

Translating Research into Practice

Models for changing clinician behavior.

By Marita Titler, PhD, RN, FAAN

umerous models are used to translate research findings into practice. Practice models, for example, guide health care providers and organizations through the process of implementing evidencebased practices (EBPs),¹⁻³ whereas other models are used to test implementation strategies and to study factors that affect the adoption of an EBP.⁴⁻⁶

Implementing evidence into practice requires a conceptual model, which helps to organize strategies and clarify variables (such as behaviors) that may influence the adoption of an EBP. Review of every available model is beyond the scope of this article. Instead, an overview is presented of one practice model, the Iowa Model of Evidence-Based Practice to Promote Quality Care, those used to guide implementation research are identified, and then, using Rogers' translation research model as a guide, an overview of scientific findings about implementation strategies is presented, followed by a review of studies on implementation strategies specific to diabetes care.

THE IOWA MODEL

Numerous evidence-based models are available to assist practitioners in using evidence in their practice.^{2, 3, 7} All share certain steps:

- 1. Select a topic (for example, diabetes self-care management).
- 2. Find and critique the evidence.
- 3. Adapt the evidence for use in a specific practice environment.
- 4. Implement the EBP.
- 5. Evaluate the effect on patient care processes and outcomes.

Clinicians at the University of Iowa Hospitals

and Clinics, myself included, developed the Iowa Model of Evidence-Based Practice to Promote Quality Care to clarify the steps needed to put research into practice, with the goal of improving the quality of care.⁸ This organizational, collaborative model has been widely disseminated and adopted in academic and clinical settings.^{9, 10} We defined EBP in this model as the "conscientious and judicious use of current best evidence," in conjunction with patient values and clinical expertise, to guide health care decisions.

The steps in the Iowa model are described in detail elsewhere.8 Briefly, triggers related to knowledge (for example, national standards or guidelines) or to problems (such as risk management data) lead staff members to question current nursing practice and to ask whether patient care can improve by using research findings. If a review of the literature and critique of studies and EBP guidelines do not show a sufficient amount of scientifically sound information to use as a base for practice, nurses may consider conducting their own research. In that case, nurses in practice collaborate with scientists in nursing and other disciplines to conduct clinical research that addresses the practice problems. Findings from such studies and existing scientific knowledge become the basis for developing improved practices. When there is insufficient research to guide practice and conducting a study is not feasible, other types of evidence, such as case reports and expert opinion, may be combined with available research evidence to guide practice.

The strengths of the Iowa model include its using a variety of evidence, focusing on implementing and evaluating the EBP improvements in care, and integrating the EBP with quality and performance improvement initiatives (such as prevention of pressure ulcers). This model approaches EBP from a systems or organization perspective rather than from the perspective of an individual provider. The model emphasizes the need to pilot the EBP in the

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setting where the new practice will occur. Another essential aspect is incorporation of the EBP into organizational structures, such as job performance criteria, so that it becomes the standard of care.^{11, 12}

IMPLEMENTATION RESEARCH

Several models have been used to guide implementation research.^{4-6, 13} The Agency for Healthcare Research and Quality (AHRQ) recently produced a "knowledge transfer framework," which assists in disseminating patient safety research findings from AHRQ-funded grantees (see Figure 1, page 28).¹³ This model encompasses three major stages: knowledge creation and distillation (1); diffusion and dissemination (2); and adoption, implementation, and institutionalization (3).

From more than 4,000 studies on innovation adoption, Rogers developed the diffusion of innovation framework.¹⁴ This framework was used as the basis for developing and testing a translation research model (see Figure 2, page 30) in which diffusion of an innovation (such as an EBP) is influenced by the characteristics of the innovation and the manner in which it's communicated to users (such as nurses or interdisciplinary teams) in a social system (such as a health care organization).⁶ This model serves as the framework for an overview of scientific findings about implementation strategies.

