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REVIEW ARTICLE

STRATEGIES FOR REHABILITATION PROFESSIONALS TO MOVE EVIDENCE-BASED KNOWLEDGE INTO PRACTICE: A SYSTEMATIC REVIEW

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Rationale: **Rehabilitation clinicians need to stay current regarding best practices, especially since adherence to clinical guidelines can significantly improve patient outcomes. However, little is known about the benefits of knowledge translation interventions for these professionals.**

Objectives: **To examine the effectiveness of single or multi-component knowledge translation interventions for improving knowledge, attitudes, and practice behaviors of rehabilitation clinicians.**

Methods: **Systematic review of 7 databases conducted to identify studies evaluating knowledge translation interventions specific to occupational therapists and physical therapists.**

Results: **12 studies met the eligibility criteria. For physical therapists, participation in an active multi-component knowledge translation intervention resulted in improved evidence-based knowledge and practice behaviors compared with passive dissemination strategies. These gains did not translate into change in clinicians' attitudes towards best practices. For occupational therapists, no studies have examined the use of multi-component interventions; studies of single interventions suggest limited evidence of effectiveness for all outcomes measured.**

Conclusion: **While this review suggests the use of active, multi-component knowledge translation interventions to enhance knowledge and practice behaviors of physical therapists, additional research is needed to understand the impact of these strategies on occupational therapists. Serious research gaps remain regarding which knowledge translation strategies impact positively on patient outcomes.**

Key words: evidence-based practice, rehabilitation, professional practice patterns, continuing education, knowledge, occupational therapy, physical therapy.

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INTRODUCTION

Clinicians are expected to integrate clinical experience with conscientious, explicit and judicious use of research evidence in order to make informed decisions that maximize the well-being of their patients (1, 2). In other words, clinicians are being told to embrace evidence-based practice (EBP) (3). This pressure is evident in the treatment of patients with stroke, where adherence to clinical guidelines significantly improves patient outcomes (4). However, a gap exists between the scientific evidence and its application in clinical practice (5). For example, strong evidence from the largest Canada-wide study of 1800 stroke rehabilitation clinicians indicates that best practices are not routinely being applied (6–10), even though over 900 published randomized controlled trials (RCTs) have assessed stroke management (11) and many reputable national and international best practice guidelines (12–14) are available. This means that patients may be receiving suboptimal treatment at best, and ineffective or deleterious treatments at worst (15).

Recognition of this dilemma has led to a burgeoning interest in knowledge translation (KT), which is the exchange, synthesis and ethically sound application of knowledge within a complex system of interactions among researchers and users (16). A first step in closing the knowledge-to-practice gap is to identify which KT interventions are most effective in promoting knowledge acquisition. According to Miller's pyramid (17), knowledge acquisition is an important initial outcome because it creates a strong foundation for promoting change in clinicians' attitudes and practice behaviors, with the ultimate goal of improving patient-related outcomes.

A substantial literature shows the effectiveness of KT strategies for enhancing physician practices. Grimshaw and colleagues conducted a comprehensive systematic review of 235 studies and while no one KT strategy surfaced as the ultimate solution, active KT strategies were more effective than passive strategies to produce change in physicians' practice behavior (18). Other interventions that were modestly effective included education outreach (e.g. opinion leaders), and multi-component interventions based on a needs assessment and aimed at overcoming potential barriers to change (18).

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To date, no systematic review has focused on rehabilitation clinicians and the effectiveness of KT strategies targeted to this group. Thus, this paper presents a systematic review examining the effectiveness of single and multi-component KT interventions for improving knowledge, attitudes toward EBP, and practice behaviors of occupational therapists and physical therapists.

METHODS AND PROCEDURES

Sampling frame for data sources

An extensive systematic review of the literature was completed by searching 4 electronic databases (MEDLINE, CINAHL, AMED, and EBM Reviews) from their inception to June 2008. Three electronic databases specific to rehabilitation and KT (Physiotherapy Evidence Database (PEDro), Occupational Therapy Seeker, and Research and Development Resource Base) were also searched from their inception to June 2008. Reference sections of all journal articles retrieved were reviewed in search of other pertinent articles. Citation indexes were searched using the ISI Web of Science database to verify that all relevant publications were retrieved.

