

## Determinants of Guideline Use in Primary Care Physical Therapy: A Cross-Sectional Survey of Attitudes, Knowledge, and Behavior

Susanne Bernhardsson, Kajsa Johansson, Per Nilsen, Birgitta Öberg, Maria E.H. Larsson

**Background.** Understanding of attitudes, knowledge, and behavior related to evidence-based practice (EBP) and use of evidence-based clinical practice guidelines in primary care physical therapy is limited.

**Objectives.** The objectives of this study were: (1) to investigate self-reported attitudes, knowledge, behavior, prerequisites, and barriers related to EBP and guideline use among physical therapists in primary care and (2) to explore associations of self-reported use of guidelines with these social cognitive factors along with demographic and workplace characteristics.

**Design.** This was a cross-sectional survey.

**Methods.** A web-based survey of 419 physical therapists in primary care in western Sweden was performed. Multiple logistic regression analysis was performed to examine factors associated with guideline use.

**Results.** The response rate was 64.7%. Most respondents had positive attitudes toward EBP and guidelines: 90% considered EBP necessary, and 96% considered guidelines important. Approximately two thirds reported confidence in finding and using evidence. One third reported being aware of guidelines. Thirteen percent knew where to find guidelines, and only 9% reported having easy access to guidelines. Fewer than half reported using guidelines frequently. The most important barriers to using guidelines were lack of time, poor availability, and limited access to guidelines. Young age and brief work experience were associated with positive attitudes toward EBP. A postgraduate degree was associated with higher application of EBP. Positive attitudes, awareness of guidelines, considering guidelines to facilitate practice, and knowing how to integrate patient preferences with guideline use were associated with frequent use of guidelines.

**Limitations.** Data were self-reported, which may have increased the risk of social desirability bias.

**Conclusions.** Use of guidelines was not as frequent as could be expected in view of the positive attitudes toward EBP and guidelines among physical therapists. Awareness of and perceived access to guidelines were limited. The identified determinants can be addressed when developing guideline implementation strategies.

S. Bernhardsson, PT, MSc, Region Västra Götaland, Närhälsan Öckerö Rehabilitation, Strandvägen 35, 475 40 Hönö, Sweden, and Department of Medical and Health Sciences, Division of Physiotherapy, Linköping University, Linköping, Sweden. Address all correspondence to Ms Bernhardsson at: susanne.bernhardsson@vregion.se.

K. Johansson, PT, PhD, Department of Medical and Health Sciences, Division of Physiotherapy, Linköping University.

P. Nilsen, PhD, Department of Medical and Health Sciences, Division of Health Care Analysis, Linköping University.

B. Öberg, PT, PhD, Department of Medical and Health Sciences, Division of Physiotherapy, Linköping University.

M.E.H. Larsson, PT, PhD, Region Västra Götaland, Närhälsan Research and Development Unit, Primary Health Care, Gothenburg, Sweden, and The Sahlgrenska Academy at Gothenburg University, Institute of Neuroscience and Physiology/Physiotherapy, Gothenburg, Sweden.

[Bernhardsson S, Johansson K, Nilsen P, et al. Determinants of guideline use in primary care physical therapy: a cross-sectional survey of attitudes, knowledge, and behavior. *Phys Ther.* 2014; 94:343–354.]

© 2014 American Physical Therapy Association

Published Ahead of Print:

October 31, 2013

Accepted: October 28, 2013

Submitted: April 22, 2013



Post a Rapid Response to this article at:  
[ptjournal.apta.org](http://ptjournal.apta.org)

**E***vidence-based practice* (EBP) is commonly defined as integrating the best available external research findings with individual clinical expertise and patient preferences.<sup>1</sup> The concept of EBP is increasingly permeating physical therapist practice, and physical therapists, like other health care professionals, are expected to treat patients with evidence-based methods and keep abreast of research advances in their field. The growth of physical therapy research has been dramatic in the past 2 decades,<sup>2</sup> with more than 19,000 randomized controlled trials published in the field.<sup>3</sup> Keeping up with this abundance of research is a major challenge for most clinicians. Not surprisingly, the transfer of research findings into practice is often described as slow, haphazard, and unpredictable.<sup>4</sup>

There is considerable variation in the extent to which EBP is applied.<sup>5-8</sup> Studies report use of interventions with strong or moderate evidence of effect and interventions with limited or no evidence of effect for common disorders treated in primary care physical therapy.<sup>9-11</sup> Numerous barriers to applying EBP have been identified, including lack of time,<sup>6,12-17</sup> poor confidence in skills to identify and critically appraise research,<sup>12,13,16-18</sup> and insufficient access to evidence.<sup>12,16,17</sup>

Evidence-based clinical practice guidelines (henceforth referred to as “guidelines”) are increasingly being used to bridge the research-to-practice gap and to facilitate EBP.<sup>4</sup> *Guidelines* have been defined as

“systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances,”<sup>19(p27)</sup> a definition adopted by the European Region of the World Confederation for Physical Therapy.<sup>20</sup> Because they present research findings to clinicians in a digested format, guidelines are potentially an important facilitator of EBP.

The use of guidelines in physical therapy has been shown to contribute to EBP and to yield both better treatment outcomes and reduced costs.<sup>7,21-23</sup> However, both availability and use of guidelines tend to vary considerably,<sup>8,21</sup> emphasizing the importance of investigating the factors that influence their use in clinical practice. Systematic implementation of guidelines is likely to increase their use. Two systematic reviews show that guidelines that were implemented using active, multifaceted strategies had positive effects on physical therapists’ knowledge and behavior.<sup>24,25</sup>

The use of social-cognitive theory has increasingly been advocated and applied in implementation research for improved understanding of determinants of EBP.<sup>26</sup> Social-cognitive theory posits that behavior is influenced by attitudes, beliefs, knowledge, self-efficacy, and social norms concerning the behavior in question,<sup>27</sup> making it important to explore such factors as possible determinants of guideline use.

Pioneering research on social-cognitive influences on EBP among physical therapists was conducted in 2003 by Jette et al,<sup>6</sup> whose survey questionnaire has become a benchmark for describing EBP in physical therapy. Their study and several subsequent studies in various countries and settings have demonstrated predominantly positive attitudes toward EBP among physical thera-

pists.<sup>6,13,16,28-30</sup> In Sweden, 2 studies have been undertaken to examine EBP in physical therapy. One study was conducted exclusively in a university hospital setting,<sup>29</sup> and the other study described attitudes and behavior related to EBP among physical therapists in different employment sectors.<sup>30</sup> However, no previous study has focused on physical therapy in primary care to investigate factors associated with guideline use in this setting. Further knowledge about these factors and the extent to which guidelines are used is needed. A better understanding of these factors can form the basis for the development of a strategy for the implementation of physical therapy guidelines in primary care. The aims of this study, therefore, were: (1) to investigate self-reported attitudes, knowledge, behavior, prerequisites, and barriers related to EBP, particularly guidelines among physical therapists in a primary care setting, and (2) to explore associations of self-reported use of guidelines with these social-cognitive factors along with demographic and workplace characteristics. We hypothesized that the use of guidelines is influenced by both demographic and workplace characteristics and by the various social-cognitive determinants of behavior.

