Ten papers for teachers of evidence-based medicine and health care: Sicily workshop 2019

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Introduction

A previous article sought to signpost papers that were considered helpful when starting on the journey of practicing evidence-based medicine (EBM).[1] The lead author was invited to run a workshop at the Eighth Conference of the International Society for Evidence-Based Health Care run in collaboration with the Gruppo Italiano per la Medicina Basata sulle Evidenze from 6 November to 9 November 2019. The aim of the workshop was to challenge a group of teachers and educators to consider useful papers for the teaching of EBM/evidence-based healthcare (EBHC). The second aim was to start a database of such studies. The third aim was to share learning and foster discussion from the workshop through journal publication. EBM and EBHC are used interchangeable throughout this article.

Article selection process

Working in eight small groups (three to five people), teachers and researchers of EBM/EBHC (n=29) first listed any articles that they considered useful for new teachers starting out their teaching journey. So that the challenge also acted as learning for the participants, they were deliberately not briefed on the full nature of the workshop (eg, the consideration and selection of specific articles). After 15 min, each group spent another 10 min selecting their top three articles from their original list (if this list had more than three papers). This was followed by another 5 min selecting their final article to put forward for this paper consensus and any disagreements resolved via discussion. Groups had to provide the following information for each paper: authors; year of publication; title; reason(s) for inclusion; link to paper/reference. Learning from previous experiences, the workshop lead (DN) instructed that a group could not select an article for which a group member was an author thus avoiding

one possible source of conflict. As a group we felt that this specific rule of the article selection process was fair, and while acknowledging the potential for exclusion of relevant articles, the consensus was that if, out of a group of 30 or so teachers of EBM, a specific paper from one of the author's in the room was not mentioned then it was a sign that it had at least not reached a level of importance/dissemination to a group of teachers attending one of the leading conferences for EBM/EBHC educators.

That said there was more than one article authored by a workshop participant selected by other group participants at the various stages, including one that made the final manuscript.

The groups worked in real time on a Google spreadsheet (database) which simultaneously acted to populate a database of articles. Following the workshop, the lead author attempted to contact all workshop participants via email to ascertain if they wanted to be authors on this publication. Four participants (three from the same group) declined authorship and acknowledgement and one participant declined authorship but accepted acknowledgement. One participant was non-responsive to emails and was excluded from authorship. The majority of groups were unable to provide a detailed synopsis of their chosen article and they therefore performed this task after the workshop as part of drafting this manuscript. Here we present the final set of papers from seven groups, presented in group order. To arrive at 'Ten' papers, the lead author (DN) added their selected articles to the same database as other participants in the workshop. From this, he selected his top three (8, 9, 10). Coauthors of the paper were emailed and offered the opportunity to agree or disagree with these three suggested articles. All of the coauthors agreed with all three selected articles.

Selected articles

Below are the selected articles. Numbering is based on group order and has no bearing in relation to importance.

Sicily statement on evidence-based practice (EBP)

The statement was developed as a result of an international meeting of EBHC teachers and developers representing various professions within the health sector in 2003.[2] The minimum standard educational requirement of evidence-based practitioners were compiled along with a summary of evidence-based teaching strategies to effectively deliver and evaluate the steps of EBP. The article emphasises the role of EBM/EBHC in the clinical decision-making process and summarises the evolution of EBM/EBHC to EBP in order to incorporate the diverse range of healthcare professions. The statement compiled five key steps in EBP that can be applied in both clinical practice and teaching, thus integrating medical education with clinical practice.

Evidence-based guidelines or collectively constructed 'mindlines'? Ethnographic study of knowledge management in primary care

The concept of 'mindlines' (collectively reinforced, internalised guidelines) challenges traditional thinking into how we teach EBP. They comprise an amalgamation and internalisation of experiences and interactions with colleagues and patients, opinion leaders and other sources of knowledge.[3] Practitioners report their knowledge and practice is continually produced and transformed as they meld different types and sources of evidence and interact with colleagues and others. Current EBP teaching is underpinned by the five steps of EBP. While this model has merit, used alone it does not fully recognise the 'messiness' of knowledge acquisition and use in everyday practice. Using mindlines in teaching can bridge the gap between the steps of EBP and the reality of the clinical environment and raise the learners' awareness of the need to develop their 'contextual adroitness' as well as skills to make rapid, complex decisions. The inclusion and importance of this paper is reflected in the fact it was also selected by others as one of 10 papers for practicing EBP.[1]

Core competencies in EBP for health professionals: consensus statement based on a systematic review and Delphi survey

This paper reports a consensus on the core competencies of EBP that would ideally be achieved by a student of EBHC, from undergraduate to practising clinician, in any healthcare discipline.[4] In providing direction on what 'should' be taught, it offers the opportunity to standardise learning across disciplines and countries. This can be augmented to help the teacher learn how to teach EBM/EBHC principles by referring to interventions identified by Young and colleagues.[5]

Tips for teachers of EBM: relative risk reduction, absolute risk reduction and number needed to treat

People find numbers hard to understand and apply in practice, but this is a crucial skill. Finding a simple way and useful examples to explain treatment effects is even harder. This paper demonstrates how to teach this directly, clearly and visually.[6] The steps shown here can change the way the learner thinks by assisting the crossing of a troublesome learning threshold regarding the interpretation and application of effect sizes that is likely to be transformative for many learners. The learner can then interpret the results of treatment papers and apply them in their practice. This paper is one from a useful series 'Tips for learning and teaching evidence-based medicine'.[7]

Why most published research findings are false?

