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Examining the use of Evidence-based Practice Resources among Physiotherapists in Canada

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EXAMINING THE USE OF EVIDENCE-BASED PRACTICE RESOURCES AMONG PHYSIOTHERAPISTS IN CANADA

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Thesis submitted to the
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ABSTRACT

Objective: To assess physiotherapists' awareness of, access to, and use of evidence-based practice (EBP) resources and factors that influence their use in practice.

Methods: A postal survey of a random sample of 321 Canadian physiotherapists. Open and closed-ended questions were used to elicit participants' views on EBP, EBP resources, and barriers and facilitators to research use.

Results: Two hundred and thirty four of the 301 eligible physiotherapists responded (77.7% response rate). Attitudes towards EBP were positive. Sixty two percent of participants had access to the Internet in their practice setting. Sixteen percent had read a Cochrane review, 15% were aware of Cochrane reviews but had not read one, and 59% were unaware of the Cochrane Library. Even fewer physiotherapists were aware of other EBP resources such as the PEDro. Participants reported major barriers to using research included lack of time (64%) and relevant literature not being compiled in one place (61%). The trustworthiness of the research message was positively associated with EBP resource use.

Conclusions: Physiotherapists have positive attitudes towards EBP and want relevant literature compiled in one place. However, a high proportion of respondents were unaware of several high-quality EBP resources. This suggests that information about the availability of EBP resources is not being adequately disseminated to Canadian physiotherapists. Efforts are needed to ensure widespread dissemination of EBP resources.

Key words: Physiotherapy, evidence-based practice, research use, knowledge transfer

EXPANDED ABSTRACT

Statement of the problem: Clinical research is constantly producing new evidence that may contribute to effective and efficient patient care. Research cannot change population outcomes unless health care professionals are aware of research findings and adopt them into practice. Research utilization studies consistently find that gaps exist between research findings and clinical knowledge, and between clinical knowledge and clinical practice. EBP resources, such as clinical practice guidelines and systematic reviews, provide summaries of the best available evidence on specific interventions for specific conditions. EBP resources are critical to achieving EBP. The EBP needs and resource use of Canadian physiotherapists are currently unclear. In Canada, it is timely and important to study physiotherapists' awareness of, access to, and use of EBP resources, as well as facilitators and barriers to their use.

Methods: This thesis involved the development, implementation, and analysis of a cross sectional self-administered postal survey in a random sample of physiotherapists drawn from the 2002 Canadian Physiotherapy Association orthopaedic division membership list. The questionnaire was developed, pilot- and pre-tested, and revised based on feedback. Relationships between demographic and practice environment characteristics and awareness of, access to, and use of EBP resources such as the Cochrane Library, the Canadian and Ontario Physiotherapy Associations' Inventory, and the Physiotherapy Evidence Database were explored. A multivariate logistic regression model was developed to examine factors related to the potential adopter, the practice environment and the EBP resource that were independently related to EBP resource use.

Results: Seventy eight percent of eligible physiotherapists responded. Half of physiotherapists (n = 128) had been exposed to EBP during their training. Attitudes towards EBP were positive. Sixty-two percent (95% CI: 55 to 68) of survey participants had access to the Internet in their practice environment. Over 80% of physiotherapists agreed that three aspects of EBP resources were important: a synopsis of the supporting evidence, a concise recommendation and a rating of the confidence with which recommendations were made. Less than 40% (40% 95% CI: 34 to 47) of survey participants were aware of the Cochrane Library, and less than 22% were aware of the CPA/OPA Inventory (18% 95% CI: 13 to 23) or the PEDro (21% 95% CI: 15 to 26). Few physiotherapists could be considered regular users of the Cochrane Library, nine percent (21/234) had read a Cochrane review three or more times in the six months prior to the survey. Lack of awareness was the main reason physiotherapists did not use EBP resources. Awareness of and access to EBP resources did not necessarily translate into use. Physiotherapists who perceived the lack of relevant literature compiled in one place as a barrier to research use and those who put lower value on the trustworthiness of the research message were less than half as likely to be EBP resource users.

Conclusion: Physiotherapists want relevant literature compiled in one place. However, a high proportion of respondents were unaware of several centralized EBP resources. This suggests that information about the availability of EBP resources is not being adequately disseminated to Canadian physiotherapists. Efforts are needed to ensure widespread dissemination of EBP resources. High quality synthesized evidence summarised and compiled in one accessible place may facilitate the use of research findings in clinical practice.

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GLOSSARY

Clinical effectiveness The extent to which specific clinical interventions, when deployed in the field for a particular patient or population, do what they are intended to do – i.e. maintain and improve health and secure the greatest possible gain from the available resources. (1)

Clinical practice guidelines (CPGs) Systematically developed statements based on the best available evidence which assist clinicians and patients in making decisions about appropriate specific interventions for specific conditions. (2)

Cochrane review - A systematic, up-to-date summary of reliable evidence of the benefits and risks of healthcare. Cochrane Reviews are intended to help health policy makers, clinicians and patients make practical decisions. For a review to be called a "Cochrane review" it must be in the Parent Database maintained by the Cochrane Collaboration. The specific methods used in a Cochrane review are described in the text of the review. (3)

CPA/OPA Inventory An Internet based inventory of systematic reviews, meta-analyses and clinical practice guidelines relevant to physiotherapy developed by the Canadian Physiotherapy Association and Ontario Physiotherapy Association. (4)

Diffusion The process by which an innovation is communicated through certain channels over time among members of a social system (5)

Evidence-based practice resource A source of information that provides a summary of the best available evidence (i.e. a systematic and rigorous process has been undertaken to

find, evaluate and synthesize evidence of effectiveness and safety) on a specific intervention for a specific condition. (2)

Meta-analysis A statistical technique that summarises the results of several studies into a single estimate, giving more weight to results from larger studies. (3)

Physiotherapy Evidence Database (PEDro) The Physiotherapy Evidence Database developed by The Centre of Evidence-Based Physiotherapy based at the School of Physiotherapy at the University of Sydney to provide rapid access to abstracts of randomized controlled trials and systematic reviews in physiotherapy. (6)

Practice Environment The structural, social, patient, and other situation-specific factors that exert influence on the potential adopter. (5)

Potential Adopter A patient, clinician, or policymaker in the health care system who is a potential user of evidence. (7)

Systematic review A review of a clearly formulated question that uses systematic and explicit methods to identify, select and critically appraise relevant research, and to collect and analyse data from studies identified for inclusion in the review. Statistical methods (such as meta-analysis) may or may not be used to analyse and summarise the results of the included studies. (3)

Randomized controlled trial/Randomized clinical trial (RCT) An experiment in which investigators randomly allocate eligible people into an intervention or control group to receive or not to receive one or more interventions that are being compared. The results are assessed by comparing outcomes in the treatment and control groups. (3)

Glossary Reference List

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1. INTRODUCTION AND OBJECTIVES

1.1. Statement of the problem

Clinical research is constantly producing new evidence that may contribute to effective and efficient patient care. Evidence-based practice (EBP), which integrates the best current research evidence with clinical expertise and patient values (1), has the potential to improve health services and, hence, population health.

Research cannot change population outcomes unless health services and health care professionals are aware of research findings and adopt them into practice (2). Unfortunately, the transfer of research findings into practice is often slow and can be a haphazard process (3). Studies have reported that 30 to 40% of patients do not receive care recommended by current evidence-based guidelines and 20 to 25% of care provided is not needed or is even contraindicated (4,5). Research utilization studies consistently find that gaps exist between research findings and clinical knowledge, and between clinical knowledge and clinical practice.

EBP resources, such as clinical practice guidelines and systematic reviews, provide a summary of the best available evidence on a specific intervention for a specific condition. Identifying the best available evidence involves a systematic and rigorous process to find, evaluate and synthesize evidence of effectiveness and safety. EBP resources are critical to achieving EBP.

Research utilization models call for a clear understanding of evidence needs and use in a target group of clinicians. One group of clinicians that is concerned about EBP is Canadian physiotherapists. In its October 2001 submission to the Independent

Commission on the Future of Health Care in Canada, the Canadian Physiotherapy Association (CPA) identified establishing EBP as a priority (6). According to Parker-Taillon, the CPA's director of education, practice and research, establishing evidence-based physiotherapy practice is crucial in the current climate of competitive health care funding. However, the EBP needs and resource use of Canadian physiotherapists are currently unclear. Therefore, in Canada, it is timely and important to study physiotherapists' awareness of, access to, and use of EBP resources, as well as facilitators and barriers to their use.

1.2. Objectives

The overall aim of this project was to assess the use of EBP resources among physiotherapists and examine factors that influence their use in practice. The primary purpose of this project was to examine the use of evidence-based practice (EBP) resources by physiotherapists who practice in the area of orthopaedics and are members of the CPA. Rogers' theory (42) of the diffusion of innovations suggests that in order for an innovation (e.g. an EBP resource) to be adopted into practice a potential adopter must be aware of the innovation and have access to it (knowledge), develop a positive attitude towards it (persuasion), intend to use it (decision) and put the innovation into use (implementation).

The study objectives, designed according to these stages, were:

A. Knowledge

1. To assess physiotherapists' awareness of, and access to, EBP resources

B. Persuasion

2. To assess physiotherapists' attitudes towards EBP and EBP resources

3. To assess physiotherapists' views on the usefulness of specific EBP resources (e.g. Cochrane reviews , Canadian Physiotherapy Association/Ontario Physiotherapy Association (OPA) Inventory, and the Physiotherapy Evidence Database (PEDro))

C. Decision

4. To assess the proportion of physiotherapists who have accessed EBP resources such as journals and clinical practice guidelines (CPGs), systematic reviews, or trials available on the Cochrane Library, CPA/OPA Inventory or PEDro

D. Implementation

5. To assess the proportion of physiotherapists using EBP resources and their preferred sources of information

6. To assess the prevalence of use of Cochrane reviews, CPA/ OPA Inventory and the PEDro database among physiotherapists

The secondary purpose of this project was to identify factors that influence the use of EBP resources among physiotherapists. Secondary objectives were:

7. To identify perceived facilitators and barriers related to the practice environment, potential user and EBP resources that influence physiotherapists' use of EBP resources

8. To identify predictors of use and non-use of EBP resources.

1.3. Relevance of the research

It is important to understand current research utilization patterns among physiotherapists before designing programs aimed at increasing EBP (7). Little is known about the current use of evidence in practice by Canadian physiotherapists. Therefore an assessment of EBP resource use and barriers and facilitators to EBP among physiotherapists was needed. The survey of CPA members that was carried out in the course of this study identified the current sources of evidence physiotherapists are aware of, have access to, and are using. This project was the first to measure EBP resource use among Canadian physiotherapists. It establishes a baseline measure of EBP needs and resource use and provides recommendations for how current evidence should be translated and presented to physiotherapists. The recommendations of this study provide concrete suggestions for increasing the use of evidence in the daily practice of Canadian physiotherapists, thus facilitating evidence-based physiotherapy.

1.4. Outline of the thesis

The rationale for and objectives of this thesis project are outlined above. Chapter two of this thesis provides a brief introduction to EBP and a review of the literature pertinent to research utilization and research transfer. EBP in physiotherapy, models of research use and determinants of research use are discussed. Chapter three outlines the methods used

to develop the questionnaire, conduct the mail survey and analyse the data. Chapter four presents the results of this thesis project. Chapter five discusses the thesis results in relationship to the literature and considers the significance of the findings. The final chapter provides recommendations for consideration and offers suggestions for future research.

2. BACKGROUND

2.1. Evidence-based practice

EBP emerged as a new paradigm within health care during the 1990's, although its philosophical origins extend back to the nineteenth century (8). EBP has been defined as "the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients" (1) and involves integrating individual clinical expertise with the best available clinical evidence from systematic research (9).

EBP is grounded in epidemiology, which is the study of the determinants, distribution, and frequency of health-related states and events in defined populations, and the application of this study to the control of health (10). Epidemiology provides the criteria and methodology for determining if treatment is effective and for describing and identifying health service needs and trends. EBP is effective health care and is one of the determinants of the health and well-being of a population (11).

The goals of EBP are clinical effectiveness and optimal resource use. "Despite the considerable amount of money spent on clinical research relatively little attention has been paid to ensuring that the findings of research are implemented in routine clinical practice" (12). If research findings are not used in patient care then money may be spent and wasted on ineffective treatments, patients may receive sub-optimal care and may be unnecessarily put at risk.

The process of EBP has been described as consisting of five key steps: (1) formulate a clear clinical question from a patient's problem, (2) search the literature for relevant articles, (3) evaluate (critically appraise) the evidence for its validity and usefulness, (4)

implement useful findings in clinical practice and (5) evaluate the impact of the change in practice (13, 9). Finding, appraising and incorporating current research findings into clinical decision making is an essential part of EBP (14).

2.2. Evidence-based practice in physiotherapy

The concept of EBP was originally developed within the medical profession and is being adapted by other health-care professionals. Physiotherapy emerged as a profession about a century ago. Since the late 1990's professional associations have been increasing focused on exploring what EBP in physiotherapy means and how to support it. In 1998, in their book Evidence-Based Healthcare: A Guideline for Therapists, Bury and Mead emphasize the importance of integrating individual expertise, which physiotherapists consider the "art" of practice, with the "science" of using the best available clinical evidence from systematic research (9). Since 1995 the CPA has defined EBP as "practice which has a theoretical body of knowledge, uses the best available scientific evidence in clinical decision making and uses standardized outcome measures to evaluate the care provided" (6). The development and evaluation of outcome measures in the last decade has facilitated improvement in the methodological quality of rehabilitation trials.

Physiotherapy currently has a small but evolving research evidence base (15). However, the use of research literature among physiotherapy clinicians is limited (16-20). Internationally, the World Confederation for Physical Therapy (WCPT) organised a landmark Expert Meeting on Evidence-based Practice in 2001. The meeting was organised around three themes: synthesizing the evidence; accessing the evidence; and implementing the evidence.

2.3. Evidence-based practice resources

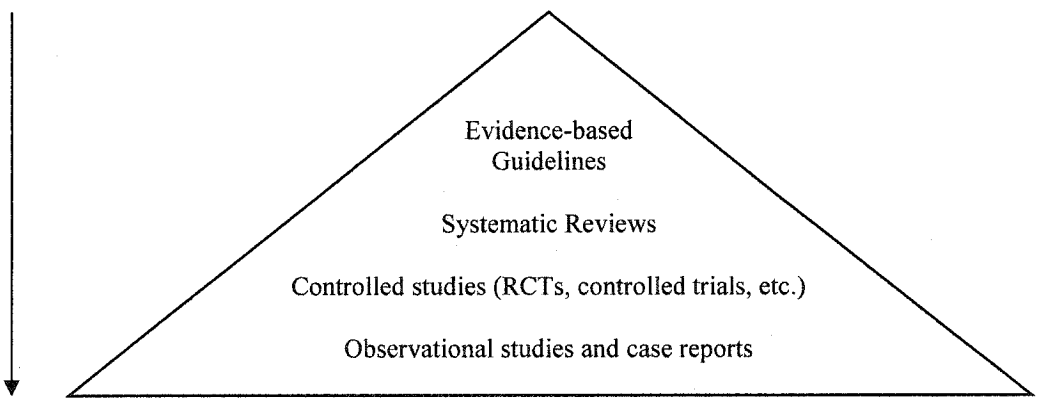
Summary sources of information have existed for some time. Traditional sources of information (e.g. textbooks, journal review articles and continuing education courses) can be used to inform clinical decision making. However, information in textbooks may be more than a decade out of date at the time of publishing (21,22) and there is significant potential for author bias in review articles and instructor bias in continuing education courses.

The frequency in which health care professionals generate clinical questions coupled with the growing volume of evidence based literature makes EBP a challenge. It has been estimated that a physician generates highly specific patient-related questions at about a rate of one to three questions for every three patient visits (23). It has also been estimated that a physician would need to read 17 journal articles a day in order to keep abreast of all research relevant to a particular area of clinical practice (24). Similar parallels can be drawn for physiotherapists.

Thus, there has been increasing interest in the use of pre-appraised and synthesized evidence resources (EBP resources) such as systematic reviews, meta-analyses, and evidence-based clinical practice guidelines (CPGs) as aids for evidence-based clinical decision making. In the steps to EBP, after formulating a clear clinical question, steps two and three involve finding and appraising current research findings. It is for these steps of the EBP process that EBP resources are most helpful. Instead of searching the literature for relevant articles reporting individual trial results, identifying an EBP resource is an efficient and less biased way of locating evidence on a topic. Instead of attempting to evaluate the quality and strength of the evidence from individual studies,

EBP resources have critically evaluated each study, considered the hierarchy of the evidence and provide a synthesis of the results. Rennie and Guyatt recommend that "resolving a clinical problem begins with a search for a valid systematic review or practice guideline as the most efficient method of deciding on the best patient care" (25). The School of Health and Related Research at the University of Sheffield recommends MEDLINE and the Cochrane Library as the best starting point for EBP queries. (26) Thus EBP tools can be conceptualized as a pyramid, with the most useful information, based on validity and relevance, placed at the top of the pyramid (see Figure 1). This usefulness hierarchy of EBP information means a clinician may only have to identify a CPG to find an answer to a clinical question. When the question is not answered by a CPG the pyramid guides the clinician to drill down through progressive layers until they find their answers (27).

Figure 1
Drilling down for EBP information



A systematic review is a "review of a clearly formulated question that uses explicit methods to identify, select and critically appraise relevant research and to collect and analyse data from the studies that are included in the review" (28).

A systematic review involves the application of scientific strategies, in ways that limit bias, to the assembly, critical appraisal, and synthesis of all relevant studies that address a specific clinical question. Statistical methods (e.g. meta-analyses) may or may not be used to analyse and quantitatively summarize the results of the included primary studies in systematic reviews. Meta-analysis combines data from multiple studies and summarises all the reviewed evidence with a single statistic. Meta-analysis can increase the power and precision of estimates of treatment benefits and risks. Whether or not systematic reviews use qualitative and/or quantitative synthesis, the explicit methods used in systematic reviews should limit bias and improve the reliability of the conclusions (29). Evidence-based CPGs have been defined as systematically developed statements based on the best available evidence (and sometimes clinical expert consensus) that assist clinicians and patients in making decisions about appropriate specific interventions for specific conditions (9). Unlike many systematic reviews, CPGs aim to make recommendations.

EBP resources, such as systematic reviews and CPGs, can help practitioners keep abreast of the health care literature by summarizing large bodies of evidence and helping to explain differences among studies on the same question. Because the process of developing EBP resources (like that of any other type of research) is subject to bias, a useful EBP resource includes clear reporting of information obtained using rigorous methods. EBP resources are being used increasingly to inform health care decision

making, plan future research agendas and establish clinical policy. They may also strengthen the link between best research evidence and optimal health care (30).

2.4. EBP resources for physiotherapy

Many EBP resources are available in databases on the Internet. Internet EBP resources relevant to physiotherapy include: the Cochrane Library (www.cochrane.org); the CPA/Ontario Physiotherapy Association (OPA) Inventory of Physical Therapy Related Consensus Statements, Systematic Reviews, Meta-analyses, and CPGs (www.physiotherapy.ca); and the PEDro (www.pedro.fhs.usyd.edu.au).