Search strategy and eligibility criteria

Key words and index terms were generated to describe the target population (occupational therapists and physical therapists), KT interventions, and outcomes measured (knowledge, attitudes, and practice behaviors). Search strategies were created specifically for each database (see Appendix I). Studies were eligible for inclusion if they were RCTs or observational studies (including before-after studies, cohort studies, case-control studies and case series); were published in English or French; and examined the effectiveness of KT interventions for improving knowledge, attitudes, and/or practice behaviors of occupational therapists or physical therapists. For the purposes of this review, a KT intervention is defined as a means of exchanging evidence-based information (e.g. through educational outreach, opinion leader, journal club, lectures, audit and feedback, reminders, online res ources) to improve knowledge, attitudes and practice behaviors of health professionals, with the ultimate goal of optimizing patient outcomes and maximizing the potential of the health system (18). Knowledge acquisition is operationally defined as the development and expansion of a health professional's knowledge base (17). Attitude towards EBP is defined as a health professional's agreement/acceptance of the evidence, their perceived clinical applicability of the evidence, and their motivation and sense of self-efficacy to adopt EBP (19). Practice behavior is defined as the process or actions used by a health professional to provide care for their patients (e.g. use of a standardized assessment tool). Studies measuring knowledge and practice behaviors objectively (e.g. knowledge questionnaires, chart audit), as well as those measuring knowledge, attitudes, and practice behaviors subjectively (e.g. perceived gain in knowledge, self-reported change in attitude or practice behavior) were considered.

Study selection

Once duplicate studies were removed, 2 investigators independently reviewed the titles and abstracts of citations. Any citation deemed potentially relevant was obtained in full text and assessed by both study investigators to determine eligibility for inclusion.

Data abstraction and quality assessment

Using a data abstraction form, the 2 investigators independently extracted data from each full-text article including type of setting; study design; population characteristics (inclusion/exclusion criteria, sample size, number of therapists assessed for eligibility and the number who met inclusion criteria); interventions (details about KT intervention and its goals; duration/intensity of intervention); outcomes; and results. For RCTs, methods for randomization, allocation concealment, blinding, and completeness of follow-up (including intention-to-treat analysis, withdrawals, and reasons for dropouts) were extracted.

RCTs were evaluated for their internal validity by 2 investigators using the PEDro Scale (20). The PEDro Scale rates the methodological quality of RCTs, such as the randomization process, concealed allocation, baseline comparability, blinding of the subjects, assessors and therapists, intention to treat analysis and adequacy of follow up, out of a possible score of 10 (Table I). Observational studies were evaluated for their internal validity based on the following criteria: selection and representativeness of sample, adequate description of intervention and outcomes measured, ascertainment of the study outcome, and adequate follow-up (Table II for specific criteria).

Data analysis

Once relevant articles were identified and reviewed, the possibility of performing a quantitative synthesis, specifically meta-analysis, was explored. Given that significant methodological and clinical heterogeneity was found among the included studies (to be described in the results section), it was not possible to perform meta-analyses and thus, the findings were synthesized in a qualitative manner to produce a narrative summary.

When creating the narrative summary, studies were first grouped according to their outcome: knowledge acquisition, attitudes, and practice behaviors. Then for each outcome, studies were grouped according to whether the KT intervention had a single component (e.g. use of opinion leader) or multi-component (e.g. combination of opinion leader, interactive educational sessions, and reminders). Using the PICO format (21) (i.e. population/ intervention/ comparison/ outcome), questions were created that were deemed relevant to clinicians based on the current evidence in the literature.

Each PICO question was rated for its level of evidence using a scale developed by Sackett et al. (21), and adapted to include PEDro scores signifying the quality of RCTs included. For example, if 2 RCTs of *high* quality (PEDro ≥ 6) found an intervention to be effective, the PICO question relating to that intervention would receive a 1a rating indicating strong level of evidence. If one RCT of *high* quality found an intervention to be effective, the PICO question relating to that intervention would receive a 1b rating indicating moderate level of evidence. One or more *fair* quality RCTs (PEDro = 4–5) that found effectiveness

Table I. *Methodological quality assessment of randomized controlled trials included in the review*

Study	Score on PEDro Scale†										Total score*
	1	2	3	4	5	6	7	8	9	10	
Rebbeck et al. 2006 (n=27) (22)	+	+	+	–	–	–	+	–	+	+	6/10
Stevenson et al. 2004 (n=30) (28)	+	–	–	–	–	–	–	–	+	+	3/10
Stevenson et al. 2006 (n=30) (31)	+	–	–	–	–	–	–	–	+	+	3/10
Bekkering et al. 2005 (n=113) (29)	+	+	+	–	–	+	–	+	+	+	7/10

+ criterion was satisfied; – criterion was not satisfied.