## Method

### Study Design

The study was a cross-sectional survey of primary care physical therapists in western Sweden, conducted in November 2010.

### Participants and Setting

Eligible participants in this study were all physical therapists employed in primary care by the Region Västra Götaland (N=425). This is the country’s second largest county council, providing health services to approximately 1.6 million inhabitants in western Sweden. Members of the guideline project



Available With  
This Article at  
[ptjournal.apta.org](http://ptjournal.apta.org)

- **eTable:** Distribution of Questionnaire Responses

team, also employed by the county council, were excluded (n=6).

**Procedure**

A validated web-based questionnaire based on the questionnaire developed by Jette et al<sup>6</sup> was adapted and further developed to suit this study.<sup>31</sup> The adapted questionnaire included items reflecting various aspects of EBP and guidelines, representing the following 4 domains: attitudes toward EBP and guidelines (12 items); knowledge about EBP resources and guidelines (4 items); behavior, including common EBP components, such as reading scientific articles and searching databases, as well as the use of guidelines (3 items); and prerequisites and barriers related to EBP and guidelines (4 items). Most items were rated on 5-point Likert scales, ranging from “strongly disagree” to “strongly agree.” The item on frequency of use of guidelines ranged from “very infrequently or never” to “very frequently or always.” The items on knowledge of guidelines and how and where to find them were answered with “yes,” “partially,” or “no.”

Invitations with a link to the web-based questionnaire to participate were distributed via e-mail. Participants responded online, and the survey software (EPiServer CMS 5, EPiServer AB, Stockholm, Sweden) logged the responses and added them to a results database. Three reminder notices were sent via e-mail at 1-week intervals.

**Data Analysis**

Statistical analyses were performed using IBM SPSS Statistics 19.0 (IBM Corp, Armonk, New York). Frequencies and distributions were analyzed with descriptive statistics. Logistic regression analyses were performed to examine univariate associations of EBP and guideline variables with demographic/workplace characteris-

tics. To explore possible determinants of guideline use, associations between attitudinal, knowledge, and behavioral variables and the self-reported use of guidelines were also examined. First, univariate analyses were performed to identify variables significantly associated with frequent guideline use, which subsequently were checked for multicollinearity. Second, the identified variables were entered in a multivariable model, using the stepwise forward conditional method. Third, the variables retained in this model were entered in a final model using the enter method and including all cases with no missing data for these variables. Interaction effects between the dependent variable and demographic and workplace variables were tested at the 1% level.

Before conducting the analyses, response categories for the dependent variable “use of guidelines” were dichotomized into “frequent use” versus “infrequent use” (including “sometimes”) and for independent variables into “agree” versus “disagree.” The neutral category was merged into the “disagree” category based on the assumption that if an individual does not have an opinion or does not know, then he or she does not agree. Following the example of Jette et al<sup>6</sup> and as suggested by Fishbein and Ajzen,<sup>27</sup> the exceptions to this strategy were items with a negative response set (ie, agreement with the statement suggested negative regard for EBP), where the neutral category was merged into the “agree” category. Responses for the 3-point items were dichotomized into “yes” versus “no/partially.” For the demographic variables age, education level, and years of experience, where some of the subsamples were small, categories were collapsed in an attempt to derive stable models. The significance level was set to .05. In significant models, associations were expressed as odds ratios (ORs)

with 95% confidence intervals (CIs) for each level of the independent variables. Missing data were handled with listwise deletion.

**Ethics**

All questionnaires were filled out anonymously, and responses could not be traced back to the respondents. A statement in the questionnaire informed the respondents of the purpose of the study and that their response to the survey was assumed to indicate their informed consent. Ethics approval, according to Swedish law and confirmed in an advisory statement by the Regional Ethics Review Board in Gothenburg, was not necessary.

**Role of the Funding Source**

The study was partially funded by the Local Research and Development Board for Gothenburg and Södra Bohuslän. The first author is partially supported by a doctoral grant from Linköping University. The funding sources had no role in the design, conduct, or reporting of the study.

**Results**

Of the 419 physical therapists invited to participate, 271 responded, yielding a response rate of 64.7%. Respondent and workplace characteristics are shown in Table 1. Internal missing values ranged from 0 to 5 (0%–1.8%).

**Attitudes, Knowledge, Behavior, Prerequisites, and Barriers Related to EBP**

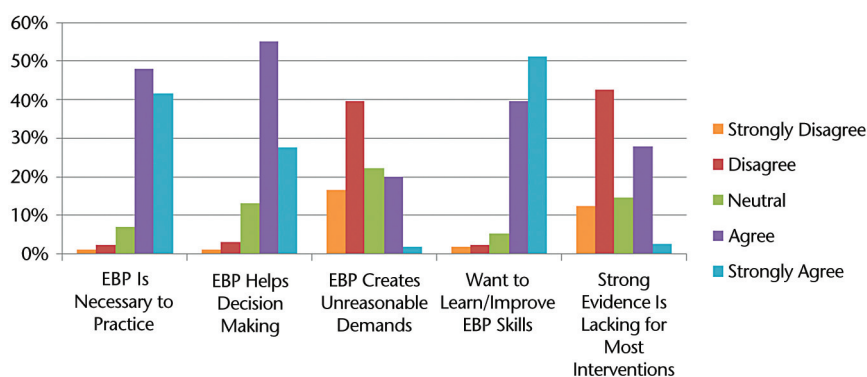
Most of the respondents agreed or strongly agreed that EBP is necessary to practice (90%) and helps in decision making (83%) (Fig. 1). Slightly more than half of the respondents disagreed or strongly disagreed that EBP creates unreasonable demands on them (56%) and that strong evidence was lacking for most interventions used in their clinical practice (55%). Ninety-one percent agreed or

## Determinants of Guideline Use in Primary Care Physical Therapy

**Table 1.**

Respondents' Demographic and Workplace Characteristics (n=271)

Characteristic	n	%
Sex		
Women	204	75.3
Men	67	24.7
Age (y)		
20–29	33	12.2
30–39	74	27.3
40–49	87	32.1
50–59	64	23.6
>60	13	4.8
Education level/degree		
Lower-level degree	76	28.0
Bachelor's degree	181	66.8
Master's degree	8	3.0
PhD student or PhD	6	2.2
Certified specialist	6	2.2
Years of experience in primary care physical therapy		
<3	40	14.8
3–5	33	12.2
6–10	50	18.4
11–15	44	16.2
16–20	38	14.0
>20	66	24.4
No. of physical therapists at facility		
<3	28	10.3
3–5	60	22.1
6–10	117	43.2
11–15	29	10.7
>15	34	12.5



**Figure 1.**

Self-reported attitudes toward evidence-based practice (EBP) (n=266–269). Percentage of respondents agreeing, being neutral, and disagreeing to statements about EBP.

strongly agreed that they wanted to learn or improve the skills necessary to apply EBP in their practice. Sixty-two percent of the respondents agreed or strongly agreed that they felt confident in their ability to find relevant research for their clinical questions, and 69% reported that they felt confident about treating patients according to current best evidence.