The call this paper makes for well performed and relevant research is as important today as when it was published 15 years ago.[8] Trial registration, publication bias, the dangers of multiple testing and a focus on finding significant p values instead of clinically important effects are identified as key issues underpinning the astonishing fact that, in the authors view, 95% of all published research is likely to be false. Errors due to overly specific questions and small sample sizes are addressed and it calls for studies with higher pre-study odds in order to improve the likelihood of real and true findings from research. Though some of the solutions put forward have been incorporated into research practice, this paper acts as a constant reminder in EBM teaching to always be critical about research findings and to be aware of the possible impact on clinical practice.

EBM: a movement in crisis

Teaching and learning in EBM/EBHC should not only consist of its merits in theory and in practice but also of its problems. In the previous '10 papers' article,[1] awareness of common criticisms of EBM was acknowledged with reference to the systematic assessment by Straus and McAlister.[9] Fourteen years on, Greenhalgh and colleagues[10] focus on more contemporary issues, adopting a collaborative approach to not only identify the unintended consequences of EBM but to also offer some solutions. Issues of importance raised include the hijacking of the evidence-based 'quality mark' by vested interests, too much clinically irrelevant evidence, management-driven over patient-centred care and under-represented populations within the evidence base. Solutions to these problems are offered—including changes to current EBM training that goes beyond the first three steps and consider honing expert judgement and skills in shared decision making. Teachers and educators are thus provided with a useful and accessible synopsis to aid learners in grasping the nuances of EBP and reminding them of the need to refocus on its founding principles—'providing useful evidence that can be combined with context and professional expertise so that individual patients get optimal treatment'.

The connection between shared decision making and EBP

EBHC should always start and end with patients. This article highlights the connections between EBHC and shared decision making—both needed for optimal healthcare.[11] With the increased availability of pre-appraised evidence, clinicians need skills to critically interpret and implement research evidence using shared decision making, often facilitated with tools to improve communication. Shared decision-making skills are crucial for inclusion of patients' values and preferences and for the practice of EBHC. This article points out that EBHC and shared decision making together reinforce the development of healthcare guidelines and not only the interaction between one patient and their clinicians. It ends unambiguously: 'Evidence-based medicine needs SDM (shared decision making), and SDM needs EBM. Patients need both'. Teaching EBHC should, therefore, include teaching shared decision making—an area historically overlooked compared with the other EBHC steps.[12]

What are the effects of teaching EBHC? Overview of systematic reviews

In 2004, Coomarasamy and Khan published a systematic review examining postgraduate education and later proposed a hierarchy of teaching and learning in EBHC.[13][14] This important work sparked a growth in research assessing the effects of teaching EBHC

using different approaches and target populations. Young and colleagues summarised this research in an overview of systematic reviews, including 16 reviews with 81 separate studies of teaching EBHC at undergraduate or postgraduate level.[5] Findings resonated with Khan's hierarchy, noting EBHC teaching and learning strategies were most successful when implementing multifaceted, clinically integrated approaches with assessment. The authors also highlighted the need for rigorous research to identify minimum components for multifaceted interventions, assessment of medium to long-term outcomes and implementation of these interventions.

Applying evidence to the individual patient

A focus on the first three steps of EBHC (ask, acquire and appraise) has led to a relative dearth of information to support teaching of step four (apply). Using a clinical scenario, Straus and Sackett describe application of step four in practice.[15] They describe how they apply evidence to the individual patient by first asking us to consider 'if our patient is so different from those included in the study that its results cannot be applied to him?' The concept of the 'f' factor—their version of personalised medicine—is also introduced. Calling for more research on decision-support methods, they conclude 'Ultimately, the patient must be our guide—he is the one with the disease, the one that may undergo therapy (and experience the adverse events) and we must find ways of enhancing our communication of evidence to the patient and of improving the shared decision-making process'.

