subjective: Quality measurement from the patient's perspective. *BMJ* 335:1021-1022.
- Engers AJ, Wensing M, Van Tulder MW, Timmermans A, Oostendorp RA, Koes BW, Grol R. 2005. Implementation of the Dutch low back pain guideline for general practitioners: A cluster randomized controlled trial. *Spine* 30:559-600
- Finger ME, Cieza A, Stoll J, Stucki G, Huber EO. 2006. Identification of intervention categories for physical therapy, based on the international classification of functioning, disability and health: A Delphi exercise. *Physical Therapy* 86:1203-1220.
- Grol R, Grimshaw J. 2003. From best evidence to best practice: Effective implementation in patient care. *Lancet* 362:1225-1230.
- Grol R, Wensing M, Eccles M. 2005. *Improving patient care: The implementation of change in clinical practice*. Edinburgh (UK): Elsevier.
- Haslam N. 2007. Humanising medical practice: The role of empathy. *Medical Journal of Australia* 187:381-382.
- Heerkens Y, Hendriks E, Oostendorp RAB. 2006. Assessment instruments and the ICF in rehabilitation and physiotherapy. *Medical Rehabilitation* 10(3):1-14.
- Hestbaek L, Leboeuf-Yde C, Manniche C. 2003a. Low back pain: What is the long-term course? A review of studies of general patient populations. *European Spine Journal* 12:149-165.
- Hestbaek L, Leboeuf-Yde C, Engberg M, Lauritzen T, Bruun NH, Manniche C. 2003b. The course of low back pain in a general population: Results from a 5-year prospective study. *Journal of Manipulative and Physiological Therapeutics* 26:213-219.
- Huijbregts PA. 2007. A new model for orthopaedic manual therapy research: Description and implications. *Journal of Manual and Manipulative Therapy* 15:197-199.

- Koes B, Van Tulder M, Ostelo R, Kim Burton A, Waddell G. 2001. Clinical guidelines for the management of low back pain in primary care: An international comparison. *Spine*. 26:2504-14.
- Law M. 2002. *Evidence-Based Rehabilitation: A Guide to Practice*. Thorofare (NJ): Slack Incorporated.
- Mayor S. 2007. Strategies to change behaviour should involve targeted groups. *BMJ* 335:961.
- McGibbon KA, Haynes RB, Dilks CJ. 1990. How good are clinical Medline searches: A comparative study of clinical end-user and librarian searchers. *Computers and Biomedical Research* 23:583-593.
- Oostendorp RAB. 2007a. *Over de Horizon van de Paramedische Zorg*. Nijmegen (The Netherlands): Radboud University Nijmegen.
- Oostendorp RAB. 2007b. Manual physical therapy in the Netherlands: Reflecting on the past and planning for the future in an international perspective. *Journal of Manual and Manipulative Therapy* 15:133-141.
- Rothwell PM, Bhatia M. 2007. Reporting of observational studies. *BMJ* 335:783-784.
- Rutten GM, Harting J, Rutten ST, Bekkering GE, Kremers SP. 2006. Measuring physiotherapists' guideline adherence by means of clinical vignettes: A validation study. *Journal of Evaluation in Clinical Practice* 12:491-500.
- Sackett DL, Straus SE, Richardson WS, Rosenberg W, Haynes RB. 2000. *Evidence-Based Medicine: How to Practice and Teach EBM*. Edinburgh (UK): Churchill Livingstone.
- Smidt N, et al. 2005. Effectiveness of exercise therapy: A best-evidence summary of systematic reviews. *Australian Journal of Physiotherapy* 51:71-85.
- Spratt K. 2002. Statistical relevance. In: Fardon DF, editor. *Orthopaedic Knowledge Update: Spine*. 2nd ed. Rosemont (IL): American Academy of Orthopaedic Surgeons.
- Stucki G, et al. 2004. ICF Core Sets for rheumatoid arthritis. *Journal of Rehabilitation Medicine* 44(Suppl): 87-93.
- Swinkels RAHM, Oostendorp RAB. 2004. Outcome assessment and measurement in spinal musculoskeletal disorders. In: Boyling JB, Jull GA, editors. *Grieve's Modern Manual Therapy*. 3rd ed. Edinburgh (UK): Churchill Livingstone.
- Taylor NF, Dodd KJ, Shields N, Bruder A. 2007. Therapeutic exercise in physiotherapy practice is beneficial: A summary of systematic reviews 2002-2005. *Australian Journal of Physiotherapy* 53:7-16.
- Trojano M. 2007. Is it time to use observational data to estimate treatment effectiveness in multiple sclerosis? *Neurology* 69:1478-1479.

Von Elm E, Altman DG, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. 2007. Strengthening the reporting of observational studies in epidemiology (STROBE) statement: Guidelines for reporting observational studies. BMJ 335:806-808.