

Review Article

Applying Evidence-Based Medicine in Actual Clinical Practice: Can We Bridge the Gap? A Review of the Literature

CHRISTOS ARGYRIOU¹, GEORGE S. GEORGIADIS¹, EFSTRATIOS I. GEORGAKARAKOS¹, STEFANOS ROUMELIOTIS², ATHANASIOS ROUMELIOTIS², PETROS KIKAS³, DIMITRIOS TZIAKAS³, MILTOS K. LAZARIDES¹

¹Department of Vascular Surgery, ²Department of Nephrology, and ³Department of Cardiology, "Democritus" University of Thrace, University General Hospital of Alexandroupolis, Greece

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Address:
George S. Georgiadis

7 Alexandrou
Papanastasiou St.
681 31 Alexandroupolis
Greece
ggeorgia@med.duth.gr
georgiadis_gs@hol.gr

Clinical practice guidelines have been defined as “systemically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances”.¹ In the era of overwhelming medical information, clinical guidelines fill the gap between scientific evidence and its application in clinical practice, highlighting the need to provide a more consistent quality of care for patients, and taking into consideration factors such as age, sex, socioeconomic status, and geographic location.² Data from studies in the United States and the Netherlands show that typically 30-40% of patients did not receive therapy according to evidence-based medicine (EBM), while at least 20% of the care provided was either unnecessary or even harmful to patients.³ Although the use of evidence is considered good clinical practice,⁴ the increasing number of clinical guidelines used in many different countries in recent decades raises questions regarding their effectiveness in promoting the health status of patients while enhancing the overall quality of care.⁵⁻⁷

Limitations and barriers, such as a shortage of consistent and coherent sci-

entific evidence, lack of patient individualization, limited time and resources, and the questionable clinical efficacy of EBM, are universally encountered in medical practice. In addition, the criticisms that EBM promotes “cookbook” medicine, “is simply a cost-cutting tool”, “is limited to clinical research”, “is too expensive”, “leads to therapeutic nihilism in the absence of evidence from randomized trials”, and “ignores patients’ values” have elicited both positive and negative reactions from physicians.⁸ Furthermore, various barriers are encountered with regard to EBM, from the development of clinical guidelines to guideline implementation and use in clinical practice.⁹⁻²⁰ Last but not least, whether educational interventions based on teaching EBM have a positive impact on physicians’ knowledge and performance in clinical decision making still remains a question. The aim of this paper is to present the existing data in the literature regarding the effect of EBM in changing physicians’ attitude towards clinical guidelines, and to describe the facilitators and barriers to implementing those clinical guidelines in clinical practice.

Methods

Study design and selection

A systemic review was conducted of scientific articles on guideline development and their implementation in clinical practice. In particular, we sought to analyze the barriers and facilitators that influence the effectiveness of clinical practice guidelines, the impact of educational interventions on EBM, and the association between teaching EBM and concomitant changes in knowledge and behavior. A barrier was defined as any factor that hindered physicians and/or health care providers from implementing scientific evidence in clinical practice or weakening their attitude towards adherence to a clinical guideline.

Search strategy

We performed an electronic search of the MEDLINE database for relevant literature published between 1997 and 2013; we chose not to extend our search to before 1997 so as to focus on the most recent articles and to achieve a more concentrated and up-to-date review. We only included systematic reviews and randomized controlled trials, so as to present robust data and therefore strengthen the scientific efficiency of the present systematic review. The following combinations of key words were used for the search: “evidence-based medicine”, “clinical guidelines”, “hospital protocols” and “medical education.” The bibliographies of the references obtained were also used if considered relevant. Additionally we sought to retrieve relevant information from colleagues, experts in the field of education, and from physicians who participate in the development of formal clinical guidelines in their field of work. We included barriers that were identified by various methods, such as questionnaires, surveys, or several data sources. We excluded studies of the teaching of EBM in undergraduate education and those strictly referring to nursing staff. A meta-analysis was not possible because of the clear heterogeneity regarding the features, quality, and assessment tools among individual studies. The screening of the results was reviewed by two independent reviewers (CA, SR) and in case of any inconsistencies in the participation or rejection of an article a third reviewer (GG) was left to judge its relevancy to the article.

