

Teaching evidence-based medicine: a clinician's perspective

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Evidence-based medicine (EBM) was introduced to provide an organised approach to clinicians and other health care providers in using research to care for their patients^[1]. By highlighting the importance of research in patient care, EBM has also provided many researchers a strong sense of purpose, with increased awareness that their everyday activities are being recognised as relevant to patient care. Most medical schools have some form of the EBM training programme at undergraduate and postgraduate levels, and many researchers, clinical epidemiologists, and biostatisticians together with clinicians are actively engaged in teaching EBM to students of medicine and other health sciences. However, the flourishing activities of EBM education bring along challenges.

Teaching and learning in Medicine is challenging, as there is too much to learn in too little time. Students grasp only such information that is easy to understand, knowledge that is important for their assessments, and what they see as immediately relevant to patient care. Teaching EBM is a great challenge, because many concepts in EBM are non-intuitive, EBM-related questions have not been featured regularly in most clinical assessments, and because it is related to the use of research, many students do not readily see EBM as immediately relevant to patient care. In addition, knowledge on EBM is still evolving, perhaps at a faster pace than in any other field of medicine, and many versions of the teaching guide are available, each somewhat different from the others.²⁻⁵ The amount of information in EBM is often beyond what the learners could digest, let alone retain and apply in their future practice. The inherent nature of EBM in accepting uncertainties further complicates the path of learning for many students who prefer

quick and clear facts. EBM is likely to be a misfit in the medical curriculum unless teachers and students alike recognise it as a clinical skill that needs to be practiced on patients, and apply the same considerations as in teaching and learning of other clinical skills.

In this regard, we should remember William Osler (1849-1919), who changed the way Medicine was thought by moving students from the lecture hall to the bedside. By advocating the need to learn medicine where the patients were, he awakened fellow medical educators of his time and laid down the chief teaching philosophy for future medical educators. Osler expounded that "the natural method of teaching the student begins with the patient, continues with the patient, and ends his studies with the patient..."⁶ This statement exemplifies Osler's great wisdom as a teacher in an era where medicine was thought mainly didactically as theories, and incidentally, it bears striking resemblance to the philosophy of EBM.⁷ The thought of bringing students to the bedside to witness the purpose of their learning might have originated from Osler's fervent exploration of what would make his own teaching effective.

Had Osler's methods been subjected to modern scientific testing, we might very well have seen one of the largest effects of any intervention in the history of medical education. With growing complexity of medical training programmes and multiple determinants of learning today, it has become increasingly difficult to demonstrate the value of any single educational intervention. However, in the field of EBM education, there have been evidences over the last two decades that enable a fair evaluation of the merits of different EBM training approaches. Despite the small sample sizes of most studies and a lack

of direct comparisons, it has been shown rather consistently that EBM training programmes that are integrated with clinical teaching appear to produce greater learning gain compared to stand-alone EBM training programmes.^{8,9}

As a clinician and teacher of EBM, the author has attempted different ways of combining EBM with bedside clinical teaching and has the following observations over the years:

- (i) EBM teaching does not blend well with the conventional clinical teaching sessions without some careful thoughts, and it almost always fails to achieve the expected learning objectives without prior planning;
- (ii) Students tend to concentrate on understanding whatever information they receive, and not on identifying information gaps that might exist in patient care, and as such struggle to formulate useful clinical questions that initiate the EBM process;
- (iii) Students lose focus easily during teaching when the discussion shifts from patients to theories and technical details such as research methodologies and statistics.

Having a teaching plan with clear learning objectives, helping students to identify important and interesting information gaps, and keeping the discussion closely related to the patient are three crucial steps to ensure that EBM teaching at the bedside is effective. In the teaching plan, it is important to set modest and realistic goals in each session by focusing only on one or two steps of EBM. It helps greatly if the teacher surveys the patients in the ward or clinic beforehand so that specific learning objectives that are tailored to the cases can be set, otherwise some generic learning objectives should be set and adapted according

to the needs of the cases; for example, from identification of information gap leading to searching pre-appraised resources, or from interpreting the results of the study to the application of evidence.