The Cochrane Collaboration is an international organization that aims to assist clinicians in making informed decisions about health care by helping to prepare, maintain, and disseminate systematic reviews of the effects of health care interventions (28). Its primary output is the Cochrane Database of Systematic Reviews. The internet-based Cochrane Library houses the systematic reviews. Several other databases are included in the Cochrane Library as it aims to provide a clearinghouse for the best clinically relevant research information. Among the multitude of EBP resources on the Internet the systematic reviews in the Cochrane Library have been shown to be generally of comparable or higher quality when compared to other systematic reviews and are updated more often (31). There are currently over 100 systematic reviews relevant to physiotherapy in the Cochrane Library. It is important to examine how successful the Cochrane Collaboration has been in informing the various health care professions for whom systematic reviews are prepared. This has been done for several physician groups

(general practitioners and internists) (14, 32-34) and nurses (35) but not for physiotherapists.

The CPA/OPA Inventory is a physiotherapy specific EBP resource and has been available on the Internet since October 2000. It is intended to provide resources that can be used to foster EBP (36) The CPGs, systematic reviews and meta-analyses included in the Inventory are identified through an annual literature search of MEDLINE, CINHAL and Cochrane databases using a simple search that includes search terms related to rehabilitation and physical therapy and systematic reviews, meta-analyses and CPGs. The CPA is in the process of conducting a quality measure of the included CPGs (37).

The Physiotherapy Evidence Database (PEDro) is an initiative of the Centre for Evidence-Based Physiotherapy, which is based at the University of Sydney, Australia. PEDro was developed to give rapid access to bibliographic details and abstracts of RCTs and systematic reviews in physiotherapy (38). As of June 2, 2000 the PEDro was the most comprehensive database of physiotherapy clinical trials and systematic reviews (2,231 papers from 519 different journals) (39). Most of the trials in the database have been rated for quality based on their "believability" (or "internal validity") and whether the trial contains sufficient statistical information to make it interpretable (38).

The Cochrane Library, the CPA/OPA Inventory and the PEDro databases have all been developed because EBP requires ready access to external evidence that can inform clinical decision making. These databases contain EBP tools that provide valuable information about clinical research findings. To my knowledge, no studies have examined the use of these databases by physiotherapists in Canada.

2.5. Research use models

Clinical research is constantly producing new findings that may contribute to effective and efficient patient care. Research utilization has been defined as "a process directed toward transfer of specific research-based knowledge into practice through the systematic use of a series of activities" (40). Similarly, research transfer has been defined as "the communication or dissemination of research findings for the explicit purpose of influencing health care decision making" (41). From a literature review, several models emerged that are helpful in examining the factors that influence research utilization.

Many researchers within the health domain have adapted Rogers' Diffusion of Innovation theory, discussed in the introduction section of this thesis, first outlined in his 1964 book Diffusion of Innovations. Rogers' model of the innovation-decision process is helpful in understanding the process by which innovations, or EBP resources, diffuse through the health care community (42). Lomas (41) describes related phases of the communication process aimed at influencing the availability of research evidence to clinicians. Rogers suggests that there are five stages potential adopters (or users) go through before an innovation is established in practice. The five stages are: knowledge (awareness and understanding of the innovation or evidence-based resource), persuasion (development of an attitude toward the innovation), decision (making a choice to use or reject the innovation), implementation (use of the innovation), and confirmation (ongoing use of the innovation). Pathman proposes an awareness-to-adherence model and uses this to examine clinical guideline compliance among physicians (43). Pathman's stages of awareness, agreement, adoption and adherence correspond to the stages Rogers describes.

The Ottawa Model of Research Use (OMRU) integrates aspects of these models and others through six elements drawn from the literature: (1) the practice environment, (2) potential user, (3) the evidence-based innovation, (4) strategies for transferring evidence into practice, (5) the use of the evidence, and (6) health-related outcomes. These elements are connected through the process of evaluation (44). Like models developed by Funk (45), Stetler (46;47) and Cabana (48), and social marketing theory, the OMRU proposes examining areas for potential barriers and facilitators to research utilization.

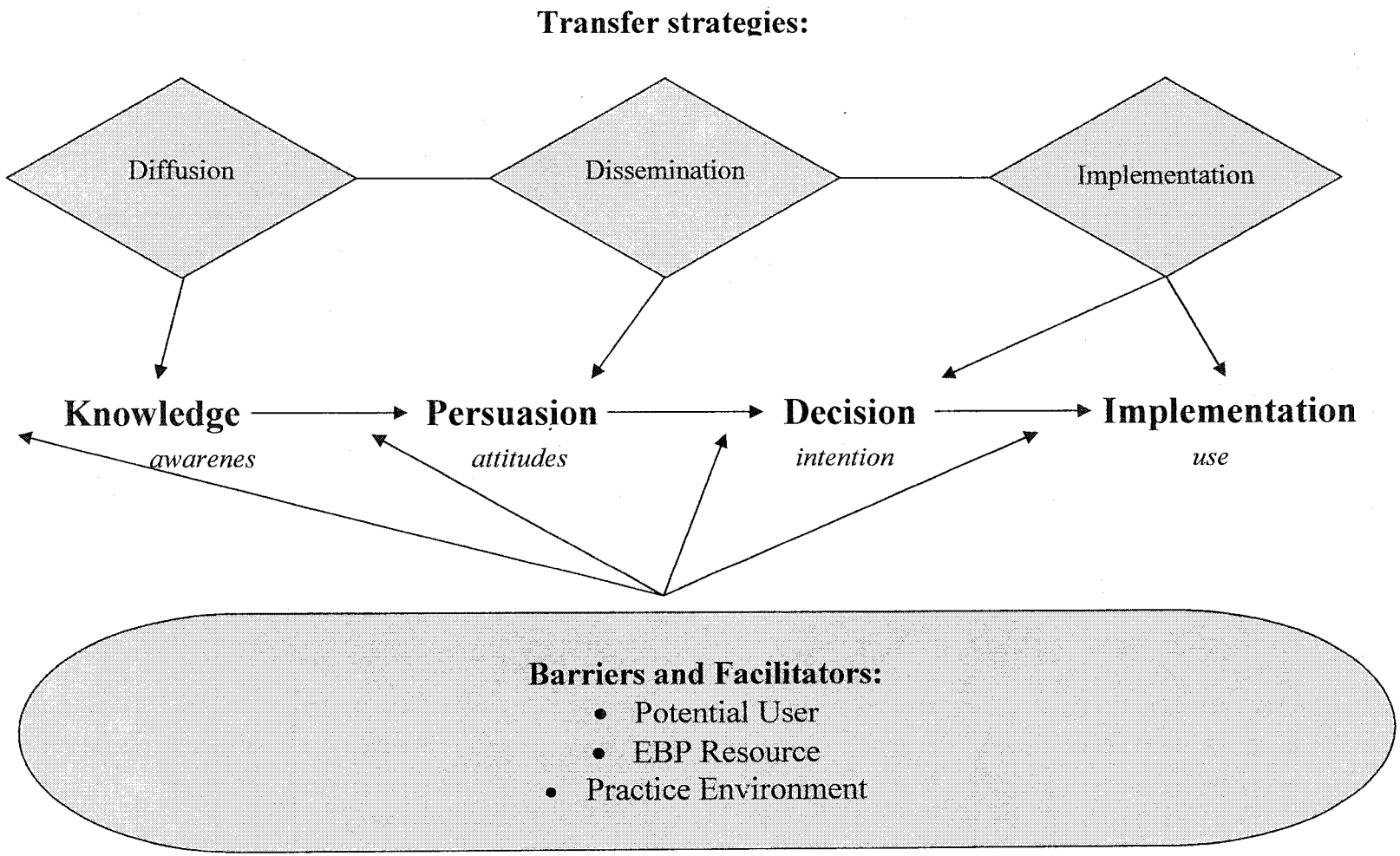
The first step in the OMRU is to assess the barriers and supports that exist in the following three areas: practice environment, potential user and evidence-based resource. The practice environment is influenced by structural, social and patient factors as well as other factors (e.g. medicolegal climate). A potential user's knowledge of, attitudes towards, and EBP skills may influence their use of EBP resources. As well, both the presentation format and the process by which primary research findings are translated into an EBP resource may influence use of that resource (44).

The fourth element of the OMRU is transfer strategies. This fourth element incorporates the work of Lomas. Lomas describes "diffusion", "dissemination" and "implementation" as distinct phases in a communication process aimed at making research evidence available to clinicians (41). Diffusion describes a passive communication technique that is not targeted at a specific audience. In the past it was thought that clinicians, including physiotherapists, would read and incorporate quality research information into clinical practice. This method of communication has been shown only to work well for a few highly motivated individuals (49) who are already interested in the topic and therefore seeking information. Diffusion has also been described as the "science push model" and

the "demand model" in the literature (50). Dissemination is a more active and focused form of communication than diffusion. It implies the information is written for and targeted to a specific audience. Dissemination activities may contribute to changes in awareness, attitudes, and even knowledge, but may not be sufficient to alter behaviour (41). According to Lomas (41) implementation implies that the goal of communication is more than simply awareness. It is the active process of identifying and addressing the barriers your target audience encounters when attempting to apply the evidence presented to them. Lomas and others have noted that the challenge is to close the gap between the two cultures of clinician and researcher by creating "linkages and exchanges". The concept of linkages and exchanges has also been referred to as the interaction model (49-50). Both Rogers and Lomas describe distinct and different phases in a process where the success of each phase is dependent on the success of the previous one.

Drawing on the models discussed above I developed a conceptual framework to guide the examination of EBP resource use in this thesis (see Figure 2). The framework attempts to break down the complex social behaviour of using EBP resources into manageable blocks or stages that make logical sense and have some support from the medical and social science literature.

Figure 2
Conceptual framework used to examine EBP resource use, adapted from work by Rogers (1995), Lomas (1993) and Logan and Graham (1998)



2.6. Determinants of research use

2.6.1. The innovation-decision process

Research information alone often does not change clinician behaviour. For example, several studies conducted in the United States and Canada have shown that synthesis and dissemination of information by respected national authorities does not reliably change physician clinical behaviour (51-54,12). Although research has demonstrated that many factors affect clinicians' awareness of and agreement with guidelines for care, few studies have attempted to identify the sequence of these cognitive and behavioural processes (43).

Pathman proposes that when physicians comply with guidelines, they must first be aware of them, then intellectually agree with them, then decide to adopt them in care, then regularly adhere to them. These stages were tested by a survey that examined 3,014 family physicians' self-reported use of paediatric vaccine recommendations. Guideline awareness among respondents was 98.4%, agreement 70.4%, adoption 77.7%, and adherence 30.1%. The data for 87.9% of physicians fit the model at every step. Significant deviation from the model only occurred for 11% of the physicians who adopted the recommendation without agreeing with it. Physician, practice setting, and information source characteristics affected the likelihood of movement from each step to the next in the path to adherence (43). This study supports the steps of the innovation-decision process outlined by Rogers in Diffusion of Innovations considered in this thesis.

2.6.2. Barriers and facilitators

Several studies have assessed barriers and supports to EBP among physiotherapists. Among physiotherapists in the province of Alberta (7), barriers related to characteristics of the practice environment include difficulties with access to evidence-based information and lack of time. Factors related to characteristics of the potential user identified in surveys conducted in the United States, England and Australia include lack of awareness of books, journals and databases containing practice-related research (16;18;55;56) and problems finding and retrieving research literature (57,16,18,56). Tucker (58) found that among physiotherapists who were aware of and read journals there was a reluctance to change practice based on research findings. Alberta therapists identified lack of evidence-based skills, such as the ability to critically appraise relevant reports, as a significant barrier preventing EBP (7). In a survey of cardiorespiratory physiotherapists practicing in Australia, Turner and Whitfield (56) found that physiotherapists with higher education were more likely than other physiotherapists to indicate that journal or research literature influenced their choice of treatment technique.

In other professions such as medicine and nursing, lack of time and resources have also been identified as practice environment related barriers to research (33,40,59-63). In contrast to Turner's survey of physiotherapists (56), McAlister (14) found that among general internists the use of EBP was not predicted by either characteristics of the potential user or by practice related factors.

While it is widely recognized that many clinicians lack the time or specific skills to locate and evaluate evidence from traditional sources of information such as journal articles and textbooks (24,64,65), little study has been done of clinicians' abilities to locate and

interpret evidence summaries (e.g. systematic reviews) or of their predisposition to use them when located. Surveys conducted between the years 1999 and 2002 investigating Internet use among physicians report that 10 to 56% of respondents use the internet for EBP information (14,32,66). Awareness of resources does not necessarily translate into resource use. For example, Young and Ward investigated the use of the Cochrane Library among physicians in Australia and found that while 22% of physicians were aware of the Cochrane Library, only six percent had access to it and only four percent had ever used it (33).

These study findings raise questions about the best way to support physiotherapists with EBP information. Research utilization models call for a clear understanding of evidence needs in a target group (44,67). In a National Health Service review the authors state "any attempt to bring about change should first involve a 'diagnostic analysis' to identify factors likely to influence the proposed behaviour change. Choice of dissemination and implementation interventions should be guided by the 'diagnostic analysis' and informed by knowledge of relevant research" (70).

Studies suggest that research implementation strategies that are effective for one discipline may not work with others (68,69). Systematic reviews of implementation activities conclude that all implementation activities work some of the time but that none work all of the time (70,12). Some authors have suggested that strategies to promote change in clinical practice are more likely to be successful if based on an analysis of barriers and facilitators specific to the context (70). It is important to understand current research utilization patterns among physiotherapists before designing programs aimed at increasing EBP (7). As mentioned in the first chapter, the overall aim of this project was

to assess the use of EBP resources among physiotherapists and examine factors that influence their use in practice.

3. METHODS

This chapter describes the literature review that preceded the development of the questionnaire, pilot and pre-testing of the questionnaire, and methods used to implement and analyse the survey.

3.1. Literature review

The first phase of the project was questionnaire development. A literature review identified previously published questionnaires, surveys and instruments on research utilization and EBP among health care professionals. The search strategy included searching MEDLINE (1966 to July Week 3 2002) and CINAHL (1982 to April Week 2 2003) electronic databases as well as hand searching of reference lists in review articles, guidelines and retrieved articles. Additional articles were identified through presentations at scientific meetings and personal communications. See Appendix A for examples of search strategies. The number of citations generated by the database literature search was reduced by selecting only citations that included either "survey" or "questionnaire" in the abstract.

Most of the identified surveys involved convenience samples (rather than a random sample) and provided little to no description of the questionnaire development process (e.g. validity and reliability testing). Few articles provided sample size justification or calculations. Several validated instruments were identified (71-73). Due to available resources and the nature and number of the questions a mail method was chosen.

3.2. Questionnaire development

Questions from existing instruments identified in the literature review were considered for use in the questionnaire (see Appendix B for a list of sources reviewed and a list of specific questions drawn from each source). I generated and selected questions based on the thesis conceptual framework and study objectives. Six questionnaire sections were created to assess (1) demographic and environmental characteristics of survey responders, (2) awareness of and access to EBP resources, (3) attitudes towards EBP and EBP resources in general, (4) views on usefulness of specific EBP resources, (5) sources of EBP information used, and (6) perceived facilitators and barriers to EBP.

Demographic questions used in previous surveys of physicians and physiotherapists by McColl, Wells, and Young were replicated with permission (74,63,33,78). Questions regarding awareness of, access to and use of 10 EBP journals relevant to physiotherapy were included (32,33,35,39,55,78). Preferred resources were identified through the open-ended question "Please list any sources of information that you have found particularly useful in informing your clinical decision making." Questions to determine important aspects of EBP resources were drawn from work by Tunis (76). Respondents' attitudes towards EBP and EBP resources were assessed using questions developed by McAlister (14), McColl (74), Tunis (76) and Young (33). The values of response categories for attitude and opinion questions ranged from one to five with lower values representing negative attitudes and higher values representing positive ones. Since the Cochrane Library was the initial EBP resource of interest in this study and its quality has been established (31,77) more detailed questions regarding the usefulness of Cochrane reviews were asked in the questionnaire.

Respondents' use of EPB resources was assessed by a modified version of questions used by Graham et al. for clinical practice guidelines (78). The following definition and description of an EBP resource was provided in the questionnaire: "an EBP resource is a source of information that provides the best available evidence on a specific intervention for a specific condition (i.e. a systematic and rigorous process has been undertaken to find, evaluate and synthesize evidence of effectiveness and safety). Examples of physiotherapy EBP resources include: systematic reviews of the literature, clinical practice guidelines, and research summaries." The following question was also posed: "How often do you use evidence-based practice resources to assist you in making clinical decisions?" Response categories consisted of "never", "very rarely", "some of the time", "most of the time", "routinely".

Respondents' views on barriers and facilitators to research use was assessed using a modified version of the 28 item barriers scale developed by Funk for nurses (73,79). Facilitators to research use were assessed with the open ended question: "What are the things that you think would facilitate your use of research findings in clinical practice?" The final version of the questionnaire, containing all questions and corresponding response categories, can be found in Appendix C.

3.2.1. Pilot and pre-testing

Following established guidelines for questionnaire development (80,81,82) the questionnaire was pilot tested with three groups: (1) two survey methodologists and three epidemiologists who were asked to reviewed the questionnaire and evaluate whether the questionnaire would accomplish the study objectives, (2) a representative from the CPA

(a potential user of the questionnaire results) who provided feedback regarding whether the questionnaire content reflected current knowledge of the survey topic, and (3) two physiotherapists who commented on the clarity and interest of the questions to establish its face and content validity. The concept of face validity examines whether or not the items appear to be assessing the intended qualities. Content validity is a closely related concept, and involves a judgment of whether the questionnaire samples all the important content (i.e. study objectives) (82).

The next phase of questionnaire development was to pre-test the questionnaire with members of the survey population to determine the acceptability and clarity of the questionnaire as a whole, to ensure that each question was understood, jargon free and unambiguous, and to test the questionnaire skip patterns and how much time it took to complete the questionnaire. The goal of pre-testing was to ensure the final questionnaire was understandable to a wide range of respondents.

A sample of convenience of thirteen practicing physiotherapists was mailed a cover letter and questionnaire and asked to complete the questionnaire and provide feedback (see Appendix D for pre-tester instruction form). In an attempt to test the questionnaire on a cross section of potential respondents the pre-testers included both male and female therapists with a diversity of clinical experience (2 to 15 years) and education (undergraduate degree or masters degree). After redundant questions identified by testers were removed, unclear questions revised, and coding for computerized data entry improved, the shortened and re-formatted questionnaire was ready for mail out. Results from survey development can be found in Appendix E.

3.3. Ethics approval

This survey was approved by the Ottawa Hospital Research Ethics Board on May 1, 2002 (Protocol No. 2002154-01H). Appendix F contains a copy of the letter of approval.

3.4. Sample frame

The sample frame for the survey consisted of a random sample of 321 physiotherapists drawn from the CPA orthopaedic division membership list. The CPA is the national professional body that represents over 9,000 Canadian physiotherapists and students (8,422 physiotherapists and 918 students). The CPA's mission is to provide leadership and direction to the physiotherapy profession; foster excellence in education, practice and research; and promote high standards of health in Canada. The CPA orthopaedic division is the largest of the 10 CPA special interest groups (83).

The CPA Orthopaedic Division's purpose is the advancement of orthopaedic physiotherapy through the promotion of excellence in education, practice and research. This sub-group of CPA members was chosen as the sample frame in order to examine the use of EBP resources most relevant to the clinical practice area of orthopaedics. This also provided a more homogeneous group than the entire association membership represents. On May 1, 2002 there were 3,714 records in the CPA orthopaedic division membership database (including students) and the S-PLUS 2000 Professional Release 3 program was used to generate 321 random numbers between 1 and 3,714. This produced a random sample of 321 physiotherapists for the survey.

