

# Quality improvement report

## Integrating evidence based medicine into routine clinical practice: seven years' experience at the Hospital for Tropical Diseases, London

Diana N J Lockwood, Margaret Armstrong, Alison D Grant

Hospital for Tropical Diseases, University College London Hospitals NHS Trust, Mortimer Market Centre, London WC1E 6AU

Diana Lockwood  
*consultant physician*  
Margaret Armstrong  
*research coordinator*  
Alison Grant  
*consultant physician*

Correspondence to:  
A Grant  
alison.grant@lshrm.ac.uk

BMJ 2004;329:1020-3

### Abstract

**Problem** Introduction and evaluation of evidence based medicine (EBM) into routine hospital practice.

**Strategy for change** Routine EBM meetings introduced in 1997.

**Design** Review of outcomes of meetings from 1997 to 2004, focusing on their effect on clinical practice.

**Setting** Referral centre for tropical and domestic infectious diseases.

**Key measure for improvement** Outcome of meetings, classified as resulting in a change in practice; confirmation or clarification of existing practice; identification of a need for more evidence; and outcome unclear.

**Effects of change** Examples include a change from inpatient to day case treatment of New World cutaneous leishmaniasis; development of guidelines on the treatment of coinfection with visceral leishmaniasis and HIV; and identification of the need for more data on the efficacy and toxicity of atovaquone-proguanil (Malarone) compared with quinine plus sulfadoxine-pyrimethamine (Fansidar) in the treatment of uncomplicated falciparum malaria, which resulted in a clinical trial being set up.

**Lessons learnt** Incorporation of EBM meetings into our routine practice has resulted in treatment guidelines being more closely based on published evidence and improvements to care of patients. Written summaries of the meetings are important to facilitate change.

### Background

Evidence based medicine (EBM) was introduced to the Hospital for Tropical Diseases in London in 1997. We were enthusiastic about making our practice more evidence based but initially daunted by the potential magnitude of the task. The hospital is a centre for tropical and domestic infectious diseases, taking local, national, and international referrals, and has a major role in advising on the management of imported infectious diseases in the United Kingdom. Our medical team consists of ten consultants, two specialist registrars, and three senior house officers. The hospital has had written guidelines since the 1960s; originally these detailed the doses of drugs used for tropical diseases, whereas now they deal with medical management of diseases

common in our practice. The guidelines are updated regularly, according to consensus of consultant opinion. Two consultants were early converts to EBM and proposed the introduction of regular meetings for all medical staff, in which evidence concerning a specific question relevant to our practice would be reviewed by the team. These meetings have become an established part of our routine.

### Key measures for improvement

We considered that care of patients would be improved if our treatment guidelines were based on the best available evidence, maximising efficacy and convenience and minimising toxicity. We categorised the outcome of EBM meetings in terms of their implications for clinical practice: meetings resulting in a change in practice; meetings confirming or clarifying existing practice; meetings identifying the need for more evidence (which may be combined with the previous two categories); and meetings with no clear outcome. We gathered this information from the meeting minutes filed in our library and, more recently, on our intranet.

### The process of EBM

We aim to have one EBM meeting every two months, each lasting two hours over a Friday lunchtime. The meeting chairperson is allocated by rotation among the consultants and specialist registrars, though any team member who wants to investigate a particular clinical question can lobby to chair the next available meeting. The chairperson chooses the question to be addressed, identifies articles to be reviewed, and distributes these articles among the members of staff who will attend the meeting, aiming for each person to be allocated one or two articles. Those given articles review them in detail beforehand, then present the key points from each paper at the meeting. We have produced notes to help the chairperson prepare for the meeting (see box), and for reviewers, giving guidance on critical appraisal and references to key EBM texts (see further details on [bmj.com](http://bmj.com)).



See [bmj.com](http://bmj.com) for details of notes given to chair of meeting

Outside experts may be invited if this will facilitate discussion.

At the meeting the selected papers are presented in an order determined by the chairperson. After each paper we take points of clarification, but the main discussion is deferred until the end, when we try to reach consensus about the evidence presented. After the meeting, the chairperson writes a summary that is circulated to all medical staff and stored on our intranet and in the library, along with a copy of the papers presented. Our clinical guidelines are updated if appropriate.

## Outcome of EBM meetings

Between January 1997 and March 2004 we had 29 meetings. The questions discussed primarily concerned clinical management of diseases common in our practice, including the use of laboratory diagnostic and monitoring tests, the use of specific drug therapies, and side effects of drugs and how we should manage them. The table gives some examples of meetings in each outcome category.