Following are two examples of EBM teaching sessions facilitated by the author using an approach that worked well within the limited time of a bedside clinical teaching session. Both the scenarios were set in the outpatient clinic. The first scenario is illustrated via a dialogue between the tutor and the student, and the second scenario is illustrated using a narrative that describes the progress of the session. Both scenarios are followed by a commentary.

Clinically integrated EBM teaching: Scenario 1

A 12-year-old boy who is grossly obese comes to the clinic for consultation about weight management. The boy spends most of his free time playing portable play station and watching television. He eats non-stop in the middle of these activities. He is in the last place in his class. He also appears to be hyperactive and fidgety, with an attention span of less than 5 minutes.

Focus of this session: Identifying information gap and forming a clinical question

After selecting the keywords according to the PICO format, the next step is to rank the keywords in the order of importance and selection to be used as search terms. A quick PubMed search is then performed using a computer located in the ward or a mobile device with Internet connection. This usually takes less than 5 minutes when the keywords and ranking are clearly identified

Box 1. shows a dialogue between the tutor and the students during the teaching session

- Tutor:* What are the problems in this boy?
Student: Obesity, sedentary lifestyle, playing video games, watching TV, excessive eating, poor school performance, hyperactivity, and attention deficit
Tutor: What among these do you think is the main problem?
Student: Obesity (other students may have different choices)
Tutor: Why?
Student: Because obesity may lead to many problems later on in life, such as metabolic syndrome.
Tutor: I see. Why do you say that?
Student: From what we read, problems in obesity are well known.
Tutor: So, are you suggesting that all obese children will develop metabolic syndrome?
Student: ...not all, but many will.
Tutor: Aren't there many non-obese children who develop metabolic syndrome later in life? What makes you particularly concerned about obese children like this boy that you have just seen?
Student: ...yes, everyone has some risk, but I think obese children have higher risk.
Tutor: Higher risk compared to...
Student: Non-obese children
Tutor: I see. How much higher is the risk do you think?
Student: ...I am not sure.
Tutor: So, what specifically are you not sure about?
Student: How much higher is the risk of developing metabolic syndrome in obese children compared to non-obese children.
Tutor: Excellent, there you have identified an important information gap. So, what should we do to fill that gap?
Student: We should search for the answers.
Tutor: Before we start searching, it is better if we plan to see what key words we should use for our search using the PICO framework. Let's fit the terms into Patient (P), prognostic Indicator (I), Comparison (C), and Outcome (O).

Commentary

The teaching session provided above focuses on one particular track of information gap, so students are not confused. There are other possible clinical questions that can be formulated from the scenario such as:

1. Is video gaming or television watching associated with obesity in children?
2. Is the length of time spent in video gaming related to the degree of severity in children with attention deficit hyperactivity (ADHD)?
3. Does a reduction in video gaming activities improve symptoms of ADHD in children?
4. Is video gaming associated with poor school performance in children?
5. Does a reduction in video gaming improve school performance in children?
6. Does reduction in video gaming reduce weight in obese children?

If there is sufficient time, these questions can be raised in the session via brainstorming, and each student may be given a task of searching information on a specific question.

Clinically integrated EBM teaching: Scenario 2

A previously healthy 7-year-old girl is accompanied by her parents to the outpatient clinic for a follow-up appointment having been treated for pneumonia with oral antibiotics for 5 days in the previous week. Her parents are anxious and ask the doctor

whether there is anything that their daughter should take to prevent another episode of pneumonia. The doctor in charge explains to the parents that any supplement is unlikely to be useful in preventing pneumonia.

Focus of the session: Applying evidence to the patient

The tutor provokes the students' thoughts by asking whether there is really nothing useful for this girl to prevent further episodes of pneumonia. He then mentions zinc, an element that supposedly favours a wide range of benefits. The tutor picks up the subject to be discussed rather than asking the students to formulate clinical questions, as the focus is on applying the evidence. Using zinc as the intervention, the tutor quickly facilitates the formation of PICO and ranking, as follows:

- P : Children with pneumonia (rank 2)
- I : zinc supplement (rank 1)
- C : no supplement
- O : prevention of recurrence (rank 4)
- S : therapy – systematic review (rank 3)