*Total score is determined by counting the number of criteria satisfied.

†Column numbers correspond to the following criteria on the Physiotherapy Evidence Database (PEDro) Scale (20): 1) random allocation; 2) concealed allocation; 3) baseline comparability; 4) blind subjects; 5) blind intervention providers; 6) blind assessors; 7) adequate follow-up (at least 85%); 8) intention-to-treat analysis; 9) between-group comparisons; and 10) point estimates and variability.

Table II. *Methodological quality assessment of observational studies included in the review*

Study (sample size)†	Study design	1	2	3	4	5	6	7
Verhoef et al. 2004 (*n*=63) (24)	Before–after	+	+	+	+	+	+	+
McQueen et al. 2006 (*n*=7) (27)	Before–after	–	–	–	+	+	–	–
Leemrijse et al. 2006 (*n*=332) (32)	Case series	+	+	–	–	+	–	+
McKenna et al. 2005 (*n*=213) (26)	Case series	+	+	+	–	+	–	+
Brown et al. 2005 (*n*=94) (23)	Before–after	+	+	+	+	+	–	+
McQueen et al. 2008 (*n*=69) (25)	Case series	–		–	+	–	–	–
Cook et al. 2007 (*n*=35) (30)	Before–after	+	+	+	+	–	–	+
Beggs et al. 1997 (*n*=34) (33)	Before–after	+	+	+	–	+	–	+

+ criterion was satisfied; – criterion was not satisfied.

†Column numbers correspond to the following criteria: 1) adequate description of sample; 2) sample representative of physical therapists and/or occupational therapists in the community; 3) outcome of interest not present at start of study; 4) intervention well described; 5) outcome measures well described; 6) outcomes assessed objectively by blind assessment or using secure records (i.e. patient charts); 7) study controls for key confounding variables; 8) subjects assessed at least once at baseline and post-intervention, respectively; 9) follow-up long enough for outcomes to occur; and 10) adequate follow-up of subjects.

would enable a 2a rating indicating limited level of evidence. Lower quality studies (PEDro ≤ 3) and non-randomized trials and strong single subject designs (for example those with multiple baselines) received a rating of 2b. A consensus by an expert panel or findings of a number of "pre/post" design studies that showed similar results, received a 3. Conflicting findings of equally well-designed studies received a 4. Finally, a level of evidence of 5 indicated that no experimental studies explored the PICO question relating to that intervention.

RESULTS

A total of 3104 potentially relevant citations were identified and reviewed for relevance (see Fig. 1 for flowchart). There was perfect agreement between 2 reviewers for selecting 12 articles (4 RCTs; 5 before-after studies; 3 case series) that met eligibility. Of the 12 studies that met the inclusion criteria (22–33), 7 involved physical therapists and 5 involved occupational therapists. Sources of methodological heterogeneity for these studies were p*resence of a control group* (4 out of 12 studies) and *method of randomization* (4 out of 12 studies used sequence generation or concealed allocation). Sources of clinical heterogeneity included *type of intervention* (opinion leaders, outreach visits, reminders, interactive educational sessions, online resources, etc.); *intensity of intervention* (5–8 h for 5 studies; 62 h for one study; intensity not specified for 6 studies); and *type of outcome measurement* (e.g. use of self-report, chart audit, multiple-choice questions, knowledge questionnaires).

Table III provides an overview of these studies including the citation, study design, number of participating clinicians, KT intervention, outcome measures and results. The following PICO questions were generated to synthesize the evidence regarding the effectiveness of single and multi-component KT interventions for improving knowledge, attitudes toward EBP, and practice behaviors of occupational therapists and physical therapists.

What is the effectiveness of an active multi-component KT intervention for improving knowledge acquired by occupational therapists and physical therapists respectively?