Results

The combined search strategy identified 245 potentially relevant abstracts. At least 56 articles addressed the effect of implementing EBM in clinical practice. However, only 35 studies had sufficient power and substantial effects. Of these, 20 studies were rejected: 12 of them addressed either undergraduate students or nursing staff exclusively, five articles were not written in English, one was unsuitable because of its format (commentary article), one was rejected for a lack of author information, and one was excluded because there was only an abstract and we were not able to access its full text. The remaining 14 studies, 12 systemic reviews and 2 randomized controlled trials were found to fulfil the eligibility criteria of this review (Table 1). The outcomes reported were the attitude, knowledge, and behavior of physicians towards clinical practice guidelines; assessment of critical appraisal skills and educational methods for implementing EBM in daily practice; and specific barriers that prevent clinical guidelines from being applied. Our analysis showed that individual, organizational, and attitudinal factors were related to the implementation of clinical guidelines in practice. Individual factors were related to the physician’s lack of access to recommended diagnostic assessment tools and standardized rating scales. On the other hand, facilitators such as leadership or training in the use of guidelines by experts could possibly lead to promoting guideline acceptance. Organizational factors included inadequate time for proper training of the medical personnel based on the guidelines, for frequent audits, and for adapting to the continuing updates of the guidelines. Resources such as lack of funding and standardization of care based on cost-effectiveness were also described as essential issues inhibiting the implementation of guidelines. Attitudinal factors involved active participation and interaction with the rest of the team, which encouraged decision making, setting treatment goals, and evaluating outcomes, whereas a lack of knowledge, skills, and motivation were described as major barriers to implementation and the use of research findings in clinical practice. Last but not least, the health provider’s concerns about the applicability of guidelines in their own clinical practice, as well as applying guidelines to specific patient populations, are considered important issues that added to the complexity of using EBM in clinical practice.

Table 1. Design and outcome measures of included studies.

First author, year	Design	Country	Main outcome measures
Davis, 1997 ¹⁷	Systematic review	Canada	Strategies for implementing clinical practice guidelines
Norman, 1998 ³²	Systematic review	Canada	Effect of critical appraisal skills on medical students' and residents' attitude and knowledge
Cabana, 1999 ¹⁴	Systematic review	USA	Barriers to physician adherence to clinical practice guidelines
Straus, 2000 ⁸	Systematic review	Canada	Reporting of most common criticisms on evidence-based medicine
Taylor, 2000 ⁵	Systematic review	United Kingdom	Effect of critical appraisal skills on physicians' attitude and knowledge
Brettell, 2003 ³³	Systematic review	United Kingdom	Effect of information retrieval training on skill improvement
Garg, 2003 ³⁴	Systematic review	United Kingdom	Impact on health professionals' skill levels in literature searching
Forsetlund, 2003 ³⁷	Randomized controlled trial	Norway	Effect of multifaceted intervention on health physicians' change of knowledge and behavior
Coomarasamy, 2004 ²⁴	Systematic review	United Kingdom	Impact of evidence-based medicine on postgraduates' knowledge and behavior
Parkes, 2004 ³¹	Systematic review	United Kingdom	Association between teaching critical appraisal skills and changes in knowledge and in evidence-based medicine
Cochrane, 2007 ¹⁶	Systematic review	USA	Identification of barriers to guideline adherence
Carlsen, 2007 ¹⁰	Systematic review	United Kingdom	Physicians' attitude and experience toward clinical guidelines
Shuval, 2007 ²⁶	Randomized controlled trial	Israel	Assessment of the impact of educational interventions on physicians' attitude and knowledge
Forsetlund, 2009 ²³	Systematic review	Norway	Assessment of the effects of educational meetings in professional practice and health-care outcomes

Discussion

Clinical guidelines are designed to guide physicians and medical personnel to use EBM in their clinical decision making, but there are both internal and external factors in the working environment that influence their implementation in practice. The internal factors are associated with the attitudes of physicians towards adapting new guidelines and their time availability and motivation. External factors are not relevant to the practitioner and are related to the working environment, the organization, or the guideline itself.¹⁹ For example, in a large survey conducted among 3000 Canadian physicians regarding their attitude toward the use and implementation of clinical guidelines in their daily practice, most of the responders were positive about the use of guidelines. However, the same study found that external barriers,

such as questioning the quality of certain guidelines not issued by a respected physicians' organization and the "unfriendly" format of the guidelines, had a negative impact on the participants' adherence to them in practice.²² A large systematic review by Cochrane et al¹⁶ comprising 256 articles categorized different types of barriers to the implementation of clinical practice guidelines into cognitive-behavioral, attitudinal or rational emotional, professional, barriers embedded in the guidelines, and patient barriers. They concluded that barriers are best understood through qualitative studies that use constant comparison models, which are more descriptive, and not survey-type data.¹⁶ A similar classification of barriers to physician adherence to clinical guidelines was also reported in another systematic review by Cabana et al.¹⁴ That article reported that the knowledge, attitudes, and behaviors of physicians are critical points

