

Teaching Evidence-Based Practice: Lessons From the Pioneers An Interview With Amanda Burls and Gordon Guyatt

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The concept of evidence-based practice originated in the field of medicine over 20 years ago. What is less known is that evidence-based practice started as a teaching method, developed at McMaster University in Canada by a team of physicians, biostatisticians, and clinical epidemiologists. This team, headed by David Sackett, successfully developed a course in which medical students' practical questions and problems were taken as a starting point, and the findings of medical research were used to support clinical decision making.

The new teaching method was developed further by Gordon Guyatt, the residency director of Internal Medicine at McMaster. In 1992, he and Sackett—together with a group of 30 other physicians called the Evidence-Based Medicine Working Group—published the seminal article "Evidence-Based Medicine: A New Approach to Teaching the Practice of Medicine" (Evidence-Based Medicine Working Group, 1992). It opened with the following statement: "A new paradigm for medical practice is emerging. Evidence-based medicine de-emphasizes intuition, unsystematic clinical experience, and pathophysiologic rationale as sufficient grounds for clinical decision-making and stresses the examination of evidence from clinical research." The article argued that physicians of the future needed to be educated differently. Instead of being knowledge- and teacher-based, their education needed to be problem- and evidence-based and

teach the skills required to make *independent* judgments about the reliability of evidence.

In fact, the Evidence-Based Medicine Working Group strongly believed that the most important skill to teach medical students is how to learn on their own, specifically: how to formulate an answerable question (Ask); how to search for evidence (Acquire); how to critically appraise the evidence (Appraise); how to apply the evidence in clinical practice (Apply); and how to monitor the outcome (Assess). In the following decade, the new approach—also referred to as the *five step approach*—was embraced by a large number of medical schools and universities in Canada and the United States and successfully adopted by other Western countries. Now, more than 2 decades later, more than 300 articles have been published on teaching evidence-based medicine and more than 30 experiments have been conducted to measure its effects.

Inspired by the question posed by Denise Rousseau in her 2005 Academy of Management Presidential Address, "Is There Such a Thing As Evidence-Based Management?", management scholars are increasing the call for an evidence-based approach to management (Briner, Denyer, & Rousseau, 2009; Pfeffer & Sutton, 2006). However, the teaching of evidence-based management is still in its infancy. Only a handful of publications are available, and the number of courses on evidence-based practice is limited (Charlier, Brown, & Rynes, 2011).

Although medicine is not management, what can evidence-based management educators learn from

their more experienced colleagues in medicine? What kinds of challenges does evidence-based management present to conventional teaching? What are the best ways to present the key ideas of evidence-based practice? And what is the ultimate aim of teaching evidence-based practice? To find out, we spoke to two pioneers of evidence-based medicine education, Amanda Burls and Gordon Guyatt:

“What kinds of challenges does evidence-based management present to conventional teaching? What are the best ways to present the key ideas of evidence-based practice? And what is the ultimate aim of teaching evidence-based practice?”— Barends and Briner

Gordon Guyatt, professor of Clinical Epidemiology and Biostatistics at McMaster University, has made a unique contribution to the practice of evidence-based medicine by developing workshops that have served as blueprints for teaching evidence-based medicine around the world. He coined the term “evidence-based medicine” in a 1991 editorial (Guyatt, 1991) introducing the idea; has conducted more than 20 randomized controlled trials; and has published over 70 systematic reviews on the effectiveness of medical interventions.

Amanda Burls, director of Postgraduate Programs in Evidence-Based Healthcare at the University of Oxford, has been a senior fellow of the Centre for Evidence-Based Medicine since 1996, where she coordinates and runs plenary sessions on teaching evidence-based medicine. Burls was a founding member of the Critical Appraisal Skills Programme (CASP) and in 1996 became its director.

In 1992 the Evidence-Based Medicine Working Group published the seminal article “Evidence-Based Medicine, a New Approach to Teaching the Practice of Medicine” in the Journal of the American Medical Association (Evidence-Based Medicine Working Group, 1992). Gordon, at that time you were the chair of The EBM Working Group. Can you tell us how it all started?