No evidence (level 5) supports the effectiveness of an active multi-component KT intervention for improving knowledge acquired by occupational therapists specifically.

Moderate evidence (level 1b) from a high-quality RCT and 2 well-designed before-after studies suggests that the use of an active multi-component KT intervention is effective for improving knowledge acquired by physical therapists (see Table III for study details). One high-quality RCT (22) randomized 27 physical therapists to receive an active multi-component KT intervention (i.e. interactive educational sessions, opinion leaders, outreach visits, and printed materials) or passive dissemination (i.e. guidelines received by mail). At 12 months post-intervention, those in the experimental group had significant improvements in their self-perceived knowledge of whiplash guidelines as measured by a questionnaire, compared with the control group ($p = 0.001$). Likewise, a before-after study (23) of 94 physical therapists found that use of an active multi-com-

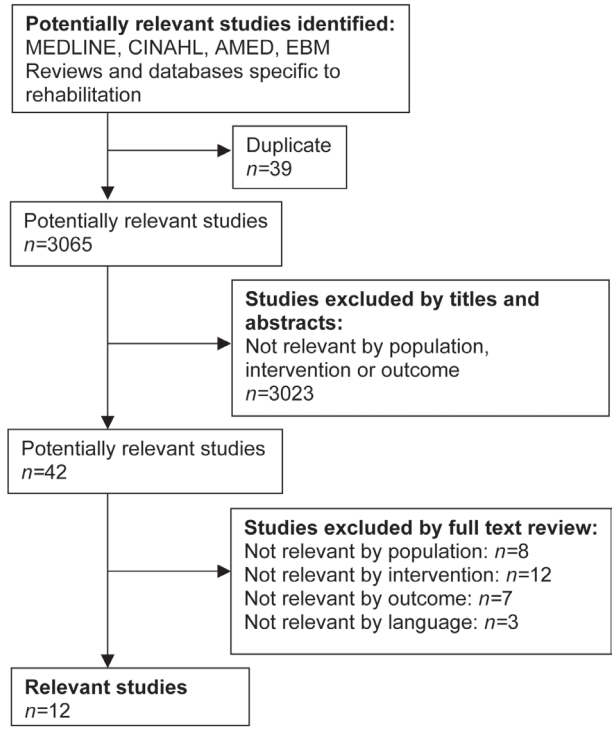

Fig. 1. Flowchart of study selection.

Table III. *Description of included studies*

Citation	Study design	Number of participating clinicians	Intervention	Outcome and significance (+) significant/(–) not significant
Rebbeck et al. 2006 (22)	Cluster RCT	27 physical therapists	Active multifaceted KT intervention (experimental group): Interactive educational sessions Opinion leaders Printed materials Outreach visit Passie dissemination (control group): Guidelines by mail	At 12 months post-intervention (–) Attitude towards guidelines ($p=0.07$–0.29) (+) Self-perceived knowledge ($p=0.001$) (+) Self-perceived/actual practice behavior ($p=0.01$–0.04) (chart audit)
Stevenson et al. 2004 (28); 2006 (31)	RCT	30 physical therapists	Opinion leader (experimental group) Evidence-based educational sessions Identify research needs/priorities Critical appraisal of literature Passive dissemination (control group): Printed material	At post-intervention (3 and 6 months) (–) Attitudes towards EBP (–) Self-perceived practice behavior
Bekkering et al. 2005 (29)	RCT	113 physical therapists	Active multifaceted KT intervention (experimental group): Didactic and interactive educational sessions Printed materials Follow-up discussion and feedback post-implementation Reminders Passive dissemination (control group): Guidelines by mail Forms to facilitate discussion with other therapists Journal articles on guidelines	At 12 months post-intervention (+) Self-perceived practice behavior Therapists in the intervention group were also more likely to adhere to all 4 guideline recommendations compared with those in the control group (OR 2.05; 95% CI 1.15–3.65)
Verhoef et al. 2004 (24)	Before–after	63 Physical therapists	Active multifaceted KT intervention: Interactive educational sessions using a problem-based learning approach Lectures and workshops Therapists' network for future communications Newsletters	At post-intervention and 18-month follow-up (+) Actual knowledge (156 multiple-choice questions) Knowledge increased significantly from 37% correct answers (range 18–47%) at baseline to 54% (range 27–77%) at post-intervention and was maintained at the 18-month follow-up (median score 55%, range 33–79%
McQueen et al. 2006 (27)	Before–after	7 Occupational therapists	Journal club: Interactive discussions regarding guidelines Critical appraisal of literature	At post-intervention (3 months) (+) Attitudes towards EBP (awareness/confidence) (+) Self-perceived practice behavior
Leemrijse et al. 2006 (32)	Case series	332 Physical therapists	Didactic educational session: Annual continuing education course Presentations, lectures and workshops at various conferences and colleges Guidelines and articles by mail	At post-intervention (+) Attitudes towards EBP 69% had a positive attitude; $n=158$ (+) Self-perceived practice behavior 64% ($n=214$) had at least some knowledge of the content of these guidelines; of these 66% ($n=141$) applied the guidelines to more than half their patients Factors that contributed significantly to compliance with guidelines: positive attitude towards guidelines in general (OR=11.6; 95% CI 4.5 to 29.8) and knowledge of colleagues using the guidelines (OR=2.4; 95% CI 1.0–5.8)
McKenna et al. 2005 (26)	Case series	213 Occupational therapists (103 of them accessed database)	Online evidence-based database with systematic reviews and RCTs relevant to rehabilitation	At post-intervention (+) Self-perceived knowledge Of the 103 users of the database, 63% ($n=65$) reported an increase in knowledge (–) Self-perceived practice behavior Of the 103 users of the database, 14% ($n=14$) reported an change in practice behavior