3.5. Sample size calculation

This study aimed to estimate use of specific Internet-based resources such as the Cochrane Library, the CPA/OPA Inventory and PEDro by physiotherapists. Sample size calculations were performed for EBP resource use, the primary outcome of interest. Estimates of rates of use were based on those reported in the literature. Kerse (32) in New Zealand, and Young (33) in Australia have reported Cochrane Library use prevalence rates for general practitioners. Kerse reported that in New Zealand 16% of general practitioners reported using the Cochrane Library on the Internet (32). Young reported that in Australia only four percent of general physicians reported using the Cochrane Library on the Internet (33). In Canada, McAlister (14) reported that 27% of general internists reported using CPGs on the Internet. For the purposes of confidence interval and sample size calculation the middle rate of 16% cited above was used in the calculations.

The sample size selected was based on the number of observations needed to estimate the proportion of physiotherapists who use Internet-based EBP resources with a reasonable bound on the error of estimation (the bound on the error of estimation is equivalent to half the width of the corresponding 95% confidence interval). Consensus among members of the Ottawa Methods Group at the University of Ottawa is that a bound of five percent is reasonable (63). The Ottawa Methods Group is a multidisciplinary group of seven methodologists and three clinicians who specialize in musculoskeletal research. Other studies have considered a 6.25%, a larger bound, to be narrow enough (84). For a five percent bound on the error of estimation of the 95% confidence interval and a prevalence estimate of 16%, a sample size of 207 was needed [95% CI: 108-211]. Based

on previous mail surveys among Canadian physiotherapists a response rate of at least 66% was anticipated in this proposed study (63,85). Therefore, to obtain 207 completed questionnaires I drew a sample of 321 physiotherapists. Sample size calculations are shown in Appendix G. Three hundred twenty-one names were randomly drawn from the CPA Orthopaedic Division's membership database (n = 3714) of which some were ineligible to participate as students and administrators were excluded from this study. Appendix G, Figure 2 shows that little is gained in the bound of error if the sample size is increased. Also, the sample size of 321 corresponds to approximately 10% of the sampling frame or a 1/10 sampling fraction. In probability sampling, the sampling fraction is the known probability with which cases in the population are selected into the sample. A sample that contains a large fraction of the population will contain less sampling error than if the sample were a small fraction. Cochran has suggested that a sampling fraction of 10% is an acceptable fraction (86).

For the secondary purpose of the study, examining the predictors of EBP resource, logistic regression was planned. Using the working rule of 10 cases per predictor variable needed in a model (87) a sample size of 207 was expected to be adequate to derive an appropriate logistic regression model.

This study was exploratory and primarily descriptive in nature. The prevalence of EBP resource use is unknown in the population (Canadian physiotherapists), therefore sample size was determined by both estimating the sample size needed for adequate power and on the basis of available funding from the supporting organizations. The CPA, University of Ottawa and the Ottawa Health Research Institute provided in-kind support for the survey in the form of mailing labels, envelopes, paper, mailing costs and data entry.

3.6. Survey administration

A modification of the Dillman method for mail surveys was used in order to elicit the fullest participation in this survey (81). A recent systematic review of methods used to increase response to postal questionnaires confirmed that many of the strategies outlined by Dillman and used in this survey improve the response rate and thus the quality of the research (88). Methods used in this survey included personalized letters, stamped return envelopes, providing non-respondents with a second copy of the questionnaire and mailing the questionnaire from a university.

Four mailings were conducted between May 8 and June 26, 2002. Each mailing was separated by two to three weeks. First, a cover letter, questionnaire and return envelope were mailed to participants. Three weeks after the initial mailing a reminder letter was sent to thank those who had responded and to remind those who had not to do so. A third package was sent to non-respondents seven weeks after the initial mailing; a cover letter and another copy of the questionnaire and return envelope was included. The last mailing included a final reminder letter.

3.7. Data analysis

Data analysis was performed using SPSS for Windows version 11.5 and SAS version 8 statistical packages for Windows. Logic checks were done using cross-tabulation of key variables. Extreme or illogical variables were verified. No attempt was made to compensate for multiple comparisons given the exploratory nature of the research. A p-value of 0.05 or less was considered statistically significant for all tests.

3.7.1. Exclusion criteria

Survey respondents who were students, not currently CPA orthopaedic division members, not practicing as physiotherapists in Canada, or not currently practicing as clinical physiotherapists (e.g. primarily in an administrative or research role) were excluded from the study analysis. A clinical physiotherapist was defined as someone who reported that they spent two hours or more a week seeing clients (measured by question four of the questionnaire).

3.7.2. Return and response rate

Both the survey return and response rates were calculated. Return rate was examined after each mailing. The return rate was calculated as the percentage of returned surveys where as the response rate excludes respondents who could not be reached by the post office or did not actively treat patients from both the numerator and denominator (80).

$$\text{Return rate} = \frac{\text{number of surveys returned}}{\text{number of surveys mailed}} \times 100$$

$$\text{Response rate} = \frac{\text{number of eligible surveys returned}}{\text{number of eligible surveys mailed}} \times 100$$

3.7.3. Characteristics of the sample

To assess the representativeness of the sample, analysis of available demographic and practice environment characteristics of survey responders were compared to the profile of the CPA orthopaedic division membership database and also the entire CPA membership database. Demographic and practice environment characteristics were examined using frequency tables, means, standard deviation, medians and histograms. Categorical

variables were created for all demographic and practice environment characteristics. Variables were divided into categories to ensure sufficient numbers in each category using several approaches (e.g. divided by quartiles or by median value of the variable). The master list of variables created for analysis can be found in Appendix H.

3.8. Analysis of primary objectives

3.8.1. Awareness and access (objective one)

The proportion of physiotherapists who are aware of and had access to each EBP resource (Cochrane Library, CPA/OPA Inventory, PEDro) and journals were calculated; 95% confidence intervals were drawn around these proportions. To identify demographic and practice environment factors related to aware/not aware and access/no access bivariate tables and the contribution to chi-square option was used.

3.8.2. Attitudes (objective two)

For each positive attitude statement about EBP the proportion who "agree" or "strongly agree" was calculated. Conversely, the proportion who disagreed with the negative statements was calculated. This was repeated for each statement outlining important aspects of EBP resources.

3.8.3. Views on usefulness (objective three)

For each of the EBP resources of interest, the Cochrane Library, the CPA/OPA Inventory and PEDro, the proportion of respondents who rated each as "useful" or "very useful" and the 95% confidence interval around this proportion was calculated.

For the systematic reviews produced by the Cochrane Collaboration, eight statements examined views on ease of use, comprehensibility, and usefulness; the proportion who "agree" or "strongly agree" with positive statements and "strongly disagree" or "disagree" to the negative statements and their 95% confidence intervals were calculated.

3.8.4. Accessing EBP resources (objective four)

The proportion of physiotherapists who had accessed each of the three EBP resources was calculated; 95% confidence intervals were drawn around these proportions.

3.8.5. Use of EBP resources and preferred sources of information (objective five)

Survey participants were asked how often they use EBP resources to assist in clinical decision making. Response categories included: "never", "rarely", "some of the time", "most of the time", and "routinely". Responses to the open-end question "Please list any sources of information that you have found particularly useful in informing your clinical decision making" were coded and categorized qualitatively and the frequency of each resource type identified was examined. The use of journals was also assessed and the prevalence of journal use reported in this survey was compared to the Institute for Scientific Information (ISI) impact factors. One approach often used to measure the quality of a journal is its impact factor (a measure of the frequency with which the "average article" in a journal has been cited in a particular year) and immediacy index (how quickly the average article is cited). The impact factor is intended to help evaluate a journal's relative importance compared to others in the same field (89). The immediacy index is intended to show which journals have the most significant impact on current

research, as articles which are cited faster may mean the journal contains more relevant current articles. Examining the impact factors and frequency of journal reading measures provides a method for comparing clinical and academic journal importance and use. It is important to note that ISI impact factors are not available for all of the journals included in this thesis survey.

3.8.6. Use of Cochrane reviews, CPA/OPA Inventory and PEDro (objective six)

"Use" of a resource was defined as "read" rather than "accessed" because reading a resource is closer to measuring if the resource was considered (i.e. used) during clinical decision making. Univariate statistics were used to calculate the proportion and the 95% confidence interval of physiotherapists who had read a resource from the Cochrane Library, the CPA/OPA Inventory, or the PEDro one or more times in the six months prior to the survey. The proportion of "users" versus "non-users" was examined by each demographic and practice environment factor.

3.9. Analysis of secondary objectives

The secondary purpose of this thesis was to identify factors that may influence the use of EBP resources among physiotherapists.

3.9.1. Perceived facilitators and barriers (objective seven)

Participants were asked both closed- and open-ended questions about their views on barriers and facilitators to using research in clinical practice. Barriers were elicited using a modification of the barriers to research utilization scale (73) (question 25) and an open-ended question. Responses to 14 statements were measured on a five point Likert scale.

The mean of the value ratings between one and four for each barrier was calculated (79). Responses were also collapsed into three categories for analysis (no or little extent, moderate or great extent, no opinion) as suggested by Funk (60). Qualitative analysis of barriers and facilitators was completed by categorizing the responses to the open-ended questions and generating themes.

3.9.2. Predictors of high EBP use (objective eight)

3.9.2.1. Defining the outcome of interest

An examination of predictors of "EBP resource users" using logistic regression methods was planned. The primary definition of an "EBP resource user" was a physiotherapist who had used resources from two of the three EBP resources of interest (the Cochrane Library, CPA/OPA Inventory and PEDro) more than once in the past six months. A second definition of an EBP resource user was also defined that broadened the primary definition to include evidence-based journals. Core journals of evidence-based physiotherapy practice were identified through analysis of PEDro – the most comprehensive database of physiotherapy randomized clinical trials – and systematic reviews. The top five journals that contributed to PEDro (*Archives of Physical Medicine and Rehabilitation*, *British Medical Journal*, *Spine*, *Physical Therapy* and Cochrane Library) plus four of the five highest quality (determined by quality assessment of the trials reported in the journal) English-language exclusively physiotherapy journals (*Australian Journal of Physiotherapy*, *Physiotherapy Theory and Practice*, *Physical Therapy*, *Physiotherapy Canada*) (39) were added to the definition of "EBP resource". Thus the second definition of an "EBP resource user" was a physiotherapist who read

resources regularly from any of the three EBP resources of interest (Cochrane Library, CPA/OPA Inventory, PEDro) or any of the seven additional EBP journals.

3.9.2.2.Defining predictor variables

Factors related to characteristics of the potential user, the practice environment and the EBP resource were hypothesized to influence research utilization. Therefore variables representing each of these three themes were considered for inclusion as predictor variables in the logistic regression models.

Nine statements regarding the importance of aspects of EBP resources included in the questionnaire (question 23) were hypothesized to represent two principal components identifiable as the quality of the research message and research presentation. Factor analysis was performed to examine the theme "importance of EBP resource characteristics" and to interpret correlations among these EBP resource statements. Factor analysis assumes that each item is a measure of an abstract underlying theme that is not directly measurable (90).

Factor analysis refers to a number of related statistical techniques that help determine which characteristics can be grouped together to constitute a factor. Two of the most common extraction methods used in factor analysis are principal components and common factor analysis. These procedures are often used in exploratory data analysis to summarize many variables by a few factors. This is done by deriving linear combinations of the original variables. For principal component analysis of the nine EBP resource statements the Kaiser criterion which states that all eiganvalues greater than one should

be retained was used. The Kaiser criterion has been shown to yield an accurate estimate for the number of true factors when there are less than 30 variables (91).

Factors were rotated to make it easier to identify and interpret them. Principal components with Varimax orthogonal rotation was used to rotate each factor so that it loads higher on a smaller number of variables. In principle the most appropriate set of factor loadings is the one that has large loadings on as few factors as possible and low or zero loadings on the remaining factors (92).

3.9.2.3.Logistic regression

3.9.2.3.1. Overview

Multiple logistic regression was used to explore which physiotherapist characteristics were independently related to using EBP resources. Logistic regression is used to describe the relationship between a dichotomous outcome and independents that include both categorical and continuous variables (87). The basic assumption of regression analysis is that all observations are statistically independent (or uncorrelated) with each other. Logistic regression can assess the magnitude of the effect of the explanatory variables on response probabilities. All multivariate analysis was performed using SPSS version 11.5.

3.9.2.3.2. Examining the variables

Variables were examined by performing univariate analyses for each variable to screen the data for any discrepancies. The mean, mode, median, skewness and extreme values were examined. All values were reasonable except where missing values were identified.

A contingency table for each categorical variable and EBP resource user was created. Hosmer and Lemeshow recommend collapsing categories at the univariate stage. This is done using three sets of criteria: (1) clinical/biological sense, i.e. whether it makes biological or clinical sense to combine categories, (2) cell and row frequencies, in which 20 to 40 subjects are needed at each level of a predictor to include in a multivariate model, and (3) odds ratios, i.e. whether there are differences in risks between levels of a predictor variable (87).

All potential user characteristic variables were transformed into categorical variables to ensure a frequency of 20 cases per cell. For example, the eight levels for "location of practice" were collapsed into three levels: "private practice", "hospital" and "other/community". If survey respondents indicated more than one of these three categories then practice location was coded hierarchically first as hospital then as private then other/community. Response categories for Internet access and journal access variables were collapsed into two categories: "access at work" and "no access at work". Table 1 in Appendix H summarises how variables were re-coded and categorised a prior to dichotomous logistic regression analysis.

The creation of continuous variables from the factor analysis results was anticipated. Therefore an examination of the distribution of the continuous variables using mean, mode, standard deviation and skew statistics to determine if they were normally distributed was planned. The creation of new scales by combining variables identified through factor analysis and an evaluation of the internal consistency of the new scales using Cronbach's alpha was proposed. Cronbach's alpha (α) is a model of internal

consistency, based on the average inter-item correlation and can be used to test the homogeneity of the new scales created from the factor analysis results (82).

It was hypothesised that several of the potential predictor variables were not independent of each other. Cross tab analysis of each predictor variable with all others using the chi-square statistic to test for association between variables and directional measures of association for nominal variables (e.g. the Lambda statistic) to assess the strength of the association was performed. Nominal correlation statistics take values from zero to one. No relationship is implied if the statistic is zero, a perfect relationship exists if it equals one (93). One guideline for interpreting the strength of the relationship between two variables suggests it is very weak if the statistic's value is between 0.01 to 0.10, weak for the range of 0.11 to 0.25, moderate for 0.26 to 0.50, strong for 0.51 to 0.75, very strong for 0.76 to 0.99 (94).

3.9.2.3.3. Multivariate model building

The focus of the logistic regression analysis was exploratory rather than theory or model testing. The purpose of the multivariate modelling was to examine potential predictors of EBP resource use. The univariate relationship between each of the 20 potential predictor variables (outlined in Appendix H, Table 1) and the outcome of interest (EBP resource use) was examined using appropriate tests of association (chi-square test for categorical variables, odds ratio for continuous variables).

A conservative approach was used in selecting variables for the multivariate model - all meaningful variables with a univariate p-value of ≤ 0.5 were included in the initial model.

Logistic regression models were developed to examine potential predictors of EBP resource use using forwards and backwards stepwise methods. Listwise deletion was used to eliminate cases with missing variables. Decisions about adding or removing variables were guided by the log-likelihood difference between two models with and without the addition or removal of a covariate to the model and a significance level of 0.1. The Wald statistic was used to identify which variables were statistically significant predictors of EBP resource use in the multivariate model. The goodness of fit of the multivariate model was evaluated using the Hosmer-Lemeshow test statistic which indicates how well the model explains the variance of the dependent variable.

Collinearity between predictor variables can be a problem with multivariate analysis as they then provide redundant information. This redundancy confounds attempts to identify the individual contributions and relative merits of the predictor variables. Possible collinearity was identified based on clinical experience and examining the strength of association of predictor variables with each other. It was decided a priori that if variables were significantly related to each other then only one of the variables would be entered into the multivariate model. When possible, the variable that was modifiable would be chosen. For example, if the number of years of practice and exposure to EBP were highly correlated than EBP exposure would be entered into the model. However, none of the 11 variables selected through univariate analysis for inclusion in the logistic regression model were strongly related. Thus, all 11 variables were retained for entry into the logistic regression model. As a hierarchical model building strategy was used (forward stepwise), if variables had been related, the variable that was added first (contributed more to predicting the outcome) would have been retained in the model.

4. RESULTS

This chapter describes the survey response rate, the representativeness of the sample and the findings related to the primary and secondary objectives of this thesis. Information about questionnaire pilot testing results can be found in Appendix E.

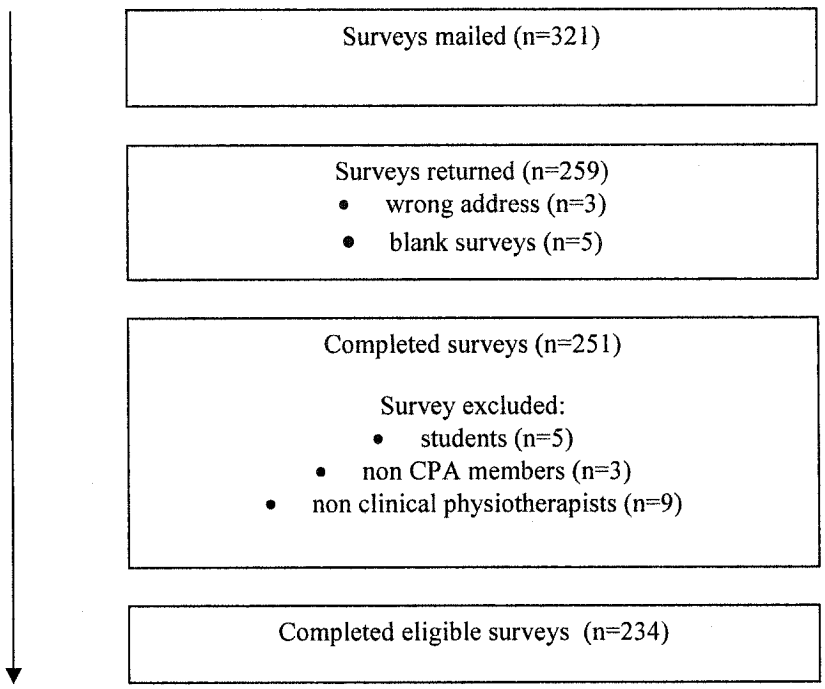
4.1. Return and response rates

The final version of the questionnaire was sent to 321 members of the CPA orthopaedic division. Table 1 illustrates the return rate after each mailing. A total of 259 (80.7%) questionnaires were returned. This included 25 unusable questionnaires. Eight questionnaires were returned blank (five were refusals and three with the wrong address), 17 were from physiotherapists who did not meet the inclusion criteria for the survey. Figure 3 outlines the reasons why 25 of the returned questionnaires were excluded from the analysis. The adjusted response rate which excluded respondents who could not be reached or did not actively treat patients from both the numerator and denominator was 77.7% (234/301).

