



## The Internet Journal of Allied Health Sciences and Practice

<http://ijahsp.nova.edu>

A Peer Reviewed Publication of the College of Allied Health & Nursing at Nova Southeastern University

*Dedicated to allied health professional practice and education*

<http://ijahsp.nova.edu> Vol. 3 No. 4 ISSN 1540-580X

---

### A Review of the Literature on Evidence-Based Practice in Physical Therapy

---

Joe Schreiber, PT, MS, PCS<sup>1</sup>  
Perri Stern, Ed.D, OTR/L, FAOTA<sup>2</sup>

1. Assistant Professor, Department of Physical Therapy, Chatham College, Pittsburgh, PA.
2. Associate Professor, Department of Occupational Therapy, Duquesne University, Pittsburgh, PA.

---

#### Citation:

Schreiber, J., Stern, P. A review of the literature on evidence-based practice in physical therapy. *The Internet Journal of Allied Health Sciences and Practice*. October 2005. Volume 3 Number 4.

---

#### Abstract

The term "evidence-based practice" (EBP) has become ubiquitous in physical therapy practice. Since the mid 1990s, over 70 articles have been published in the physical therapy literature relating to EBP. Many physical therapists agree with the notion that scientific evidence should be utilized to guide practice decisions. However, for physical therapy clinicians, there are numerous barriers to EBP. Also, there appears to be a disconnect between academia and clinical practice in terms of the utilization of research evidence to inform clinical decision making. The purpose of this review of the literature is to begin to elucidate and address some of the many issues that the physical therapy profession faces with respect to evidence-based practice by providing a comprehensive synthesis and analysis of the EBP literature in Physical Therapy (PT).

---

#### Introduction

The term "evidence-based practice" (EBP) has become ubiquitous in the physical therapy (PT) literature. Since the mid 1990s, when the term first began to appear, more than 70 articles pertaining directly to the construct of EBP have appeared in our professional journals. Countless others are evident in our practice magazines, newsletters and other publications. In 1995, at the 13<sup>th</sup> general meeting of the World Confederation for Physical Therapy, several "Declarations of Principle" were adopted relative to EBP since "...in the interests of best practice, physical therapists have a duty and responsibility to use techniques and technologies that have been evaluated scientifically."<sup>1</sup>

A number of authors have argued that the profession continues to be in its "infancy" relative to EBP, and that the profession needs to move more quickly toward practice that is more formally based on scientific evidence.<sup>2-7</sup> Others have expressed concerns about some aspects EBP as they related to clinical research and practice. For example, in an editorial titled, "The End of Evidence-based practice?" Baxter has argued that "... it would appear that an increasing number of clinicians and researchers have become tired of hearing the message that their work to date has been of variable or poor quality, and that further (better designed) research is urgently needed."<sup>8</sup> Others have argued against the emphasis on the relative strength of randomized controlled trials (RCTs) in physical therapy clinical research.<sup>9-11</sup> Therefore despite the high visibility of this issue within the profession, all physical therapists, including clinicians and researchers, are still faced with many questions and uncertainties about the relevance of EBP to clinical practice. The purpose of this paper is to review and synthesize the physical therapy literature in an effort to elucidate issues pertaining to EBP in PT as they have evolved over the past 15 years. In addition, the paper will attempt to identify challenges and barriers that exist relative to EBP in PT practice and begin to articulate some possible solutions to these challenges.

#### Methods

The first author conducted a literature search through CINAHL, OVID, and MEDLINE for the years 1990 to 2005. This time frame was chosen in an effort to focus the scope of the search to all relevant information on EBP, since this term first began to appear

in the medical literature in the early 1990s. Key words used to search each database included *evidence-based practice AND physiotherapy*, *evidence-based practice AND physical therapy*, *evidence based medicine AND physiotherapy*, *evidence based medicine AND physical therapy*, *EBP AND physiotherapy*, and *EBP AND physical therapy*. A manual search of the reference lists from each article was also conducted, and additional articles were gathered, including any appropriate articles from prior to 1990. Approximately 100 articles were initially identified. Articles were included for review if they were in peer reviewed journals and specifically related to the construct of EBP within the practice of physical therapy. Articles devoted to a summary of the evidence for a specific treatment technique, approach, or body segment were discarded.

The articles included for review were summarized and categorized into major topic areas based on the authors' interpretation of the primary focus of the content of the article. The topic areas emerged as a consequence of the ongoing analysis of the gathered information. They included the following: history or overview of the evolution of EBP within the PT profession (n = 9), barriers and challenges to the implementation of EBP for physical therapist clinicians (n = 13), strategies or solutions that have been proposed and implemented to encourage clinicians to utilize an EBP approach to patient management (n = 24), and mixed or combination focus (n=19). Articles were further classified as editorials and commentaries (n = 21; designated with the letter "E",) literature reviews (n = 30; designated with the letter "L",) and research (n = 14; designated with the letter "R",) Table 1 summarizes this organizational structure by primary author of each article.