Table III. *Contd.*

Citation	Study design	Number of participating clinicians	Intervention	Outcome and significance (+) significant/(–) not significant
Brown et al. 2005 (23)	Before–after	94 Physical therapists	Active multifaceted KT intervention Opinion leaders Outreach visit Training manuals/risk factor checklists (also available online) Working groups Newsletters/media	At post-intervention (between 6–24 weeks following outreach visit): (+) Self-perceived knowledge (+) Self-perceived practice behavior Self reported use of fall prevention strategies increased significantly when comparing behaviors before and after exposure to the intervention ($p<0.0001$), where 64% reported increased fall reduction practice behaviors. All targeted risk factors were mentioned by at least 30% of the participants. Post-intervention knowledge of the risk factors for falls was associated with an increase in self-reported fall prevention behaviors (OR 1.5; 95% CI 1.1–2.2) Those with greater knowledge of fall risk factors were 1.4 times more likely use them post-intervention (OR 1.4; 95% CI 1.0–2.1)
McQueen et al. 2008 (25)	Case series	69 Occupational therapists	Opinion leader: Identify research needs/priorities Critical appraisal of literature Journal clubs to search and implement evidence-based practice	At post-intervention (18 months) (+) Self-perceived knowledge 62% ($n=43$) felt that involvement in clinical effectiveness projects enhanced their knowledge (+) Self-perceived practice behavior 54% ($n=37$) felt that their involvement resulted in changes in practice behavior
Cook et al. 2007 (30)	Before–after	35 Occupational therapists	Interactive educational session: Lectures/practical sessions Small group discussions Information sheet Follow-up support by telephone/e-mail	At post-intervention (4 months) (+) Self-perceived practice behavior Significant change in outcome measure use between baseline and post-intervention ($x^2=6.29$; df=1; $n=36$, $p=0.012$)
Beggs et al. 1997 (33)	Before–after	16 Occupational therapists 16 Physical therapists	Didactic educational session: Teleconferences Individual consultations Seminars/on-site workshops Small group discussions	At post-intervention (+) Self-perceived practice behavior 61.8% ($n=21$) reported that they had a lot or some opportunity to utilize their skills and knowledge learned

CI: confidence interval; EBP: evidence-based practice; KT: knowledge translation; OR: odds ratio; RCT: randomized controlled trial.

ponent KT intervention (i.e. combination of opinion leaders, outreach visits, working groups, printed materials) improved self-perceived knowledge of fall risk factors and fall reduction strategies from baseline to 1–6 months post-intervention. Another before-after study of 63 physical therapists found that use of an active multi-component KT intervention (i.e. interactive educational sessions, problem-based learning, networking, and newsletters) improved their actual knowledge regarding the assessment/treatment of rheumatic diseases when their scores on a multiple-choice knowledge questionnaire were compared from baseline to post-intervention and 18-month follow-up (24). Therapists' actual knowledge increased significantly, from 37% correct answers (range 18–47%) at baseline to 54% (range 27–77%) at post-intervention, and was maintained at the 18-month follow-up (median score 55%, range 33–79%).