Therapists with less than 5 years' work experience in primary care stated that they were more likely to consider EBP necessary (OR=3.13, 95% CI=1.00–9.78), and men were more likely than women to consider EBP helpful in decision making (OR=2.02, 95% CI=1.02–3.97) (Tab. 2). This attitude was associated with young age (OR=0.30, 95% CI=0.12–0.76) and few years of work experience in primary care (OR=0.35, 95% CI=0.19–0.67). Age was correlated with years of experience ( $\rho=.73$ ).

Sixty-two percent stated that they agreed or strongly agreed that the use of research was encouraged at their place of work, whereas 20% disagreed or strongly disagreed. Forty-eight percent agreed or strongly agreed that they knew how to access online databases through the electronic library, whereas 39% disagreed or strongly disagreed. Younger therapists were less likely to feel encouraged (OR=0.42, 95% CI=0.18–0.99) and to know how to access databases (OR=0.32, 95% CI=0.13–0.77) (Tab. 2).

Concerning behavior, 44% of the respondents reported reading fewer than 2 articles in an average month. Slightly more (46%) reported reading 2 to 5 articles per month, and 10% reported reading more than 5 articles. A high proportion (71%) of the respondents reported performing fewer than 2 database searches on average per month. Twenty-three

**Table 2.** Demographic and Workplace Characteristics Associated With Aspects of Evidence-Based Practice (EBP) and Guidelines<sup>a</sup>

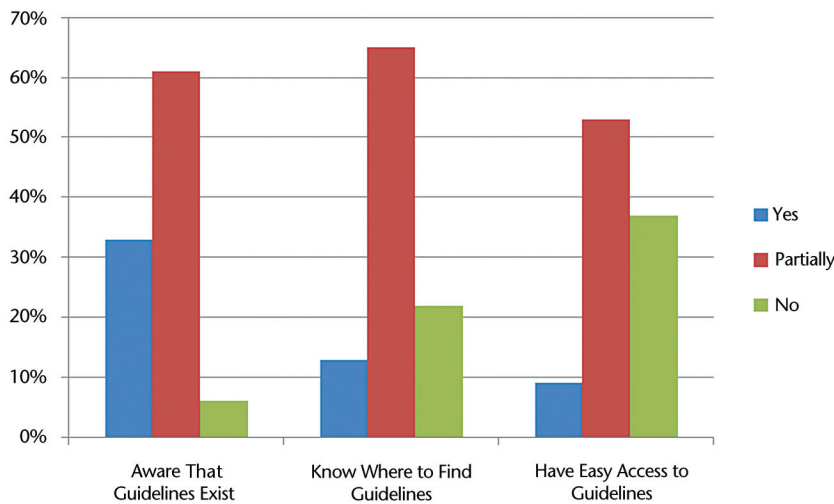
Dependent Variable	Independent Variable	Level	Odds Ratio (95% CI)	Model P <sup>b</sup>	Model R <sup>2,c</sup>	n
EBP is necessary	Primary care experience	≤5 y	<b>3.13 (1.00–9.78)</b>	.144	.04	269
		6–10 y	1.66 (0.57–4.81)			
		11–15 y	2.51 (0.69–9.11)			
		>15 y	Reference			
EBP helps decision making	Sex	Men	<b>2.02 (1.02–3.97)</b>	.047	.02	268
		Women	Reference			
EBP creates unreasonable demands	Age	20–29 y	<b>0.30 (0.12–0.76)</b>	.057	.04	267
		30–39 y	0.87 (0.46–1.66)			
		40–49 y	0.66 (0.36–1.24)			
		>50 y	Reference			
	Primary care experience	≤5 y	<b>0.35 (0.19–0.67)</b>	.011	.05	
		6–10 y	0.76 (0.38–1.50)			
		11–15 y	0.59 (0.29–1.21)			
		>15 y	Reference			
Read articles	Highest degree	Postgraduate degree	<b>6.39 (1.62–25.27)</b>	.027	.06	268
		Bachelor's degree	1.13 (0.42–3.01)			
		Lower-level degree	Reference			
Search databases	Highest degree	Postgraduate degree	<b>20.56 (3.47–121.87)</b>	.001	.13	269
		Bachelor's degree	1.96 (0.41–9.29)			
		Lower-level degree	Reference			
Access databases	Age	20–29 y	<b>0.32 (0.13–0.77)</b>	.058	.04	267
		30–39 y	0.65 (0.34–1.24)			
		40–49 y	0.57 (0.31–1.07)			
		>50 y	Reference			
EBP encouraged at workplace	Age	20–29 y	<b>0.42 (0.18–0.99)</b>	.040	.04	270
		30–39 y	<b>0.43 (0.22–0.85)</b>			
		40–49 y	0.80 (0.41–1.56)			
		>50 y	Reference			
	Highest degree	Postgraduate degree	1.40 (0.36–5.52)	.023	.04	
		Bachelor's degree	<b>0.50 (0.28–0.89)</b>			
		Lower-level degree	Reference			
	Primary care experience	≤5 y	<b>0.36 (0.19–0.68)</b>	.09	.06	
		6–10 y	0.55 (0.27–1.14)			
		11–15 y	<b>0.42 (0.20–0.88)</b>			
		>15 y	Reference			
	Self-efficacy to find research	Highest degree	Postgraduate degree	<b>11.10 (1.38–89.13)</b>	.010	
Bachelor's degree			1.44 (0.83–2.47)			
Lower-level degree			Reference			
Primary care experience		≤5 y	<b>1.90 (1.01–3.59)</b>	.125	.03	
		6–10 y	1.10 (0.55–2.18)			
		11–15 y	1.90 (0.89–4.05)			
		>15 y	Reference			
Can integrate patient preferences with guidelines	Sex	Men	<b>0.55 (0.31–0.97)</b>	.041	.02	269
		Women	Reference			
Know where to find guidelines	Primary care experience	≤5 y	<b>3.29 (1.26–8.62)</b>	.064	.05	269
		6–10 y	2.70 (0.92–7.95)			
		11–15 y	2.69 (0.88–8.22)			
		>15 y	Reference			
	Highest degree	Postgraduate degree	<b>13.50 (3.13–58.18)</b>	.010	.05	
		Bachelor's degree	<b>3.06 (1.03–9.09)</b>			
		Lower-level degree	Reference			
Easy access to guidelines	Highest degree	Postgraduate degree	<b>7.20 (1.55–33.44)</b>	.052	.05	270
		Bachelor's degree	1.88 (0.61–5.78)			
		Lower-level degree	Reference			

<sup>a</sup> CI=confidence interval, postgraduate degree=master's/PhD student/doctorate. Significant associations are in bold type.