**Table 1: Articles by category and Type**

Citations	Category	Type
Michels, 1969	History/Evolution	Editorial
Basmajian, 1975	History/Evolution	Editorial
Bohannon, 1986	Mixed	Literature Review
Rothstein, 1990	History/Evolution	Editorial
Bohannon, 1990	Challenges/Barriers	Research
Newham, 1994	Strategies	Editorial
Carr, 1994	Challenges/Barriers	Research
Sackett, 1996	History/Evolution	Literature Review
Practice Profile Report, 1996	History/Evolution	Literature Review
Harris, 1996	Strategies	Editorial
Harrison, 1996	Mixed/Combination	Editorial
Bury, 1996	Mixed/Combination	Editorial
Mead, 1996	Mixed/Combination	Editorial
Sumison, 1997	Mixed/Combination	Editorial
Turner, 1997	Challenges/Barriers	Research
Closs, 1998	Challenges/Barriers	Research
Godges, 1998	Strategies	Literature Review
Richardson, 1998	Strategies	Literature Review
Robertson, 1998	Strategies	Research
DiFabio, 1999	Challenges/Barriers	Editorial
Turner, 1999	Challenges/Barriers	Research
Rothstein, 1999	Strategies	Editorial
APTA goals, 1999	Strategies	Literature Review
Vanderkooy, 1999	Strategies	Research
EBMWG, 1999	Mixed Combination	Literature Review
Ritchie, 1999	Mixed Combination	Literature Review
MacIntyre, 1999	History/Evolution	Literature Review
Wakefield, 2000	Strategies	Literature Review
Guyatt, 2000	Strategies	Literature Review
Bithell, 2000	Mixed/Combination	Editorial
Sackett, 2000	Mixed/Combination	Literature Review
Turner, 2001	History/Evolution	Literature Review
Sherrington 2001	History/Evolution	Editorial
Connolly, 2001	Challenges/Barriers	Research
Metcalfe, 2001	Challenges/Barriers	Research
Wade, 2001	Challenges/Barriers	Literature Review
Fritz, 2001	Challenges/Barriers	Editorial
Rothstein, 2001	Challenges/Barriers	Editorial

O'Brien, 2001	Strategies	Literature Review
Ottenbacher, 2001	Strategies	Literature Review
Ritchie, 2001	Strategies	Literature Review
Walker, 2001	Strategies	Literature Review
Cibulka, 2001	Strategies	Literature Review
Walker-Dilks, 2001	Strategies	Literature Review
Maher, 2001	Strategies	Literature Review
Scalzitti, 2001	Strategies	Literature Review
Herbert, 2001	Mixed/Combination	Literature Review
Barnard, 2001	Mixed/Combination	Research
Parker-Taillon, 2002	History/Evolution	Editorial
Cormack, 2002	Strategies	Literature Review
Haynes, 2002	Mixed/Combination	Literature Review
Scherer, 2002	Mixed/Combination	Editorial
Kamwendo, 2002	Mixed/Combination	Research
Pomeroy, 2003	Challenges/Barriers	Research
Miller, 2003	Challenges/Barriers	Research
Rich, 2003	Strategies	Literature Review
Pomeroy, 2003	Strategies	Literature Review
Gibson, 2003	Strategies	Literature Review
Morris, 2003	Strategies	Editorial
Baxter, 2003	Mixed/Combination	Editorial
Jette, 2003	Mixed/Combination	Research
Jette, 2003	Mixed/Combination	Editorial
Rothstein, 2004	Strategies	Editorial
Maher, 2004	Mixed/Combination	Literature Review

### Definition

Evidence-based practice is an outgrowth of evidence-based medicine. Evidence-based medicine was initially defined as the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients.<sup>12</sup> It represented a radical shift from a paradigm of knowledge that was based on autonomy and clinical experience.<sup>9</sup> Evidence Based Medicine initially emphasized the importance of evaluating a large body of medical literature and disseminating the most valid and important findings to the medical community.<sup>13</sup> Evidence-based practice broadened this conceptualization and is now defined to also include the integration of individual clinical expertise, individual patient preferences, and the best available external clinical evidence from systematic research in order to best guide clinical decision making.<sup>14</sup> The term "practice" is also an effort to expand the definition to other aspects of health care beyond medicine.

### History and Evolution of Evidence-Based Practice in Physical Therapy

Physical therapy practice has been subject to decades of criticism for its lack of a research base.<sup>15</sup> This was identified as early as 1969 to be a significant issue for the PT profession.<sup>16</sup> Eugene Michels, in a presidential address to the membership of the American Physical Therapy Association, called on his fellow members to move away from practice based solely on the suggestions of colleagues or personal experience and toward practice based on scientific evidence.<sup>16</sup> However, prior to the mid 1970s, there was little need for evidence to support clinical decision-making as the practice of PT was largely directed by physicians.<sup>11</sup> During the late 1970s and 1980s, physical therapists began to assume more responsibility for clinical decision making and gradually became less reliant on direction from physicians.<sup>11</sup> Still, clinical decision making tended to be based primarily on intuition, trial and error, and a blind clinging to what was traditionally fashionable.<sup>11</sup>

Despite numerous calls for a shift toward the use of research and scientific evidence to guide practice, most physical therapists continued to base practice decisions largely on anecdotal evidence, and utilized treatment techniques with little scientific support.<sup>16-21</sup> Studies published in 1997 and 1999 indicated that physical therapists tended to rely more heavily on initial education and training when selecting treatment techniques. In fact, less than five percent of survey respondents indicated that they regularly used scientific evidence to guide practice.<sup>17,22</sup> Personal experience and "expert" opinion guided clinical decision making throughout the 1990s.<sup>17,22-24</sup>

Within the PT profession, the call for a commitment to EBP has gradually become more strident and has corresponded with similar ongoing efforts in other health care professions.<sup>2,5,11,25,26</sup> Many PT professional organizations have identified EBP as a

priority.<sup>1,26-30</sup> Numerous authors have stated that physical therapists have a moral, professional, and ethical obligation as professionals to provide evidence based service and to move away from interventions based solely on anecdotal testimonies, expert opinion, or physiologic rationale.<sup>1,2,4,9,17,25,31-33</sup> The ultimate goal of this increased emphasis on using evidence to guide practice is to build a body of knowledge that supports the effectiveness of that practice.<sup>5,28</sup> As Harris noted, "It is high time for physical therapists to ensure that the treatments they are endorsing and providing for their clients are based on the strictest rules of experimental design and scientific evidence."<sup>4</sup>