Table 1
Survey return rate over time

Surveys returned	N	% of total questionnaires returned (out of 259)
After mailout #1	109	42.1
After mailout #2 (1st reminder letter)	86	33.2
After mailout #3	49	18.9
After mailout #4 (2nd reminder letter)	15	5.8
Total number of surveys returned (including blank)	259	100.0
Return rate = number returned / number mailed	259 / 321	80.7

Figure 3
Survey return and response results



4.2. Representativeness of the sample

When the survey response rate was examined by region with the exception of respondents from the province of Quebec (57.9%), the provincial rates exceeded 66%. There was no difference in response rate by gender.

Characteristics of survey participants and CPA members are displayed in Table 2. The proportion of physiotherapists by gender, region and employment status were similar to that of the orthopaedic division membership database. Responder characteristics were less similar to those of the entire CPA membership in terms of age, type of practice setting and years of practice.

Table 2
Characteristics of the members of the Canadian Physiotherapy Association and survey responders

Characteristic	% of CPA Orthopaedic Division members* (N = 3742)	% (95% CI) study responders (N = 234)
Gender		
Female	71	73 (70-78)
Male	29	27 (22-33)
Region of practice		
West of Ontario	42	48 (41-54)
Ontario	45	41 (34-47)
East of Ontario	13	11 (7-15)
Hours of practice		
Full time	84	83 (80-90)
Part time	16	17 (11-20)

Characteristic	% of CPA members** (N = 8,422)	% (95% CI) study responders (N = 234)
Age		
Under 30 years	26	30 (24-36)
31 to 40 years	29	31 (25-37)
41 to 50 years	25	29 (23-34)
51 or older	20	10 (6-14)
Practice setting		
Private practice	55	64 (58-70)
Hospital, rehabilitation facility	36	30 (24-35)
Home care, long term care facility, community, other	9	6 (3-10)
Number of years as a physiotherapist		
< 5	18	28 (22-34)
6 to 15	33	35 (29-41)
16 to 25	22	26 (20-31)
> 26	27	11 (7-15)

* Year 2002
** Year 2000

4.3. Characteristics of the sample

The frequency distribution of respondent characteristics is presented in Table 3. The majority of physiotherapists were female (73%), between the ages of 22 and 41, had trained in Canada and had received a bachelors degree. Over half the sample had been exposed to EBP during their training and had practiced as a physiotherapist for more than 10 years. When asked to indicate on a 100 mm visual analogue scale "overall, what

percentage of your clinical practice do you consider is currently evidence-based" responses ranged from two to 99% with a mean response of 55.39% (20.58 mm standard deviation).

Table 3
Demographic and professional characteristics of sample

Characteristic	Respondents	
	N	%
Gender (n = 234)		
Female	170	73
Male	64	27
Age (n = 234)		
0-31years	82	35
32-41 years	70	30
42-65 years	82	35
Years of clinical practice (n = 233)		
0-5 years	63	27
6-11 years	54	23
12-20 years	62	27
21-45 years	54	23
Country of physiotherapy training (n = 232)		
Inside Canada	199	86
Outside Canada	33	14
Exposed to EBP during training (n = 234)		
Yes	128	55
No	106	45
Region (n = 234)		
West of Ontario	112	48
Ontario	97	41
East of Ontario	25	11
Frequency of participation in the past 6 months in (n = 230)		
City, provincial or national conference/education meeting (> median of 0)	88	38
Courses in orthopaedics/manual therapy (> median of 1)	94	41

The practice milieu where physiotherapists who participated in this survey work is described in Table 4. Most worked in private practice and were one of several therapists

in their practice setting. Over 60% had access to the Internet and professional journals in their work place, almost 95% had access to the Internet and journals somewhere. There was significant difference in Internet access between practice locations, a smaller proportion had access in private practice (54.42%) compared with the hospital (75.75%) or community (71.43%) ($p = 0.009$). Over half of physiotherapists spent more than 21 hours per week providing direct patient care and saw more than 15 patients on a typical workday.

Table 4
Practice environment characteristics of sample

Characteristic	Respondents	
	N	%
Clinical setting (n = 234)		
Private practice	150	64
Hospital (rehab or acute) or university clinic	69	30
All other (community etc.)	15	6
Practice environment (n = 234)		
Solo practice (only physiotherapist)	49	21
Group practice (one of several)	185	79
Computer access in practice setting (n=233)		
Yes	196	84
No	37	16
Internet access (n = 232)		
Practice setting	144	62
Home or other location only	82	35
Not at all	6	3
Journal access (n = 233)		
Practice setting	165	71
Home or other location only	63	27
Not at all	5	2
Patients seen per day (n = 227)		
0-14.9 (below median of 15)	100	44
15-60 (median and above)	127	56
Hours per week in direct patient care (n = 231)		
20 or less (part time)	35	15
21 or more (full time)	196	85

4.4. Results: primary objectives

4.4.1. Attitudes towards EBP

Physiotherapists who participated in this survey have positive attitudes towards EBP. Thirty-three percent reported they were somewhat positive and 59.6% reported they had a positive or an extremely positive attitude towards the current promotion of EBP. Table 5 presents the responses to three statements about the role and value of EBP. Approximately half of the physiotherapists strongly agreed with the positive statement "practicing evidence-based care improves patient outcomes" and strongly disagreed with the negative statement "although good in theory, EBP places yet another demand on already overloaded physiotherapists".

Several demographic and practice environment characteristics were significantly related to positive attitudes towards the current promotion of EBP by univariate analysis. Physiotherapists were more likely to report positive attitudes towards the current promotion of EBP if they were younger (less than 31 years old) ($p = 0.021$), had fewer years of practice (less than five) ($p = 0.039$), viewed themselves as being early adopters of change ($p = 0.014$), were exposed to EBP during their training ($p = 0.000$), worked in a hospital ($p = 0.000$), had Internet access at work ($p = 0.007$), and saw fewer clients (i.e. less than the average number of patients per day [15]) reported by survey participants ($p = 0.002$).

Table 5
Attitudes towards EBP (responses to the question "Please circle the number corresponding to your opinion or response to the following statements.")

Statement	Strongly disagree/disagree (rating 1, 2)		Somewhat agree (rating 3)		Strongly agree/agree (rating 4, 5)		
	N	%	N	%	N	%	95% CI
Practicing evidence-based care improves patient outcomes (n = 231)	20	8.7	79	34.2	132	57.1	(50.7-63.6)
Evidence-based practice is of limited value in physiotherapy because much of physiotherapy lacks a scientific base (n = 231)	142	61.5	67	29	22	9.5	(5.71-13.3)
Statement	**Strongly agree/agree (rating 4, 5)**		**Somewhat agree (rating 3)**		**Strongly disagree/disagree (rating 1, 2)**		
Although good in theory, EBP places yet another demand on already overloaded physiotherapists (n = 231)	61	26.4	69	29.9	101	43.7	(37.3-50.2)

4.4.2. Attitudes towards EBP resources

In the survey, an EBP resource was defined as "a source of information that provides the best available evidence on a specific intervention for a specific condition (i.e. a systematic and rigorous process has been undertaken to find, evaluate and synthesize evidence of effectiveness and safety). Examples of physiotherapy EBP resources include: systematic reviews of the literature, clinical practice guidelines, and research summaries". Table 6 presents responses to each of the nine descriptors of EBP resources. Over 80% of the sample agreed that three aspects of EBP resources were important: a synopsis of the supporting evidence, a concise recommendation, and a rating of the confidence with which recommendations were made. Less than half agreed that it was important that EBP resources quantify the treatment benefit to society.

Table 6
Attitudes towards EBP resources (responses to the question "Please circle the importance of the following aspects of an EBP resource.")

Statement	Not important (rating 1, 2)		Somewhat important (rating 3)		Important (rating 4,5)		
	N	%	N	%	N	%	95% CI
Provides an extensive review of the health care literature (n = 229)	7	3.1	52	22.7	170	74.2	(68.5-79.9)
Includes a synopsis of supporting evidence (n = 227)	2	0.9	25	11	200	88.1	(83.9-92.4)
Explains differences from findings of other EBP resources (n = 227)	6	2.6	52	23.0	169	74.4	(68.7 80.2)
Describes how findings can be customized for individual patient (n = 228)	11	4.8	49	21.5	168	73.7	(67.9-79.4)
Quantifies benefit to individual patient (n = 228)	13	5.7	47	20.6	168	73.7	(67.9-79.4)
Quantifies benefit to society (n = 227)	39	17.2	84	37	104	45.8	(39.3-52.4)
Includes a description of how evidence was analysed and recommendations achieved (n = 226)	13	5.7	56	24.8	157	69.5	(63.4-75.5)
Provides a concise recommendation (n = 229)	7	3.1	23	10.0	199	86.9	(82.5-91.3)
Rates the confidence with which recommendations were made (n = 228)	9	3.9	30	13.2	189	82.9	(78.0-87.8)

4.4.3. Awareness of, access to, attitudes towards, and use of EBP resources

More survey participants were aware of the Cochrane Library (40%, 95% CI: 34 to 47%) than the CPA/OPA Inventory (18%, 95% CI: 13 to 23%) or the PEDro (21%, 95% CI: 15 to 26%). Of those who were aware of the Cochrane Library (n = 93), about half had access to it (52.7%, 95% CI: 42.3 to 63.0), and a third did not know if they had access. Of

the 49 respondents who had access to the Cochrane Library, 33 (67.9%) reported that they had accessed it. Among the 52 physiotherapists who either had access to the Cochrane Library or had been given a copy of a Cochrane review, 38 (73%) reported they had read a Cochrane review one or more times during the six months prior to the survey. Awareness of, access to, and use of the Cochrane Library, the CPA/OPA Inventory and the PEDro by survey participants are summarized in Table 8.

Table 7
Awareness of, access to, access and use of EBP resources

	Cochrane Library			CPA/OPA Inventory			PEDro		
	Total N	N	%	Total N	N	%	Total N	N	%
Aware of	234			234			234		
No		141	60.2		192	82.0		186	79.5
Yes		93	39.8		42	18.0		48	20.5
Access to	93			42			47		
No		17	18.3		14	33.3		5	10.6
Don't know		27	29.0		9	21.4		10	21.3
Yes		49	52.7		19	45.3		32	68.1
No access but given a copy		3	1.3%		1	0.4%		0	0
Read	52*			20**			32		
0		14	26.9		7	35.0		18	56.2
1-2		17	32.7		8	40.0		6	18.8
3-9		16	30.8		3	15.0		5	15.6
10 or more		5	9.6		2	10.0		3	9.4

*Cochrane Library = number who had access (49) + number without access but given a copy (3) = 52 (total of 15 given a copy some had access though)
**CPA = number who had access (19) + number without access but given a copy (1) = 20 (total of 6 given a copy some had access though)

Of the 196 respondents who had not read a Cochrane review in the last six months, 141 (60%) were not aware of the Cochrane Library. Among those who had access to the Cochrane Library less than a third (14 [27%]) had chosen not to read a Cochrane review when seeking information. Of the 218 respondents who had not read any of the EBP

resources available in the CPA/OPA Inventory, 192 (82%) were not aware of the Inventory. Among those with access to the Inventory seven (35%) had not read any of the available resources. Of the 220 respondents who had not read any PEDro resources 186 (80%) were not aware of PEDro while 18 (56%) had access to PEDro but had not read any PEDro resources in the six months prior to the survey. The main reason for not reading any of the EBP resources was that physiotherapists did not know about them (60 to 80%). Of those who were aware a minority opted not to read them (30%).

Since awareness of the three EBP resources was low, and due to the skip pattern in the questionnaire, the number of survey participants who rated the usefulness of the Cochrane Library, CPA/OPA Inventory and PEDro was also low (7 to 22% of all respondents). Of those who did rate the usefulness of the resources for their clinical decision making 66 to 88% rated the resources as "somewhat useful" or "useful" but less than 25% rated them as "very useful".

Responses to statements about Cochrane reviews are presented in Table 8. Cochrane reviews were viewed as being credible and comprehensive. The statements "slow to be updated" and "developed in a timely fashion" had the largest number of "neither agree nor disagree" responses. This may reflect respondents' lack of familiarity with Cochrane reviews and even perhaps current research findings.

Table 8
Opinion on reviews produced by the Cochrane Collaboration

Statement	Strongly disagree/disagree		Neither agree nor disagree		Agree/strongly agree	
	N	%	N	%	N	%
Credible source of information (n = 62)	1	1.6	13	21	45	72.5
Offer comprehensive synthesis of literature (n = 62)	2	3.2	19	30.6	41	66.1
Developed in timely manner (n = 61)	5	8.2	38	62.3	15	24.6
Easy to read (n = 62)	5	8.1	21	33.8	36	58.1
Easy to understand (n = 62)	3	4.8	23	37.1	36	58.1
Slow to be updated (n = 61)	3	4.9	45	73.8	13	21.3
Provide recommendations that are flexible (n = 60)	5	8.4	33	55	22	36.7
Provide recommendations that are clinically useful (n = 61)	6	9.8	24	39.3	31	50.8
Provide recommendations that are implementable (n = 61)	4	6.5	31	50.8	26	42.6

Univariate predictors of awareness of and access to the three EBP resources were explored. Significant predictors and their level of significance (p-value) are presented in Table 9. Many of the same factors which were associated with positive attitudes towards EBP were associated with awareness of the Cochrane Library. Physiotherapists who had been exposed to EBP during their training, were less than 32 years old or had practiced for less than five years, practiced in a hospital setting, viewed themselves as being early adopters of change, had more positive attitudes towards the promotion of EBP and had higher than average level of participation in continuing education activities were more likely to be aware of the Cochrane Library compared to those who did not have these characteristics.

Table 9
Summary of significant variables related to Awareness and Access to Cochrane Library, CPA/OPA Inventory, PEDro (p-value presented)

Variable	Cochrane		CPA		PEDro	
	Awareness	Access	Awareness	Access	Awareness	Access
Exposed to EBP during school	p = 0.008					
Attitudes	p = 0.00	p = 0.043			p = 0.002	
Age group	p = 0.013					
Adopter of change (median value 70)	p = 0.02	p = 0.029	p = 0.015		p = 0.029	
Continuing education	p = 0.033	p = 0.031				
Practice setting	p = 0.045					
Years of practice	p = 0.048					
Country of school of study					p = 0.016	p = 0.036
Internet access at work		p = 0.01				
Gender				p = 0.009		
Region: Ontario vs. outside Ontario			p = 0.012	p = 0.035	p = 0.038	

4.4.4. Awareness of, access to, usefulness of, and use of other sources of information

4.4.4.1.1. Journals

The Cochrane Library, the CPA/OPA Inventory and PEDro are all Internet-based EBP resources. Traditional journals, available in paper and Internet formats, can also be important sources of information for clinical decision making. Physiotherapists indicated their experience with a number of resources (including five physiotherapy specific journals); responses are provided in Table 10. Half of the respondents were unaware of the journal *Physiotherapy Theory and Practice*, one of the five highest quality physiotherapy journals (39). When the responses for each resource were examined

individually it appeared less than a third of respondents were aware of but could not access resources. The top three journals that were "read regularly" were *Physiotherapy Canada* (59.6%, 95% CI: 53.1 to 66.1%), *Physical Therapy* (20.6%, 95% CI: 15.3 to 26.0%) and *Spine* (9.9%, 95% CI: 6.0 to 13.9%). With the exception of *Physiotherapy Canada* less than 21% of survey participants read any journals regularly (range 5 to 20%).

Table 10
Awareness of, access to, and use of journals

Resources	Unaware of	Aware of but cannot access	Can access but not used	Read once	Read occasional -ly	Read regularly
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Physiotherapy journals						
Physiotherapy Canada (n = 223)	1 (0.4)	4 (1.8)	8 (3.6)	5 (2.2)	72 (32.3)	133 (59.6)
Physical Therapy (n = 223)	3 (1.3)	31 (13.9)	13 (5.8)	11 (4.9)	119 (53.4)	46 (20.6)
Australian Journal of Physiotherapy (n = 223)	32 (14.3)	85 (38.1)	24 (10.8)	23 (10.3)	52 (23.3)	7 (3.1)
Physiotherapy Theory and Practice (n = 220)	123 (55.9)	27 (12.3)	15 (6.8)	25 (11.4)	26 (11.8)	4 (1.8)
General resources						
Spine (n = 222)	8 (3.6)	48 (21.6)	23 (10.4)	26 (11.7)	95 (42.8)	22 (9.9)
Database of Abstracts of Reviews of Effectiveness (part of the Cochrane Library) (n = 226)	133 (58.8)	27 (11.9)	17 (7.5)	16 (7.1)	24 (10.6)	9 (4.0)
Archives of Physical Medicine and Rehabilitation (n = 223)	24 (10.8)	60 (26.9)	30 (13.4)	24 (10.8)	77 (34.5)	8 (3.6)
The Journal of Bone and Joint Surgery (n = 227)	45 (19.8)	57 (25.1)	31 (13.7)	27 (11.9)	61 (26.9)	6 (2.6)
British Journal of Sports Medicine (n = 220)	53 (24.1)	68 (30.9)	33 (15)	31 (14.1)	34 (15.5)	1 (0.4)
British Medical Journal (n = 214)	41 (19.2)	72 (33.6)	42 (19.6)	28 (13.1)	30 (14)	1 (0.5)

The *British Medical Journal* was the least frequently read journal by survey participants although its impact measures (presented in Table 11) indicate its articles are frequently

cited in academic publications. In contrast, the only journal read regularly by survey physiotherapists, *Physiotherapy Canada*, did not produce enough journal citations to even generate an academic impact rating. The intention of presenting the impact factors in Table 11 is not to compare impact factors (impact factor or immediacy index) between journals. The information is presented to make the observation that impact factors (which are often used as measures of academic impact) are not necessarily indicative of clinical impact as measured by the frequency of journal readership among clinicians.

Table 11
Comparison of frequency of journal reading and citations

Resources	Impact factor *	Immediacy index +	Read occasionally	Read regularly
			N (%)	N (%)
Physiotherapy journals				
Physiotherapy Canada	none	none	72 (3.23)	133 (59.6)
Physical Therapy	1.14	0.28	119 (53.4)	46 (20.6)
Australian Journal of Physiotherapy	0.22	0.06	52 (23.3)	7 (3.1)
Physiotherapy Theory and Practice	none	none	26 (11.8)	4 (1.8)
General resources				
Spine	1.85	0.38	95 (42.8)	22 (9.9)
The Journal of Bone and Joint Surgery	none	none	61 (26.9)	6 (2.6)
Archives of Physical Medicine and Rehabilitation	1.37	0.16	77 (34.5)	8 (3.6)
British Journal of Sports Medicine	1.03	0.32	34 (15.5)	1 (.05)
British Medical Journal	6.63	3.19	30 (14)	1 (0.5)

* frequency "average" journal article is cited
\+ how quickly "average" journal article is cited

4.4.4.2.Preferred sources of information

In addition to questions about specific EBP resources physiotherapists were asked to "list any sources of information [they] found particularly useful in informing [their] clinical

decision making". Sixty-two percent of physiotherapists provided responses. Resources were categorized and coded and into one of the types listed in Table 12.

Table 12
Response to open ended question "Please list any sources of information that you have found particularly useful in informing your clinical decision making." (grouped by response type)

Category	N	%	Examples included
Courses	61	26.1	Workshops
Journal(s)	59	25.2	*Physiotherapy Canada*
Newsletters	43	18.4	Backletter, ortho(paedic) division review, APTEI report
Colleagues (n = 38) or study groups (n = 1)	39	16.6	"peer knowledge", "peer review discussions", physiotherapists and any other health professional listed
Internet	22	9.4	Medscape, Pubmed
Books	15	6.4	
Medical library service	6	2.6	Librarian
Performing a literature review	4	1.7	
Clinical experience	4	1.7	
Clinical practice guidelines , systematic reviews, meta-analysis	5	2.2	

Survey participants were also given a list of sources of information and asked to "select the three that you use most often." Responses are summarized in Table 13.