that hinder them from applying clinical guidelines to best medical practice. Pogorzelska et al² studied the adherence of intensive care unit (ICU) workers to clinical guidelines in general, via a survey that included a total of 1359 physicians and health-care personnel in 70 different ICUs in the United States. Although the respondents had a very positive attitude towards practice guidelines, many of the barriers to compliance that were also highlighted by other researchers, such as a lack of professional autonomy or the guidelines being too prescriptive or “too cookbook”, were also confirmed in that study.² The same study found that a lack of time, age, profession, type of ICU work, and race significantly affected the attitudes of health-care workers towards practice guidelines.² Other clinical guideline attributes that render them more appealing to physicians are their validity based on scientific evidence, their specificity regarding the mode of treatment, their ability to be individualized to the patients, and their compatibility with current values.¹¹⁻¹³

In a systematic review, Carlsen et al¹⁰ focused more on the barriers to physicians' using clinical practice guidelines and less on the experiences and attitudes of physicians towards them, and found that the two main reasons for physicians failing to apply guidelines in practice were uncertainty that the guidelines would be useful to an individual patient's needs, and questioning the credibility of the guidelines.¹⁰ In contrast to the effect of lack of credibility with respect to implementing guidelines cited in some reports,¹⁰ a national survey conducted among Estonian physicians regarding the barriers and facilitators to the use of clinical guidelines found that most physicians recognized treatment guidelines as being reliable and convenient tools for treating their patients' diseases.⁹ In the same study, the main barrier to guideline use was reportedly the lack of available time and the absence of an easily accessible electronic health database from which to obtain medical information.⁹

There is no compelling evidence to show that teaching critical appraisal skills enhances physicians' knowledge or improves their management abilities as applied to patient care. A multi-targeted approach towards persuading physicians to use EBM through theoretical, behavioral, and practical interventions was conducted in a randomized controlled trial involving 148 public health physicians in Norway. The study showed a significant improvement in the knowledge demonstrated in the intervention group com-

pared to the control group, but failed to achieve any other positive effects regarding the implementation of this knowledge in clinical practice.²³ Although there is sufficient evidence in the literature to support the effectiveness of EBM in improving knowledge, there are few studies documenting that integrated EBM teaching actually changes the medical behaviors of physicians in practice or increases the actual quality of care for patients.²³⁻³⁰ In particular, among the five randomized controlled trials of which the present authors are aware,^{23,26-30} only one randomized clinical trial by Kok et al demonstrated that a clinically integrated and multifaceted EBM educational program, comprising both theoretical and practical sessions, successfully improved not only knowledge, but also the skills and efficacy of clinical practice of the physicians involved.²⁸

The superiority of integrated versus standalone teaching with regard to enhancing the clinical practice skills of the physicians involved and the benefit of changing physicians' attitudes towards EBM was also highlighted in two randomized controlled trials, although their results could be questioned because of the lack of reliable assessment tools.^{29,30} Furthermore, there are several systematic reviews that lack sufficient data to support the effectiveness of critical appraisal skills on knowledge and consequent changes in behavior.^{5,24,31-36} In particular, a systematic review by Forsetlund et al³⁷ showed that educational meetings coupled with interactive activities, such as audits and interactive meetings, positively affected the behavior of health professionals, but exerted only a moderate (if any) positive effect on complex behaviors. In addition, according to a systematic review by Davis et al,¹⁷ the process of disseminating clinical guidelines and implementing them in clinical practice is not only a multistep procedure, but it is also influenced by various factors. In the same review, the authors concluded that there is a marked difference in setting, providing, adopting, and implementing clinical guidelines in practice, and that factors such as the nature of the guidelines, physicians' attitudes, and environmental factors are key points regarding their successful implementation.¹⁷

Conclusion

The implementation of EBM by physicians as a useful tool remains an ongoing challenge. However, al-

though the adoption and use of clinical guidelines by practitioners is a dynamic process that requires constant evaluation beyond simply publishing and disseminating documents, few articles have addressed the impact of teaching EBM on clinical outcomes. Furthermore, health-care leaders seeking to improve clinical practice guidelines should ensure that facilitators and barriers to their implementation are both considered and addressed. In order to demonstrate that teaching EBM changes medical practice and patient outcomes for the better, frequent reevaluation is required to determine a guideline's validity and applicability. In our view, many of these problems do not constitute a limitation of EBM, but rather highlight the importance of training clinicians to evaluate the existing medical information and to apply the evidence according to their patients' unique characteristics and needs.

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