The evolution of EBP in PT corresponds with a shift away from traditional models of practice in which uncertainty was seen as a failing. In these traditional models, individual expertise was afforded a high priority and expert clinicians were thought to be those who always "knew what to do," not those who questioned what they do.<sup>5</sup> The early formulations of EBP discouraged clinical decisions based on individual clinical expertise and physiologic rationale. Subsequent iterations have emphasized that research evidence alone is not an adequate guide to action.<sup>34</sup> As noted by Sackett et al, clinical expertise must be informed but cannot be replaced by evidence alone.<sup>12</sup> Evidence-based practice is not recipe-based. It requires physical therapists to integrate individual clinical experience with an understanding of the rules of evidence and the relevance of these rules to practice.<sup>35</sup> Practitioners must also consider the individual values and needs of the patient and the unique circumstances of the clinical environment. Scientific evidence should be used to inform this process, not replace it.<sup>2,5,12,25,31,33</sup> Evidence-based practice is now considered to be a process that leads to a specific decision for an individual patient and is predicated on a number of clinical judgments that are directly related to the expertise of the clinician.<sup>2,5,25,36,37</sup> Physical therapists should strive to use research evidence in a systematic way, in conjunction with clinical judgment, to make clinical decisions.

### **Challenges and Barriers to Implementing EBP**

Although the importance of research-based practice was identified decades ago and has gradually been adopted by the physical therapy profession, there are a number of challenges for physical therapists who are attempting to use research to aid in clinical decision-making.<sup>16, 18-21</sup> Most challenges can be grouped under one of three areas: research methods, clinicians' skill, and administrative factors.

The goal of EBP is to use the knowledge created by scientific research in practice.<sup>1</sup> This cannot happen without clinicians, as they are the interface. The promotion and development of a clinical "culture" that understands research, values the evidence generated by that research, and demands to be informed is essential. However, clinicians are often unclear as to the definition of EBP and they may not understand the types of research that constitute high quality evidence.<sup>31</sup> Therapists often have difficulty applying research findings to individual patients and are unclear as to whether high quality evidence exists to support or refute therapeutic interventions.<sup>35</sup> Much of what physical therapists do awaits definitive research to establish its efficacy.<sup>33</sup> In many instances there is little evidence to support or refute current practices.<sup>33</sup> Clinicians' negative attitudes about research further compound the difficulties.<sup>32</sup> In summary, the transition to EBP will not readily occur if clinicians do not know about the evidence, do not understand it, do not believe in it, or do not know how to apply the findings.<sup>33</sup>

### **Challenge #1: Research Methods**

According to Sackett et al, the quality or strength of research evidence is classified according to a five-level hierarchy that sorts evidence according to rigor and potential for confounding variables to influence the research outcomes.<sup>38</sup> For example, scientific evidence generated by systematic reviews of RCTs is at the top of this hierarchy while case reports and expert opinion are at the bottom.<sup>38</sup> Physical therapists are encouraged to consider a study's "level of evidence" in the process of making evidence based clinical decisions. EBP implies that clinicians use the best available research, based on this hierarchy, to guide clinical decision making.<sup>36</sup> Clinicians have a moral responsibility to know about the strength of available evidence relating to assessments and interventions, and to consider this when making decisions about patient management.<sup>6</sup>

One challenge for clinicians attempting to utilize this hierarchy has been the application of results from RCTs to physical therapy practice. Some authors have suggested that physical therapists only read and utilize RCTs when seeking out evidence for practice and to disregard lower levels of evidence.<sup>39</sup> However, there are inherent difficulties in applying evidence generated by RCTs to a clinical population.<sup>9</sup> For example, the array of unique clinical circumstances a therapist treating a child with cerebral palsy must take into consideration is daunting. These include, but are not limited to, the child's age, type of cerebral palsy, motor ability, cognitive ability, behavior and motivation, family involvement and support, home environment, and educational placement. The results from highly controlled RCTs often are not directly applicable to an individual patient. Thus the practitioner is required to make an interpretative "leap" in determining whether the results from any research, including RCTs, yields the best evidence to support a clinical decision.<sup>8,40</sup> As noted by Bithell, "...There is no intrinsic reason why a clinical experiment developed to prove pharmacological efficacy should be the best way to demonstrate effectiveness of therapies which depend so much on human interaction."<sup>9</sup> The concept of a hierarchy of evidence, as derived from medicine and pharmacologic investigations may not always

be applicable to the array of factors that influence physical therapy outcomes because of the variability inherent in these types of patients, in patient-therapist interactions, and even in statistically significant results.<sup>9,40</sup>

Several other limitations related to the perceived “gold standard” of RCTs have been identified.<sup>9,10,25,40-42</sup> In physical therapy, RCTs are typically efficacy studies involving distinctly selected patient subgroups in university medical facilities. This information is not always relevant to real-world clinical practice.<sup>10,25</sup> In addition, the research procedures of randomly assigning patients to an experimental or control group, using standardized outcome measures that may not have real-world relevance, and the difficulty of blinding investigators and clients to the research procedures all make RCTs difficult for physical therapists to implement, interpret, and utilize.<sup>10,41</sup>