### Notes for the chairperson of the EBM meeting

You need to start preparing at least three weeks ahead of the meeting. People attending the meeting need to have their papers to review a week in advance

- Decide on the topic  
Well focused questions work best  
Keep it clinically relevant
- Do a literature search  
Medline/BIDS (library staff can advise on the best search strategy)  
Textbooks  
Experts' reference collection
- Identify any outside experts who may like to participate  
Invite them early  
Explain the format of the meeting  
Ask them for input into the literature search
- Identify articles to be reviewed in the meeting  
Check through the results of the literature search and identify key papers
- Decide on meeting structure and timing  
An overview at the start often works well  
Material to be reviewed can often be organised into sections  
Timing is critical—tell presenters how long they have to talk
- Identify key references  
If there is a lot of material, it is better to focus on key references rather than trying to cover everything  
Give key references to people who are definitely attending and will do concise presentations
- Distribute the allocated paper(s) to each presenter at least a week in advance
- In the meeting  
Allow brief discussion after papers/sections  
Keep at least 20 minutes at the end for general discussion of the evidence
- Produce and circulate a summary within four weeks of the meeting  
Previous summaries can be seen in the EBM file in the library
- File the meeting summary and the papers reviewed in the library

### Meetings resulting in a change in practice

Until 2002 we treated patients with New World cutaneous leishmaniasis as inpatients with 21 days of intravenous sodium stibogluconate. In an EBM meeting we reviewed published data on the toxicity of sodium stibogluconate and concluded that serious cardiac toxicity is rare and predictable, patients with pre-existing cardiac disease and elderly patients being at higher risk. An audit of toxicity among our patients confirmed this view, and sodium stibogluconate treatment is now given on a day case basis to young patients with no pre-existing heart disease by using an integrated care pathway developed with our nursing team.

### Meetings identifying the need for more evidence

We reviewed the evidence concerning atovaquone-proguanil (Malarone) as a treatment for uncomplicated falciparum malaria. We concluded there were insufficient data to justify changing our current first line regimen from quinine plus sulfadoxine-pyrimethamine to atovaquone-proguanil and have set up a randomised controlled trial to compare the efficacy and toxicity of these two regimens.

## Lessons learnt: meeting organisation

We have gradually refined the way we organise the meetings and have some suggestions for others who may be considering implementing EBM meetings.

*Share out the role of meeting chairperson*—The chair has a key role in the success of the meeting. Important tasks include refining the question to be addressed so that it is not too broad or too narrow; doing an effective literature search; deciding which articles should be presented in the meeting; allocating each article to an appropriate person (it may be better to give more complex articles to people with more experience in literature appraisal); and writing a summary of the meeting. This is time consuming (perhaps two days' work in total), and we rotate this role so that it is not too onerous for any one individual. The chairperson needs to identify appropriate literature to review; library staff may be able to advise on literature search strategies. Having team members trained in critical appraisal is helpful.

*Include key people involved in making practice guidelines*—If the question has implications for current guidelines, we make sure that key people involved in decision making attend the meeting. For example, if the question concerns whether or not a particular diagnostic test should be done, a senior staff member from the laboratory concerned should be invited to take part.

*Involve staff at all levels*—All members of staff attending our meetings are given at least one article to review and present. Guidelines for presenters help to ensure that people with less experience of literature appraisal focus on the key issues.

*Ensure there is enough time to discuss the evidence*—It is crucial that there is enough time to discuss the evidence presented. There may be questions or discussion about individual articles. More importantly, there must be enough discussion time at the end to reach consensus as to whether practice should be changed. This may mean restricting the selection of papers that

are reviewed in the meeting to those which are most relevant. Presenters must also keep strictly to time: it may help to appoint a timekeeper.

*Consider appointing a scribe*—If there are many articles to review, it may help to have someone to write the main findings and conclusions of each study on a white board or flip chart. This generates a summary of the evidence presented, which assists discussion at the end.

*Chase the chairperson for a summary of the meeting*—Meetings for which the chairperson does not produce a written summary for the records are unlikely to result in a change in practice.