Characteristics of the innovation or EBP topic that affect its adoption include the complexity of the EBP; the relative advantage of the EBP (for example, its effectiveness or relevance); and compatibility with the values, cultural norms, jobs, and perceived needs of its users. One strategy to promote adoption of an EBP is to ask practitioners to review it and provide their own "reinvention" of the EBP, making it appropriate for their practice.¹⁵ Researchers can also create quick reference guides, decision aids, and clinical reminders to assist in the adoption process.¹⁶

Computerized decision support and prompts that support practice (for example, decision-making algorithms) have a positive effect on aligning practices with the evidence base.¹⁶⁻¹⁸ Computerized knowledge management has consistently demonstrated significant improvements in provider performance and in patient outcomes.^{5, 18-20} Information systems should bring the evidence base to the point of care by way of computer software that integrates evidence and clinical decision making.^{17, 21, 22}

Perceptions of users and stakeholders regarding the value of an EBP change over time. Thus, the attributes of an EBP are neither stable features nor determine its adoption. Rather, the combination of the characteristics of the EBP topic, the intended users, and the particular context determines the rate and extent of adoption.^{6, 14, 23}

Communication. Interpersonal communication, methods of communication, and networks of influence among users (for example, a group of school nurses who meet regularly) affect the adoption of an EBP.¹⁴ Education and the involvement of three types of people—opinion leaders, change champions, and expert consultants—are essential when promoting adoption of an EBP.

Although education is necessary to change practice, alone it is not sufficient. Didactic continuing education does little to change behavior in practice,²⁴ and there is a paucity of evidence that "interprofessional" education—as compared with discipline-specific education—improves EBP.²⁵ The combination of interactive education (such as discussion groups) and other practice-reinforcing strategies (such as audit and feedback) have been found to have more positive effects on improving EBP than education alone.²⁶⁻²⁸

Mass media targeted at the general population have had some effect on the use of health services.²⁹ One successful mass media campaign focused on the need for more patients to undergo colorectal cancer screening. Yet little empirical evidence is available to help design campaigns that will successfully encourage the appropriate use of health services.²⁹

Opinion leaders. Few projects to implement innovations have been successful without the input of opinion leaders, who are people from the local peer group viewed by their associates as respected sources of influence and technically competent.^{6, 14, 23} Opinion leaders have been shown to be effective in changing the behaviors of health care practitioners,^{23, 30, 31} because their peers trust them to evaluate the EBP and the local situation. When opinion leaders use an EBP, they influence their peers and alter group norms.^{14, 32} If an EBP is interdisciplinary in nature, it is more likely to be adopted if discipline-specific opinion leaders promote the change in practice.¹⁴

Change champions are also helpful in implementing innovations.^{14, 33} These practitioners within the local group setting (that is, the clinic or patient care unit) are expert clinicians, passionate about the innovation (EBP topic), and committed to improving the quality of care. They have positive working relationships with other health professionals,^{14, 34-36}

FIGURE 1. AHRQ Knowledge Transfer Framework



Nieva VF, et al. From science to service: a framework for the transfer of patient safety research into practice. In: Advances in patient safety: from research to implementation. Vol. 2. Rockville, MD: Agency for Healthcare Research and Quality; 2005. www.ahrq.gov/downloads/pub/advances/vol2/nieva.pdf

encourage peers to adopt the innovation, arrange demonstrations, and orient staff to the innovation.^{33,37} Successful adoption of an EBP by direct care providers requires identification of one or two change champions for each patient care unit or clinic implementing the change.³⁸

Compared with change champions, opinion leaders usually have a broader span of influence, across several units or clinics. Opinion leaders and change champions should meet with the EBP users periodically during implementation to address questions and provide guidance.^{6, 38, 39}

Educational outreach, also known as academic detailing, is another strategy used to promote positive change in the practice behaviors of nurses and physicians.^{23, 40, 41} A "topic expert" who is external to the practice setting and knowledgeable about the research performs academic detailing. This person meets with practitioners individually in their setting to provide information about the EBP. The topic expert also may give feedback on provider or team performance on selected EBP indicators (such as annual foot exams for patients with diabetes).27, 42, 43 The expert is able to explain the research basis for the EBP and to respond convincingly to challenges and debates.23 This strategy, used alone or in combination with others, results in positive changes to health care practices.44,45

Users of the EBP. Potential users of an EBP influence how quickly and widely it is adopted.¹⁴ Factors that may influence the adoption of the EBP include their education, motivation, values, and preferred learning style.^{6, 14, 23}

Three strategies used to encourage users to adopt the EBP include performance gap assessment, audit and feedback, and encouraging the user to try the innovation before adopting it.²⁷ Performance gap assessment informs users *before* a planned change about their practice performance and opportunities for improvement. The specific practice indicators selected for performance gap assessment relate to the EBP topic, such as annual eye exams for patients with diabetes.