Along with the methodological limitations, there is often a difference between an optimal and objective *research* outcome, and an optimal individual *clinical* outcome. Physical therapy intervention is typically complex, long term, and specifically related to the patient. Translating research results, even those results from high quality RCTs, into specific clinical decisions for an individual patient or client is challenging.<sup>1,40,41</sup> Teasing out one aspect of a clinical intervention for study in isolation may lead to what has been termed a Type III error, whereby the interactive effects of an intervention are not considered.<sup>43</sup> The scientific method focuses on one variable at a time across a given number of identical research subjects to determine a single generalizable outcome. Clinical practice deals with countless variables at a time with one person in order to generate a range of outcomes intended to satisfy that person's goals, needs and desires.<sup>11</sup> Oftentimes, efficacious research regimens that work under ideal research conditions are not implemented if they do not address relevant clinical issues and cannot be applied to individual patients.<sup>1,44,45</sup> A recent review of research and review articles in four national physical therapy journals during a 12-month time period produced a relatively small yield of articles containing scientific evidence that was both clinically useful and of high quality.<sup>46</sup> An important and ongoing challenge for researchers is to generate clinically relevant findings that subsequently influence practice.<sup>1,47</sup>

### **Challenge #2: Clinicians' Skills**

EBP requires clinicians to read current research literature, understand research methodology, and incorporate best evidence into practice as appropriate. However, many clinicians have difficulty accessing and interpreting the evidence that does exist. Even if research evidence is available, it may be difficult to use in client-centered practice.<sup>48</sup> The research literature may be difficult to access and relevant information is often not compiled in one place. The evidence that does exist may be conflicting or have methodological flaws.<sup>40,49</sup> Interpreting and implementing research evidence also requires clinical skill, judgment, and experience. Deciding what constitutes evidence that justifies a change in practice is not simple, and the opportunity for bias exists at every stage of the process.<sup>40,45,50</sup> For example, some have suggested that the nature of scientific inference leads to an inevitable subjectivity in interpreting and implementing evidence.<sup>40,51</sup> Others have suggested that changing clinical practice to implement therapies that have not been sufficiently tested across a wide variety of settings in multi-center RCTs constitutes “evidence-tinged” practice and is inappropriate.<sup>45</sup> Interestingly, no definitive evidence has accumulated over some 15 years of research and debate on EBP to show that ‘practice by EBP’ is superior to ‘practice as usual,’ or that patients who receive interventions from evidence based practitioners achieve superior outcomes when compared to those who do not.<sup>52</sup>

An often overlooked element of clinicians' skills in EBP is that clinicians must critically evaluate their own individual practice.<sup>48</sup> Physical therapists should regularly question habituated and traditional practice and seek evidence to support clinical decision making.<sup>53</sup> Subsequently, practitioners must also critically reflect on the application of evidence-based interventions with each individual patient, and alter practice accordingly. Failure to consider all aspects of EBP, including critical self-evaluation, during clinical decision making may lead to a decrease in effectiveness.<sup>53,54</sup>

### **Challenge #3: Logistical Considerations**

A number of other factors present challenges to clinicians who are attempting to use evidence to guide clinical decision making. Time constraints are almost universally identified as a primary limiting factor.<sup>5,26,31,35,36,55,56</sup> Clinicians refer to pressures of today's health care environment and administrators' emphasis on productivity as factors that directly inhibit their ability to seek out, gather, read, and integrate scientific information relevant to daily practice.<sup>31,35,49,55-57</sup> Practitioners in settings not affiliated with teaching or research institutions often face challenges in accessing relevant scientific evidence into practice.<sup>31</sup> Clinicians may lack essential skills relative to using technology to complete literature and database searches.<sup>26,35,56</sup> Finally, many practitioners lack the skills that are necessary to understand statistical analyses and research processes.<sup>26,30,31,34,35,46,49,56-58</sup>

Clinicians also face difficulties in implementing changes in practice.<sup>35,49</sup> This may be due to resistance from other health care providers, including physicians and peers.<sup>30,31,49,57,59</sup> Institutions may be reluctant to support changes, especially when financial

considerations are involved.<sup>30,31,35,59</sup> EBP is not necessarily less expensive, and therefore changes in practice as a result of EBP may be met with some resistance.<sup>14</sup>

### **Strategies for Effective Evidence-Based Practice**

Despite the many challenges, physical therapists have indicated that they value the integration of scientific research into clinical practice.<sup>17,26,31,35,49,56</sup> In a recent survey, 85% of physical therapy respondents indicated a strong willingness to improve skills relative to EBP.<sup>35</sup> However, the *evidence* suggests that despite this willingness, most physical therapists continue to base practice decisions on the information learned during entry-level education and personal experience rather than on information gathered from research literature.<sup>15,17,22,55,58</sup> In fact, use of journal articles and research literature to guide practice was virtually absent in a survey of physiotherapists from England and Australia.<sup>17</sup> And, in a recent survey, only 58% of physical therapist respondents reported that they currently possessed sufficient knowledge and skills to read and evaluate research reports published in scholarly journals.<sup>60</sup> Students just entering clinical practice did not sustain beliefs about appropriate sources of authority for treatment decisions that were established during entry-level education.<sup>30</sup> This may indicate that these early beliefs were not supported by fellow practitioners and administrators in the clinic.<sup>30</sup> These results lead to the inevitable suspicion that for many practitioners, the use of scientific evidence to guide practice may not be modified following entry-level education.<sup>17</sup>

Despite these factors, a number of strategies have been suggested as a means of bridging the gap between research evidence and clinical practice.