Guyatt: What had happened was that a decade or more before that, David Sackett had come up with this idea of critical appraisal and that a

physician should know how to read the literature. But the initial vision was more of a classroom sort of thing. And then gradually, it was okay, let’s bring this into clinical practice. So David came up with bringing critical appraisal to the bedside, where it actually happens. Then a bunch of us started doing it, really taking it to the front lines, and trying to do it on a case-by-case basis in our interactions with the students and guiding our practice on it. So when I took over the residency program in internal medicine in 1990, I said, “Okay, now we’re doing this thing, this residency program is going to teach it,” and then it needed a name. And that’s how *evidence-based medicine* came to be as a term.

I believe first you used the term “scientific medicine”?

Guyatt: I needed a name to call this thing, and I thought “well, this is making medicine scientific,” so I called it *scientific medicine*. And then in an initial meeting I was introduced to the members of the Department of Medicine as the new residency director. The person who asked the first question was so angry, he was shaking. His hands were shaking and his voice was shaking because all these guys, these academics, they thought of themselves as scientific and we were saying that we were scientific and they weren’t. And there was such a strong outrage, that I thought, “OK, back to the drawing board.” And evidence-based medicine was the next idea I came up with, which was magically taken up.

Why was it taken up so readily?

Guyatt: Well, I guess I don’t really understand why the term hit so well, but one theory is that it came along at a time when medicine was getting challenged in a way and losing its authority to some extent, and this was a way for it to reestablish its legitimacy. I hadn’t particularly been thinking along those lines at the time, but in retrospect it makes a lot of sense. And so, it was not much more than a year after the *JAMA*¹ publication, which was the flag-waving of the new movement, that I got promotional literature from the American College of Physicians that began, “In this era of evidence-based medicine.” So it was extraordinary. But in general it had

¹ The *JAMA*: The Journal of the American Medical Association.

upset people like hell and caused a huge amount of antagonism because it was very threatening.

So what reactions did the concept of evidence-based medicine produce in other medical school faculty who were not familiar with the idea?

Guyatt: They reacted with rage and for multiple reasons. Number one, it was challenging authority. They had been the authority figures, and we were now saying: "Actually, there is a different way of being an authority figure, and we can do it, and you can't." So there was definitely a power-authority thing. Another related reason is that we were saying, "You think you've been a good doctor for the last 20 years, but actually you've been missing something." So that was very upsetting. And then, for a lot of people, they hadn't expected to have to learn a new way of looking at the world, and a new set of knowledge and a new set of skills at this stage in their careers. So, it was threatening on a whole host of different levels. And you know we perhaps didn't help things by being a little bit arrogant in how we approached it at the time, but even if we hadn't been, I think it would have elicited the same kind of reactions. But fortunately we had a cadre of trained clinical epidemiologists, and we had students and so on, so we had people who were core, and they were people who were ready to take the leadership roles.

But at the meeting where I was introduced to the members of the Department of Medicine as the new residency director, everybody was attacking me and the chair told me afterward that about five times in the course of the meeting he thought he was going to have to stand up and say "OK, call it off," and each time I managed to get over it. But one of the things I said was, "Okay, if you want to do it, come join the executive team, you know . . . take it on." But none of these guys actually wanted to do any educational work so that was one way of dealing with it. But it was a very intense, negative reaction at the beginning.

Part of the ferocity of the reaction was because I was taking over the Residency Program, which is an important thing in the department of medicine. I sent out a document saying what we were going to do, and it had all these elements of, "We're taking over" and "What you have done in the last 20 years is too limited, we're going to do it better." So the presentation was part of the reaction. But there was no question that what we were doing was challenging authority, challenging paradigms, challenging edu-

cational approaches, challenging what you had to know, challenging how you do practice ultimately. So that's going to be very threatening.