Using a computer in the clinic room, the group makes a quick search in PubMed using a combination of three key terms according to their ranking ("I" followed by "P" and then "S"). The following Cochrane Systematic Review is found:

Lassi ZS, Haider BA, Bhutta ZA. Zinc supplementation for the prevention of pneumonia in children aged 2 months to 59 months. Cochrane Database Syst Rev. 2010;(12):CD005978.¹⁰

The review shows that zinc supplementation reduced the incidence of pneumonia by 13% (risk ratio (RR) 0.87; 95% confidence interval (CI) 0.81-0.94, six studies, 7850 participants).¹⁰ The following points are covered in an exercise

on applying the results:

- I. Interpreting the results, which suggest a beneficial effect of zinc in reducing the incidence of pneumonia
- II. Identifying issues in the review that may affect the applicability of the results to patients in Malaysia, such as the 7-year-old girl seen in the clinic:
 - a. Age of the patient (7 years) versus age of the participants in the review (2-59 months).
 - b. Setting of the studies in the review (studies were conducted mostly in countries with high incidence of childhood pneumonia and zinc deficiency such as India and Bangladesh), whereas in Malaysia the population risk of childhood pneumonia and zinc deficiency is substantially lower. Apart from the population risk, the individual risk of recurrent pneumonia for this otherwise healthy girl is very low.
 - c. Other factors that may determine the applicability of the research findings to our patient, categorised under the acronym SCRAP (S: sex, C: comorbidity, R: race, A: age, P: pathology).
- III. Other issues in applying evidence to the patient, such as the availability of the medicine or other intervention and the cost, and patient's values and preference are to be considered.

Based on the differences between the patients in Malaysia and the patients in the settings of the studies included in the review, it is reasonable to conclude that zinc is not likely to be of any major benefit to the concerned patient in

preventing pneumonia further as her baseline risk of having recurrent pneumonia is very low, in view of her excellent health and the comparatively low incidence of childhood pneumonia in this country. The session ends with a brief role-play during which a student acts as the parent who requests for zinc supplement for the daughter, and another student acts as the attending doctor who communicates the information discussed to the parents.

Commentary

In this scenario, the tutor makes use of his prior knowledge on this systematic review of zinc and childhood pneumonia to direct the learning process. This is likely to lead to a more controlled and efficient teaching session compared to a spontaneous question-formulating exercise without the assurance of a good answer. This strategy is likely to be effective if the focus is not on framing questions. Role-play is very useful in helping students to learn how to communicate clinical evidence to non-medical persons. The ability to translate scientific knowledge, which is often expressed in complicated technical

terms, to layman language is a good indicator that learning has taken place.

Conclusions

Despite the enthusiasm of EBM teachers and the favourable reports on clinically integrated EBM teaching, it is uncertain that the degrees of learning gain demonstrated in most studies would persist and influence behaviour and patient outcomes, as these aspects have rarely been assessed^[11-13]. As teachers of EBM, we are still some way from being able to show the value of what we do in the same rigour as we treat clinical evidence in our teaching. We need to continue explore ways to improve our teaching and open to challenges, with meaningful, patient-related outcomes as our ultimate goals.

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Cochrane Primary Care Field

The Cochrane primary care field (<http://www.cochranepriarycare.org/>) was established in 1993 as the first registered field under the Cochrane Collaboration. It serves “to coordinate and promote the mission of the Cochrane Collaboration within the primary health care disciplines, as well as ensuring that primary care perspectives are adequately represented within the Collaboration”.¹ The field consists of key academics and administrative staff from New Zealand, the Netherlands, the United States of America and Ireland.

One of the most notable initiatives of the Cochrane Primary Care Field was the creation of Practical Evidence About Real Life Situations (PEARLS) to guide the practice of primary care practitioners.² This is an on-going project funded by the New Zealand Guidelines group. PEARLS are short summaries of Cochrane Systematic Reviews that are considered relevant in primary care. They are prepared mainly as educational materials to complement clinical judgement in the care of individual patients. Since March 2007, more than 360 PEARLS have been developed. PEARLS are freely accessible via the following link: <http://www.cochranepriarycare.org/pearls-and-pearls-various-languages>.

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