#### **Strategy #1: Develop, Implement, and Evaluate Dissemination Techniques Specific to EBP**

There is surprisingly little information on determining the best way to get the results of sound physical therapy research into clinical practice.<sup>54</sup> Several strategies have been designed to aid clinicians in identifying specific clinical problems, fostering collaboration among clinicians, reinforcing desirable clinical-research practices, and addressing institutional barriers to change. Many of these programs are aimed at integrating external clinical evidence from systematic research into practice within a particular clinic, and have been described in detail.<sup>7,36,58,61-63</sup> A critical aspect is to create a change in management culture and a change in administrators' and supervisors' attitudes.<sup>17,32,49,54,56,58,62</sup> Implementation strategies that focus on a specific problem, involve collaboration among clinicians, reinforce desirable practices, and address barriers to change, such as organizational factors in the practice setting, are more likely to lead to permanent behavioral change.<sup>54,58</sup>

There is little evidence to support the use of passive dissemination techniques such as didactic lectures, workshops and handouts in order to effect a positive change in EBP related activities.<sup>37,49,58,62,64</sup> However, a variety of strategies that are specific to EBP and focus on a comprehensive implementation plan have been shown to be successful in creating behavioral change relative to EBP.<sup>32,54</sup> These programs have generally included some explicit guidance regarding the process of EBP.<sup>7,35,36,47,58,62,63,65</sup> Some have also recommended specific strategies to effectively implement each component of EBP within a particular clinic.<sup>36,58,62</sup> Many programs emphasize the importance of minimizing barriers to implementation and promoting factors that enhance implementation, including such aspects as an emphasis on ethics, incentives, motivation, social norms, patient problems and decision support systems.<sup>58,62</sup> An important aspect of many of the programs has been to identify EBP as an intellectual challenge and a critical element of individual professional development, not as a management imperative. Some programs focus on the creation of a culture change from the staff level up, engaging managers and administrators in the process as well.<sup>56,58</sup> Finally, several other strategies have focused on multi-faceted and interactive educational programming, utilization of small groups of staff to find and report research findings, allocation of specific time for reading and discussing articles, use of hospital clinic audit teams, journal clubs, and providing clinicians with opportunities for experiential learning through collaborative participation in clinical research.<sup>1,7,17,46,49,54,56-58</sup>

#### **Strategy #2: Re-Think Traditional Continuing Education Courses**

One strategy that continues to be employed by physical therapists to gain additional skills and to guide practice decisions is attendance at continuing education conferences.<sup>4,54</sup> Recently practitioners have been urged to request evidence from conference speakers in order to critically evaluate any claims of effectiveness.<sup>4,6,32,66</sup> Others have suggested that time spent at continuing education conferences may be better spent by individuals or in small groups answering their own clinical questions via EBP.<sup>5,32</sup> Many clinics have limited continuing education funds, making travel to conferences difficult for practitioners. Perhaps the time spent traveling to and attending continuing education conferences may be better spent on structured and focused EBP activities within a particular clinic.

#### **Strategy #3: Development, Implementation, and Evaluation of "User-Friendly" Knowledge Transfer Activities**

Simply publishing results is not enough to change practice.<sup>2</sup> Physical therapists are generally eager to use proven and effective treatments and agree that the use of evidence in practice is necessary.<sup>35,44</sup> However, barriers do exist and should be taken into

consideration when the results of a research study are reported.<sup>54</sup> Clinicians may benefit from “hands-on” guidance from academicians and researchers regarding best clinical evidence and its implementation. Multi-faceted interventions such as outreach visits, ongoing interactive educational opportunities for clinicians, and journal clubs involving academics, clinicians and researchers, should be employed.<sup>17,32,49,54,56,58,62</sup> Active and ongoing interaction and collaboration is especially important given the prominent role that clinicians play in entry-level education.

Physical therapists have been urged to follow specific guidelines when seeking and utilizing scientific evidence to support a specific intervention.<sup>4,42</sup> These guidelines serve to aid clinicians to systematically evaluate the available evidence and determine its usefulness to clinical practice. However, because of the challenge of reading and interpreting a large number and wide variety of primary research articles, some have suggested that it may be more appropriate for clinicians to utilize secondary sources such as clinical guidelines, systematic reviews, journals that publish summaries of information from primary sources, and databases.<sup>50</sup>

It may be unrealistic to expect clinicians to implement research findings directly into clinical practice without some adaptation and guidance.<sup>44,47,54</sup> Some have suggested a re-thinking of the way research results are presented in professional journals.<sup>67</sup> One approach has been through the use of “critically appraised topics” or CATS.<sup>47</sup> A CAT is a summary of the best available evidence to answer a clinical question and includes a clinical “bottom line” to guide practitioners in interpreting the evidence.<sup>47</sup> They are concise, devoted to specific case scenarios, and recommended to be updated every two years.<sup>47</sup> CATS and other means of disseminating the evidence should be explored and evaluated for their effectiveness. A similar approach has been undertaken by the American Physical Therapy Association. Hooked on Evidence is a “grassroots” effort to develop a database containing current research evidence on the effectiveness of physical therapy interventions. The Hooked on Evidence project was motivated by a concern that clinicians lacked access to the knowledge available from current research, thus hindering evidence-based practice. Hooked on Evidence was developed to provide members of the APTA with rapid and easy access to a wide variety of research articles from the peer-reviewed literature. Members of the APTA are able to access and contribute to this database, which consists of a summary of the key points in each article.<sup>68</sup>