I think it is very interesting that you said that the things really got going at a time when medicine was perhaps distrusted and had been losing its reputation. It really got me thinking about management. Does management have any reputation to lose? If you think about the crash and a lot of these things, it is often pretty squarely blamed at the ways in which those financial organizations are managed. So you could say that managers still claim authority, but there is a massive distrust and disrespect for managers already.

Guyatt: The disadvantage you in management have is that, for whatever reason, when we came along, the community was ready for a shift. There might have been all this resistance, hostility, and so on, but somehow the community was ready to shift its thinking. And, you know, in management you are still climbing uphill, but we now have evidence-based medicine, evidence-based education, evidence-based this, evidence-based that, so there is a milieu around that if it permeates into your area, it could lead to a major shift.

Amanda, how did you get involved in evidence-based medicine?

Burls: My background was in philosophy and I started medicine very late in 1990. And because I was 30 years old when I started medical school and had training in philosophy I was appalled by everything I was taught. I thought: "How am I going to do this job?" And just by sheer luck, in a bookshop before I started working, I stumbled across David Sackett's clinical epidemiology book (Sackett, Haynes, & Tugwell, 1991). And I was like, "Ah, thank god for this. Thank god it doesn't have to be the way I have been taught." So in 1991 my mother phoned David Sackett, and said, "My daughter wants to be a clinical epidemiologist, can you tell her how she can do it?" because I couldn't see myself continuing as a doctor in the way medicine was being practiced. And he just said, "In the UK you can't, so the best thing you can do if you're in the UK is to go into public health," so I became a public health physician. And I was lucky enough to be in training as a public health physician in Oxford, in the 90s, when pioneers like

Muir² and Iain³ were there—it was just wonderful. First of all we were doing exactly what you in management are doing—we tried to learn from best practice—so we brought over Larry Chambers from McMaster University—he was there at the beginning when we were thinking: “How can we get policy makers to understand the need for evidence and systematic reviews?” That led to the birth of the critical appraisal skills program. And then Muir thought, “Let’s get David Sackett⁴ over, because the evidence is that opinion leaders are really important.”

And to go back to the choice of name, very initially, we were going to have a Department of Clinical Epidemiology, and then we thought, “No, let’s get up people’s noses,” and we deliberately chose *evidence-based medicine*, as a sort of annoying thing to upset people, because we thought that it would raise interest. And it was just the time, wasn’t it? You had all the failed *Getting Research Into Practice* projects of the 80s; you’d seen all the stuff that was coming through about systematic variations in care. And that was how I got involved. So the moment I heard that David Sackett was coming to Oxford I was ecstatic.

“[W]e thought, ‘No, let’s get up people’s noses,’ and we deliberately chose evidence-based medicine, as a sort of annoying thing to upset people, because we thought that it would raise interest.—Burls

Is evidence-based medicine now taught in all universities and medical schools in the world? Is it the gold standard?

Burls: We wish. Well, I say “I wish” in the UK context. To get it into the medical curriculum in the UK, we systematically went around to all the professional bodies, and said, “This should be in your exams.” It was only when it started getting into the professional exams that it started getting into the

curriculum. And for example, about 4 years ago, the General Medical Council produced a document called “Tomorrow’s Doctors” that had nothing about evidence-based practice in it at all. So we wrote letters and we suggested phrases, and I think we got one phrase in. That was a little genuflection to evidence-based practice.

Guyatt: So yes, it has been very influential, it is in all the US medical schools, in both undergraduate and graduate curricula. It’s part of what you’re supposed to do. Now, how well is it done? How well do people understand it? Who cares whether it’s done in the schools if it’s not done in the front lines of clinical practice? So, there are still big questions, but it is accepted. In order to be accredited at either the residency level or the undergraduate level, you are expected to show what you are doing to address this.

Is there now a standard, widely accepted way to teach evidence-based medicine?

Guyatt: I’m not sure about that. But 30 years ago or so our workshop started as “How to teach critical appraisal.” It then became “How to teach evidence-based medicine.” It is now “How to teach evidence-based health care.” I have been helping to run our workshop for the last 15 years or so. We’ve trained over a thousand people. Oxford runs something similar. But everything is based on that McMaster model of teaching, which is all small group, problem-based, and interactive.