With the exception of journals (which could be considered both a traditional and potential EBP resource) traditional sources were used more often than potential EBP sources. Interactive information sources (hands on workshops and clinical experience) were more frequently cited in the top three than other sources. EBP resources and CPGs had the lowest frequency of all information sources listed.

Table 13
Information sources used most often

	% of total sample ranked #1	% of total sample ranked #2	% of total sample ranked #3	Cumulative % of total sample (#1-3 + checked)*
Traditional information sources				
hands on workshop/course	25.2	31.6	17.9	79.4
clinical experience	38.9	10.7	12.4	67.6
opinion of colleagues	6	15.8	13.7	37.6
lectures/seminars/inservice	4.7	11.1	13.2	30.7
peer study group/journal club	2.6	1.7	4.7	9.4
Potential EBP-related information sources				
journals, e journals, books or reference, articles	15	15.8	23.1	57.3
web resources	0.4	4.3	3.4	8.5
CPGs	1.3	2.6	3.8	8.1
EBP resources such as Cochrane Library, CPA, PEDro	0.9	0.9	2.1	3.9

* includes responses indicated with a check mark rather than ranked one through three

4.5. Results: secondary objectives

4.5.1. Barriers to research use

Barriers to research use were clustered into three types: characteristics related to the potential user (physiotherapist), the practice environment, and the innovation (EBP resource). Time is a dimension that appears to cut across all three areas. The main barriers to research use identified by physiotherapists from the Funk barriers questions were: (1) not enough time to read research, and (2) the relevant literature is not compiled in one place (Table 14). Analyzing the responses by the percent reporting "great or moderate extent" or by mean score both identified these two as the top barriers.

Table 14
Barriers to research utilization (responses to the question " We would like to know the extent to which you think each of the following situations is a barrier to your use of research to alter/enhance your practice.")

Statements	No or little extent		Moderate or great extent		No opinion	
	n	%	n	%	n	%
Characteristics of the practice environment						
I do not have time to read research (n=231)	81	35.1	150	65.1	0	0
Patients demand treatment despite lack of evidence for effectiveness (n=230)	102	44.3	124	53.9	4	1.7
There is insufficient time on the job to implement new ideas (n=229)	125	54.6	104	45.4	0	0
The administrative environment does not provide support for the use of EBP resources (n=229)	136	59.4	77	33.6	16	7
I do not have enough authority to change patient care procedures (n=230)	201	87.4	28	12.2	1	0.4
Characteristics of the potential user:						
I do not feel capable of evaluating the quality of the research (n=231)	132	57.1	95	41.1	4	1.7
I am isolated from knowledgeable colleagues with whom to discuss the research (n=231)	154	66.7	76	32.9	1	0.4
I am unaware of research that might be relevant to my practice (n=232)	175	75.4	55	23.7	2	0.9
Characteristics of the research						
The relevant literature is not compiled in one place (n=227)	81	35.7	139	61.2	7	3.1
The literature reports conflicting results (n=232)	99	42.7	117	50.4	16	6.9
The research has methodological inadequacies (n=230)	75	32.6	115	50.0	40	17.4
Statistical analyses are not understandable (n=232)	119	51.3	108	46.6	5	2.1
Research is not reported clearly and readably (n=232)	131	56.6	95	40.9	6	2.5
There is not enough evidence to support my clinical decision (n=225)	142	63.1	71	31.6	12	5.3

For the practice environment factor the biggest barriers were the items "I do not have time to read research" (65%) and "Patients demand treatment despite lack of evidence for effectiveness" (54%). Less than half of respondents felt "There is insufficient time on the job to implement new ideas" (45%). Only about a third of respondents felt that their administrative environment did not support the use of EBP resources. As well, some

physiotherapists felt that they lacked authority to change patient care procedures – this, though, was by far the least frequently identified barrier (12%).

For statements about the quality of the research the number of "no opinion" responses was higher than for any other factor. Seventeen percent of participants were unable to say whether methodological shortcomings in the research were a barrier. Seven percent were unsure about the item "the literature reports conflicting results." However, 50% identified these factors as major barriers to research use. Presentation and accessibility of research were identified as important barriers by 40 to 60% of physiotherapists.

Less than half of physiotherapists identified potential user related barriers as major barriers. Forty percent reported they felt their inability to evaluate the quality of the research was a barrier. Under a third indicated that isolation from knowledgeable colleagues with whom to discuss the research and lack of awareness of research were barriers to research use.

Examining the responses to the barriers questions for each category, the main barriers to research utilization were the items grouped under practice environment and EBP resource research characteristics.

Sixty-six physiotherapists (28% of survey participants) identified additional barriers to research use in response to an open-ended question. Lack of clinically relevant research, inaccessibility of research resources and financial issues emerged as a significant theme. Physiotherapists felt that the interventions studied, the comparison groups (e.g. use of placebo instead of an active control or combined interventions) and the type of study patients (young straightforward patients vs. multi-problem sedentary patients with co-

morbidities) included in research studies were not reflective of current clinical reality. Several therapists noted a dearth of research for specialists and those who use complementary techniques (e.g. craniosacral therapy). The cost of obtaining research results (e.g. journal subscriptions or travel time to a medical library), the language used in research reports and a lack of synthesis of results were identified as barriers to using research to enhance practice. Many physiotherapists indicated that they were currently paid only for time spent with patients – not for time spent seeking out research to alter practice. Lack of awareness, knowledge and research skills emerged as physiotherapist related barriers. Interesting and telling quotes from some of the participants are presented in Appendix I. One respondent summarized the major barriers related to practice environment, the research itself and the potential user as follows: "I don't have access to research articles in my clinic. When I try and find answers to my questions often I can't find what I really want. Interpreting studies is difficult. I only recently became aware of potential bias, methodological flaws etc."

4.5.2. Facilitators of research use

Sixty-five percent (153/234) of survey respondents provided one or more suggestions for facilitating the use of research in practice. An overwhelming majority of the suggestions related to improving the presentation and accessibility of research findings. These factors relate to both the research itself and the practice environment.

Providing access to succinct user-friendly research reviews and summaries was the most frequent suggestion. The need for research results that are applicable to physiotherapy practice – clinically relevant research – was highlighted (27 comments). Respondents

called for clinical research comparing active and combined treatments. Access was seen as an important facilitator. Suggestions for improving access to research included providing free access to Internet (14 comments) and compiling user-friendly (described as synthesized, pre-evaluated and easy to implement) research summaries (69 comments) in one place (70 comments). A freely accessible Internet website was a suggested place to compile easy to implement research reports (28 comments).

Protected time provided at work for education and research activities (29 comments), interactive presentations, and discussions with colleagues involving a research resource person (33 comments) were commonly suggested potential facilitators related to the practice environment .

Only seven respondents suggested that knowledge and skills training would facilitate the use of research in practice. Appendix I contains comments that illustrate some of survey participants' suggestions for facilitating research use. More comments were categorized as factors related to research rather than practice environment or physiotherapist characteristics.

4.5.3. Predictors of EBP resource use

4.5.3.1.Definition of an EBP resource user

Since few survey respondents had used the Cochrane Library, CPA/OPA Inventory, or PEDro resources, the number of therapists who met the primary definition of an EBP resource user was too low to conduct multivariate logistic regression (12/231, 5%). Therefore I used the secondary definition of EBP resource user (a physiotherapist who

read resources regularly from any of the three EBP resources of interest (Cochrane Library, CPA, PEDro) or any of the seven additional EBP journals) for multivariate modelling. Sixty-five percent of physiotherapists in the survey met the secondary definition of an EBP resource user.

4.5.3.2. Definition of predictors of EBP resource use

Principal components analysis and common factor analysis extraction methods with Varimax rotation of the nine EBP resource statements from question 23 of the survey both extracted two factors that accounted for 57.9% of the variance of the data (results from principal components analysis with orthogonal Varimax rotation shown in Appendix J). The items in each factor appeared to combine to form two meaningful and identifiable subscales: trustworthiness of the research message and research application (outlined in Table 15). The factor "trustworthiness of the research message" represents the quality of both the process and the result of evidence synthesis. The methodological quality of the process used to distil the evidence (e.g. extensive review of literature, description of how evidence analysed) and the resulting message – how the information is given – (e.g. explanation of differences from other findings, confidence in recommendation, synopsis provided) is captured by this factor. Statements captured by the factor "research application" describe how to put synthesized information into context and how to make use of it in clinical practice.

Table 15
EBP resource scales created from factor analysis

Factor	Statement
Trustworthiness of the research message	Provides an extensive review of the health care literature
	Includes a description of how evidence was analysed and recommendations achieved
	Explains differences from findings of other EBP resources
	Includes a synopsis of supporting evidence
	Rates the confidence with which recommendations were made
Research application	Describes how findings can be customized for individual patient
	Quantifies benefit to individual patient
	Quantifies benefit to society
	Provides a concise recommendation

Based on the two research components, the nine EBP resource statements were split and combined into two new variables by calculating a simple average score. For example, responses to the five statements that loaded on the "trustworthiness of the research message" factor were summed and divided by five to create a value for the new variable trustworthiness of the research message. Similarly, the responses to the four statements that loaded on the factor "research application" were summed and divided by four to create data values for the new variable research application.

The homogeneity of the new EBP resource scales was high. Cronbach's alpha (α) was 0.78 and 0.77 for internal consistency of the research application scale and trustworthiness of the research message scales respectively. This indicated that the scales both had a high degree of internal consistency without item redundancy. Streiner and Norman suggest that α should be above 0.70, but not higher than 0.90 (82).

The distribution of the "trustworthiness of the research message" and "research application" variables was unimodal and near normal (distribution of values 2-5 and 1.5-5 respectively). These index variables used the same five point Likert scale as their constituent variables and were considered as continuous variables for entry into the logistic regression model.

Although several of the predictor variables were significantly associated with each other the strength of the association was only weak to moderate for most relationships ($r < 0.26$). The exception was a strong relationship between age and exposure to EBP in school ($r = 0.64$) where younger physiotherapists were more likely to have been exposed to EBP. Appendix K presents statistics describing the relationship between predictor variables considered for inclusion in the logistic regression model.

4.5.3.3.Univariate analysis and variable selection for the multivariate model

The variables that were significantly related to EBP resource use in the univariate analysis are presented in Appendix H, Table 1. Physiotherapists were more likely to use EBP resources regularly if they worked in a hospital or community setting, compared to those who worked in private practice setting ($p = 0.045$). Those who rated aspects of trustworthiness of the research message as important for EBP resources were also more likely to use EBP resources ($p = 0.04$). Therapists who did not view the lack of relevant literature compiled in one place as a potential barrier to research use were more likely to be EBP resource users ($p = 0.024$). Lack of time as a barrier to research use was not a statistically significant predictor of research use ($p = 0.064$) but may be important clinically and worth considering in future studies.

4.5.3.4. Multivariate model

Selecting all meaningful variables with a univariate p-value of ≤ 0.5 into the initial model resulted in the inclusion of eleven variables representing the broad categories of the potential user, the practice environment and the EBP resource. Initial physiotherapist variables included response to change (early or late adopter), attitude towards the promotion of EBP, exposure to EBP during training, and frequency of participation in continuing education orthopaedic courses; practice environment variables included practice location, group or solo practice, access to journals, access to Internet; and whether lack of time to read research findings was viewed as a barrier to using research in clinical practice. EBP resource variables were views on the trustworthiness of the research message and whether literature not being compiled in one place was a barrier in using research. Since the two EBP resource variables were moderately related a second logistic regression model was developed which included all 11 variables from the first model plus the variable research application.

The best fit final model was developed using a dataset of 211 physiotherapists. Both forward and backward hierarchical modelling approaches retained only two of the 11 variables entered into the model: trustworthiness of the research message and research application. Each of the predictors in the multivariate model is a statistically significant predictor of EBP resource use as given by the Wald statistic (Table 16). The Hosmer-Lemeshow test for goodness-of-fit is 5.98 with 8 degrees of freedom and a p-value of 0.649 indicating that overall the model is a very good fit to the data. The classification table indicates that the overall percent of correctly predicting cases is 68.2%.

Table 16
Predictors of EBP resource use

Variable	Beta	S.E.	Wald	df	Sig.	OR	95.0% CI for OR)	
							Lower	Upper
BARLIT (Literature not a barrier)	.747	.321	5.407	1	.020	2.110	1.124	3.958
TRM (Trustworthiness of the research message important)	.554	.266	4.330	1	.037	1.740	1.033	2.933
Constant	-1.846	1.099	2.820	1	.093	.158		

The variables included in the final model were (1) relevant literature compiled in one place as a potential barrier to research use and (2) trustworthiness of the research message. Physiotherapists who do not view a lack of research being compiled in one place as a barrier to using research in practice were twice as likely to use EBP resources regularly than those who view relevant literature not being compiled in one place as a barrier (OR 2.11, 95% CI: 1.12 to 3.96). For each one point increase (on a scale from one to five) in the importance rating of trustworthiness of the research message the odds of using EBP resources were nearly double for those who indicated that characteristics describing the trustworthiness of the research message were important in EBP resources (OR: 1.74, 95%CI: 1.03 to 2.93) compared to those who did not. A physiotherapist's opinion regarding the trustworthiness of the research message was the most powerful predictor of whether they were an EBP resource user or not.

5. DISCUSSSION

This chapter discusses the use of EBP resources among physiotherapists who participated in this survey, offers recommendations to facilitate physiotherapists' use of EBP resources, considers potential limitations of the survey results, and suggests areas for future research.

5.1. Physiotherapists' use of EBP resources

This study aimed to estimate the use of specific Internet-based resources such as the Cochrane Library, the CPA/OPA Inventory and the PEDro by physiotherapists. Like other studies conducted after the release of clinical practice guidelines(67), results of this thesis indicate less than satisfactory awareness of and use of these three EBP resources. Less than 40% (40%, 95% CI: 34 to 47) of survey participants were aware of the Cochrane Library, and less than 20% were aware of the CPA/OPA Inventory (18%, 95% CI: 13 to 23) or the PEDro (21%, 95% CI: 15 to 26). Sixteen percent of physiotherapists had read a Cochrane review in the six months prior to the survey. Few physiotherapists in the thesis survey could be considered regular users of the Cochrane Library; nine percent (21/234) had read a Cochrane review three or more times in the six months prior to the survey.

Failure to use the Cochrane Library, CPA/OPA Inventory and PEDro was most frequently associated with lack of awareness of these resources (60 to 82% were unaware) followed by lack of access (32 to 55% did not have access). However, awareness of and access to EBP resources did not necessarily translate into use. Among physiotherapists who had access to the Cochrane Library 70% had read a Cochrane

review in the six months prior to the survey; only 40% (21/52) read Cochrane reviews on a regular basis.

These findings are similar to those among other health care professionals. Thirty-three percent of Canadian family physicians and 12% of nurses affiliated with a regional cancer centre were aware of the Cochrane Library (1998- 2000) (34). In a survey of New Zealand general practitioners, conducted in the year 2000, 42% (95% CI: 37 to 47) were aware of the Cochrane Library, and just 16% had ever read a Cochrane review (32). Although use was measured slightly differently in other surveys conducted between 1997 and 2001, the proportion of regular readers has been reported to be four to six percent among physicians (14,33,74,95,96) which is not dissimilar to the nine percent of physiotherapists in this thesis. These results suggest that Canadian physiotherapists may be in a similar position as other health care professionals in terms of awareness of and use of the Cochrane Library.

Access to the Internet is a prerequisite for using Internet-based EBP resources such as the Cochrane Library, the CPA/OPA Inventory and the PEDro. In this thesis sixty-two percent (95% CI: 55 to 68) of survey participants had access to the Internet in their practice environment although 97% had access somewhere. This finding is somewhat higher than that reported among general practitioners (GPs) in the past few years. In studies conducted in the United Kingdom (1997) it has been reported that 17% of GPs had access to the Internet in their practice (74), in New Zealand (2000) 40% (95% CI: 36 to 46) had Internet access in their practice (32) and in 67% (95% CI: 53 to 78) of Australian GPs (2001) had access to the Internet somewhere (work or home) (66). What is not clear from this research or others is whether a computer with Internet access was

available at the point of decision making and delivery of care (i.e. where a health care professional and a patient interact). Access to the Internet at work is important to consider as it was a positive predictor of attitudes towards the current promotion of EBP in this study and is an important source of EBP related information.

When the secondary definition of an EBP resource was used, 65% of physiotherapists met this definition [a physiotherapist who read a resource from the Cochrane Library, CPA/OPA Inventory or PEDro more than once in the past six months or read one or more of the top seven physiotherapy relevant EBP journals "regularly"]. There is no gold standard definition for either an EBP resource or an EBP resource user. The definition used in this thesis considers that an EBP resource user may use a number of different resources infrequently and/or a few sources frequently. The sources of information included in the secondary EBP resource definition included CPGs and systematic reviews and provide the best available external clinical evidence from systematic research.

The majority of EBP resource users were journal readers (64.5% were EBP journal readers while only 11.1% were Cochrane Library, CPA/OPA Inventory or PEDro readers). Most physiotherapists met the definition because they read the journal *Physiotherapy Canada* (59.6% of physiotherapists read it regularly). Less than 20% of survey participants read any other journals regularly (range 5 to 20%). Given that all survey participants were members of the CPA and therefore received the journal *Physiotherapy Canada* quarterly, I expected the number of EBP resource users to be higher. The low readership may reflect a lack of predisposition to reading and/or research as a source of information. It may also reflect how the journal is valued and viewed by clinicians. In a recent survey conducted by the CPA, 42% of readers agreed that

Physiotherapy Canada was their primary source of current physiotherapy research but only nine percent stated that *Physiotherapy Canada* contributed "very much" to their performed work (97).

5.2. What influences research use?

Physiotherapists who perceived the lack of relevant literature compiled in one place as a barrier to research use and those who put lower value on the trustworthiness of the research message were less than half as likely to be EBP resource users. Synthesized research summaries are important – the findings of this study suggest that high quality synthesis of evidence summarized and compiled in one accessible place may facilitate the use of research findings in clinical practice.

In the multivariate modelling the variable representing the trustworthiness of the research message was the most powerful predictor of EBP resource use. It was surprising to discover that the variable representing research application was not a significant univariate or multivariate predictor of EBP resource use. This may reflect that physiotherapists are primarily looking for a credible synthesized research message or the "bottom line."

Research application relates to how to use and apply the research message, how to engage with it. This involves both physiotherapist and patient values, preferences and judgment. Deciding who would benefit from a treatment, the magnitude of the benefit and under which circumstances may a less important aspect of an EBP resource for physiotherapists. Alternatively, it may be that assessing the trustworthiness of the research message precedes deciding how to apply it. The majority of physiotherapists in

this survey may be at the first stage of developing an appreciation for whether an EBP resource is valid or not. Assessing research application may be a second stage. This coincides with the key steps of EBP as evaluation of the validity of evidence precedes evaluation of its usefulness (13). It is important to note that the logistic regression analysis was exploratory and further examination of the potential relationship between the variables "research application" and the "trustworthiness of the research message" and EBP resource use is needed.