#### **Strategy #4: Highly Visible Role for Professional Associations**

Professional associations need to play a prominent role in fostering EBP and helping change negative attitudes that exist among physical therapists.<sup>31,32,44</sup> Professional associations should work to establish a framework for implementing EBP, and work to create increased consistency of the process.<sup>7,26,36,50,62,63</sup> Providing information about appropriate resources for scientific evidence and access to computerized databases for members are ways for professional organizations to foster and support EBP.<sup>26,69</sup>

Professional associations should promote the development and implementation of clinical practice guidelines. Guidelines may also be developed to aid practitioners in evaluating “non-standard” therapies that may lack the support of scientific evidence.<sup>3,4,15,70,71</sup> Support for the development of secondary sources of information (clinical practice guidelines, systematic reviews, CATS, etc) to aid practitioners who may lack the skills necessary to interpret and implement primary research is also critical.<sup>33</sup> Professional organizations are perhaps best positioned to facilitate the gradual development of an EBP culture throughout the profession.<sup>50</sup>

#### **Strategy #5: Broaden the meaning of “evidence”**

Given the ambivalence about the relationship of RCTs to physical therapy practice and the inherent bias in inferential statistics, perhaps a re-thinking of what constitutes “evidence” is in order.<sup>8,10,25,40,41,72</sup> As Di Fabio noted, “I think we need to abandon the quest for absolute truth and look, instead, at clinical research as a way to develop a reasoned philosophy about patient care.”<sup>40</sup> A high quality RCT may provide strong scientific evidence, but its relevance to clinical practice may not be clear.<sup>9,10,25</sup> Some have argued for an emphasis on “pragmatic” or needs-led RCTs in contrast to “explanatory” RCTs which are more appropriate for traditional laboratory studies and focus on the underlying physiology for a particular intervention.<sup>2,25</sup> Pragmatic RCTs evaluate a treatment itself, rather than the underlying physiology.<sup>25</sup> In addition, a less direct but perhaps more useable approach may be to integrate the findings from a variety of studies and a variety of methodologies into a theoretical framework for practice. In this way, the theory guides practice, and results of one specific study or group of studies supports and aids in the development and revision of the theoretical framework.<sup>10</sup>

Some have argued that there is little point in practitioners even reading research studies that do not meet basic criteria such as true randomization, blinding where possible, and acceptable follow-up.<sup>5,39</sup> This implies that clinicians should not read case reports, single case research designs, or qualitative research studies. This is especially problematic since there may be a relatively small number of articles in physical therapy or related journals that are clinically relevant and provide strong research evidence.<sup>46</sup> In contrast, others have argued that the standards for evidence may be set too high, and that the RCT gold standard

established in medicine is not always directly relevant to the complex interactions and clinical decision making inherent in clinical practice for physical therapists.<sup>9,10,46</sup> In addition to utilizing RCTs and systematic reviews, qualitative methodologies, single subject research designs, and case series research should continue and must be valued by our profession.<sup>5,8-10,41,72</sup> While these methodologies may not appear to ascend to the level of "high-quality" scientific evidence as currently defined, the information and knowledge generated by these types methodologies is valuable to practicing clinicians and should contribute to the evolution of the practitioners' theoretical framework as noted above.<sup>8,41,72</sup>

### **Strategy #6: Start Early**

There is evidence that recent graduates and therapists with additional educational background tend to have a more positive attitude and increased skills in accessing and utilizing scientific research to guide practice than their more experienced co-workers.<sup>30,31,35,56</sup> It is critical that educational programs, including both entry-level and post professional, continue to foster the development of EBP skills.<sup>35,69</sup> Educational activities and curricula used for entry-level students, as well as continuing education programming for practicing clinicians are good starting points.<sup>36</sup> The transitional doctorate in physical therapy programs (t-DPT) may be an ideal opportunity for academicians to aid practitioners who are returning for their t-DPT in gaining appropriate skills and knowledge relative to EBP.

### **Strategy #7: Increase Clinicians' Involvement in Research**

All physical therapists should take part in the cycle of research, publication, dissemination, and implementation.<sup>1,32,57</sup> It is of critical importance that there is increased collaboration in research in order to move the profession forward.<sup>25,32,73</sup> Joint initiatives between academia, where students are learning research skills and developing research competencies, and the clinicians, who provide a working laboratory for inquiry, must be encouraged.<sup>15,30</sup> These initiatives should also include interactive educational programs, research project development and implementation, and support in the form of access to databases and other library resources that lend themselves to EBP activities.<sup>48</sup>

### **Conclusion**

The notion that scientific evidence should guide physical therapy practice has been present for quite some time. However, as indicated by this review, the reality of EBP lags behind the ideal. Practitioners face numerous challenges relative to EBP and most often continue to base clinical decisions on information from sources other than scientific research. Several strategies are being used to foster EBP among clinicians, although little research has been done to date that suggests any of these strategies are effective. Clinicians must commit to the notion that research evidence plays a critical role in every-day decision making, and researchers must commit to participating in the translation of their findings into daily practice. EBP is a long-term endeavor. There is a profound need to develop and enhance *all* physical therapists' understanding and use of scientific evidence and to ensure that this evidence influences clinical practice in a way that optimizes the outcomes for the patients we serve.