You all keep referring to critical appraisal.

Do you consider that to be the core of evidence-based practice?

Guyatt: The connotation of the original critical appraisal is potentially unfortunate, because it focuses you to ask, “How trustworthy is the evidence?” It is about being critical about the evidence. But an equally big part of it, or even bigger part, is that whether it’s good or not so good, if it’s the best available evidence you’ve got to use it. So while critical appraisal has the connotation on the *appraisal* part, it doesn’t have the connotation on the *using it* part. And in fact, even with preappraised evidence,⁵ you still have to know how to use it. If somebody tells you “this is the best

² Muir Gray, Director of Research and Development for the Anglia and Oxford Region of the National Health Service.

³ Iain Chalmers, one of the founders of the Cochrane Collaboration.

⁴ In 1994 Muir Gray created a Chair in Clinical Epidemiology for Sackett and invited him to create the Centre for Evidence-Based Medicine.

⁵ Preappraised evidence is research literature that is already critically appraised by an author or a group of experts.

available evidence," you still have to understand the evidence in particular, so that you can use it appropriately and deal with it in the decision-making process. So that's why there was another revolution. The initial guides were readers' guides. The second guides were users' guides, with much less focus on critical appraisal, and a much bigger focus on understanding the results and applying them, which is different. So I think the connotation of critical appraisal is probably not ideal.

In the early years the focus of evidence-based medicine was very much on scientific research and in particular on randomized controlled trials. But later, there was a shift toward including experiential evidence. As David Sackett asserted, doctors should "use both individual clinical expertise and the best available external evidence, and neither alone is enough (Sackett, Rosenberg, Gray, Haynes, & Richardson, 1996). Without clinical expertise, practice risks becoming tyrannized by evidence, for even excellent external evidence may be inapplicable to or inappropriate for an individual patient." In the field of management we also emphasize the relevance of experiential evidence as well as organizational data. How do you address all these different sources of evidence in your teaching?

Guyatt: My definition of evidence is "observations in the world." So we look at things and we make inferences. So in my introductory talk on evidence-based healthcare, I ask, "Are clinical experiences evidence?" And then I say that although clinical experiences are evidence, unfortunately our clinical experiences are subject to a whole bunch of biases. So now what we've got to do is bring in strategies to avoid the biases. So it's not this kind of evidence or that kind of evidence, it's about looking at the world, watching what happens.

But first of all, if you just watch and you don't actually measure anything, things go very wrong. But then, even when you start to measure things, unless you adopt strategies to deal with biases and measurement errors, you're going to be misled. Humans think they have this intuitive critical thinking. However, when psychologists look at it, they find we make serious mistakes left and right all the time. Therefore you have to institute safeguards against the errors that inevitably occur if you leave people solely to their own intuition. And then, when you are selling it, you sell it by showing how people have made grievous errors. I always

start with, "Why bother with evidence-based medicine?" Because if you can't answer that question, then I assume people will be thinking: "Ah, you know, this is a pain, we already have our way of doing it." You have to prove to them why they should bother. I used to get this: "What is the evidence behind evidence-based medicine?" So now I tell three stories of people making disastrous mistakes and I don't get the questions anymore.

***"[E]ven with preappraised evidence. . . you still have to know how to use it. If somebody tells you 'this is the best available evidence,' you still have to understand the evidence in particular, so that you can use it appropriately and deal with it in the decision making process."*—Guyatt**

To sell it to your management students you'll need to find similar stories. Like how people adopted particular strategies. They believed in them on the basis of the prior stuff and their prior ways of thinking. As it turns out, somebody then assessed it properly, it was all wrong, and people now accept that you have to do it the other way, because the evidence has shown that. It is obviously much more compelling if you can use a management example.