<sup>b</sup> Model P=goodness of fit for the model.

<sup>c</sup> Nagelkerke R<sup>2</sup>.

## Determinants of Guideline Use in Primary Care Physical Therapy



**Figure 2.**

Self-reported knowledge and prerequisites related to guidelines (n=269–271). Percentage of respondents reporting “yes,” “partially,” and “no” to being aware of, knowing where to find, and having easy access to guidelines.

percent reported performing database searches 2 to 5 times per month, and 6% reported performing database searches more than 5 times per month. A postgraduate degree was associated with searching databases (OR=20.56, 95% CI=3.47–121.87), reading articles (OR=6.39, 95% CI=1.62–25.27), and feeling confident in finding research relevant to clinical questions (OR=11.10, 95% CI=1.38–89.13) (Tab. 2).

### Attitudes, Knowledge, Prerequisites, and Barriers Related to Guidelines

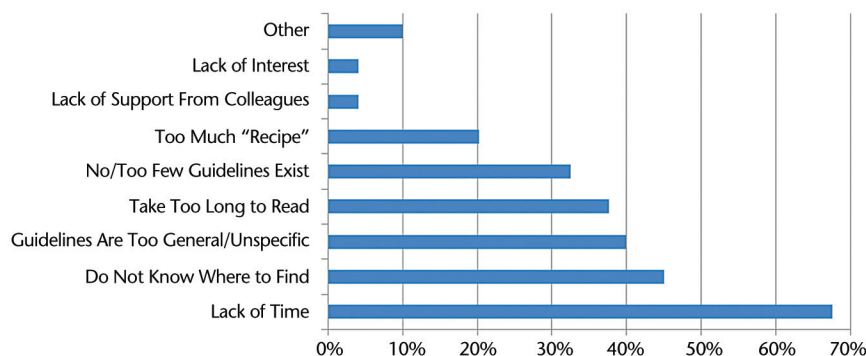
Ninety-six percent of respondents agreed or strongly agreed that it is important to use guidelines. A third of the respondents reported being aware of the existence of guidelines relevant to their work, while 61% stated that they were partially aware (Fig. 2). Only 13% knew where to find guidelines on the Internet, whereas 65% knew this to some extent. Only 9% stated that they had

easy access to relevant guidelines at their workplace, and 53% stated that they had access to some extent; 37% reported not having easy access to relevant guidelines. Sixty-eight percent reported knowing how to integrate patient preferences with guidelines. Men were less likely to know how to integrate patient preferences (OR=0.55, 95% CI=0.31–0.97) (Tab. 2). Less than 5 years of work experience in primary care and a postgraduate degree were associated with knowledge of where to find guidelines (OR=3.29, 95% CI=1.26–8.62). A postgraduate degree also was associated with perceiving easy access to guidelines (OR=7.20, 95% CI=1.55–33.44).

Reported barriers to using guidelines are shown in Figure 3. The most important barrier was lack of time, cited by 68% of the respondents. In the “other” category, the most cited barrier was lack of support or encouragement from superiors.

### Use of Guidelines

Forty-seven percent of the respondents stated that they used guidelines frequently or very frequently, 41% sometimes, and 12% infrequently or never. Of the 25 variables analyzed, 15 were significantly associated with frequent guideline use in the univariate analyses. Of these 15 variables, 5 remained significant in the final multiple regression model, together explaining 46% of the variation in the outcome (Tab. 3). The strongest associations were those between considering guidelines important to facilitate practice (OR=10.11, 95% CI=2.47–41.33) and knowing how to integrate patient preferences (OR=5.58, 95% CI=2.47–12.58) and frequent guideline use. No significant interaction effects were found. No associations were found between demographic or workplace characteristics and the use of guidelines.



**Figure 3.**

Self-reported barriers for using guidelines (n=258). Percentage of respondents reporting the barrier.

**Table 3.**

Variables Associated With Frequent Use of Guidelines in Univariate Analyses and in the Final Multiple Logistic Regression Model (n=258)<sup>a</sup>

Independent Variable	Level	Univariate Associations P Value	n	Multiple Associations		
				B (SE)	Odds Ratio (95% CI)	P
EBP is necessary to practice	Agree Disagree	.042	267			
EBP helps decision making	Agree Disagree	.034	268			
EBP creates unreasonable demands	Disagree Agree	<.001	267	1.18 (0.34)	3.25 (1.68–6.28) Reference	<.001
Strong evidence is lacking for most treatments	Disagree Agree	<.001	266	1.06 (0.32)	2.89 (1.53–5.46) Reference	.001
Important that guidelines exist	Agree Disagree	.007	268			
Self-efficacy to treat patients according to evidence	Agree Disagree	<.001	267			
Self-efficacy to find research	Agree Disagree	.001	265			
Knowledge of how to integrate patient preferences with guidelines	Agree Disagree	<.001	269	1.72 (0.42)	5.58 (2.47–12.58) Reference	<.001
Awareness that guidelines exist	Yes No	<.001	269	1.08 (0.35)	2.95 (1.49–5.86) Reference	.002
Knowledge of where to find guidelines	Yes No	<.001	269			
EBP is encouraged at the workplace	Agree Disagree	.016	268			
Easy access to guidelines	Yes No	.002	268			
Guidelines are important in facilitating practice	Agree Disagree	<.001	265	2.31 (0.72)	10.11 (2.47–41.33) Reference	.001
Guidelines are important in providing best treatment	Agree Disagree	.013	266			
Guidelines are important in providing equal treatment	Agree Disagree	.006	266			

<sup>a</sup> Model P for final model=<.001, Nagelkerke R<sup>2</sup>=.46, overall correctly predicted=75.6%, SE=standard error, CI=confidence interval.

The complete distribution of responses for all variables is shown in the eTable (available at ptjournal.apta.org).

**Discussion**  
**Main Findings**

The key findings of this study conducted among a sample of physical therapists in Swedish primary care were that attitudes toward EBP and guidelines were in general very positive, although self-reported behavior did not fully reflect this, and that awareness of and perceived access to guidelines and other EBP

resources were limited. Attitudes toward EBP were more positive among younger therapists and those with few years of experience, whereas self-efficacy concerning EBP was greater among those with a postgraduate degree. The most important determinants of frequent guideline use were considering guidelines important to facilitate practice and knowing how to integrate patient preferences with guidelines.