What is the effectiveness of an active single KT intervention for improving knowledge acquired by occupational therapists and physical therapists respectively?

Limited evidence (level 3) from 2 case series suggests that the use of an active single KT intervention may be effective for improving knowledge acquired by occupational therapists (see Table III). Sixty-nine occupational therapists were led by an opinion leader for 18 months to establish clinical priorities for EBP, known locally as "burning questions" for specific conditions (e.g. osteoporosis, spinal injuries, stroke, mental illness) (25). This study found that 62% reported an increase in their knowledge of best practices for those conditions when responding to a feedback questionnaire. Another case series also found that of the 103 occupational therapists who accessed an online evidence-based resource, 63% reported that the resource had increased their knowledge as per their responses on a feedback questionnaire (26).

No evidence (level 5) supports the effectiveness of an active single KT intervention for improving knowledge acquired by physical therapists' specifically.

What is the effectiveness of an active multi-component KT intervention for improving occupational therapists' and physical therapists' attitudes towards EBP?

No evidence (level 5) supports the effectiveness of an active multi-component KT intervention for improving occupational therapists' attitudes towards EBP specifically.

Moderate evidence (level 1b) from one high-quality RCT suggests that the use of an active multi-component KT intervention is ineffective for improving physical therapists' attitudes towards EBP compared with passive dissemination (see Table III).This trial (22) found no significant differences in physical therapists' attitudes towards EBP when comparing questionnaire responses of the experimental and control groups at post-intervention ($p = 0.07$–0.29).

What is the effectiveness of an active single KT intervention for improving occupational therapists' and physical therapists' attitudes towards EBP?

There is limited evidence (level 3) from one before-after study suggesting that the use of an active single KT intervention may be effective for improving occupational therapists' attitudes towards EBP (see Table III). Limited evidence (level 2a) from a fair-quality RCT suggests that the use of an active single KT intervention is ineffective for improving physical therapists' attitudes towards EBP.

In the before-after study, 7 occupational therapists participated in a journal club, which consisted of interactive discussions and a critical appraisal of the literature on evidence-based management of chronic obstructive pulmonary disease (27). All 7 therapists reported that they experienced positive changes in their attitude towards EBP when comparing their questionnaire responses at baseline and 3 months post-intervention.

The trial (28) examined the use of an opinion leader for providing evidence-based educational sessions compared with passive dissemination (i.e. printed material). No significant differences in physical therapists' attitudes towards EBP were found when comparing questionnaire responses of the experimental and control groups at post-intervention.

What is the effectiveness of an active multi-component KT intervention for changing practice behaviors of occupational therapists and physical therapists respectively?

No evidence (level 5) shows the effectiveness of an active multi-component KT intervention for changing practice behaviors of occupational therapists specifically.

Strong evidence (level 1a) from 2 high-quality RCTs and a well designed before-after study suggests that the use of an active multi-component KT intervention is effective for changing practice behaviors of physical therapists (see Table III). The 2 high-quality RCTs found that physical therapists who participated in an active multi-component KT intervention reported significant changes in their actual (22) and self-perceived practice behaviors (22, 29) when assessed at 12 months post-intervention, compared with those who received passive dissemination. Bekkering et al. (29) found that therapists in the intervention group reported that they were more likely to adhere to guideline recommendations when treating patients at 12 months post-intervention compared with those in the control group (odds ratio (OR) 2.05; 95% confidence interval (CI) 1.15–3.65). The before-after study (23) of 94 physical therapists found that use of an active multi-component KT intervention resulted in significant changes in self-perceived practice behaviors when assessed within 1–6 months post-intervention. Therapists' self-reported use of fall prevention strategies increased significantly when comparing their practice behaviors from pre- to post-exposure with the intervention ($p < 0.0001$) (23).

What is the effectiveness of an active single KT intervention for changing practice behaviors of occupational therapists and physical therapists respectively?