Burls: But you can borrow examples. Borrow examples from medicine. Or the Scared Straight program (Petrosino, Turpin-Petrosino, Hollis-Peel, & Lavenberg, 2013). Or the evidence on debriefing and counseling for trauma (Rose, Bisson, Churchill, & Wessely, 2001). The first thing we do when kids are killed at a school or something is send in councilors, while all the evidence shows it does more harm than good. And yet we keep on doing it. The other thing, when they were setting up the Cochrane Library⁶ and they were bringing people over and all this, everyone was saying,

⁶ The Cochrane Collaboration is an independent nonprofit organization consisting of a group of more than 30,000 volunteers in more than 120 countries. It was founded in 1993 under the leadership of Iain Chalmers to conduct systematic reviews of relevant medical research to facilitate the choices that health professionals, patients, policy makers and others face in health interventions.

"You're going out, telling people to do systematic reviews, but there is no good quality evidence out there." And they said the same with the Campbell collaboration.⁷ But actually, when you went out to look, there is good quality evidence out there. And you will need to start with that, and it will blossom, in the way that systematic reviews have grown exponentially in healthcare.⁸

The best way to teach evidence-based practice is to talk to people. Everybody has anxieties; everyone has questions about what they are doing, so I always present evidence-based practice as a solution to the problems that they're having. You know, even if you find out "Actually, we don't know the answer to this," that's a huge relief. You're agonizing whether it should be X or Y, but lo and behold, we don't know whether it should be X or Y. And that's a huge relief. So I would advise you to start with the real problems, where people have got anxieties.

There is now evidence-based practice in medicine, in healthcare, in nursing, and other areas such as criminology, public policy and policing. "The Sicily Statement on Evidence-Based Practice" (Dawes et al., 2005), which Amanda coauthored, states: "We propose that the concept of evidence-based medicine be broadened to evidence-based practice to reflect the benefits of entire health care teams and organizations adopting a shared evidence-based approach. This emphasizes the fact that evidence-based practitioners may share more attitudes in common with other evidence-based practitioners than with nonevidence-based colleagues from their own profession who do not embrace an evidence-based paradigm." Does this mean there is no difference, and that the principles of evidence-based practice are applicable in all domains?

Burls: It is absolutely the same skill set. So we started a master's in Evidence-Based Health Care at Birmingham, and one person who was an evidence-based practitioner who worked at a local hospital was having a conversation with her

spouse in bed, who's a conservationist, and she was asking, "How can you not be using these techniques?" So the next thing, they sent a bunch of conservationists to our course, and they set up the Centre for Evidence-Based Conservation.⁹

Guyatt: From the very beginning it was evident that evidence-based practice is a way of looking at the world. People go around making statements, that, when you look at them, cannot be substantiated. And people do it all the time, in every field of human endeavor. This is a different way of approaching the world.

What will the future of evidence-based practice look like?

Guyatt: What we now recognize much more is that practitioners need reappraised evidence. You can't expect practitioners to be doing a lot of their own critical appraisal. And they need guidance on applying that evidence. So they need not only evidence summaries, they also need guidelines on how to apply that evidence. Evidence-based guidelines, if well done, give you an appropriate summary of the evidence that can be easily translated into decision aids. That, of course, has direct implications for searching. We now teach students to first look for evidence-based summaries and guidelines, then for reappraised evidence such as systematic reviews, and when everything fails, to use the approach we used to tell people to go to first—not reappraised evidence from databases such as PubMed. So that's the new searching strategy of the future for evidence-based practice.

But it goes further. From the very beginning, when we started teaching critical appraisal, we realized, "Who's got the time for this?" It is very demanding, so people like Brian Haynes started developing evidence-based resources for people. They identified and critically appraised the evidence as it was being published, and provided that in various formats, such as evidence-based journals. The next step was McMaster PLUS, a literature service that systematically scans and critically appraises 30,000 articles per year. Only 3,500 articles meet the criteria for validity and relevance, which is less than 12%. But now we

⁷ The Campbell Collaboration is a sibling organization to the Cochrane Collaboration and is an international research network that produces systematic reviews of the effects of social interventions.