**Attitudes, Knowledge, Behavior, Prerequisites, and Barriers to EBP**

The positive attitudes toward EBP found in this study are largely consistent with previous surveys in the United States,<sup>6</sup> Australia,<sup>16</sup> and Sweden.<sup>29,30</sup> A smaller qualitative study in the United Kingdom also showed favorable attitudes toward EBP, although participant understanding of EBP varied.<sup>32</sup> The fact that younger and less experienced therapists reported more positive attitudes toward EBP also is consistent with previous studies.<sup>6,16,30</sup> In recent years, undergraduate education in

Sweden has increasingly emphasized the importance of EBP and various EBP skills are now taught, whereas those who graduated before the turn of the millennium have not received EBP training to the same extent, possibly contributing to this difference in attitudes. One way to address this difference in attitude would be to offer continued education on EBP, particularly targeting older and more experienced therapists.

The association found between self-efficacy to find research and a postgraduate education, also supported by previous studies,<sup>6,16,30,32</sup> further points to the relevance of providing education and training in EBP skills, possibly as part of a guideline implementation strategy.

Nearly all therapists expressed a desire to learn or improve their EBP skills, and approximately one third expressed low degrees of self-efficacy to find relevant research and to treat patients according to current best evidence. Low self-efficacy and insufficient education are among the previously identified barriers to performing EBP activities,<sup>12,13,17,18</sup> further strengthening the case for educational efforts. A desire for learning also has been identified as a predictor of the propensity to adopt EBP in physical therapy.<sup>33</sup>

Respondents in our study appeared to read scientific articles and perform database searches somewhat less frequently than their colleagues in the United States.<sup>6</sup> These findings possibly can be explained by the fact that a smaller proportion (approximately half of the respondents) knew how to access online databases.

Barnard and Wiles<sup>32</sup> reported that access to EBP resources such as libraries and databases was seen as an important facilitator of EBP by British physical therapists, and Iles

and Davidson<sup>16</sup> reported poor access to journals and summaries of evidence as the second largest barrier after time among Australian physical therapists. The limited knowledge of how to access databases in our study is most likely an information issue because all employees of the Region Västra Götaland have online access to databases via an electronic library. The youngest therapists knew to a lesser extent how to access databases, suggesting a need for the county council to provide better information on access to evidence resources for recent hires. Online access to research summaries or systematic reviews has been shown to facilitate the implementation of EBP in clinical practice,<sup>34</sup> and access to evidence has been identified as a key prerequisite for achieving EBP in physical therapy.<sup>35</sup>

The frequency of reading scientific articles is somewhat difficult to interpret. Reading scientific articles or searching databases may not be necessary if you have access to summarized research briefings, such as those typically provided in national professional journals and newsletters, or summaries of evidence in clinical guidelines. Fruth et al<sup>15</sup> concluded that summarized and synthesized research findings could lessen the barrier “lack of time” and increase clinician use of EBP. In a recent qualitative study, Dannapfel et al<sup>36</sup> reported that Swedish physical therapists perceived this type of research summary as a time saver and an important facilitator of research use.

### Attitudes, Knowledge, Prerequisites, and Barriers Related to Guidelines

Nearly all respondents (96%) agreed that guidelines are important, primarily in order to provide best possible treatment to patients but also to provide equal treatment and to facilitate their own work. The propor-

tion of respondents who considered guidelines important was substantially higher in this study than it was in a 2003 survey by Overmeer et al<sup>21</sup> in which only 56% considered guidelines useful in clinical practice. The difference may be an indication of a growing interest in guidelines and could possibly be attributed to the growth of the evidence-based movement in the last decade, which has resulted in a stronger focus on EBP and guidelines in health care. However, in the Netherlands, a qualitative study demonstrated rather unfavorable attitudes toward guidelines among physical therapists.<sup>37</sup> As discussed by that study's authors, this difference in attitude may be related to national or cultural differences, but also may be attributable to participants in qualitative studies possibly being more critical.

Knowledge of where to find guidelines and access to relevant guidelines are obviously key prerequisites to using them. The proportion (9%) who reported having easy access to guidelines in our survey was much lower than the 62% of the hospital-based therapists.<sup>29</sup> This finding may have been due to perceived or actual organizational or structural barriers for convenient access to guidelines in primary care. For example, at the time of this study, there was no known website in Sweden where guidelines specifically for primary care physical therapy were published, either within the organization or externally. Organizational barriers are primarily related to time and access to resources. Access to web-based resources has been identified earlier as an organizational barrier to EBP in physical therapy.<sup>13</sup> Research on organizational barriers for EBP and guideline use in physical therapy is limited, and more research may be warranted.

The proportion who stated knowing how to integrate patient preferences



with guidelines was slightly higher compared with the proportion in hospital-based therapists reported by Heiwe et al.<sup>29</sup> However, the one third who reported not knowing how to integrate patient preferences can possibly be explained by a poor understanding of the meaning of the EBP concept, as defined by researchers.<sup>1</sup> Many clinicians primarily equate the EBP concept with the use of evidence from research, paying less attention to the other 2 components of EBP (ie, clinical experience and patient preferences).<sup>38</sup> This misinterpretation implies a need for educational measures to enhance understanding of the underlying concepts of EBP. Evidence-based practice training programs (eg, workshops) have been shown to improve EBP knowledge and skills among physical therapists.<sup>39</sup>

Somewhat expectedly, the main barrier to using guidelines was perceived lack of time, consistent with findings from several other studies among physical therapists in both hospital and primary care settings in various countries.<sup>6,12-17,29,30,32</sup> The proportion of respondents who have reported this as a main obstacle ranges between 46% and 86% in the various studies. Physical therapists have cited the pressures of today's health care environment and the emphasis by administrators on productivity as factors that inhibit their ability to seek, appraise, and integrate research findings into daily practice.<sup>40</sup> This important barrier is not likely to be reduced without organizational or managerial support (eg, provision of protected work time) and also highlights the need for evidence to be summarized in brief formats, minimizing time spent searching for and reading literature.