### Lessons learnt: effect on practice

EBM meetings are consistently well attended by both junior and senior members of staff, suggesting they are popular. We think that the meetings promote an environment in which we aim to base our practice on evidence rather than tradition. Staff at all levels are encouraged to question why we do what we do: a question arising on a ward round can lead to an EBM meeting to investigate the issue and ultimately to a change in guidelines. When an EBM meeting concludes that there is little evidence to support what we do in a specific situation, this may generate ideas for audit and research. An EBM meeting question may also arise after publication of an article that seems relevant to our practice. By reviewing the new article along with other relevant publications, we get a more balanced view as to whether our practice should change. EBM meetings bring together all staff involved in the care of our patients, including senior house officers from other teams who provide cross cover for whom the meetings are a part of the formal training programme.

### Key learning points

EBM meetings have proved popular in our unit and, after seven years, remain well attended by both senior and junior staff

EBM meetings can help to build consensus around clinical guidelines and ensure that guidelines evolve to incorporate new evidence

Meetings that conclude that evidence is lacking provide topics for audit and research projects

The meetings are most useful when a written summary is produced

### Next steps

Some EBM meetings have resulted in a change to our guidelines that has clear implications for the care of patients, such as our move from inpatient to day case administration of sodium stibogluconate for New World cutaneous leishmaniasis. It is harder to evaluate formally to what degree the meetings influence staff to adopt a more critical approach to clinical practice; in the future we plan to formally audit the views of trainees on our EBM meetings.

To date, the issues examined have generally been about clinical diagnosis and treatment and have primarily involved medical staff, with contributions from colleagues in the laboratory disciplines and pharmacists to discuss specific questions. In the future we would like to make more meetings multidisciplinary.

### Examples of outcomes of EBM meetings

Outcome and question	Conclusion	Implication for practice
Change in practice:		
Does the published literature support hospital practice of measuring quinine levels in patients with malaria on intravenous quinine therapy?	Little relation between total quinine levels and risk of serious cardiac toxicity	Stopped measuring quinine levels routinely in patients on intravenous quinine: all patients undergo ECG before treatment, patients at higher risk of arrhythmias undergo cardiac monitoring
How serious and common is toxicity from sodium stibogluconate in treatment of cutaneous leishmaniasis?	Serious cardiac toxicity is rare and predictable. Non-cardiac toxicity is common and not clinically important	Day case treatment of New World cutaneous leishmaniasis introduced
Should we change from quinine to artemisinins for the treatment of falciparum malaria?	Little difference in efficacy overall. Artemisinins useful if high risk of quinine resistance, or of serious side effects from quinine	Artemisinins now used for falciparum malaria from Thai border areas, severe malaria from South East Asia, and in patients with high risk of cardiac toxicity from quinine
Confirmation of existing practice:		
How many days of ciprofloxacin treatment is needed for typhoid?	No evidence to support reducing to five days' treatment	No change to current practice
Clarification of existing practice:		
What is the optimal treatment for patients with HIV infection and visceral leishmaniasis?	Treatment with liposomal amphotericin is less toxic than treatment with pentavalent antimonials. Patients relapse unless they are on antiretroviral therapy; secondary prophylaxis may be needed	Liposomal amphotericin should be given as first line treatment for coinfecting patients. Pentamidine isethionate is the first line agent for secondary prophylaxis
Need for more evidence identified:		
Should returning travellers with diarrhoea be treated with antibiotics?	Early treatment of travellers' diarrhoea with a single dose of ciprofloxacin is safe and effective. No clear evidence on the value of antibiotics for returning travellers with diarrhoea lasting >3 days	No evidence to guide practice for returning travellers with diarrhoea for >3 days. A study could be developed to examine this question
Should uncomplicated falciparum malaria be treated with atovaquone-proguanil (Malarone)?	Malarone treatment seems safe and effective but data are from populations where malaria is endemic, and no data available to compare with our current standard of care (quinine plus sulfadoxine-pyrimethamine (Fansidar))	Randomised controlled trial set up to compare efficacy and toxicity of Malarone with quinine-Fansidar

Overall, we have found EBM meetings a good way to bring together all members of the team in a way that builds consensus around practice guidelines and helps to ensure that our guidelines evolve to incorporate new evidence.

Contributors: DNJL established and has overseen the EBM sessions since 1997. MA manages the EBM database. ADG had the

idea for the article, which was further developed by DNJL and MA. ADG and DL wrote the paper. All authors approved the final paper. ADG is guarantor.

Funding: MA is supported by the Special Trustees of the Hospital for Tropical Diseases. ADG is supported by a National Public Health Career Scientist award from the Department of Health.

Competing interests: None declared.

Ethical approval: Not required.