Time to access and read EBP resources is important. Although a lack of time did not emerge as a significant predictor of EBP resource use in multivariate modelling in this study, it approached significance as a univariate predictor ($p = 0.06$) of EBP resource use. "I do not have time to read research" was identified as a barrier to using research by more survey participants (64%) than any of other of the 13 Funk barriers (73) statements in question 25. Time-related issues also emerged from the open-ended questions. Designated protected time to interact with colleagues regarding research findings or to participate in seminars was a common suggestion. This may reflect an understanding of what research suggests - interactive strategies appear to be helpful in facilitating the integration of research findings into clinical decision making (98).

Although a lack of time to read research was identified as a barrier to using research, physiotherapists did not identify a lack of support for EBP resources from their practice environment as a barrier. However, there was a disconnect between the closed ended response to question 25 and the qualitative responses where many identified that their work environment did not provide EBP resources or support paid time or activities outside of direct patient care. Time, resources, education and training are all supports that

need to be provided by the environment if it is truly supportive of evidence-based care. Perhaps physiotherapists interpreted question 25 to ask whether their practice environment was theoretically supportive of using EBP resources. This needs further study.

Among qualitative responses, a theme emerged that many physiotherapists expected the CPA to evaluate, summarize the quality of research and make it readily accessible (via newsletter, web and interactive presentations). Respondents had greater expectations of the CPA than of their work place to provide resources for supporting the integration of research into practice. There were mixed opinions regarding whose responsibility it was to create time to connect with research. Many therapists felt this was their responsibility as a professional while others felt this responsibility was shared by their employers and paid time within work should be provided for keeping up with research findings.

Lack of time is a barrier that is pertinent to all the categories of potential user, practice environment and EBP resource and is common to all health care professionals (40,60-62, 74,79,99). However in nursing studies using the barriers scale insufficient authority to change patient care procedures emerged as one of the most frequently reported barriers (60,100). In contrast physiotherapists who participated in this thesis survey did not feel that they lacked authority to change patient care procedures. In fact it was the least frequently identified barrier of all the statements (only 12% identified it as a barrier).

Funk's integrative review of the barriers and facilitators to nursing research utilization (60) identified similar facilitators to those suggested by participants in this thesis study. Improved access to research reports, more clinically relevant research, and more readable

research reports were all common suggestions. The strongest predictor of EBP resource use in this thesis study was how strongly physiotherapists valued research message synthesis and the trustworthiness or quality of the message. This finding is similar to that identified in studies of physicians uptake of clinical guidelines where physicians perception of quality influenced uptake of guidelines (48,74).

5.3. Limitations

As with all knowledge, attitude and practice surveys there are potential limitations, these include self-report bias, social response bias and generalisability.

Self-report bias may have inflated or deflated the reported use of EBP resources in this survey. Physiotherapists may have unintentionally reported higher or lower use of EBP resources than actual use. Therefore, a random sample and efforts to obtain a high response rate were made. When considering the potential for self report bias it is worth noting that Covell et al (23) compared self-reported use and observed use of information sources among physicians and found that physicians tend to over report their use of journals and books and underreport their reliance on colleagues' opinions. Thus the proportion of physiotherapists who were EBP resource users may actually be lower than reported in this thesis.

Social response bias may have caused physiotherapists to intentionally overreport their use of EBP resources in this study as the use of EBP resources may be perceived as socially desirable in an age of EBP. However physiotherapists appeared to consistently report relatively low use of EBP resources. Only six percent of physiotherapists reported

using EBP resources to assist clinical decision-making "routinely" and only 11% reported that EBP resources were in their top three most frequently used sources of information. Nine percent reported having read a Cochrane review more than three times; all nine percent were able to provide the topic or title of a review they read. Moreover, of the Cochrane Library, CPA/OPA Inventory and the PEDro, survey participants reported the lowest awareness of and use of their own association's resource. The confidence intervals for use of the Cochrane Library and the CPA/OPA Inventory do not overlap. A recent study among German physicians examined the tendency to report socially desired responses and concluded that while about 10% of the responses were inaccurate this was not likely caused by social response bias (84). Self report bias and social response bias are likely not major limitations in this study because physiotherapists reported low awareness (despite the fact the three EBP resources were described in the questionnaire) and use of EBP resources and discriminated between the types of resources in their answers.

Comparison of the sample and the population characteristics suggests that older physiotherapists and those who practice in the community may have been underrepresented. However data for age and practice location characteristics were only available for the entire CPA membership and not for the orthopaedic division specifically. Physiotherapists who practice in the area of orthopaedics are more likely to work in private practice and less likely to work in home care compared to the general CPA membership. CPA members who have been physiotherapists longer are more likely to be in administrative or research roles and physiotherapists not currently seeing patients

were excluded from the analysis. Therefore, there is no reason to suspect that the results are not generalisable to CPA orthopaedic members.

The definition and measurement of EBP resource use was imperfect. There are many approaches to defining EBP resources and one may argue that EBP is not limited to the use of one or two forms of scientific evidence, such as CPGs or systematic reviews. However, when attempting to measure a concept such as EBP resource use it is necessary to define it. The sources of information included in my EBP resource definitions included CPGs and systematic reviews and provide the best available evidence from systematic research. While a multitude of studies have examined research utilization there is not a feasible, valid and reliable gold standard approach to measurement of this concept. As no formal scales or instruments were available to measure EBP resource use I developed a questionnaire, drawing questions from previous surveys whenever possible.

In reality EBP resource use is not a dichotomous variable. Use was measured by self-reported reading so at best is a proxy measure of use in clinical decision making. Ideally, one would measure ongoing EBP resource use, the impact of EBP resource use on health professional's behaviour and ultimately on the health of their patients.

Lastly, it is not possible to know how generalisable these results are to therapists working throughout Canada. Approximately 65% of Canadian physiotherapists are members of CPA (estimation based on CIHI and CPA reports). It may be that CPA members differ from non members in that they have more interest in professional activities. If this is true, and if awareness and use of EBP resources is low among CPA members, it is likely to be even lower among the general population of physiotherapists in Canada.

5.4. Future research

The findings support the development, implementation and evaluation of a dissemination strategy aimed at raising awareness of and encouraging positive attitudes towards EBP resources for physiotherapists. The strategy's effectiveness should be evaluated through a RCT by measuring awareness of and use of these resources in a randomized intervention group that received the dissemination strategy compared to a control group.

The multivariate analysis performed in this thesis was exploratory and the model presented is not the final model for predicting EPB resource use. The relationship between the perception of the trustworthiness of the research message and the perception of research being compiled in one place predicting EBP resource use needs to be tested prospectively. The multivariate model predicting EBP resource use needs to be validated on a new dataset. Further exploration of the potential relationship between the level of participation in continuing education activities and EPB resource use is warranted. In future surveys it would be informative to measure participation in terms of hours (unit of measurement) and specific activities (rather than the location of the activity).

EBP resource use was self-reported in this study. It would be informative to track electronically actual use of the EBP Internet based resources and compare this with self-reported use.

The variables representing the potential user, the practice environment, and EBP resources in my questionnaire were generic rather than specifically related to a particular clinical question, specific evidence or situation. To better understand facilitators and barriers to research use, especially those related to the practice environment, it would be

helpful to develop a clinical encounter case study scenario and examine physiotherapists' awareness of, access to and use of evidence related to the patient scenario in a specific practice environment.

6. CONCLUSIONS AND RECOMMENDATIONS

This study provides a measure of EBP needs and resource use among Canadian physiotherapists. An important factor contributing to physiotherapists not using EBP resources is that they were unaware of them (although awareness did not necessarily translate into use for everyone). Closing the knowledge gap between research evidence and clinical practice will require interdisciplinary teamwork. Systematic reviews of interventions aimed at improving health professionals' clinical behaviour have concluded that there are no "magic bullets" and suggest multi-faceted strategies are needed (12,69). Drawing on the results of this study and a review of the knowledge translation literature I offer several suggestions for the CPA, EBP resource developers, health care administrators, physiotherapists and the public.

6.1.Recommendations for the CPA

(1) Rather than promoting "evidence-based practice" the CPA might consider promoting "evidence-informed practice." Physiotherapists who participated in this survey generally had positive attitudes towards the current promotion of EBP. However, many expressed concerns about the lack of clinically relevant research and questioned whether there was enough research on which to base practice. Clinical research is constantly producing new findings that may contribute to effective patient care. Physiotherapists need to know if the current evidence for interventions they provide is conclusive or not. Inconclusive scientific evidence does not necessarily mean a therapeutic approach should not be used. Therapists must combine research findings with clinical expertise, patient values and practice

environment factors (e.g. time and finances) in clinical decision making. Knowing that the current available evidence is inconclusive is consistent with keeping up to date with research – the therapist is informed.

(2) Widespread active dissemination of EBP synthesis resources such as Cochrane Library, CPA/OPA Inventory, and PEDro is needed to address lack of awareness of these sources. Physiotherapists want relevant literature compiled in one place. A high proportion of respondents were unaware of these three high quality EBP resources. Most research indicates that dissemination of educational materials may not be effective at changing practice but the outcomes affected by dissemination (knowledge, beliefs, attitudes) appear to be important precursors to behaviour change (101,98). More recent research suggests dissemination may be as effective as multi-faceted strategies in changing behaviour and is less costly (102). Dissemination of materials in *Physiotherapy Canada* may be effective as this was the information source read most frequently by survey participants. Raising awareness of these resources could be done by making them available at CPA sponsored continuing education events.

(3) Use of resources may also be encouraged by offering interactive workshops that teach critical appraisal skills and introduce physiotherapists to EBP tools such as CPGs and systematic reviews and EBP resources that house these such as the PEDro. Systematic reviews and trials report that there is evidence that teaching critical appraisal skills has positive effects on participants' knowledge and attitudes towards the medical research literature. It is not yet clear whether the teaching impacts decision making or patient outcomes (103,104,68). Curriculum

for critical appraisal skills education is freely available (e.g. the Critical Appraisal Skills Program www.caspinternational.org.uk). Hands on workshops and courses appear to be a preferred way to learn as they were ranked in the top three most frequently used sources of information by 79% of physiotherapists in this survey. This finding is consistent with the results of a 1994 survey of 644 Ontario physiotherapists which indicated conferences or workshops should be used as a primary vehicle for the delivery of continuing education programs (105). Training physiotherapists to be information literate means not only being able to locate information but being able to assess its relevance and credibility.

(4) The role of opinion leaders in physiotherapy is not yet known. Opinion leaders are health care professionals identified by their colleagues as being educationally influential (have the ability to influence health professionals practice). Research examining the use of local opinion leaders to influence professional practice among physicians and nurses reports mixed results. Several studies have found that the use of opinion leaders improved some but not all of the outcomes measured (106).

(5) The CPA could facilitate the use of evidence in practice by hosting interactive conferences bringing together researchers, clinicians and administrators to examine the state of the evidence, share latest research findings, and discuss together implications for practice. The Canadian Institutes for Health Research and the Canadian Health Services Research Foundation have both stressed in recent knowledge translation recommendations the importance of building linkages for exchange between producers and users of research. Both

organizations hypothesize that the transfer of knowledge between producers and users of research may be facilitated by knowledge brokers whose role is to build relationships and focus on activities that enhance communication between these groups (107-110).

(6) Finally, the CPA website could be used as a portal to credible sources of relevant information for physiotherapists. For example the CPA website could provide links to the Cochrane Library and PEDro. There is some evidence that among physicians, endorsement by their own organization or a respected colleague or more than one major organization positively influences adoption of CPGs (76).

6.2.Recommendations for EBP resource developers

(1) Many studies have found that perceptions of CPGs affect their use (78,113,114). It is important to provide information about the process used to develop the EBP resource (including details on the literature review, methods for analyzing evidence and formulating recommendations) and rate the confidence with which a recommendation is made. These aspects of an EBP resource were represented by the factor "trustworthiness of the research message." In this survey a physiotherapist's value of the trustworthiness of the research message was the most powerful predictor of whether he/she was an EBP resource user or not. Those who valued the trustworthiness of the research message were at least twice as likely to be EBP resource users. This affirms that aspects of EBP resources already outlined by many EBP resource providers (such as the Cochrane

Collaboration and PEDro) are important and their inclusion in research synthesis reports and EBP tools appears related to their use. Published literature supports the importance of the trustworthiness of information as indicated by source credibility, research evidence to support the information and currency of the information (111,112).

(2) Continue to compile synthesized evidence in one place and provide Internet links to other credible sources of information. Physiotherapists who did not view a lack of research being compiled in one place as a barrier to using research in practice, were twice as likely to use EBP resources regularly as those who viewed relevant literature not being compiled in one place as a barrier. This affirms the value of EBP resources such as those examined in this survey (Cochrane Library, CPA/OPA Inventory, PEDro) which aim to provide rapid access to a clearinghouse of high quality synthesized clinically relevant research information to support EBP.

(3) Promote the importance of the trustworthiness of research and then promote the EBP resource as being a source of trustworthy information. It may not be enough to market a resource as being the single best source of evidence if physiotherapists don't appreciate what that means. The results of this survey suggest that physiotherapists may need to understand why the trustworthiness of the research message is important before they will use it. Critical appraisal skills training may improve physiotherapists' appreciation for the value of trustworthy information.

(4) There may be merit in developing and providing several progressively more detailed versions of a research synthesis report as indicated by a review of open-ended comments in this survey. Physiotherapists surveyed offered differing opinions on the level of detail they wanted in a research summary. Many felt a bottom line recommendation that could be digested quickly would be most useful. Others, however, preferred more detailed information. Both could be accomplished by a summary which first provides the bottom line and is supported by more detailed reports at progressive levels so readers can dig down to find the depth and amount of information they are interested in. For example, the Cochrane Musculoskeletal Group has developed summaries of Cochrane reviews that take one, five, or 15 minutes to read thus providing several levels of details (these can be found on the Arthritis society website, www.arthritis.ca, under "a look at research"). Similarly, for every research report prepared by the Canadian Health Services Research Foundation a one, three and twenty-five page summary is developed.

(5) Use plain language, avoid technical jargon, and provide a concise recommendation. Providing access to "user-friendly" research summaries was suggested frequently by survey participants and 86% indicated a concise recommendation was very important in EBP resources. Many methods for presenting and grading the recommendation have been developed. One approach is to use a ribbon rating system (e.g. platinum, gold, silver or bronze levels) to indicate the quality and strength of the evidence and recommendation (115,116). The U.S. Preventative Services Task Force outlines a five letter scheme with an A

to D hierarchy that indicates how strongly to recommend an intervention based on the quality of the evidence and magnitude of the benefit. An "I" rating indicates there is insufficient evidence to make conclusions about benefits or harms (117). The Agency for Healthcare Research and Quality (http://www.ahcpr.gov/) and the Canadian Task Force on Preventative Health Care (http://www.ctfphc.org) have reviewed existing systems for rating recommendations and grading the level of evidence for each recommendation. A basic approach is to simply state whether a practice is beneficial, of unknown effectiveness, or likely to be ineffective or harmful (118). For physiotherapy, reporting whether the evidence to support a treatment approach is unreported, poor or good has been used (119).

(6) Use the media to publicize accessible EBP resources such as the Cochrane Library and PEDro widely so patients can access the information about their health.

6.3.Recommendations for health care administrators

(1) Provide computers and access to Internet resources in clinical practice environments at the point of care. Administrators should consider cost effective means of providing access to the growing number of high quality EBP resources available on the Internet. Many are freely accessible. Although provision of computers and Internet access may not be sufficient to ensure use of EBP resources access is a necessary precursor to use.

(2) Provide time for physiotherapists to access and read EBP resources at work – as this is an important part of patient care. There may be supporting roles for

research resource people who can identify, prioritize and disseminate research syntheses most relevant to each practice area. As well, administrators should consider supporting interactive learning opportunities for professionals to learn critical appraisal skills and be introduced to EBP tools and resources. It is not reasonable to expect professionals to search for evidence at home outside of work time.

6.4.Recommendations for physiotherapists

(1) Participate in workshops teaching critical appraisal skills and introducing EBP tools such as CPGs and systematic reviews. This will increase awareness of EBP resources and improve research information literacy.

(2) Identify a few high quality relevant research synthesis sources to consult and read them regularly. When searching for answers to a clinical question first look for a valid research summary such as a CPG or a systematic review on the topic.

(3) Advocate for support of time and resources to foster EBP for all professionals in your work place.

6.5. Recommendations for the public

(1) Access information about your health and bring it to the attention of physiotherapists. Research indicates that patient mediated interventions (interventions aimed at changing the behaviour of healthcare professionals for which specific information was sought from or given to patients) can be effective in influencing the use of evidence in clinical practice (12).

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APPENDIX A: SEARCH STRATEGIES

Search strategy for MEDLINE database

Ovid Technologies, Inc. Email Service

Search for: 3 and 12
Citations: 1-121

Database: MEDLINE <1966 to July Week 3 2002>
Search Strategy:

1 "Physical Therapy (Specialty)"/ (104)
2 (physiotherapist$ or physical therapist$).tw. (2498)
3 1 or 2 (2576)
4 EVIDENCE-BASED MEDICINE/ (8680)
5 (evidence based or ebm or ebhc or ebp).tw. (8146)
6 Utilization Review/ (4435)
7 Decision Making/ (29228)
8 (knowledge transfer or knowledge translation or knowledge uptake).tw. (68)
9 Knowledge, Attitudes, Practice/ (17974)
10 (research dissemination or research uptake).tw. (47)
11 implementation.tw. (25555)
12 or/4-11 (87748)
13 3 and 12 (121)
14 from 13 keep 1-121 (121)

Search strategy for CINHAL database

Cinahl 1982 – April Week 2 2003

1	exp allied health personnel/	Details
2	exp allied health occupations/	Details
3	exp nurses/	Details
4	exp physicians/	Details
5	(physical therapist$ or physiotherapist$).tw.	Details
6	exp professional practice, evidence based/ or evidence based medicine/	Details
7	(evidence based or ebm or ebhc or ebp).tw.	Details
8	exp utilization review/	Details
9	exp decision making/ or decision making, clinical/ or decision making, organizational/	Details
10	diffusion of innovation/	Details
11	(research dissemination or research uptake).tw.	Details
12	implementation.tw.	Details
13	(knowledge adj3 (transfer or translation)).tw.	Details
14	(knowledge transfer or knowledge translation or knowledge).tw.	Details
15	exp physicians, family/	Details
16	or/1-5	Details
17	or/5-12	Details
18	16 and (17 or 14)	Details
19	16 and (17 or 13)	Details
20	1 or 2 or 3 or 5 or 15	Details
21	20 and (17 or 14)	Details
22	20 and (17 or 13)	Details
23	(1 or 2 or 5) and (17 or 13)	Details

APPENDIX B: SURVEY QUESTION CHART

Table 1
Summary of literature review of existing instruments

Questionnaire section	**Survey questions drawn from existing questionnaires [survey question number]**	**Sources reviewed and used when developing questions [author, publication year, (reference list number)]**
(1) Demographic, professional and environmental characteristics of responders	17 9, 10, 11 2,3,4,5,6,7,8,16,	Graham 2000 (78) McColl 1998 (74) Young 1999 (33) Wells 2001 (63)
(2) Awareness of, access to, EBP resources	28,29,30,34,35,36,37,41,43 19,20,21	Bohannon 1987 (55) Graham 2000 (78) Jadad 2001 (35) Kerse 2001 (32) Maher 2001 (39) Young 1999 (33)
(3) Attitudes towards EBP and EBP resources	 20 19 21,22 23	Connoly 2001 (71) Kerse 2001 (32) McAlister 1999 (14) McColl 1998 (74) Pain 1996 (72) Young 1999 (33) Tunis 1994 (76)
(4) Views on usefulness of specific EBP resources	31,33,39,45 23	Graham 2000 (78) Tunis 1994 (76) Rowe 2001 (95)
(5) Sources of EBP information use	30 24,46	Graham 2000 (78) Kerse 2001 (32) McAlister 1999 (14) Young 1999 (33) Turner 1997 (76)
(6) Perceived facilitators and barriers to EBP and EBP resource use	 25	Closs 2000 (79) Funk 1991 (79)

APPENDIX C: FINAL VERSION OF THE QUESTIONNAIRE

Id# **Total pages: 8**

Mail back: Please use pre-stamped envelope provided

or

Fax back: (Attention: Maria Judd)

SECTION A: General

Demographic questions about you, as well as some general questions about your experience and access to computers at work.

