Teaching evidence-based practice on foot

Come along to watch some clinical teachers in action:

1. *A hospital physician rounding with the team's medical students examines a middle-aged woman with upper extremity deep venous thrombosis. After the bedside visit, the attending asks aloud about the frequency of underlying diseases associated with this condition, admits aloud that he doesn't know the answer, and records the question concisely in his PDA (1). After rounds, the attending invites the students along as he finds and appraises evidence about this topic and "thinks aloud" about how he'll use this knowledge in planning further testing.*
2. *An attending physician and 2 learners examine a patient with new-onset congestive heart failure. After teaching how to hear a subtle S3 gallop with the stethoscope's bell, the physician explains the accuracy and precision of this finding as a test for heart failure and provides a reference for further information (2).*
3. *After starting emergency therapy for a patient's thyroid storm, an attending physician guides the team through the quantitative results of prognostic studies of this condition. The team then discusses how to use this evidence in counseling the patient (3).*

These teaching moments share 4 important features. First, notice that the teaching is actually happening, despite the several barriers and disincentives clinical teachers face (4, 5). Second, the teaching happens "on foot"—that is, during the course of busy clinical work, rather than off-site (6). Third, while not exclusively so, these episodes involve teaching-in-context at the bedside (7–10). This editorial examines a fourth shared feature, the use of evidence from clinical care research. In all 3 episodes, the attending made conscientious, explicit, and judicious use of either the process of evidence-based learning or its yield (11). The subtle but important variations in how this was done can be described as 3 different modes of teaching evidence-based practice, which are summarized in Table 1 (12, 13).

Table 1. Three modes for teaching evidence-based practice on foot

For each mode:	1. *Role modeling* evidence-based practice	2. *Weaving* evidence in with other clinical teaching	3. *Targeting* specific skills of evidence-based practice
What:	Show the use of evidence in real clinical decisions.	Integrate evidence with other knowledge when teaching clinical care.	Identify specific skills to teach for evidence-based practices.
Why:	Learners see the use of evidence as part of good clinical practice. Teach by example: "Actions speak louder than words."	Learners see the use of evidence as part of good clinical learning. Teach by explicit guiding on what to know.	Learners develop their abilities to access, understand, and use evidence. Teach by explicit coaching on skills for practice.
How:	"Think aloud" tactic. Show use of evidence resources. Debrief later to reflect on lessons.	Select 1 or a few of the strongest or most relevant bits of evidence. Show how evidence fits with other knowledge for action.	Select 1 skill area and 1 task within that area. Coach learners on pragmatic specifics of that skill in use.
Where:	Practice settings.	Practice settings. Can be done in classroom, too.	Practice settings. Can be done in classroom, too.
When:	Little or no extra time is needed. Can be done almost anytime.	May add only 1 to 3 minutes to teaching. Can be done almost anytime.	May add 2 to 5 minutes to teaching. Can be done almost anytime.
Who:	Any teacher, any learner.	Any teacher, any learner.	Teachers who can coach these skills.

In the first encounter, the attending role-models evidence-based practice (mode 1 in Table 1), combining the actual doing with the "think aloud" technique to guide the learners' attention to what is being done. By using the first mode, we show our learners how we incorporate evidence, along with other knowledge, into clinical decisions. As a result, they come to see the use of evidence as part of good clinical practice. We show by example that we really do it, and we can give pointers on when, where, and how to do it, too. Given the maxim, "actions speak louder than words," we can expect this first mode of teaching evidence-based practice to be very effective in itself, and it should reinforce what learners derive from the other modes.

In the second encounter, the teacher weaves evidence in among the other facts and skills being taught (mode 2 in Table 1). When we teach clinical topics with evidence in the mix, we show by example how to integrate evidence with other useful knowledge in the context of preparing to make real clinical decisions. As a result, learners come to see that using evidence is part of good clinical learning. Also, since the evidence and the other knowledge can be learned together, these components might be better organized in memory in the elaborated networks of knowledge that are so important for clinical thinking (14). By using mode 2, we are "putting our money where our mouth is" —that is, spending valuable teaching time and effort on using evidence in context, so we might expect this mode to be effective as well, even though neither mode has been studied.

In the third encounter, the teacher targets specific skills within evidence-based practice about which to coach the learners (mode 3 in Table 1). By using this mode, we help learners develop their abilities for evidence-based learning, which in turn should boost their capacity for lifelong learning and professional development. By targeting 1 or a few specific skills at a time, the teacher makes it possible to fit these learning moments into the schedule of busy practice, knowing that the cumulative learning from many such moments could be great. For mode 3, we have some evidence that this approach is effective—the Cochrane review of trials of teaching critical appraisal skills found some evidence of improvement in participants' knowledge (15). A recent review of the trials of teaching evidence-based medicine to postgraduate students concluded that stand-alone teaching improved knowledge but not skills, attitudes, or behavior, whereas teaching that is clinically integrated into routine practice improved knowledge, skills, attitudes, and behavior (16). Although none of the trials seem to have tested the teaching strategies and tactics of the 3 modes discussed here, Table 1 shows that these modes would qualify as "clinically integrated."