### **References**

1. Harrison M. Evidence based practice: Practice based evidence. *Physiotherapy Theory and Practice*. 1996;12:129-130.
2. Bury T. Evidence-based practice: Survival of the fittest. *Physiotherapy*. 1996;82:75-76.
3. Godges J, Deyle G. Lower quadrant: Evidence based description of clinical practice. *Orthopedic Physical Therapy Clinics of North America*. 1998;7(3).
4. Harris S. How should treatments be critiqued for scientific merit? *Physical Therapy*. 1996;76(2):175-181.
5. Herbert R, Sherrington C, Maher C, Moseley A. Evidence-based practice: Imperfect but necessary. *Physiotherapy Theory and Practice*. 2001;17:201-211.
6. Rothstein J. Editorial. *Physical Therapy*. 1999;79(11):1024-1025.
7. Cormack J. Evidence-based practice: What is it and how do i do it? *Journal of Orthopedic and Sports Physical Therapy*. 2002;32(10):484-487.
8. Baxter D. The end of evidence-based practice? *Physical Therapy Review*. 2003;8:3-4
9. Bithell C. Evidence-based physiotherapy: Some thoughts on "best evidence". *Physiotherapy*. 2000;86:58-60.
10. Ottenbacher K, Hinderer S. Evidence-based practice: Methods to evaluate individual patient improvement. *American Journal of Physical Medicine & Rehabilitation*. 2001;80(10):786-796.
11. Ritchie J. Using qualitative research to enhance the evidence-based practice of health care providers. *Australian Journal of Physiotherapy*. 1999;45:251-256.
12. Sackett D, Straus S, Richardson W, Rosenberg W, Haynes R. Introduction. *Evidence-Based Medicine: How to Teach and Practice EBM*; 2000:1.
13. EBMW G. Evidence based medicine: A new approach to the teaching of the practice of medicine. *Journal of the American Medical Association*. 1992;268:2420-2425.



14. Sackett D, Rosenberg W, Gray J, Haynes R, Richardson W. Evidence based medicine: What it is and what it isn't. *British Medical Journal*. 1996;312:71-72.
15. Turner P. Evidence based practice and physiotherapy in the 1990's. *Physiotherapy Theory and Practice*. 2001;17:107-121.
16. Michels E. The 1969 presidential address. *Physical Therapy*. 1969;49:1191-1200.
17. Turner P, Whitfield T. Physiotherapists' reasons for selection of treatment techniques: A cross-national survey. *Physiotherapy Theory and Practice*. 1999;15:235-246.
18. Basmajian J. Research or retrench: The rehabilitation professions challenged. *Physical Therapy*. 1975;1975:607-610.
19. Bohannon R, Leveau B. Clinicians' use of research findings. *Physical Therapy*. 1986;66:45-50.
20. Newham D. Practical Research. *Physiotherapy*. 1994;80:337-339.
21. Rothstein J. Caveat Emptor (Editorial). *Physical Therapy*. 1990;70:278-279.
22. Turner P, Whitfield T. Physiotherapists' use of evidence based practice: A cross-national study. *Physiotherapy Research International*. 1997;2(1):17-29.
23. Carr J, Mungovan S, Shepherd R, Dean C, Nordholm L. Physiotherapy in stroke rehabilitation: bases for Australian physiotherapists' choice of treatment. *Physiotherapy Theory and Practice*. 1994;10(201-209).
24. Robertson V, Spurr D. Electrophysical agents: Implications of their availability and use in undergraduate clinical placements. *Physiotherapy*. 1998;84(335-344).
25. Wakefield A. Evidence-based physiotherapy: The case for pragmatic randomized controlled trials. *Physiotherapy*. 2000;86(8):394-396.
26. Parker-Taillon D. CPA initiatives put the spotlight on evidence-based practice in physiotherapy. *Physiotherapy Canada*. 2002;Winter:12-15.
27. Health Professions Council Standards of Proficiency (Physiotherapy) draft documentation. Paper presented at: Quality Assurance Agency for Higher Education, 2003; London.
28. MacIntyre D, McAuley C, Parker-Taillon D. Canadian physiotherapy research and evidence-based practice initiative in the 1990's. *Physical Therapy Review*. 1999;4:127-137.
29. Goals for 1999-2000. In minutes of the house of delegates meeting, 1999; Alexandria, Virginia.
30. Connolly B, Lupinnaci M, Bush A. Changes in attitudes and perceptions about research in physical therapy among professional physical therapist students and new graduates. *Physical Therapy*. 2001;81(5):1127-1134.
31. Barnard S, Wiles R. Evidence based physiotherapy: Physiotherapists' attitudes and experiences in the Wessex area. *Physiotherapy*. 2001;87(3):115-124.
32. Morris J. Evidence-based practice: The way forward. *Physiotherapy*. 2003;89(6):330-331.
33. Association RCVBotAP. Evidence based practice. *Australian Journal of Physiotherapy*. 1999;45:167-171.
34. Haynes R, Devereaux P, Guyatt G. Clinical expertise in the era of evidence-based medicine and patient choice. *ACP Journal Club*. 2002;136(2):A11-A18.
35. Jette D, Bacon K, Batty C, et al. Evidence-based practice: Beliefs, attitudes, knowledge, and behaviors of physical therapists. *Physical Therapy*. 2003;83(9):786-805.
36. Scherer S, Smith M. Teaching evidence-based practice in academic and clinical settings. *Cardiopulmonary Physical Therapy*. 2002;13(2):23-27.
37. O'Brien. Keeping up to date: Continuing education improvement strategies and evidence based physiotherapy practice. *Physiotherapy Theory and Practice*. 2001;17:187-199.
38. Sackett D, Straus S, Richardson W, Rosenberg W, Haynes R. Levels of evidence and grades of recommendations. *Evidence-Based Medicine: How to Practice and Teach EBM*. Edinburgh: Churchill-Livingstone; 2000:173-176.
39. Maher C, Sherrington C, Elkins M, Herbert R, Moseley A. Challenges for evidence-based physical therapy: Accessing and interpreting high-quality evidence on therapy. *Physical Therapy*. 2004;84(7):644-654.
40. Difabio R. Myth of evidence based practice. *Journal of Orthopedic and Sports Physical Therapy*. 1999;29(11):632-634.
41. Ritchie J. Case series research: a case for qualitative method in assembling evidence. *Physiotherapy Theory and Practice*. 2001;17:127-135.
42. Rothstein J. Evidence based guidelines: Application to clinical practice. *Physical Therapy*. 2001;81(10):1620-1621.
43. Wade D. Research into the black box of rehabilitation: The risks of a type III error (editorial). *Clinical Rehabilitation*. 2001;15:1-4.
44. Hurley M. Linking research with practice: The missing link-collaboration. *Physiotherapy*. 2000;86(7):339-341.
45. Pomeroy V, Talls R. Avoiding the menace of evidence-tinged neuro-rehabilitation. *Physiotherapy*. 2003;89(10):595-601.
46. Miller P, McKibbin K, Haynes R. A quantitative analysis of research publication in physical therapy journals. *Physical Therapy*. 2003;83(2):123-131.