### Use of Guidelines

The high proportion of respondents who considered it important to use guidelines was not reflected in the

proportion of respondents who stated that they used them. Fewer than half of the respondents reported using guidelines "frequently" or "very frequently or always." This finding can likely be attributed to the relatively low proportion who were aware of guidelines and the even lower proportion who knew how to access them. The frequency of use of guidelines also is likely to vary with various diagnoses and fields. More well-researched diagnoses are associated with abundant evidence, whereas research is lacking for others, resulting in a corresponding variation in the availability and use of guidelines. In fields where therapists feel confident and experienced, the use of guidelines may be lower because they trust their clinical experience and competence. However, the proportion reporting frequent use of guidelines in our study is similar to levels of guideline use reported by physical therapists in the United States (40%) and in Australia (45%)<sup>7,16</sup> but lower than that in the Netherlands (61%).<sup>41</sup> If we also include respondents in our survey who reported using guidelines "sometimes," the proportion rises to 88%, which is more in line with the guideline use reported in the other Swedish studies.<sup>29,30</sup> It also is possible that the term "use" was interpreted differently by the therapists; use can be explicit (eg, the therapist reads the guideline at the treatment occasion) or implicit (eg, the therapist reads the guideline but integrates it into his or her thinking and clinical reasoning later). In the latter case, it may not have been reported as use; the therapist might not even be aware of using a guideline.

Despite less positive attitudes toward EBP and guidelines, older and more experienced therapists reported similar use of guidelines as their younger colleagues. Previous research on guideline use by various

health care professionals has shown that those who are young or less experienced are more inclined to use guidelines than those who are older or more experienced, who are more likely to lean on their clinical expertise.<sup>42</sup> The non-difference between old and young therapists in our study may suggest that the therapist's choice of whether or not to use guidelines has more to do with individual characteristics than with age. It also may imply that the confidence of younger therapists in their capabilities makes up for their lesser experience, so that they perceive a similar need to use guidelines. In our study, age was correlated with experience; this relationship, however, may not always be the case.

The strongest determinant of frequent guideline use was the attitude that guidelines are important to facilitate practice. This finding seems to indicate a perceived need for guidelines, emphasizing the importance of providing clinicians with the decision support that guidelines offer. An interesting finding was the strong association between integrating patient preferences with guidelines and frequent guideline use, implying an understanding of the EBP concept and of the notion that guidelines can and should be adapted to the individual patient. This finding points to the importance of knowledge about patient preferences. Our study was not designed to explore this issue in more detail, and further study of patient preferences for physical therapy interventions may be indicated.

Disagreeing that EBP creates unreasonable demands and that strong evidence is lacking for most treatment methods also was associated with frequent guideline use in the final regression model. Disagreement with these statements can be considered as positive attitudes toward EBP. This association between atti-

tude and behavior is consistent with a recent systematic review that identified perceptions, attitudes, and beliefs about research and EBP in allied health professionals as significant predictors of self-reported use of research evidence.<sup>43</sup> The same association has been found in the nursing literature.<sup>44</sup>

A rather obvious finding was the relationship between awareness that guidelines exist and frequent use. Awareness of, familiarity with, and agreement with guidelines are practitioner characteristics that have been found in previous studies to be associated with guideline use.<sup>42</sup> Awareness also has been established as an important first step toward adherence to guidelines.<sup>45</sup> The multiple logistic regression model explained approximately half of the variation in guideline use, indicating that, although not significant in the final model, the other variables likely contributed to the explanation of the variation. There may be other factors not examined in this study that could contribute to an explanation of the variation in guideline use.

The other factors showing significant univariate associations with the use of guidelines were knowledge of where to find guidelines, consideration of EBP and guidelines as important, self-efficacy in performing EBP activities, easy access to guidelines and EBP, and encouragement in the workplace to apply research in practice. Treating these factors as potential facilitators of EBP and guideline use and addressing them in guideline implementation strategies would likely be important for increased guideline use. These factors are among the determinants of practice that were identified by a recent systematic review.<sup>46</sup> Attitudes, self-efficacy, and social norms concerning a particular behavior are all important behavior change determinants in social-cognitive theories,

and research on clinical behavior in general suggests that these determinants are relevant in the explanation of the use of guidelines.<sup>47</sup> This supports our finding that the tenet that behavior can be influenced by attitudes, beliefs, knowledge, self-efficacy, and social norms<sup>27</sup> also is true in the case of guideline use in physical therapy, a finding that needs to be confirmed in future studies.

### Limitations and Strengths

Some limitations should be recognized when interpreting the results of this study. The cross-sectional design was used to demonstrate associations, and no causal relationships can be inferred. The survey was limited to publicly employed physical therapists. Private practitioners, who also provide outpatient services at the primary care level, may display different attitudes and behaviors. As with all self-reported data, there is a risk that the results are more positive than what is actually the case. It is not unlikely that the generally positive attitudes found in our study and others can be partially attributed to a social desirability bias.<sup>48</sup> Considerable focus has been put on EBP in recent years, and it would be rather politically incorrect to express a negative attitude toward this concept.

Measuring clinical practice behavior, such as the use of guidelines, is highly complex. Evidence for the accuracy of clinician self-reported behavior is inconclusive.<sup>49</sup> Other proxy measures such as medical record review or patient reports or, ideally, some kind of direct observation could possibly be used. All measures, however, would be challenging and have their limitations in the case of measuring guideline use in physical therapy.

Response options for items investigating frequency (eg, use of guidelines) were purposely unspecific.

Many physical therapists in Sweden work part-time, the patient populations are diverse, and the availability of guidelines varies considerably among different diagnoses. Hence, the frequency of guideline use (eg, once per day, once per week, once per month) could vary considerably from week to week or month to month for each therapist and was not thought to provide a meaningful answer. Instead, we chose to use the words “never or very seldom,” “seldom,” “sometimes,” “frequently,” and “very frequently or always,” leaving the qualitative definition and interpretation of frequency of guideline use to the respondent. The results for these items, therefore, should be interpreted with caution.

Using a web-based questionnaire can be considered both a strength and a limitation. Drawbacks with a web-based questionnaire are that only a limited depth of response is possible and that it may be perceived as intrusive. However, using a web-based questionnaire had the advantages of being both time- and cost-efficient, as well as being easy to administer and to achieve anonymity. The respondents could complete the questionnaire at their convenience. No manual data entry was required, minimizing the risk for errors in the data.

The population in our survey is likely to be broadly similar to the national population of physical therapists. Sex distribution nationwide of physical therapist members of the Swedish Association of Registered Physiotherapists employed by county councils is 82% women and 18% men (Swedish Association of Registered Physiotherapists, e-mail communication, June 11, 2012). Although our survey was conducted in only 1 county council/geographic region, this particular county council is the second largest in Sweden. Thus, we believe that our results can

be generalized to physical therapists working in other county councils in Sweden.

Other strengths of the present study were the use of a validated and reliable questionnaire, a homogenous population, and a fairly high response rate (65%). Response rates in the other studies examining EBP have been 49%,<sup>6</sup> 54%,<sup>16</sup> and 45%,<sup>30</sup> respectively.