Although this editorial concerns teaching "on foot," there are other promising ways to teach evidence-based practice that are "clinically integrated," even if they're not "on foot." We'll use the teaching mode structure in Table 1 to describe 2 examples. First, in an interactive, large-group classroom session for students and house officers on approaching patients with involuntary weight loss, the teacher can include evidence about the frequency of underlying diseases in the material covered. In doing so, the teacher has selected

to weave the results of research evidence into other knowledge to explicitly guide specific decisions and actions, so we can recognize this as teaching in mode 2 in Table 1. Second, consider a department-wide, daily conference like Morning Report, wherein residents are asked to bring back to the group the evidence-based answers to questions that arose in the care of their patients, using an Educational Prescription (17). In addition to facilitating the residents' discussions of their questions, searches, appraisals, and answers, the teacher can interject relevant and narrowly focused "slices" about the process of evidence-based practice (18). Because the teacher is targeting specific skills around which to coach learners, this is teaching in mode 3 in Table 1. Most of the clinically integrated forms of teaching we've seen or read about emphasize ≥ 1 of these modes.

Keep in mind that the 3 modes in Table 1 are not meant to be either jointly exhaustive (other possible ways exist to teach wise use of evidence) or mutually exclusive (hybrids do exist). Furthermore, these modes are complementary, and the best teachers of evidence-based practice use all 3, moving from one to the next to fit the clinical and teaching situation. If we actually use evidence in our own practice and clinical teaching (modes 1 and 2), we'll have more realism and legitimacy when we coach our learners on specific skills of evidence-based practice (mode 3).

What can we do to prepare to teach in these modes? The following 7 suggestions help us prepare for any mode. First, we should refine our own skills in evidence-based practice, so we're sufficiently competent to serve as role models. Second, we can work to gain access to evidence resources we'll need, whether through our health care system (local or national) or on our own. Third, because we encounter some problems and decisions repeatedly, we can anticipate the questions we'll have and track down evidence-based answers ahead of time so they're ready for use. Fourth, rather than store the entire text of the evidence, we might assemble and keep available concise summaries of the evidence, such as the 1-page summaries from evidence-based synoptic journals (e.g., *Evidence-Based Medicine* or *ACP Journal Club*), or from our own critically appraised topics (CATs) (19) or eCATs (1). Fifth, for some of these recurring decisions, investigative teams have assembled evidence-based decision aids to explicitly guide our patients and ourselves through the processes of integrating evidence with values, so we can retrieve these ahead of time and keep them within reach (20). Sixth, it can be useful to obtain and keep handy some how-to references on evidence-based practice, appropriate to our discipline (13, 21). Seventh, we should develop our teaching awareness, or reflection-in-action, that allows us to recognize the teaching moments as they occur and helps us choose which to seize and which to let pass (22).

Beyond these 7 suggestions, a few things can be done ahead of time to prepare to teach in each mode. For mode 1 (role modeling), many of us feel more comfortable after practicing the use of evidence several times before being observed by learners using evidence in real patient care. Once we feel comfortable with when, how, and how much evidence to add to our patient encounters, we'll be better able to show others this "flavoring" or "spice" in our practice. For mode 2, we can anticipate that certain bits of evidence will be used alongside predictable aliquots of other knowledge, so we can prepare these mixtures ahead of time, as "teaching vinaigrettes" (23). For mode 3, it can help to prepare ahead of time some short (i.e., 2 to 5 min) scripts (your own or others [24-27]) about the specific skills you'll be targeting, as "teaching slices" (not the whole pie) of evidence-based practice (18).

How can we further improve our teaching of evidence-based practice? As a complex craft built on experience as well as knowledge, excellence in teaching takes time to develop. Table 2 includes 5 suggestions for using that time well. First, to develop excellence or even mastery, we probably need to undertake deliberate practice where we purposefully and repeatedly engage in activities designed to improve aspects of our craft (28, 29). Second, we can keep reflective teaching journals to record observations and interpretations of our own teaching, including both successes and failures (30, 31), as well as observations of other teachers, including those outside clinical medicine (32). Third, we can identify respected teachers at our own institutions who can observe our teaching

Table 2. Learning more about teaching evidence-based practice

Strategy or tactic	Why?	How?
Deliberate practice of teaching (28, 29)	Purposeful refinement of teaching craft "Practice makes perfect"	Select areas on which to focus attention. Identify new or alternate strategy or tactic to try out (e.g., from the "Teaching Tips" series [24-27]). Practice new strategy or tactic repeatedly, reflecting after each use on what worked well and what could be improved
Keep a teaching journal	Record observations and interpretations of teaching and learning experiences, this boosts reflective practice	Take prospective notes on planning, execution, and reflection of one's teaching. Add observations from others' teaching Add insights from reading about learning and teaching
Get coached on teaching	Learn more about teaching from peers and masters	Identify skilled teachers who are able and willing to be a teaching coach. Do real teaching while coach observes. Debrief afterward to reflect on the lessons
Attend courses on teaching evidence-based practice	Concentrated focus on building teaching skills and repertoire over a short period. Learn through sharing teaching craft with others	Find and attend a course that best fits your learning and teaching needs (34)
Learn more about human learning	Helps build conceptual models that underlie our teaching craft. Boosts range of teaching options available. Helps troubleshooting when teaching goes awry	Find and use resources on human learning in general (35-41) and learning in specific settings, such as in small groups (42-48)

and provide us with detailed feedback and coaching (33). Fourth, we can attend 1 of the growing number of workshops on teaching evidence-based practice being held around the world (34). Fifth, because teaching is so intertwined with learning, we can learn more about how humans learn and how this learning can be facilitated (35-48).

This editorial has focused on *how* to teach evidence-based practice as part of clinical teaching, not on *whether* to do so (49). I have tried to collect here the teaching strategies and tactics that I and others have found useful, and I look forward to learning more from many of you.

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