Audit and feedback involves monitoring performance indicators throughout the implementation process and discussing findings with practitioners *during* implementation.^{27, 33} This strategy helps staff see how using the EBP is improving care and patient outcomes. Audit and feedback should be done at regular intervals throughout the implementation process. Some evidence suggests that the greater the intensity of the audit and feedback, the greater the effect on changing practice.^{23,27,46} There is little empirical evidence on how researchers should audit and provide feedback²⁷; however, it's known that in order to obtain a positive effect on performance, the feedback should be timely, valid, individualized, nonpunitive, and customized so that data are meaningful to the clinician or team.^{46,47}

Users of an innovation often try it for a period of time before adopting it to their practice.^{14, 48} The innovation is more likely to be adopted when it has first been tried by the user.^{6, 14, 23}

Holding focus groups early in the implementation process allows users to participate in the implementation plan.⁶ A focus group provides a forum for participants to discuss the components of the EBP that might be challenging, system changes that may be necessary, possible competing clinical demands, and anticipated barriers and facilitators to adoption. Focus groups can also develop a consensus about the essential components of an EBP guideline and the ways in which it might be adapted for local use.^{6, 15, 39, 49}

Social system. The same implementation intervention may meet with varying degrees of effectiveness when applied to different contexts.⁵⁰⁻⁵² Implementation strategies need to address the perspectives of both the individual practitioner and the organization.^{5, 13, 23}

The social system or organizational context influences the implementation of an EBP.^{47, 53-56} For example, investigators demonstrated the effectiveness of a prompted voiding intervention for urinary incontinence in nursing homes.⁵⁷ But the intervention was difficult for nursing home staff to incorporate into everyday practice because it required staffing levels greater than those in most nursing homes.

Large, mature, functionally differentiated organizations (such as those divided into semiautonomous departments and units) with ample resources to devote to new projects, decentralized decision making, and low levels of formalization will more readily adopt innovations.14, 23 However, Greenhalgh and colleagues found that these organizational characteristics account for only about 15% of the variation in adoption among comparable organizations.23 Adler and colleagues suggested that more structurally complex organizations may be more innovative and hence adopt EBPs relatively early, but less structurally complex organizations may be able to diffuse EBPs more effectively.58 Creation of semiautonomous project teams is associated with successful implementation of EBPs, a strategy that may be useful to encourage their adoption.58

Absorptive capacity for new knowledge, or the knowledge and skills needed to enact the EBP, is



FIGURE 2. Translation Research Model

Rogers EM. Diffusion of innovations. 5th ed. 2003; and Titler MG, Everett LG. Crit Care Nurse Clin N Am 2001;13(4):587-604. Reproduced with permission from Marita G. Titler, PhD, RN, FAAN; for permission to use or reproduce the model, please contact Dr. Titler.

another social system factor that affects adoption of an EBP. An organization that is able to identify, interpret, share, and reframe new knowledge systematically and put it to appropriate use is better able to assimilate EBPs.^{59, 60} A culture of learning and proactive leadership that promotes the sharing of knowledge are important for building an environment that is open to accepting new knowledge. Other critical factors include a clear strategic vision, good managerial relations, visionary staff in key positions, a climate conducive to experimentation and risk taking, a system that records data effectively, and leaders who encourage staff to think beyond accepted beliefs and routines.^{14, 23}

An organization may be amenable to innovation in general but may not be ready or willing to assimilate a particular EBP. Effective implementation requires both a receptive climate and a good fit between the EBP and users' needs and values.^{23, 47, 61} Factors that can determine an institution's readiness for change may include²³

- "tension for change," which refers to a situation the staff perceives to be intolerable. Assimilation of an EBP is likely if it can successfully address the issue and thereby reduce the tension.
- fit between the EBP and the system. Assessment and structuring of work flow to fit with a potential EBP are important to foster its adoption.
- assessment of implications. Thorough assessment, anticipation, and planning for the effects of the EBP can increase the likelihood that the practice will be adopted.
- support and advocacy of the EBP. When supporters of a specific EBP outnumber and are better placed strategically within the organizational

powerbase than opponents are, the organization is more likely to adopt the EBP.

- dedicated time and resources.
- capacity to evaluate the effect of the EBP during and after implementation.

Wensing and colleagues recently reviewed five organizational interventions for implementing EBPs.¹⁸ They found that revision of professional roles (such as expanded responsibilities for nurses and pharmacists) improved processes of care, but the effect on patient outcomes was less clear. Use of multidisciplinary teams improved patient outcomes, and integrated care services (such as disease management and case management) resulted in improved patient outcomes and cost savings. Interventions aimed at knowledge management (mainly, use of technology to support patient care, such as electronic health records) improved adherence to EBPs and patient outcomes. The effects of the last type of organizational intervention, quality management, were uncertain.