⁸ It was estimated that in 1990 there were approximately 250 published systematic reviews on healthcare. In August 2013, the Cochrane Database of Systematic Reviews contained 5,637 reviews and 2,405 protocols, and the DARE contained over 24,000 reviews.

⁹ The CEBC was established in 2003 with the goal of supporting decision making in conservation and environmental management.

are developing what we call "push services," where as a clinician you sign up and you define your area of interest. So when I'm a specialist in internal medicine, I get what's new in internal medicine appearing in my e-mail or on my smartphone. We have estimated that most physicians don't need more than 20 articles per year, which is a 99.96% noise reduction. Because a lot of what is published is, frankly, misleading. And that includes the most prestigious journals, which to a large extent publish on the basis of the news value, rather than the credibility of the findings. So reading journals is completely a way of the past. You don't even have to go to the secondary evidence-based journals and look through all the articles, because all the relevant evidence will come to you.

Some years ago, you stated, "When I started, I thought we were going to turn people into evidence-based practitioners, that they were really going to understand the methodology, that they were really going to critique the literature and apply the results to clinical practice. I no longer believe that. What I believe now is that there will be a minority of people who will be evidence-based practitioners, and that the other folk will be evidence users who will gain a respect for the evidence and where it comes from and a readiness to identify evidence-based sources that summarize the evidence for them" (Daly, 2005). What does that mean for teaching?

Guyatt: It means nothing. I teach exactly the same way I always did. One thing I have learned about teaching evidence-based practice, regardless of whether it's in workshops or short courses, is that specific content is largely irrelevant. And the reason I say this is that I've learned that people forget most of what you teach them. So the only purpose is to inspire people. Inspire them and teach them an attitude. And the way you teach them an attitude is to tell them stories and tell them how to appraise literature. Get them to have an idea of the basic principles.

Of course, there will be some students who are going to pursue evidence-based practice so they understand deeply what randomization is, what blinding is, and what a relative risk is. But most will not. The ones who forget it, what they will come away with is a respect for evidence and an understanding of the basic principle of evidence-

based practice: that there is "more trustworthy" evidence and "less trustworthy" evidence. Because the individual that understands the concept of "more-versus-less-trustworthy evidence" will be able to recognize the appropriate resources and will understand enough to make an evidence-based decision. I hope that at least that is achievable, and I'm still thinking that that is achievable. So I teach evidence-based practice exactly the same way, I just have a different purpose when I'm teaching it.

Burls: Let me give you my point of view, which has evolved over the years. Depending on how many meetings I'm going to get with them and how long I'm going to spend with them, I do teach them about randomized controlled trials, internal validity and all that stuff. But I make them think them up themselves. I never tell them anything about randomization or blinding, I just ask: "How are you going to know? How would you test this if I would give you a half million dollars to test it?" And when they come up with a suggestion I say, "Alright, can you think of any reason you got the results showing it works, while in fact it doesn't." And they say, "Well, it could be this, it could be that" and then I say, "Ok, then redesign your study so it can't be this," and what they come up with are precisely those things: randomization and blinding. So I never teach people the theoretical constructs required for evidence-based practice, but when they come up with a concept themselves I simply tell them the epidemiological term for that concept. I discovered that what we are doing is transformative learning (Mezirow, 1997), which means that it is not just about changing a person's skills and knowledge, it's giving them a totally different perspective on the world.

Guyatt: We try to change the way they think about things, and the way they interact with the world.

Burls: But you know, it goes further than that. My hypothesis is that most evidence-based practitioners will do something to actually improve the world. Like signing the All Trials petition,¹⁰ set up campaigns, writing stuff, it's not just "get this evidence and use it."

¹⁰ The All Trials petition is an initiative of the "Sense About Science" movement to get all clinical trial results into the public domain: <http://www.alltrials.net/>. See also Ben Goldacre. 2012. What doctors don't know about the drugs they prescribe. *TEDMED*.

It's a kind of activist thing?

Guyatt: Yes, that's exactly what it is. We want them to get out of our classroom and change the world.

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