1. Are you a member of the Canadian Physiotherapy Association Orthopaedic Division?
   1 YES (please complete all 8 pages of this survey, there are questions on both sides of the page!)
   2 NO (please return the uncompleted survey)

2. In which Canadian province or territory do you practice physiotherapy?

   _____

3. In which of the following settings do you usually work?
   1 PRIVATE PRACTICE
   2 GENERAL/COMMUNITY NON-TEACHING HOSPITAL
   3 TEACHING HOSPITAL
   4 REHABILITATION FACILITY
   5 LONG TERM CARE/RESIDENTIAL FACILITY
   6 COMMUNITY CARE ACCESS CENTRE/HOME CARE
   7 WSIB/WCB EVALUATION CENTRE
   8 OTHER: _____

4. How many hours a week do you typically see clients? _____

5. How many clients do you see on a typical day? _____

6. In your daily practice setting are you:
   1 THE ONLY PHYSIOTHERAPIST
   2 ONE OF SEVERAL PHYSIOTHERAPISTS IF SO, HOW MANY OTHER PHYSIOTHERAPISTS IN THE GROUP? _____
   3 OTHER _____

7. Your age _____(YEARS)

8. Are you:
   1 MALE
   2 FEMALE

Note: Several of the questions in this survey have been adapted with permission from an Australian instrument developed by Young J, Ward J. General practitioners' use of evidence databases. Medical Journal Australia 1999; 170(2):56-58.

9. Do you have access to a computer in your practice setting?

   1 YES
   2 NO

10. Do you have access to the Internet? *Please check one only.*

    1 YES, ONLY AT HOME
    2 YES, ONLY IN MY PRACTICE SETTING
    3 YES, BOTH AT HOME AND IN MY PRACTICE SETTING
    4 NOT AT ALL
    5 OTHER _____

11. Do you have access to professional (paper) journals?

    1 YES, ONLY AT HOME
    2 YES, ONLY IN MY PRACTICE SETTING
    3 YES, BOTH AT HOME AND IN MY PRACTICE SETTING
    4 NOT AT ALL
    5 OTHER _____

12. At which school did you study physiotherapy? _____

13. What is your highest level of education obtained or currently enrolled in?

    1 DIPLOMA
    2 BACHELOR'S DEGREE
    3 MASTER'S DEGREE
    4 PHD

14. What year did you graduate (or do you anticipate graduating) from your highest level program? _____

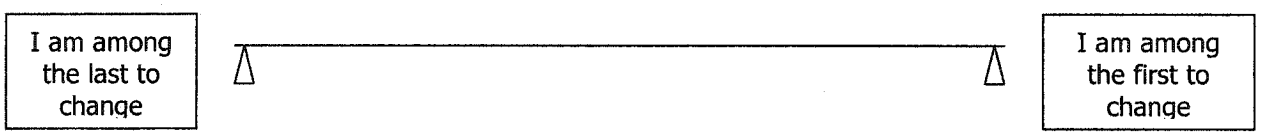
15. How many years of clinical experience do you have as a physiotherapist?

    _____ YEARS

16. In the past 6 months, in which of the following professional activities have you participated?
    Please write how frequently you have participated in the last 6 months.

Type of Activity	Number of times in the last 6 months
Conference/rounds/educational meeting at your workplace	_____times
City, Provincial or National conference/education meeting	_____times
Courses in orthopaedics/manual therapy	_____times

17. Individuals vary in the rate at which they adapt to new ways of doing things. Compared with the group of practitioners that you consider your professional peer group (colleagues), please draw a mark on the line at the point that best describes you.



Section B: Evidence-based practice

Evidence-based practice (EBP) integrates clinical experience with the best available external clinical evidence from systematic research to make decisions about the care of individual patients.

We are interested in your current views about EBP.

18. Were you exposed to EBP at school during your training as a physiotherapist?

1.

1 Yes

2 No

19. How would you describe your attitude towards the current promotion of evidence-based practice? *Please circle the number corresponding to your opinion.*

EXTREMELY CYNICAL		SOMEWHAT POSITIVE		EXTREMELY POSITIVE
1	2	3	4	5

20. Please circle the number corresponding to your opinion or response to the following statements.

	STRONGLY DISAGREE		SOMEWHAT AGREE		STRONGLY AGREE
Practising evidence-based care improves patient outcomes.	1	2	3	4	5
Evidence-based practice is of limited value in physiotherapy because much of physiotherapy lacks a scientific base.	1	2	3	4	5
Although good in theory, EBP places yet another demand on already overloaded physiotherapists.	1	2	3	4	5

If you currently hold a position in a clinical site, *please answer the questions in relation to your current work setting.* If you do not currently practice, *you may refer to your last clinical experience or provide your general perceptions.*

21. Overall, what percentage of your clinical practice do you consider is currently evidence-based?
Please place a cross on the scale provided.

0% _____ 100%

Section C: Evidence-based Practice Resources

An *Evidence-based Practice Resource* is a source of information that provides the best available evidence on a specific intervention for a specific condition (i.e. a systematic and rigorous process has been undertaken to find, evaluate and synthesize evidence of effectiveness and safety).

Examples of physiotherapy EBP resources include: systematic reviews of the literature, clinical practice guidelines, and research summaries.

22. How often do you use evidence-based practice resources to assist you in making clinical decisions?

1 NEVER 2 VERY RARELY 3 SOME OF THE TIME 4 MOST OF THE TIME 5 ROUTINELY

23. Please circle the importance of the following aspects of an EBP resource:

	NOT IMPORTANT		SOMEWHAT IMPORTANT		VERY IMPORTANT
Provides an extensive review of the health care literature	1	2	3	4	5
Includes a synopsis of supporting evidence	1	2	3	4	5
Explains differences from findings of other EBP resources	1	2	3	4	5
Describes how findings can be customised for individual patient	1	2	3	4	5
Quantifies benefit to individual patient	1	2	3	4	5
Quantifies benefit to society	1	2	3	4	5
Includes a description of how evidence was analysed and recommendations achieved	1	2	3	4	5
Provides a concise recommendation	1	2	3	4	5
Rates the confidence with which recommendations were made	1	2	3	4	5

24. Please circle the number that describes your experience with each of the following sources of information:

	UNAWARE OF	AWARE OF BUT CANNOT ACCESS	CAN ACCESS BUT NOT USED	READ ONCE	READ OCCASIONALLY	READ REGULARLY
Australian Journal of Physiotherapy	1	2	3	4	5	6
Archives of Physical Medicine and Rehabilitation	1	2	3	4	5	6
British Journal of Sports Medicine	1	2	3	4	5	6
British Medical Journal (BMJ)	1	2	3	4	5	6
Physical Therapy	1	2	3	4	5	6
Physiotherapy Canada	1	2	3	4	5	6
Physiotherapy Theory and Practice	1	2	3	4	5	6
Spine	1	2	3	4	5	6
Database of abstracts of reviews of effectiveness (DARE) (part of the Cochrane Library)	1	2	3	4	5	6
The Journal of Bone and Joint Surgery	1	2	3	4	5	6

Section D: Factors that influence the use of research findings (e.g. EBP resources) in your practice.

25. We would like to know the extent to which *you* think each of the following situations is a barrier to your use of research to alter/enhance your practice.

For each item, circle the number of the response that best represents your view.

	THIS IS A BARRIER:				
	To no extent	To a little extent	To a moderate extent	To a great extent	No opinion
The administrative environment does not provide support for the use of EBP resources	1	2	3	4	5
I do not have time to read research	1	2	3	4	5
There is insufficient time on the job to implement new ideas	1	2	3	4	5
I am isolated from knowledgeable colleagues with whom to discuss the research	1	2	3	4	5
I do not have enough authority to change patient care procedures	1	2	3	4	5
The relevant literature is not compiled in one place	1	2	3	4	5
Research is not reported clearly and readably	1	2	3	4	5
I am unaware of research that might be relevant to my practice	1	2	3	4	5
The literature reports conflicting results	1	2	3	4	5
Statistical analyses are not understandable	1	2	3	4	5
The research has methodological inadequacies	1	2	3	4	5
I do not feel capable of evaluating the quality of the research	1	2	3	4	5
Patients demand treatment despite lack of evidence for effectiveness	1	2	3	4	5
There is not enough evidence to support my clinical decision making	1	2	3	4	5

26. Any other barriers we have missed, or are there any comments you'd like to make?

_____

_____

27. What are the things that you think would facilitate your use of research findings in clinical practice?

_____

_____

_____

_____

Section E: Your views on the Cochrane Library

The *Cochrane Library* contains systematic reviews of the effectiveness of various interventions as well as a register of clinical trials. It can be accessed via the internet or on CD-ROM.

28. Before today, were you aware of the Cochrane Library?

    1 YES
    2 NO *Go to Question 34*

29. Do you have access to the Cochrane library?

    1 YES
    2 NO *Go to Question 34*
    3 DON'T KNOW

30. In the last 6 months, how many times have you: *(Please circle appropriate response)*

accessed a Cochrane Review on the internet?	0 times	1-2 times	3-9 times	10 - 20 times	more than 20 times
been given a paper copy in your practice setting of a Cochrane review?	0 times	1-2 times	3-9 times	10 - 20 times	more than 20 times
read a Cochrane Review?	0 times	1-2 times	3-9 times	10 - 20 times	more than 20 times

31. What is your opinion of systematic reviews produced by the Cochrane Collaboration. *(Please circle how strongly you agree or disagree.)*

	STRONGLY DISAGREE	DISAGREE	NEITHER AGREE NOR DISAGREE	AGREE	STRONGLY AGREE
Are a credible source of information	1	2	3	4	5
Offer a comprehensive synthesis of current literature	1	2	3	4	5
Are developed in a timely manner	1	2	3	4	5
Are easy to read	1	2	3	4	5
Are easy to understand	1	2	3	4	5
Are slow to be updated	1	2	3	4	5
Provide recommendations that are flexible	1	2	3	4	5
Provide recommendations that are clinically useful	1	2	3	4	5
Provide recommendations that are implementable	1	2	3	4	5

32. If you have read a Cochrane systematic review in the last 6 months please provide the title or topic.

    _____

33. How useful do you find the Cochrane Library for your clinical decision making?

    1 NOT AT ALL USEFUL
    2 NOT VERY USEFUL
    3 SOMEWHAT USEFUL
    4 USEFUL
    5 VERY USEFUL

Section F: Your views on the CPA/OPA Inventory

The *CPA/OPA Inventory* is a physiotherapy specific EBP resource giving Physical Therapy Related Consensus Statements (CS), Systematic Reviews (SR), Meta-analyses (MA), and Clinical Practice Guidelines (CPGs).

34. Before today, were you aware of the CPA/OPA Inventory?

    1 YES
    2 NO *Go to Question 40*

35. Do you have access to the OPA/CPA Inventory ?

    1 YES
    2 NO *Go to Question 40*
    3 DON'T KNOW

36. Have you requested an electronic or paper copy of the CPA/OPA Inventory from CPA or OPA in the last 6 months?

    1 YES
    2 NO

37. In the last 6 months, how many times have you: *(Please circle the appropriate response)*

accessed the CPA/OPA Inventory via the internet?	0 times	1-2 times	3-9 times	10 - 20 times	more than 20 times
been given paper copies in your practice setting of resources listed on the CPA/OPA Inventory?	0 times	1-2 times	3-9 times	10 - 20 times	more than 20 times
read any of these resources?	0 times	1-2 times	3-9 times	10 - 20 times	more than 20 times

38. If you have read a meta-analysis, clinical practice guideline or consensus statement recommended by the CPA/OPA Inventory in the last 6 months please provide the title or topic.

    _____

39. How useful do you find the CPA/OPA Inventory for your clinical decision making?

    1 NOT AT ALL USEFUL
    2 NOT VERY USEFUL
    3 SOMEWHAT USEFUL
    4 USEFUL
    5 VERY USEFUL

40. Please list any sources of information that you have found particularly useful in informing your clinical decision making.

    _____
    _____
    _____

Section G: Your views on PEDro

PEDro is the Physiotherapy Evidence Database. It has been developed to give rapid access to bibliographic details and abstracts of randomised controlled trials and systematic reviews in physiotherapy. Most trials on the database have been rated for quality.

41. Before today, were you aware of the Physiotherapy Evidence Database (PEDro)?

    1 YES
    2 NO *Go to Question 46*

42. Do you have access to PEDro?

    1 YES
    2 NO *Go to Question 46*
    3 DON'T KNOW

43. In the last 6 months, how many times have you: *(Please circle the appropriate response)*

accessed PEDro via the internet?	0 times	1-2 times	3-9 times	10 - 20 times	more than 20 times
been given paper copies in your practice setting of resources listed on PEDro?	0 times	1-2 times	3-9 times	10 - 20 times	more than 20 times
read any of these resources?	0 times	1-2 times	3-9 times	10 - 20 times	more than 20 times

44. If you have read a trial or systematic review in the last 6 months recommend by PEDro please provide the title or topic.

    _____

45. How useful do you find PEDro for your clinical decision making?

    1 NOT AT ALL USEFUL
    2 NOT VERY USEFUL
    3 SOMEWHAT USEFUL
    4 USEFUL
    5 VERY USEFUL

46. Here is a list of a number of sources of information. Please select the 3 that you make use of most often.

    Please number them 1,2,3 according to how frequently you make use of them.

_____Your clinical experience
_____Opinion of colleagues
_____Clinical practice guidelines
_____Lectures/seminars/in-services
_____Hands-on participatory courses/workshops
_____Reading resources obtained from the web (internet)
_____Peer study groups/ journal clubs
_____Reading journals, e-journals, books or reference articles
_____EBP resources such as Cochrane Library, PEDro, CPA/OPA Inventory

Thank you for completing the questionnaire!

APPENDIX D: TEXT OF COVER LETTER TO PILOT TESTERS

April 23, 2002 ID#

Dear Pilot tester,

Thanks so much for agreeing to complete and comment on the attached survey for me. As I shared previously, the survey will be mailed out to a random sample of Canadian Physiotherapy Association Orthopaedic Division members in May 2002. The survey is part of my master's thesis project. Before mailing the survey out I am asking you to "pre-test" it by completing it and giving your comments. Please feel free to be candid -- your feedback will help me to improve the survey.

INSTRUCTIONS (please read carefully before beginning the survey):

1) PRINT this page, the attached cover letter, and the attached survey (11 pages in total)

2) COMPLETE the survey

3) CONSIDER the following as you are completing the survey:

(a) Wording of questions

Please note and mark with a star directly on the survey any items, questions or responses that you find are unclear or awkward.

(b) Length of the survey

i. Please write the time you START to complete the survey _____

ii. Please write the time you FINISH the survey _____

(c) Did you find the survey too long? Yes No

(d) If you found the survey too long, did you find certain questions more onerous than other?
Question numbers _____

(e) Do you have any additional comments or suggestions about the survey or the draft cover letter? You can write directly on the survey or use an additional sheet if necessary.

_____

_____

_____

4) **RETURN THE SURVEY and this sheet by 5 p.m. on Wednesday, May 1, 2002.**

Send by FAX to:

Institute for Population Health,

Attention: Maria Judd

Many thanks for your help!

- Maria

APPENDIX E: RESULTS AND FEEDBACK FROM PRE-TESTING

Thirteen practicing physiotherapists completed the pre-test version of the questionnaire and provided quantitative and qualitative feedback on its content and structure. The average time to complete the questionnaire was 23 minutes (range 12-40 minutes), seven participants indicated the questionnaire was too long, four said it wasn't too long and two did not answer this question. Pre-testers identified three questions that were hard to understand and provided suggestions for re-ordering the flow of questions. Their comments are displayed in Table 1 below. The questionnaire was revised based on this feedback. Two questions (questions seven and eight) were eliminated because they did not relate directly to the study objectives. These questions asked physiotherapists to rate their confidence in and interest in learning more about four EBP skills: formulating questions, identifying studies, evaluating studies and applying finding to practice. Question 11 was revised so journals were only listed once (instead of once with a web address and then again as paper based). Question 27 (which listed all 25 barriers included in Funk's barriers scale) was shortened, re-formatted and introduced earlier in the questionnaire (page five instead of nine).

Table 1: Comments from pilot testers

Theme:	Comments:
Format/layout	• "The survey wasn't too long but could be spaced out better on the page to improve the flow". • "Put the response categories in bold to better define them" • "Section D, question 27 on barriers is too long and too busy".
Content	• "...the last few pages of the questionnaire felt the same... " • "Questions 7 and 8 were hard to understand at first" • "Question 7 is a bit confusing." • "Question 11: It took me a minute to figure out you wanted responses for both the web and paper journal versions. Makes this a long question. Does it matter?" • "Question 27 was really difficult to understand. The questions were double negatives and I didn't know which way to answer." • "Question 27 was a chore, especially at the end of the survey" • "Question 27 was difficult to sort through." • "Question 27 is a very long, wordy question. Can it be reduced? How important is it?" • Does question 27 have to be so personal?"
General	• "I found it be quite readably sound." • "Overall well presented and easy to understand. The only major issue is Question 27." • "A great survey I really had to think about what I do and shutter to think about how much of it is by the seat of my pants."

APPENDIX G: SAMPLE SIZE CALCULATIONS

Figure 1 Sample size calculation for a single proportion

A) Required sample size for a survey so that the bound on the error of estimation for a 95% confidence interval of a proportion of 16% will be smaller than 5%:

$N=Z_{\alpha}^{2}(pq)/b$
$= 1.96^{2}(0.16)(0.84)/0.05^{2}$
$= 3.842\ (0.1344)/0.0025$
$= 0.5163/0.0025$
$= 206.5459$
$= 207$

Where:
N = sample size required
p= proportion
q= 1-p
$Z_{\alpha} = 1.96$
b= bound on the error of estimation

B) Estimating a response rate of at least 66%:

To obtain a sample of 207 completed surveys 314 physiotherapists will need to be sampled. Round this number up to 320 surveys.