47. Foster N, Barlas P, Chesterton L, Wong J. Critically appraised topics (CATs): One method of facilitating evidence-based practice in physiotherapy. *Physiotherapy*. 2001;87(4):179-190.
48. Sumison T. Client centered implications of evidence based practice. *Physiotherapy*. 1997;83(7):373-374.
49. Metcalfe C, Lewin R, Wisner S, Perry S, Bannigan K, Klaber-Moffett J. Barriers to implementing the evidence base in four NHS therapies: Dietitians, occupational therapists, physiotherapists, speech and language therapists. *Physiotherapy*. 2001;87(8):433-441.
50. Research Committee (Victorian Branch) of the Australian Physiotherapy Association. Evidence-based practice. *Australian Journal of Physiotherapy*. 1999;45:167-171.
51. Fritz J. Invited Commentary. *Journal of Orthopedic and Sports Physical Therapy*. 2001;31(12):689-691.
52. Miles A, Grey J, Polychronis A, Price N, Melchiorri C. Current thinking in the evidence-based health care debate. *Journal of Evaluation in Clinical Practice*. 2003;9(2):95-109.
53. De Vera Barredo R. Reflection and evidence based practice in action: A case based application. *The Internet Journal of Allied Health Sciences and Practice*. 2005;3(3):1-10.
54. O'Brien M. Keeping up to date: Continuing education improvement strategies and evidence-based physiotherapy practice. *Physiotherapy Theory and Practice*. 2001;17:187-199.
55. Bohannon R. Information accessing behaviour of physical therapists. *Physiotherapy Theory and Practice*. 1990;6:215-225.
56. Kamwendo K. What do Swedish physiotherapists feel about research? A survey of perceptions, attitudes, intentions, and engagement. *Physiotherapy Research International*. 2002;7(1):23-34.
57. Pomeroy V, Talls R, Stitt E. Dismantling some barriers to evidence based practice with 'hands-on' clinical research secondments: Initial development. *Physiotherapy*. 2003;89(5):266-275.
58. Richardson B, Jerosch-Herold C. Appraisal of clinical effectiveness- an ACE approach to promoting evidence-based therapy. *Journal of Clinical Effectiveness*. 1998;3(4):146-150.
59. Closs S, Lewin B. Perceived barriers to research utilisation: A survey of four therapies. *British Journal of Therapy and Rehabilitation*. 1998;5:151-155.
60. 1996 Practice Profile Report. Alexandria, VA: American Physical Therapy Association; 1996.
61. Cibulka M, Aslin K. How to use evidence based practice to distinguish between three different patients with low back pain. *Journal of Orthopedic and Sports Physical Therapy*. 2001;31(12):678-695.
62. Vanderkooy J, Bach B, Gross A. A clinical effort toward maximizing evidence based practice. *Physiotherapy Canada*. 1999;51(4):273-279.
63. Walker-Dilks C. Searching the physiotherapy evidence based literature. *Physiotherapy Theory and Practice*. 2001;17:137-142.
64. Sherrington C, Moseley A, Herbert R, Maher C. Evidence based practice. *Physiotherapy Theory and Practice*. 2001;17:125-126.
65. Guyatt G, Haynes R, Jaeschke R, et al. Users' guides to the medical literature: XXV. Evidence-based medicine: Principles for applying the users' guides to patient care. *Journal of the American Medical Association*. 2000;284(10):1290-1296.
66. Rich N. Challenge assumptions, search for evidence: Where do we go from here? *Journal of the Section on Women's Health*. 2003;27(2):39-40.
67. Rothstein J. The difference between knowing and applying. *Physical Therapy*. 2004;84(4):310-311.
68. Scalzitti D. Happy Birthday to Hooked on Evidence. *PT Magazine*. Vol 11; 2003:56-58.
69. Maher C, Moseley A, Sherrington C, Herbert R. Core journals of evidence-based physiotherapy practice. *Physiotherapy Theory and Practice*. 2001;17:143-151.
70. Mead J. Evidence-based practice: How far have we come? *Physiotherapy*. 1996;82(12):653-654.
71. Scalzitti D. Evidence based guidelines: Application to clinical practice. *Physical Therapy*. 2001;81(10):1622-1628.
72. Gibson B, Martin D. Qualitative research and evidence based physiotherapy practice. *Physiotherapy*. 2003;89(6):350-358.
73. Jette A. Invited Commentary. *Physical Therapy*. 2003;83(2):131-133