Limited evidence (level 3) from 2 before-after studies and 2 case series suggests the effectiveness of active single KT interventions for changing practice behaviors of occupational therapists (see Table III for study details). Limited evidence (level 2a) from a fair-quality RCT also suggests that the use of an active single KT intervention is ineffective for changing practice behaviors of physical therapists.

One before-after study (27) of 7 occupational therapists participating in a journal club on evidence-based management of chronic obstructive pulmonary disease, found that participants experienced positive changes in their self-perceived practice behaviors when their questionnaire responses were compared at baseline and 3 months post-intervention. The second before-after study (30) of 35 occupational therapists who received interactive educational sessions (i.e. lectures, group discussions, follow-up support by telephone/email) regarding outcome measurement, reported that they experienced significant changes in their use of outcome measures between baseline and post-intervention ($p = 0.012$). One case series study of 69 occupational therapists involving the use of an opinion leader to implement EBP found that 54% reported a change in their practice behaviors when responding to a feedback questionnaire (24). The second case series found that of the 103 occupational therapists who accessed an online evidence-based resource, 14% reported that the resource changed their practice behaviors when responding to a feedback questionnaire (26).

One fair-quality RCT (31) examined the use of an opinion leader for providing evidence-based educational sessions compared with passive dissemination (i.e. printed material). No significant differences in physical therapists' attitudes towards EBP were found when comparing the experimental and control groups at post-intervention.

DISCUSSION

Findings from this systematic review suggest that participation in an active multi-component KT intervention results in improved self-perceived knowledge (22–24), as well as positive changes in actual and self-perceived practice behaviors of physical therapists (22, 23, 29). These gains did not translate into change in physical therapists' attitude towards best practices. While this review found no studies examining the use of active multi-component interventions with occupational therapists specifically, limited evidence suggests that single active KT interventions may improve knowledge, attitudes and practice behaviors of this professional group (25–27, 30).

These results are generally consistent with systematic reviews involving other groups of health professionals where active, multi-component KT interventions were found to be more effective than passive dissemination or single KT interventions for improving evidence-based knowledge (34) and producing change in practice behaviors (18, 35–37). In reviewing the interventions, it is difficult to disentangle exactly which components, or the number of components that, led to these improvements in knowledge and practice behavior (18, 37).

It is not clear from this review which KT strategy can effectively change clinicians' attitudes towards the use of EBP (22, 27, 28). Underlying factors that influence how a clinician responds to new information are likely. For instance, Green et al. (38) suggest that most individuals have their own "practice style trait" that causes them to differ in what they consider to be credible sources of evidence (i.e. the value of evidence vs experience), the weight they assign to practical concerns (e.g. the importance of managing workload vs patient satisfaction), and their willingness to diverge from group norms (i.e. issues of non-conformity). Indeed, in 2 recent studies where we identified the prevalence of practice style traits of occupational therapists and physical therapists, we found very few *seekers,* that is clinicians whose practice is driven by scientific evidence, and a very high prevalence of *pragmatists* whose practice is driven by practicality (38, 39).

This review highlighted serious gaps in the literature on effective KT strategies to enhance best practice behaviors among occupational therapists specifically. While this professional group has been shown, in general, to be positive about EBP, they rely more on their clinical experience, colleagues, and informal continuing education experiences to guide their practice as opposed to using research evidence (40–42). Surveys of occupational therapists have identified that even when they do identify relevant research evidence, they often lack confidence and skills to interpret/apply these research findings into clinical practice (40, 43). Therefore an important step will be to account for key barriers and facilitators of the therapist/work environment when tailoring KT interventions or designing future effectiveness studies to achieve successful uptake with these professionals, as recommended by the Ottawa Model of Research Use framework (44). Logan & Graham (44) suggest that the following 4 factors need to be considered when examining the effectiveness of KT interventions for changing practice behaviors: (*i*) characteristics of the intervention; (*ii*) characteristics of the health professional; (*iii*) characteristics of the behavior that the intervention is trying to change; and (*iv*) characteristics of the organization and context. Thus, as we go forward with attempts to identify highly effective KT interventions, it will be important to consider matching of KT strategies not only to the environment in which the clinician works but also likely to the clinician's specific learning styles and traits (38).

Limitations

The most important limitation of this systematic review was the reported quality of the studies included, some of which had methodological weaknesses that may have reduced the validity of our conclusions for each PICO question. This review was also restricted to studies published in English or French, thus one case series involving 63 physical therapists published in Dutch was not reviewed (45).