Tailored interventions to overcome barriers to change first assess what is causing the gap between current practice and a specific EBP, which behaviors or mechanisms need to change, which organizational units and persons should be involved, and how to facilitate the changes. This information is then used to tailor implementation interventions specific to the setting.⁶² A recent systematic review found that the effectiveness of tailored interventions remains uncertain.⁶²

STRATEGIES FOR DIABETES CARE

In September 2004 the Stanford University-University of California at San Francisco Evidence-Based Practice Center released a critical analysis of quality improvement strategies for outpatient care of adults with type 2 diabetes.⁶³ The report, which the AHRQ funded, focused on changes in provider behavior and modifications in the organization. The reviewers found 58 articles reporting on 66 trials that met the inclusion criteria. The most common interventions were organizational change (40 trials), patient education (28 trials), and provider education (24 trials). Most trials (52) used more than one quality improvement strategy. The investigators found that no specific type of strategy was superior, but use of at least two strategies in combination offered a greater chance of success than did a single intervention alone. Most of these studies did not indicate why the investigators selected a particular strategy to address a given problem.

Balas and colleagues conducted a systematic review of 40 randomized trials on computerized

- computerized prompting of clinicians who provide diabetes care, which consisted mainly of clinically relevant and guideline-based reminders or prompts
- use of home glucose records by patients and clinicians in computer-assisted insulin dose adjustment
- computer-assisted patient education

Overall compliance with recommended diabetes care procedures and guidelines was significantly higher in the groups of physicians who were prompted compared with those in the control groups. Metaanalysis of 16 studies in which home glucose records were used to perform computerassisted insulin dose adjustment demonstrated a significant decrease in glycosylated hemoglobin. A separate metaanalysis of 9 studies in which the dependent variable was blood glucose demonstrated a significantly greater decrease among patients in the intervention group. Computerassisted diabetes education resulted in significant improvement in self-care knowledge and skills.

FUTURE PRIORITIES

Although models for implementing evidence into practice are available, theoretical formulations are needed to guide research and systematic reviews. For example, given that organizational context is an important factor influencing many interventions that translate research into practice, systematic reviews may benefit by grouping findings by type of care (for example, acute, ambulatory, and primary care) in addition to grouping findings by type of intervention. Additionally, taxonomy of implementation strategies and related definitions is needed to provide consistency in systematic reviews and testing of interventions. Little is known about the best frequency and type of implementation strategies, and this issue needs attention to further the state of the science.^{6, 33} $\mathbf{\nabla}$

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Continuing Education

Translating Research into Practice

LEARNING OBJECTIVES: After reading this article and taking this test (answer coupon on page 75), you will be able to

- outline the models presented here for implementing evidence-based practice.
- plan the appropriate strategies for implementing evidence-based practice.

1. The lowa model approaches evidence-based practice (EBP) from which type of perspective?

- a. systems c. academic
- b. individual d. performance
- 2. The lowa model emphasizes the need to pilot the EBP in
 - a. a university medical center.
 - b. the setting in which the practice will be used.
 - c. a nursing school.
 - d. a research facility.

3. When promoting adoption of an EBP it is essential to involve three groups: opinion leaders, change champions, and

- a. expert consultants. c. fundraisers.
- b. facility liaisons. d. case managers.
- 4. Of the following, which has been found to have the most positive effect on improving EBP?
 - a. didactics
 - b. continuing education
 - c. practice-reinforcing strategies
 - d. interprofessional education
- Compared with change champions, opinion leaders usually a. are expert clinicians.
 - b. have good relationships with staff.
 - c. can orient staff to the innovation.
 - d. have a broader influence.

6. Educational outreach is also called

- a. practice synthesizing. c. academic detailing.
- b. external brokering. d. research contexting.

7. According to Adler and colleagues, less structurally complex organizations are at an advantage in that they

- a. may be able to diffuse EBPs more effectively.
- b. tend to adopt EBPs relatively early.
- c. are often more innovative.
- d. can create semiautonomous project teams.

8. According to Wensing and colleagues, revision of professional roles improved

- a. quality management.
- b. patient outcomes.
- c. adherence to EBPs.

d. processes of care.

TEST CODE: AJND3