

Innovations in Family Medicine Education

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Feature Editor

*Editor's Note:* Send submissions to jfreeman3@kumc.edu. Articles should be between 500–1,000 words and clearly and concisely present the goal of the program, the design of the intervention and evaluation plan, the description of the program as implemented, results of evaluation, and conclusion. Each submission should be accompanied by a 100-word abstract. You can also contact me at Department of Family Medicine, University of Kansas, Room 1130A Delp, 3901 Rainbow Boulevard, Kansas City, KS 61160-7370. 913-588-1944. Fax: 913-588-1910.

## Teaching Evidence-based Medicine Skills Through a Residency-developed Guideline

John Epling, MD; John Smucny, MD; Anita Patil, MD; Fred Tudiver, MD

*Though many residencies have recognized the need for instruction in evidence-based medicine, the best way to teach these skills to resident physicians remains uncertain. We designed a curriculum intended to develop a resident-produced, evidence-based guideline for the care of patients with diabetes. Each resident was supervised going through the steps of evidence-based medicine: asking a clinical question, searching for the evidence to answer that question, appraising that evidence, and producing an evidence-based answer. These answers were then compiled into a guideline distributed in the residency practice. An evaluation of this curriculum using focus group and survey data showed that learners appreciated the skills and knowledge gained in devising guidelines in an evidence-based manner but were uncertain that their searches were complete. The clinical evaluation of the guideline implementation showed improvement in several clinical markers of diabetes care.*

(Fam Med 2002;34(9):646-8.)

Though many residencies recognize the need for instruction in evidence-based medicine (EBM), the best way to teach these skills to residents remains uncertain. Traditional curricula, such as journal clubs and lectures, have been criticized for their lack of immediate applicability to clinical practice. A recent systematic review of instruction in critical appraisal skills using these types of

curricula demonstrated that residents have smaller gains in knowledge when compared with medical students.<sup>1</sup> Because we felt that if residents had a clinical stake in what they were learning and producing, it would lead to increased absorption and retention of both knowledge and skills, we chose to teach EBM skills by producing a local, residency-developed clinical practice guideline on a common medical problem.

### Methods

All 11 residents and three faculty members participated in the guideline development process. The site was a rural family practice resi-

dency training program. The process was conducted over a 6-month period and consisted of monthly meetings, with independent work required between the sessions. The residents had received a set of lectures on the basics of critical appraisal earlier in the academic year. We first solicited support for the idea of a guideline development project from the learners. The group then chose type 2 diabetes mellitus as the broad topic for the guideline, given its prevalence among the patients in our family practice center and the residents' stated need for some guidance in the care of these patients. The participants were each asked to develop a clinical question

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to use as the starting point for their guideline statement.

Over the six monthly sessions, the participants worked through the traditional five-step process of EBM for their questions (Table 1). They were aided in their searches for evidence by a high-speed Internet connection to the library resources of our affiliated university. The large group was divided into two smaller groups (organized by the two general categories of questions that arose—those concerning glycemic control and those concerning prevention of complications. The groups were each facilitated by one faculty member with an interest in EBM. The individual learners conducted the searching and appraising as “homework,” and group sessions were mainly used for teaching and providing feedback concerning these efforts. They were directed away from guidelines and narrative review articles and toward the primary literature and systematic reviews on their topics. Once the evidence was found and appraised, the participants then developed answers with evidence grades (<http://www.cebm.net/docs/levels.html#levels>) as their guideline statements. Throughout the process, the participants were offered one-on-one ad hoc meetings with faculty to assist them with searching and critical appraisal skills.

Table 1

The Five Steps of Evidence-based Medicine

1. Convert the information need into a focused, answerable clinical question.
2. Track down the best evidence with which to answer the question.
3. Critically appraise the evidence with regard to validity, impact, and applicability.
4. Integrate the appraisal with our clinical expertise and our patient’s unique biology, values, and circumstances.
5. Evaluate our effectiveness and efficiency in performing the above steps and seek ways to improve them for the next time.

Adapted from Sackett DL, Straus SE, Richardson WS, et al. Evidence-based medicine: how to practice and teach EBM, second edition. London: Churchill-Livingstone, 2000:3-4.

The large group then reconvened in the final two sessions to discuss the evidence and to formulate the final guideline. The guideline was formatted as a series of answers to each clinical question and was summarized on a single sheet of paper (Table 2). It was distributed to all the providers and nurses in the clinic and included in the charts of each diabetic patient presenting for care to the clinic during a 3-month period. The group elected not to fill in the gaps in the guideline where specific aspects of care of diabetes had not been addressed, instead preferring to concentrate on only the recommendations they had produced.