### Implications for Practice

Our results suggest that the positive attitudes found toward EBP and guidelines constitute important prerequisites for evidence-based physical therapist practice in primary care, but that they need to be accompanied by increased availability of and access to clinical guidelines. The identified determinants can be addressed by organizational and educational measures and could serve as a basis for the development of a tailored guideline implementation strategy specifically addressing key obstacles. Tailoring implementation interventions to identified barriers and facilitators is likely to improve professional practice.<sup>50</sup> The possibility of achieving behavior change by influencing social cognitive determinants such as attitudes, knowledge, and self-efficacy should be considered, while acknowledging the difficulty of changing established clinical practice.<sup>51</sup>

Both local and national initiatives would be beneficial in the facilitation of the uptake of guidelines in primary care physical therapy. The production of guidelines, or at least the synthesis of the evidence base underpinning them, could be (and is to some extent) coordinated on a national level, while implementation may be more suitable for local adaptation. Implementation efforts should be based on strategies that have been proven effective<sup>24,25</sup> and may benefit from taking guidance

from implementation theory that specifies important predictors or facilitators of successful implementation. Although not specific for physical therapy, there is tentative evidence in other health care settings that implementation interventions that are informed by theory are more effective than those that are not.<sup>52</sup> Development and implementation of evidence-based guidelines targeting primary care physical therapists should be a high priority in order to render practice more evidence-based, facilitate effective patient care, and reduce unwarranted variation in practice.

### Conclusions

The use of guidelines in this population of Swedish primary care physical therapists was not as frequent as expected in view of the highly positive attitudes toward EBP and guidelines. Awareness of and perceived access to guidelines were limited. Evidence-based practice-related attitudes and behavior were associated with age, years of experience, and postgraduate education, supporting the results of previous studies.<sup>6,16,27</sup> Factors associated with frequent use of guidelines were: positive attitudes toward EBP and guidelines, awareness of guidelines, considering guidelines to facilitate practice, and knowing how to integrate patient preferences with guideline use, verifying our hypothesis that social-cognitive factors can influence the use of guidelines. The identified determinants can be addressed when developing guideline implementation strategies.

Ms Bernhardsson and Dr Larsson provided concept/idea/research design, data analysis, and writing. Ms Bernhardsson provided data collection. The remaining authors also provided data analysis and critical review of the manuscript. All authors approved the final manuscript. The authors thank all participating physical therapists for completing the questionnaire and Magnus Pettersson and Henrik Magnusson for statistical assistance.

Preliminary results of the study were presented at the First International Conference on Evidence-Based Health Care, October 6–8, 2012, New Delhi, India, and the Guidelines International Network, August 18–21, 2013, San Francisco, California.

The study was partially funded by the Local Research and Development Board for Gothenburg and Södra Bohuslän. Ms Bernhardsson is partially supported by a doctoral grant from Linköping University.

DOI: 10.2522/ptj.20130147

### References

- 1 Sackett DL, Rosenberg WM, Gray JA, et al. Evidence based medicine: what it is and what it isn't. *BMJ*. 1996;312:71-72.
- 2 Maher CG, Moseley AM, Sherrington C, et al. A description of the trials, reviews, and practice guidelines indexed in the PEDro database. *Phys Ther*. 2008;88:1068-1077.
- 3 Centre for Evidence-Based Physiotherapy, The George Institute for Global Health. Physical Therapy Evidence Database PEDro. Available at: <http://www.pedro.org.au/>. Accessed August 29, 2013.
- 4 Grol R, Grimshaw J. Evidence-based implementation of evidence-based medicine. *Jt Comm J Qual Improv*. 1999;25:503-513.
- 5 Turner P, Whitfield TW. Physiotherapists' use of evidence based practice: a cross-national study. *Physiother Res Int*. 1997; 2:17-29.
- 6 Jette DU, Bacon K, Batty C, et al. Evidence-based practice: beliefs, attitudes, knowledge, and behaviors of physical therapists. *Phys Ther*. 2003;83:786-805.
- 7 Fritz J, Cleland JA, Brennan GP. Does adherence to the guideline recommendation for active treatments improve the quality of care for patients with acute low back pain delivered by physical therapists? *Med Care*. 2007;45:973-980.
- 8 van Tulder MW, Tuut M, Pennick V, et al. Quality of primary care guidelines for acute low back pain. *Spine (Phila Pa 1976)*. 2004;29:E357-E362.
- 9 Holden MA, Nicholls EE, Hay EM, Foster NE. Physical therapists' use of therapeutic exercise for patients with clinical knee osteoarthritis in the United Kingdom: in line with current recommendations? *Phys Ther*. 2008;88:1109-1121.
- 10 Mikhail C, Korner-Bitensky N, Rossignol M, Dumas JP. Physical therapists' use of interventions with high evidence of effectiveness in the management of a hypothetical typical patient with acute low back pain. *Phys Ther*. 2005;85:1151-1167.
- 11 Walsh NE, Hurley MV. Evidence based guidelines and current practice for physiotherapy management of knee osteoarthritis. *Musculoskeletal Care*. 2009;7:45-56.