David L Sackett: interview in 2014 and 2015

Shortly after Dave was diagnosed with terminal cancer in 2014, two of his mentees, Iain Chalmers and Steve Goodman, urged a third, Haynes, to 'do something' to record Dave's thoughts on his remarkable life and career. The result was this interview.[16] Indicating the importance Dave placed on educating the next generation, the words 'teach', 'teaching', 'teacher', 'teaches', 'education' and 'educator' appear a total of 146 times. 'Practice' appears 45 times. On page 41, Dave provides two key lessons for any teacher—inspiring change in your learners and practicing what you preach: 'The residents not only showed up and learnt, but became threatening to some of the faculty, and we eagerly responded to the latters' requests for their own (separate) sessions [...]. Along the way, it was bolstered by a non-randomised trial conducted by the [...] graduate student Kathryn Bennett that demonstrated considerable improvements in critical appraisal skills among experimental, but not control, medical students'. This paper offers great insight into Dave's philosophy and practice of teaching EBM throughout his career.

Summary

The articles selected overlap on three broad themes useful for teachers of EBM/EBHC to consider: (1) 'back to basics'—a reminder of the EBHC journey and why teaching it matters (articles 1, 9 and 10); (2) practical resources—for specific elements and methods of teaching EBHC (articles 1, 3, 4, 7 and 8); and (3) challenges we face in teaching EBHC and that EBHC faces as a movement and practice (articles 2, 5 and 6)

The articles presented here reflect the preferences of teachers and educators from a diverse set of backgrounds under resource and time-restricted conditions. The final selected list is not designed to be exhaustive, nor comprehensive, nor the 'top' or 'best' articles on the topic of teaching EBHC. Indeed, some participants voiced this concern during the workshop, stressing their choices would likely have been different under different circumstances. One of the objectives of the workshop was the intentional act of putting teachers of EBHC 'on the spot'; to get them thinking about their own knowledge base and the resources they can signpost peers and colleagues to without much thought. Participants may have found this challenging. The hope is that participants walked away with having learnt something about themselves they may wish to improve on, while at the same time having a tangible output in the form of this paper. You may disagree with the final selections. We, however, found benefit discussing some of the articles that we consider useful in informing our own teaching and practice. We hope that this list will evolve and encourage fellow teachers and educators to suggest relevant articles to add to a database that we will look the share via the EBHC teachers website (www.teachingebhc.org). This can be done by contacting the lead author David Nunan via email (david.nunan@phc.ox.ac.uk).

The full slide set from the workshop is available here: www.EBHCconference.org

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References
1 **Nunan D**, O'Sullivan J, Heneghan C, *et al*. Ten essential papers for the practice of evidence-based medicine. *Evid Based Med* 2017;**22**:202–4.
2 **Dawes M**, Summerskill W, Glasziou P, *et al*. Sicily statement on evidence-based practice. *BMC Med Educ* 2005;**5**:1.
3 **Gabbay J**, le May A. Evidence based guidelines or collectively constructed "mindlines?" Ethnographic study of knowledge management in primary care. *BMJ* 2004;**329**:1013–1010.
4 **Albarqouni L**, Hoffmann T, Straus S, *et al*. Core competencies in evidence-based practice for health professionals: consensus statement based on a systematic review and Delphi survey. *JAMA Netw Open* 2018;**1**:e180281.
5 **Young T**, Rohwer A, Volmink J, *et al*. What are the effects of teaching evidence-based health care (EBHC)? overview of systematic reviews. *PLoS One* 2014;**9**:e86706.
6 **Barratt A**, Wyer PC, Hatala R, *et al*. Tips for learners of evidence-based medicine: 1. relative risk reduction, absolute risk reduction and number needed to treat. *CMAJ* 2004;**171**:353–8.
7 **Wyer PC**, Keitz S, Hatala R, *et al*. Tips for learning and teaching evidence-based medicine: introduction to the series. *CMAJ* 2004;**171**:347–8.
8 **Ioannidis JPA**. Why most published research findings are false. *PLoS Med* 2005;**2**:e124.
9 **Straus SE**, McAlister FA. Evidence-Based medicine: a commentary on common criticisms. *CMAJ* 2000;**163**:837–41.
10 **Greenhalgh T**, Howick J, Maskrey N, *et al*. Evidence based medicine: a movement in crisis? *BMJ* 2014;**348**:g3725.
11 **Hoffmann TC**, Montori VM, Del Mar C. The connection between evidence-based medicine and shared decision making. *JAMA* 2014;**312**:1295–6.
12 **Albarqouni L**, Hoffmann T, Glasziou P. Evidence-Based practice educational intervention studies: a systematic review of what is taught and how it is measured. *BMC Med Educ* 2018;**18**:177.
13 **Coomarasamy A**, Khan KS. What is the evidence that postgraduate teaching in evidence based medicine changes anything? A systematic review. *BMJ* 2004;**329**:1017.
14 **Khan KS**, Coomarasamy A. A hierarchy of effective teaching and learning to acquire competence in evidenced-based medicine. *BMC Med Educ* 2006;**6**:59.
15 **Straus SE**, Sackett DL. Applying evidence to the individual patient. *Ann Oncol* 1999;**10**:29–32.
16 **Sackett DL**Haynes B, ed. *Interview in 2014 and 2015*. McMaster University, 2015. https://www.jameslindlibrary.org/sackett-dl-2015/