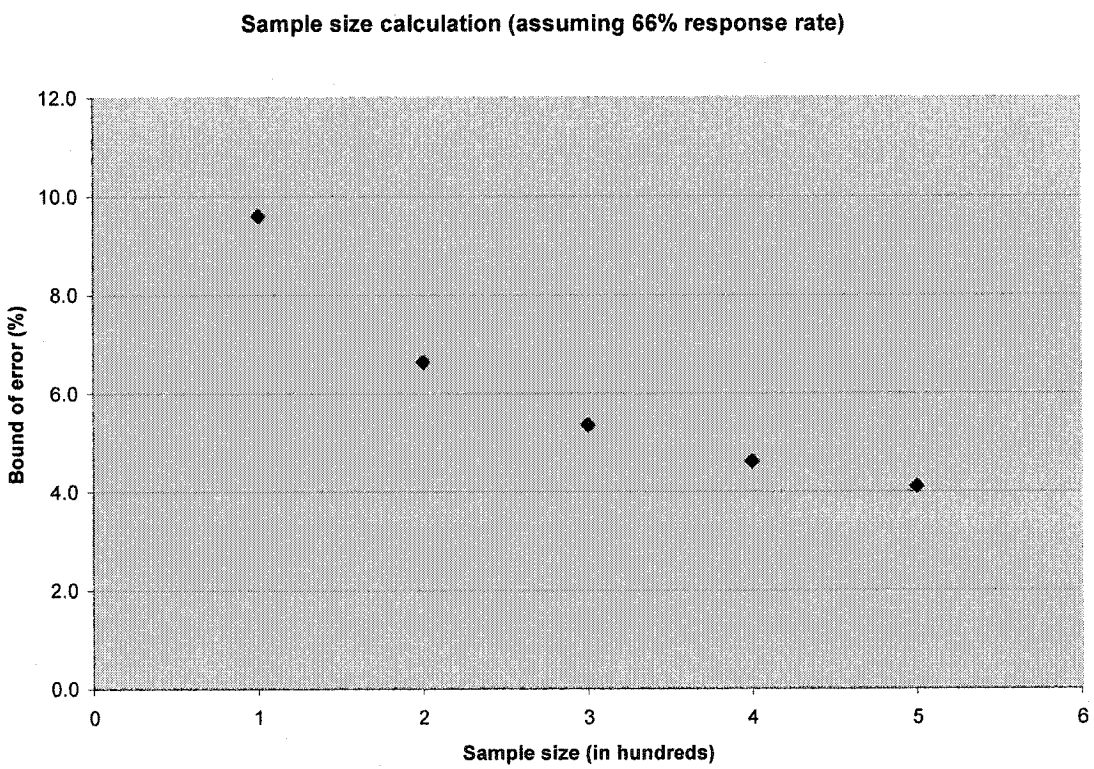
C) 95% Confidence interval on the prevalence estimate of 16% using a sample size of 320:

$p-c_{a/2}\ \text{sqrt}\ (pq/n)-1/2n \leq P \leq p+c_{a/2}\ \text{sqrt}\ (pq/n)+1/2n$

Lower 95% confidence interval $= p-c_{a/2}\ \text{sqrt}\ (pq/n)-1/2n$
$= 0.16-1.96^{2}\ \text{sqrt}(0.16)\ (0.84)/211 - 1/2(211)$
$= 0.108$

Upper 95% confidence interval $= p+c_{a/2}\ \text{sqrt}\ (pq/n)+1/2n$
$= 0.16+1.96^{2}\ \text{sqrt}(0.16)\ (0.84)/211 + 1/2(211)$
$=0.211$

Figure 2 Bound on the error estimate by sample size



APPENDIX H: MASTER TABLE OF VARIABLES

Table 1 Master table of predictor variable definitions, re-coding, univariate analysis of predictor variables with dependent variable (EBP resource user)

			Test of association with EBP resource user		
Original variable in questionnaire	**Re-coded variable for analysis (VARIABLE NAME)**	**Type of variable and categories**	**Chi-square**	**Degrees of freedom**	**p-value**
Potential user characteristics					
Age	Age group (NAGE)	Ordinal 1=0-31 yrs old 2=32-41 3=42 to highest (65)	0.68	2	0.71
Years of practice	Years of practice grouped by quartiles (N15YRS)	Ordinal 1=0-5yrs (quartile 1) 2=6 - 11 (quartile 2) 3=12 - 20 yrs (quartile 3) 4=21-45 (quartile 4)	0.98	3	0.80
Response to change (adopter)	Adopter of change (AD17)	Ordinal (split above and below median value of 70) 1=70.00 - 100 mm 2=0-69.99mm	0.52	1	0.47 *
Gender	(GENDER)	Nominal 1=male 2=female	0.11	1	0.74
Exposed to EBP during school	Exposed to EBP (Q18)	Nominal 1=yes 2=no	1.03	1	0.31 *
Attitudes towards EBP	(N19)	Ordinal 1=negative (1,2&3) 2-postive (4 &5)	1.75	1	0.19 *
Continuing education (ed)	Workplace ed events (Q16.1DIC)	Ordinal 1=Above median number of events 2=Below or equal to median (2.5)	4.02	1	0.04 +
	Provincial or National events (Q16.2DIC)	Ordinal 1=Above median # of events 2= Below or equal to median (0)	1.98	1	0.16 •
	Ortho courses (Q16.3DIC)	1=Above median # of events 2= Below or equal to median (1.0)	1.06	1	0.30 *

Original variable in questionnaire	Re-coded variable for analysis (VARIABLE NAME)	Type of variable and categories	Chi-square	Degrees of freedom	p-value
Practice environment characteristics					
Practice location	Practice setting grouped (N3LOCP)	Nominal 1=hospital or rehab facility or university clinic 2=private practice 3=all other (e.g. community care)	6.21	2	0.04 *
Group versus solo practice	(Q6)	Nominal 1= one of several therapists 2= the only therapist	0.41	1	0.52 *
Patients seen per day	(PTS)	Ordinal (split at 15 - median and mean number of patients, range 0-60) 1= (0-14.9 pts per day, below median) 2 =(15 to 60 pts)	0.21	1	0.64
Time as a barrier to using research findings in clinical practice	(BARTIME)	Nominal 1=time not a barrier 2=time is a barrier	3.43	1	0.06 *
Internet access	Internet access at work (INTERNET)	Nominal 1=access at work (old 2 or 3) 2=no access at work (access at home or in other place old 1 or 5) + (old 4 not at all)	1.39	1	0.24 *
Journal access	Journal access at work (JOURNAL)	Nominal 1=access to journals at work 2=no access at work (access to journals in other locations (home, library etc) + no access to journals not at all)	0.83	1	0.36 *
Research not compiled in one place is a barrier to using it	(BARLIT)	Nominal 1=not a barrier 2=a barrier	5.10	1	0.02 *

Original variable in questionnaire	Re-coded variable for analysis (VARIABLE NAME)	Type of variable and categories	Wald (df)	p-value	OR (95% CI)
EBP resource characteristics					
Research application	(RAO) research application ordinal variable	Ordinal 1-1.49 = 1 1.6 – 2.49 = 2 2.5 to 3.49 = 3 3.5 to 4.49 = 4 4.5 to 5 = 5	Ordinal variable created to test relationship with other predictor variables (see Appendix K Table 1)		
Trustworthiness of the research message	(RTO) Trustworthiness of the research ordinal variable	Ordinal 1-1.49 = 1 1.6 – 2.49 = 2 2.5 to 3.49 = 3 3.5 to 4.49 = 4 4.5 to 5 = 5	Ordinal variable created to test relationship with other predictor variables (see Appendix K Table 1)		
Research application	(F1RA)	Continuous 1-5 Likert scale	0.23 (1)	0.63	1.10 (0.74 to 1.66)
Trustworthiness of the research message	(F2RQ)	Continuous 1-5 Likert scale	4.24 (1)	0.04	1.66 (1.02 to 2.70) *

* variable with p-value ≤ 0.5 entered into logistic regression model

+ variable Q 16.1 (workplace participation) excluded from logistic regression model because largest range of responses (0 to72 times) and judged not to be due to actual variation in participation but variation in interpretation of the question due to vagueness of question

- variable Q 16.2 (provincial/national events) excluded from logistic regression model because most poorly answered question in entire survey (most missing/blank responses, 21% missing)

APPENDIX I: INTERESTING QUOTES FROM OPEN-ENDED QUESTIONS ABOUT BARRIERS AND FACILITATORS TO RESEARCH USE

Table 1: Responses to open-ended question "Any other barriers we have missed, or are there any comments you'd like to make?" grouped by response type.

Barriers	
Practice environment	Cost effectiveness and economic pressures often outweigh clinical decisions
	… time vs. financial reward doesn't allow for better EBP
	… far from library with medical references and no budget for ref journals
	… lack of recognition by administration that admin time and research time valuable for physios - involves more than just seeing patients
	… patient ability, willingness & availability of funding to complete any intervention over a period of time advocated by research is a big barrier to using research and EBP
Potential user	… I often can't interpret data presented (e.g. s.d.)
	Not knowing how to access information on the Internet
	…much of research is not practical and is a waste of time to review
	… research reviews are far too long and complicated to read and I have limited time and interest to figure it out
EBP resource	The populations used in research often do not correspond with population seen in practice
	Patients have confounding medical conditions that limit the applicability of available research
	Research must be done on patient groups we usually treat. Not on university students or athletes, we see a lot of sedentary patients who don't want to become active
	Inflammation and pain fluctuate therefore treatment must be relevant on a day to day base (studies are not able to measure these well objectively)
	Not sure how much ergonomics info there is in the 3 EBP resources you've asked about - Cochrane Library, Pedro, CPA inventory
	…work exclusively with chronic pain clients and there is not a lot of research done to support what we do
	The major barrier with the majority of research is its clinical irrelevancy. Have you read Physiotherapy Canada lately - they are the worst offenders
	… "more evidence is required in this area" is discouraging, no clinical application

Table 2: Responses to open-ended question "What are the things that you think would facilitate your use of research findings in clinical practice?" grouped by response type.

Facilitators	
Practice environment	Convincing colleagues to change their practice or at least look at EBP
	Regular in-services with opportunity to review systematic and easily understood publications and discuss with colleagues.
	...guidance from peers who are involved in research...mentor system - ability to call on an experienced therapist to troubleshoot
	Working with a team (am only therapist in my practice environment)
	More reviews of good EBP being placed in front of me
	...better access to Internet, longer days - really time is the biggest issue.
	Mandatory journal reviews at work on a biweekly basis
	More paid time for activities besides direct patient care
Potential user	Help with practical ways to implement research
	Getting together with colleagues review literature and discuss findings, would motivate each other to stay up to date with current research findings
	Being taught how to search for information more efficiently on the Internet
	...improving my knowledge of technology to easily access current literature on specific topics - I often spend too much time tracking things down.
	I have not had any formal training or education on EBP and am not fully aware of its advantages and disadvantages. I must admit that I am open to learning more about it and to use it when appropriate. With 22 years of experience I have learned a lot of what actually does and does not have a positive or negative impact on patient care.
EBP resource	...literature compiled in one place, the number of places to look is overwhelming
	Textbook which complies the evidence for various conditions/body parts/techniques
	One website needed "Evidence-based physiotherapy" to a) explain EB physio & b) on line access to all articles
	Finding it in one place, better dissemination so each individual practitioner doesn't have to find it independently
	Websites/newsletters which do the evaluation for you and report EBP techniques (like APTEI)
	A credible organization (like CPA) providing a package of the most current reliable and relevant research findings.
	...quick, clear, concise and reliable resources
	Monthly newsletters which describe good as well as unsupported techniques/practices
	... must be very quick and easy to read AND easy to implement

APPENDIX J: RESULTS FROM FACTOR ANALYSIS

Table 1 Component matrix from principal component analysis

	Component	
	1	2
EBP resource: Provides an extensive review of the health care literature	.523	.520
EBP resource: Includes a synopsis of supporting evidence	.734	.282
EBP resource: Explains differences from findings of other EBP resources	.693	.242
EBP resource: Describes how findings can be customized for individual patient	.651	-.494
EBP resource: Quantifies benefit to individual patient	.661	-.550
EBP resource: Quantifies benefit to society	.604	-.286
EBP resource: Includes a description of how evidence was analysed and recommendations achieved	.550	.489
EBP resource: Provides a concise recommendation	.716	-.187
EBP resource: Rates the confidence with which recommendations were made	.742	.102

Extraction Method: Principal Component Analysis.

a 2 components extracted.

Table 2: Factor loadings of EBP resource statements after a principal component analysis with Varimax rotation

		Factor	
Item	EBP resource statement/characteristic	1	2
Q23.5	Quantifies benefit to individual patient	.858	.063
Q23.4	Describes how findings can be customized for individual patient	.811	.097
Q23.8	Provides a concise recommendation	.646	.363
Q23.6	Quantifies benefit to society	.633	.213
Q23.1	Provides an extensive review of the health care literature	.015	.737
Q23.7	Includes a description of how evidence was analysed and recommendations achieved	.057	.734
Q23.2	Includes a synopsis of supporting evidence	.332	.713
Q23.3	Explains differences from findings of other EBP resources	.330	.656
Q23.9	Rates the confidence with which recommendations were made	.463	.589

Reliability analysis for new EBP resource scales

Alpha values for both scales if each scale item was deleted are shown below in Figure 1. The alpha values don't change significantly when any single item is omitted. This indicates that the research application and quality scale have item homogeneity - there are no items for which exclusion would increase the homogeneity of the scales.

Figure 1: Item-total statistics for research scales

Research application scale (Factor 1)

Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if item Deleted
Q23.4	11.7289	4.4306	.6120	.4458	.7069
Q23.5	11.7467	4.0829	.7021	.5195	.6561
Q23.6	12.3422	4.4761	.5136	.3009	.7628
Q23.8	11.4622	5.1068	.5127	.2690	.7572

Trustworthiness of the research message scale (Factor 2)

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Alpha if Item Deleted
Q23.1	16.4480	5.8302	.4929	.2723	.7513
Q23.2	16.2127	5.9773	.6490	.4377	.7049
Q23.3	16.4706	5.7684	.5831	.3665	.7193
Q23.7	16.5611	5.7201	.5011	.2632	.7495
Q23.9	16.3167	5.8629	.5335	.3161	.7360

APPENDIX K: RELATIONSHIP BETWEEN PREDICTOR VARIABLES

Table 1 Relationship between predictor variables considered for inclusion in logistic regression (variable names defined in Appendix H)

		Test of association			Measures of degree of association (correlation coefficients)			
					Nominal		Ordinal	
					SYM*	**PRE***	**SYM***	**PRE***
Variable	**2nd variable**	**Chi-square (Pearson)**	**DF**	**Sign (2 sided)**	**Phi / Cramer**	**Lambda**	**Tau B**	**Somder's d**
NAGE	N15YRS	236.17	6	0.00			0.80	0.80
	AD17	0.76	2	0.68				
	Q18	95.31	2	0.00	0.65	0.46		
	N19	7.75	2	0.02	0.19	0.08		
	N3LOCP	8.62	4	0.07				
	Q6	3.23	2	0.19				
	PTS	4.72	2	0.09			-0.13	-0.13
	BARTIME	0.10	2	0.95				
	INTERNET	1.83	2	0.40				
	JOURNAL	4.67	2	0.1				
	BARLIT	0.64	2	0.73				
N15YRS	AD17	8.38	3	0.04	0.19	0.05		
	Q18	102.27	3	0.00	0.67	0.39		
	N19	8.38	3	0.04	0.19	0.05		
	N3LOCP	14.54	6	0.02	0.18	0.04		
	Q6	7.48	3	0.06				
	PTS	3.61	3	0.31				
	BARTIME	0.27	3	0.97				
	INTERNET	3.88	3	0.28				
	JOURNAL	5.14	3	0.16				
	BARLIT	4.35	3	0.23				

Variable	2nd variable	Chi-square (Pearson)	DF	Sign (2 sided)	Phi / Cramer	Lambda	Tau B	Somder's d
Q16.3DIC	BARTIME	1.28	1.	0.26				
	BARLIT	0.12	1	0.73				
	AD17	1.19	1	0.27				
	Q18	3.35	1	0.07				
	N19	0.05	1	0.82				
	N3LOCP	0.94	2	0.62				
	Q6	0.12	1	0.72				
	INTERNET	0.04	1	0.84				
	JOURNAL	1.30	1	0.25				
AD17	Q18	1.09	1	0.30				
	N19	6.03	1	0.01	0.16	0.06		
	N3LOCP	1.49	2	0.48				
	Q6	2.64	1	0.10				
	PTS	0.52	1	0.47				
	BARTIME	0.52	1	0.47				
	INTERNET	2.16	1	0.14				
	JOURNAL	0.04	1	0.83				
	BARLIT	0.90	1	0.34				
Q18	N19	13.84	1	0.00	0.25	0.13		
	N3LOCP	3.45	2	0.18				
	Q6	3.48	1	0.06				
	PTS	2.28	1	0.13				
	BARTIME	0.11	1	0.74				
	INTERNET	0.93	1	0.33				
	JOURNAL	3.5	1	0.06				
	BARLIT	0.90	1	0.33				
N19	N3LOCP							
	Q6	1.77	2	0.41				
	PTS	11.93	2	0.00	0.23	0.00		
	BARTIME	0.73	1	0.39				
	INTERNET	7.23	1	0.007	-0.18	0.01		
	JOURNAL	0.69	1	0.40				
	BARLIT	7.83	1	0.005	-0.19	0.00		
N3LOCP	Q6	1.77	2	0.41				
	PTS	11.93	2	0.00	0.23	0.00		
	BARTIME	1.38	2	0.50				
	INTERNET	9.37	2	0.009	0.20	0.00		
	JOURNAL	9.57	2	0.008	0.20	0.00		
	BARLIT	1.69	2	0.43				
Q6	PTS	0.05	1	0.82				
	BARTIME	0.12	1	0.73				
	INTERNET	1.84	1	0.18				
	JOURNAL	2.64	1	0.11				
	BARLIT	1.59	1	0.21				

Variable		Chi-square (Pearson)	DF	Sign (2 sided)	Phi / Cramer	Lambda	Tau B	Somder's d
PTS	BARTIME	0.10	1	0.75				
	INTERNET	4.14	1	0.23				
	JOURNAL	2.64	1	0.11				
	BARLIT	1.59	1	0.21				
BARTIME	INTERNET	0.30	1	0.86				
	JOURNAL	2.67	1	0.10				
	BARLIT	1.59	1	0.21				
INTERNET	JOURNAL	2.55	1	0.11				
	BARLIT	3.38	1	0.07				
RAO	Q6	4.34	3	0.23				
(ORDINAL)	BARTIME	2.05	3	0.56				
	INTERNET	1.52	3	0.68				
	JOURNAL	2.20	3	0.53				
	BARLIT	2.10	3	0.55				
	Q18	3.07	3	0.38				
	N3LOCP	11.79	6	0.07				
RTO	Q6	13.48	3	0.0004	0.25	0.015		
(ORDINAL)	BARTIME	1.14	3	0.77				
	INTERNET	4.12	3	0.25				
	JOURNAL	3.73	3	0.29				
	BARLIT	1.94	3	0.58				
	Q18`	0.73	3	0.87				
	N3LOCP	9.47	6	0.15				
		Spearman's r						
RAF1	AD17	0.01						
(CONTINUOUS)	N19	0.16						
	PTS	-0.09						
	NAGE	-0.08						
	N15YRS	-0.07						
RQF2	AD17	-0.08						
(CONTINUOUS)	N19	0.28						
	PTS	-0.16						
	NAGE	-0.02						
	N15YRS	-0.04						
RTO	RAO	0.41						
		Pearson's r						
RAF1	RQF2	0.51						

*SYM = SYMMETRICAL MEASURE (NON-DIRECTIONAL)

**PRE =PROPORTIONAL REDUCATION IN ERROR (PRE) MEASURE