- 12 Hannes K, Staes F, Goedhuys J, Aertgeerts B. Obstacles to the implementation of evidence-based physiotherapy in practice: a focus group-based study in Belgium (Flanders). *Physiother Theory Pract*. 2009;25:476–488.
- 13 Salbach NM, Jaglal SB, Korner-Bitensky N, et al. Practitioner and organizational barriers to evidence-based practice of physical therapists for people with stroke. *Phys Ther*. 2007;87:1284–1303.
- 14 Salbach NM, Guilcher SJ, Jaglal SB, Davis DA. Factors influencing information seeking by physical therapists providing stroke management. *Phys Ther*. 2009;89:1039–1050.
- 15 Fruth SJ, Van Veld RD, Despos CA, et al. The influence of a topic-specific, research-based presentation on physical therapists' beliefs and practices regarding evidence-based practice. *Physiother Theory Pract*. 2010;26:537–557.
- 16 Iles R, Davidson M. Evidence based practice: a survey of physiotherapists' current practice. *Physiother Res Int*. 2006;11:93–103.
- 17 Grimmer-Somers K, Lekkas P, Nyland L, et al. Perspectives on research evidence and clinical practice: a survey of Australian physiotherapists. *Physiother Res Int*. 2007;12:147–161.
- 18 Stevenson K, Lewis M, Hay E. Do physiotherapists' attitudes towards evidence-based practice change as a result of an evidence-based educational programme? *J Eval Clin Pract*. 2004;10:207–217.
- 19 Field MJ, Lohr KN, eds. *Guidelines for Clinical Practice: From Development to Use*. Washington, DC: National Academy Press; 1992.
- 20 Clinical guidelines. World Confederation for Physical Therapy. Available at: <http://www.wcpt.org/node/29664>. Accessed August 29, 2013.
- 21 Overmeer T, Linton SJ, Holmquist L, et al. Do evidence-based guidelines have an impact in primary care? A cross-sectional study of Swedish physicians and physiotherapists. *Spine (Phila Pa 1976)*. 2005;30:146–151.
- 22 Liddle SD, Baxter GD, Gracey JH. Physiotherapists' use of advice and exercise for the management of chronic low back pain: a national survey. *Man Ther*. 2009;14:189–196.
- 23 Rutten GM, Degen S, Hendriks EJ, et al. Adherence to clinical practice guidelines for low back pain in physical therapy: do patients benefit? *Phys Ther*. 2010;90:1111–1122.
- 24 van der Wees PJ, Jamtvedt G, Rebbeck T, et al. Multifaceted strategies may increase implementation of physiotherapy clinical guidelines: a systematic review. *Aust J Physiother*. 2008;54:233–241.
- 25 Menon A, Korner-Bitensky N, Kastner M, et al. Strategies for rehabilitation professionals to move evidence-based knowledge into practice: a systematic review. *J Rehabil Med*. 2009;41:1024–1032.
- 26 Davies P, Walker AE, Grimshaw JM. A systematic review of the use of theory in the design of guideline dissemination and implementation strategies and interpretation of the results of rigorous evaluations. *Implement Sci*. 2010;5:14. doi: 10.1186/1748-5908-5-14.
- 27 Fishbein M, Ajzen I. *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*. Reading, MA: Addison-Wesley; 1975.
- 28 Akinbo S, Odebiyi D, Okunola T, Aderoba O. Evidence-based practice: knowledge, attitudes and beliefs of physiotherapists in Nigeria. *Internet J Med Inform*. 2009;4:169–172.
- 29 Heiwe S, Kajermo KN, Tyni-Lenné R, et al. Evidence-based practice: attitudes, knowledge and behaviour among allied health care professionals. *Int J Qual Health Care*. 2011;23:198–209.
- 30 Nilsagård Y, Lohse G. Evidence-based physiotherapy: a survey of knowledge, behaviour, attitudes and prerequisites. *Adv Physiother*. 2010;12:179–186.
- 31 Bernhardsson S, Larsson ME. Measuring evidence-based practice in physical therapy: translation, adaptation, further development, validation, and reliability test of a questionnaire. *Phys Ther*. 2013;93:819–832.
- 32 Barnard S, Wiles R. Evidence-based physiotherapy: physiotherapists' attitudes and experiences in the Wessex area. *Physiotherapy*. 2001;87:115–124.
- 33 Bridges PH, Bierema LL, Valentine T. The propensity to adopt evidence-based practice among physical therapists. *BMC Health Serv Res*. 2007;7:103.
- 34 Salbach NM, Veinot P, Jaglal SB, et al. From continuing education to personal digital assistants: what do physical therapists need to support evidence-based practice in stroke management? *J Eval Clin Pract*. 2011;17:786–793.
- 35 Maher CG, Sherrington C, Elkins M, et al. Challenges for evidence-based physical therapy: accessing and interpreting high-quality evidence on therapy. *Phys Ther*. 2004;84:644–654.
- 36 Dannapfel P, Peolsson A, Nilsen P. What supports physiotherapists' use of research in clinical practice? A qualitative study in Sweden. *Implement Sci*. 2013;8:31. doi: 10.1186/1748-5908-8-31.
- 37 Harting J, Rutten GM, Rutten ST, Kremers SP. A qualitative application of the diffusion of innovations theory to examine determinants of guideline adherence among physical therapists. *Phys Ther*. 2009;89:221–232.
- 38 Trinder L, Reynolds S, eds. *Evidence-Based Practice: A Critical Appraisal*. Oxford, United Kingdom: Blackwell Science; 2000.
- 39 Dizon JM, Grimmer-Somers KA, Kumar S. Current evidence on evidence-based practice training in allied health: a systematic review of the literature. *Int J Evidence Based Healthcare*. 2012;10:347–360.
- 40 Schreiber J, Stern P. A review of the literature on evidence-based practice in physical therapy. *Internet J Allied Health Sci Practice*. 2005;3. Available at: <http://ijahsp.nova.edu/articles/vol3num4/Schreiber-Stern.htm>. Accessed August 29, 2013.
- 41 Rutten G, Kremers S, Rutten S, Harting J. A theory-based cross-sectional survey demonstrated the important role of awareness in guideline implementation. *J Clin Epidemiol*. 2009;62:167–176.e1.
- 42 Francke AL, Smit MC, de Veer AJ, Mistiaen P. Factors influencing the implementation of clinical guidelines for health care professionals: a systematic meta-review. *BMC Med Inform Decis Mak*. 2008;8:38. doi: 10.1186/1472-6947-8-38.
- 43 Lizarondo L, Grimmer-Somers K, Kumar S. A systematic review of the individual determinants of research evidence use in allied health. *J Multidiscip Healthcare*. 2011;4:261–272.
- 44 Squires JE, Estabrooks CA, Gustavsson P, Wallin L. Individual determinants of research utilization by nurses: a systematic review update. *Implement Sci*. 2011;6:1. doi: 10.1186/1748-5908-6-1.
- 45 Pathman DE, Konrad TR, Freed GL, et al. The awareness-to-adherence model of the steps to clinical guideline compliance. The case of pediatric vaccine recommendations. *Med Care*. 1996;34:873–889.
- 46 Flottorp S, Oxman A, Krause J, et al. A checklist for identifying determinants of practice: a systematic review and synthesis of frameworks and taxonomies of factors that prevent or enable improvements in healthcare professional practice. *Implement Sci*. 2013;8:35. doi: 10.1186/1748-5908-8-35.
- 47 Godin G, Bélanger-Gravel A, Eccles M, Grimshaw J. Healthcare professionals' intentions and behaviours: a systematic review of studies based on social cognitive theories. *Implement Sci*. 2008;3:36. doi: 10.1186/1748-5908-3-36.
- 48 Streiner DL, Norman GR. *Health Measurement Scales: A Practical Guide to Their Development and Use*. 4th ed. New York, NY: Oxford University Press; 2008.
- 49 Hrisos S, Eccles MP, Francis JJ, et al. Are there valid proxy measures of clinical behaviour? A systematic review. *Implement Sci*. 2009;4:37. doi: 10.1186/1748-5908-4-37.
- 50 Baker R, Camosso-Stefinovic J, Gillies C, et al. Tailored interventions to overcome identified barriers to change: effects on professional practice and health care outcomes. *Cochrane Database Syst Rev*. 2010(3):CD005470.
- 51 Nilsen P, Roback K, Broström A, Ellström PE. Creatures of habit: accounting for the role of habit in implementation research on clinical behaviour change. *Implement Sci*. 2012;7:53. doi: 10.1186/1748-5908-7-53.
- 52 Abraham C, Kelly MP, West R, Michie S. The UK National Institute for Health and Clinical Excellence public health guidance on behaviour change: a brief introduction. *Psychol Health Med*. 2009;14:1–8.