CONCLUSION

For the first time in the history of rehabilitation we have substantial evidence regarding the effectiveness and ineffectiveness of treatments. This knowledge needs to be utilized by clinicians to enhance patient outcomes. The growing realization that KT does not occur without intense efforts has led to a new field of research aimed at identifying the most effective KT strategies. While this review suggests that the use of active, multi-component KT interventions does enhance knowledge and practice behaviors of physical therapists, additional research is needed to understand the impact of these strategies on occupational therapists. In addition, it will be important to examine which KT strategies have a positive impact on patient outcomes.

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APPENDIX I. Specific search strategies

Ovid MEDLINE(R): 1950 to June Week 1 2008

1. exp Clinical Competence / or exp Knowledge / or exp Information Dissemination / or knowledge translation.mp. or exp "Diffusion of Innovation" / or exp Health Knowledge, Attitudes, Practice /
2. exp Evidence-Based Medicine / or evidence-based practice.mp.
3. exp Practice Guidelines as Topic / or exp Guideline Adherence / or guidelines adherence.mp.
4. exp Professional Practice / or exp Physician's Practice Patterns / or practice patterns.mp.
5. exp Education, Medical / or exp Education, Continuing / or exp Competency-Based Education / or exp Education, Professional / or exp Education, Distance / or exp Education, Professional, Retraining / or exp Education, Medical, Continuing/
6. competency.mp. or exp Competency-Based Education/
7. 1 or 2 or 3 or 4 or 5 or 6
8. exp "Physical Therapy (Specialty)" / or exp Physical Therapy Modalities / or physical therapy.mp.
9. occupational therapy.mp. or exp Occupational Therapy/
10. 8 or 9
11. 7 and 10

CINAHL – Cumulative Index to Nursing & Allied Health Literature: 1982 to June Week 2 2008

1. exp "Diffusion of Innovation" / or exp Professional Knowledge / or knowledge translation.mp.
2. evidence-based practice.mp. or exp Professional Practice, Evidence-Based/
3. practice patterns.mp. or exp Practice Patterns/
4. exp Professional Compliance / or exp Practice Guidelines / or exp Professional Practice / or guideline adherence.mp.
5. competence.mp. or exp PROFESSIONAL COMPETENCE / or exp CLINICAL COMPETENCE/
6. exp EDUCATION, MEDICAL, CONTINUING / or exp EDUCATION, CONTINUING / or exp EDUCATION, OCCUPATIONAL THERAPY / or exp EDUCATION, PHYSICAL THERAPY / or exp EDUCATION, ALLIED HEALTH / or exp EDUCATION, COMPETENCY-BASED/
7. occupational therapy.mp. or exp Occupational Therapy/
8. physical therapy.mp. or exp Physical Therapy/
9. 1 or 2 or 3 or 4 or 5 or 6
10. 7 or 8
11. 9 and 10

AMED (Allied and Complementary Medicine) 1985 to June 2008

1. knowledge translation.mp.
2. exp Evidence based medicine / or evidence-based practice.mp.
3. exp Professional competence/
4. exp Education continuing / or continuing education.mp.
5. guideline adherence.mp. or exp practice guidelines/
6. practice patterns.mp.
7. exp Occupational therapy / or occupational therapy.mp.
8. exp Physiotherapy / or physiotherapy.mp.
9. 1 or 2 or 3 or 4 or 5 or 6
10. 7 or 8
11. 9 and 10

All EBM Reviews (from inception to June 2008) – Cochrane DSR, ACP Journal Club, DARE, and CCTR

1. knowledge translation.mp.
2. evidence-based practice.mp.
3. professional education.mp.
4. continuing education.mp.
5. competency.mp.
6. guideline adherence.mp.
7. occupational therapy.mp.
8. physical therapy.mp.
9. physiotherapy.mp.
10. 1 or 2 or 3 or 4 or 5 or 6
11. 7 or 8 or 9
12. 10 and 11

Databases specific to rehabilitation (from inception to June 2008) – Physiotherapy Evidence Database, Occupational Therapy Seeker, and Research and Development Resource Base

Key terms used: knowledge translation, evidence-based practice, continuing education, competency, guideline adherence, practice patterns, professional practice