We carried out both curricular and clinical evaluation of the effect of this guideline. The curricular evaluation was performed by focus

group research and confirmed by survey. A qualitative research expert from our affiliated family medicine department led a 1-hour focus group of the participating residents discussing the guideline development process, the value of this guideline process as a method of teaching EBM, and the impressions of the quality of the guideline itself. Three of the authors reviewed the verbatim transcript independently and developed emerging themes concerning the educational outcomes of the curriculum. These themes were then explicitly tested by means of an anonymous survey of the participants, with questions based on those themes.

The clinical evaluation consisted of a chart review (performed by one of the authors, who is a third-year resident and one of the participants)

Table 2

Examples of Initial Clinical Questions and Final Guideline Statements

<i>Question</i>	<i>Guideline Statement (Evidence Level)</i>	<i>Group Assignment</i>
In elderly patients with newly diagnosed type 2 diabetes, does treatment lead to similar outcomes as in younger patients?	In patients with type 2 diabetes mellitus over the age of 74, there are no specific alterations in the management plan. (C)	Glycemic control
In patients with type 2 diabetes, which medication to control blood sugar decreases mortality and morbidity the most?	Sulfonylureas are the most cost-effective first-line medications for type 2 diabetes mellitus. (B) Exception: in the presence of obesity, metformin is the first line choice. (A)	Glycemic control
In patients with type 2 diabetes, does screening for neuropathy with monofilament testing decrease the rate of foot ulcer and amputation?	Monofilament testing should be performed in all patients with type 2 diabetes mellitus at regular intervals. (A)	Complications

Table 3

## Answers to Survey Questions\*

Survey Question	Mean	SD
• The guidelines taught me practical skills in evidence-based medicine.	1.82	.98
• I would be interested in producing local clinical practice guidelines in the future.	2.45	.93
• I was given adequate help with critical appraisal methods.	1.91	1.14
• I feel more confident in appraising clinical practice guidelines.	2.18	.87
• I have a greater appreciation for the process of guideline development.	2.27	1.27
• There was adequate time allotted for finding and appraising the answer to my question.	2.18	1.40
• I anticipate having enough time to do quality improvement activities when I'm in practice.	3.09	1.04
• I feel the guideline addresses key areas of diabetes management in our clinic.	2.00	1.10
• I feel the breadth of the topic was appropriate for developing a guideline.	2.45	1.29
• I will use this guideline in my practice.	2.09	1.04
• I feel I can provide better care for diabetic patients in our clinic now.	2.00	1.18
• I am confident in the recommendations in this guideline.	2.09	.94
• I feel qualified to write a local, evidence-based clinical practice guideline.	2.82	.98
• I feel as though I found all available evidence in my literature search.	2.91	1.14
• I had help in how to do an adequate search for my topic.	2.09	1.14

\* 1= strongly agree, 5= strongly disagree, n=11

SD—standard deviation

before and 6 months after implementation of the guideline. This review examined clinical measures such as blood pressure, fingerstick glucose, and hemoglobin A1C control, as well as documentation of specific aspects of care, such as foot exams and referral to a nutritionist. We had initially planned longer-term follow-up evaluation of the clinical outcomes, but this was not possible due to closure of the residency program.

### Results

In the curricular evaluation, we achieved a 100% participation rate for both the focus group and the survey response. The participants agreed that there was improvement in searching and critical appraisal skills and that the guideline was generally useful for the care of their patients. In addition, they felt a greater appreciation for the process of developing a guideline and an increased confidence in their ability to critically appraise one. The participants expressed concern, however, that there may have been significant information missed during their searches and that they would not have sufficient time or skill to individually develop such guidelines in future practice (Table 3). In the clinical evaluation, im-

### Chart Review Results Before and After Guideline Implementation

Percent With Outcome	Before Guideline	After Guideline
Fingerstick glucoses recorded*	77%	97%
Hemoglobin A1C results at target (<7.0)*	27%	50%
Referred to podiatrist if neuropathy was documented	21%	21%
Neurologic examinations recorded*	32%	64%
Dietitian referral recorded*	29%	72%
Urine protein or microalbumin tests recorded	24%	13%
Sulfonylurea used for management	49%	45%
Metformin used for management*	23%	48%
ACE inhibitor used*	29%	51%
Blood pressures at target ( $\leq 130/85$ )*	50%	68%

\*  $P < .05$

provement was seen in several outcomes (Table 4) over the 6-month period of implementation of the guideline.

### Conclusions

The development of a locally produced clinical guideline was a well-received method of teaching EBM skills to residents and can improve some clinical endpoints of care in the short term. In addition, the qualitative development of themes from a focus group followed up by means of a quantitative survey derived from those themes seems to be a useful method of evaluating a curricular change. Its

utility derives from the free-form development of feedback, which is then objectively tested to ensure adequate representation of the group.

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### REFERENCE

1. Norman GR, Shannon SI. Effectiveness of instruction in critical appraisal (evidence-based medicine) skills: a critical appraisal. *Can Med Assoc J* 1998;158:177-81.