

Discussion

To our knowledge, a comparison of the effects of standalone versus integrated teaching in critical appraisal skills and EBM has not been done before. In addition to not making the distinction between standalone and integrated courses,²⁻⁴ several existing reviews have generally considered undergraduates and postgraduates together. There is empirical evidence, however, that the outcomes of teaching EBM markedly differ between undergraduates and postgraduates, with smaller gains in knowledge among the postgraduates.¹ Moreover, adult learning theory suggests that the determinants of learning in the two groups are different, with postgraduate learning tending to be driven by self motivation and relevance to clinical practice, whereas undergraduate learning is generally driven by external factors such as curriculum and examinations.⁵ This suggests that effectiveness of educational interventions in teaching critical appraisal skills and EBM should be evaluated separately for postgraduate and continuing education, which we have done.

Studies examining the effectiveness of educational interventions may suffer from various weaknesses. Even a randomised controlled study, which is generally regarded as the optimum method for settling questions of effectiveness, is not immune to many of these weaknesses. These weaknesses include difficulty with standardising the educational intervention(s), contamination between the two arms of a study, inability to blind the study participants and the teachers from the educational intervention(s) leading to selective cointervention, and finally difficulty with measuring outcomes due to the lack of valid and reliable assessment tools. Some of these factors make randomised trials unfeasible in educational settings, thus necessitating other designs such as non-randomised controlled and before and after studies. We included all three designs in our review.

We have shown that while standalone teaching and integrated teaching are both effective in improving the knowledge base, it is clinically integrated teaching of EBM that is likely to bring about changes in skills, attitudes, and behaviour (fig 2).

The purpose of EBM is to integrate best research evidence with clinical skills and patients' values and preferences.⁶ Teaching EBM should not only equip practitioners with knowledge and skills but also foster their attitudes and encourage the practice of EBM. This is because the ultimate aim of improving care could not be achieved with changes in knowledge and skills alone—it would also require changes in attitudes and behaviour. Critical appraisal and EBM teaching that is integrated into clinical practice seems more effective in improving such substantial outcomes including behavioural changes. Teachers of critical appraisal and EBM should aim to bring teaching out of classrooms into the clinic, but this will require a greater effort.

Contributors: See bmj.com

Funding: None.

Competing interests: AC and KSK have a grant from West Midlands Deanery to teach EBM to specialist registrars in the region, as well as a European Union Grant (LSE031068WM2) to promote EBM among small to medium size enterprises that supply the NHS.

Ethical approval: Not required.

Summary points

Critical literature appraisal and evidence based medicine (EBM) can be taught through standalone courses or through instructional methods that incorporate teaching into routine clinical care

Several randomised and non-randomised studies have evaluated the effects of teaching EBM to postgraduates

Both standalone courses and integrated teaching improve knowledge

Improvements in skills, attitudes, and behaviour, however, come about when teaching is integrated into clinical practice; standalone courses bring about no change

It is important to incorporate EBM teaching into clinical practice, but this would require a sustained effort well beyond standalone instruction

- 1 Norman GR, Shannon SI. Effectiveness of instruction in critical appraisal (evidence-based medicine) skills: a critical appraisal. *CMAJ* 1998;158: 177-81.
- 2 Parkes J, Hyde C, Deeks J, Milne R. Teaching critical appraisal skills in health care settings. *Cochrane Database Syst Rev* 2001;(3):CD001270.
- 3 Taylor R, Reeves B, Ewings P, Binns S, Keast J, Mears R. A systematic review of the effectiveness of critical appraisal skills training for clinicians. *Med Educ* 2000;34:120-5.
- 4 Coomarasamy A, Taylor R, Khan KS. A systematic review of postgraduate teaching in evidence-based medicine and critical appraisal. *Med Teach* 2003;25:77-81.
- 5 Knowles MS, Downie CM, Basford P. *Teaching and assessing in clinical practice*. London: University of Greenwich, 1998: 23-38.
- 6 Sackett DL, Straus SE, Richardson WS, Rosenberg W, Haynes RB. *Evidence-based medicine: how to practice and teach EBM*. Edinburgh: Churchill Livingstone, 2000.

(Accepted 23 August 2004)

Corrections and clarifications

Systematic review of the relative efficacy of non-steroidal anti-inflammatory drugs and opioids in the treatment of acute renal colic

An oversight during our complex ELPS (Electronic Long, Paper Short) system resulted in several errors in the numbering of the reference list of the abridged version of this paper by Anna Holdgate and Tamara Pollock (12 June, pp 1401-4).

References cited within the text or figures as 4, 12, 21, 23, 25-28, 30, 31 and 33 link in fact to references listed as 2, 9, 15, 17, 19-22, 24, 25, and 27 respectively. The referencing in the full version of this paper (on bmj.com) is correct.

Tobacco companies aimed to keep smokers hooked, court told

A lapse of concentration during the editing of this news article by Anne Harding led to the wrong name being attributed to the attorney for the Philip Morris tobacco company (2 October, p 757). The attorney's name is Ted Wells, not Ted Morris.

Minerva

The editing and proofreading processes of the seventh item (4 September, p 580) let Minerva down when, at a late stage in production, a spelling error in the word urethras was "corrected" to ureters. The published version therefore appeared to suggest that Minerva believed not only that a urinary catheter is passed through a ureter rather than the urethra, but also that ureters are longer in boys than in girls (they are not - the urethra is longer, though).