(Accepted 4 August 2004)

## Commentary: The fool wonders, the wise (women) ask . . . about tropical diseases in their practice

Michael L Green

Lockwood and colleagues have shared their seven year experience of integrating evidence based medicine into their practice at the Hospital for Tropical Diseases in London.<sup>1</sup> Consultants, assigned as “chairs” in rotation, identify emerging clinical questions, search the literature for clinical research studies, assign articles to participants, and distribute materials in advance of a bimonthly “EBM meeting.” During these two hour meetings, the group appraises the evidence and strives to reach a consensus about its implications for their practice.

Reviewing their experience, the group classified the outcome of each meeting, citing examples that resulted in a change in practice, confirmed or clarified existing practice, or identified a need for more evidence. The latter outcome often provided the impetus for a new research project. In addition to these concrete changes in practice, Lockwood and colleagues qualitatively observed a cultural shift in their institution. Physicians, in this new atmosphere of inquiry, aimed to base their decision making on “evidence rather than tradition.” Importantly, the authors turned inwards and evaluated the process of their particular model of evidence based practice. And they kindly offer these lessons learnt, mid-course corrections, and general guidelines to readers inspired to adopt it.

This theme issue of *BMJ* asks the question: Does EBM “work?” . . . does it really change anything? For obvious methodological limitations, we cannot draw a straight line of causality from these EBM meetings, representing a discreet intervention, to changes in practice and then to improved outcomes in patients. None the less, we can say that the authors, clearly a reflective bunch, embraced EBM and witnessed substantial changes in their practice, both in their management of specific conditions and their general approach to decision making. Furthermore, they committed not only to a style of practice but to a style of lifelong learning that is in keeping with an international movement towards practice based, self directed approaches and away from traditional continuing medical education. I suspect that their electronic “portfolio” of clinical questions would be more useful than sitting through conferences on parasitic diseases.

In deciding how to integrate EBM into their practice, Lockwood and colleagues did their homework. The format of their meetings bears a striking resemblance to the EBM curriculums offered by many internal medicine

residency programmes. In several studies, participants in these curriculums improved their EBM knowledge, skills, and certain behaviours.<sup>2,3</sup> At Yale, our residents, with faculty guidance, have brought their clinical questions to weekly EBM seminars since 1995.<sup>4</sup> However, we enjoy the luxury of protected time in a training programme. The longevity of the EBM meeting at the Hospital for Tropical Diseases (seven years and still going strong) demonstrates its feasibility for busy clinicians in “routine practice.”

Finally, the authors’ experience adds tropical medicine to the growing number of settings in which sufficient evidence exists to guide many clinical decisions. It would be interesting for them to determine more precisely, as did Ellis and colleagues, the exact proportion of therapeutic manoeuvres in their practice that were supported by systematic reviews of randomised controlled trials, individual randomised controlled trials, or “convincing non-experimental evidence.”<sup>5</sup>

Funding: None.

Competing interests: None declared.

Ethical approval: Not required.

1 Lockwood DNJ, Armstrong M, Grant AD. Integrating evidence based medicine into routine clinical practice: seven years’ experience at one hospital. *BMJ* 2004;329:1020-3.

2 Smith CA, Ganschow PS, Reilly BM, vans AT, McNutt RA, Osei A, et al. Teaching residents evidence-based medicine skills: a controlled trial of effectiveness and assessment of durability. *J Gen Intern Med* 2000;15:710-5.

3 Ross R, Verdick A. Introducing an evidence-based medicine curriculum into a family practice residency—is it effective? *Acad Med* 2003;78:412-7.

4 Green ML, Ellis PJ. Impact of an evidence-based medicine curriculum based on adult learning theory. *J Gen Intern Med* 1997;12:742-50.

5 Ellis J, Mulligan I, Rowe J, Sackett DL. Inpatient general medicine is evidence based. A-Team, Nuffield Department of Clinical Medicine [see comments]. *Lancet* 1995;346:407-10.

(Accepted 20 September 2004)

doi 10.1136/bmj.38257.549653.55

### Endpiece

#### Discoveries

Discoveries are often made by not following instructions; by going off the main road; by trying the untried.

Frank Tyger

Syed Hasan, senior house officer in surgery, Great Yarmouth

Department of Internal Medicine, Yale University School of Medicine, New Haven, CT 06520, USA

Michael L Green  
associate professor of medicine

Correspondence to: M Green, Yale Primary Care Residency Program, Waterbury Hospital, 64 Robbins Street, Waterbury, CT 06721, USA  
michael.green@yale.edu