Towards a broader agenda for training in critical appraisal

T Greenhalgh and A Herxheimer

ABSTRACT - Much progress has been made in recent years towards an evidence-based approach to health care, ie the routine framing of an explicit decision sequence in the clinical encounter, the systematic search for published evidence, and the appraisal of relevant research articles. We argue that this is a commendable but limited milestone, and that training in evidence-based health care, particularly the use of critical appraisal techniques, is in need of a broader agenda. We outline a proposal through which the skills and attitudes needed for the critical appraisal of published articles may be applied to all other aspects of clinical practice, from planning research projects to presenting results and guidelines and peer review of articles submitted for publication.

The evidence-based medicine movement has taught the practising clinician a number of lessons which in hindsight may appear obvious: that published 'evidence' pertaining to a particular clinical problem varies in both quality and relevance; that both the methods and the results of medical articles can be evaluated using structured checklists; that for the purposes of scientific enquiry there exists a hierarchy of methodology with meta-analysis at the top and anecdote at the bottom (thus, the pooled results of randomised controlled trials are the 'gold standard' of scientific evidence); and that the application of scientific evidence in the clinical situation requires clinical experience and judgement and a clinician-patient dialogue in order to take account of values, preferences and resource limitations as well as critically appraised evidence.

Educationists have been keen to develop a 'curriculum' for teaching the skills and application of critical appraisal at undergraduate and postgraduate level, and, more radically, to non-clinicians involved in the care of patients or the development of health policy. While critics have raised legitimate questions about the universal validity of the hierarchy of evidence or the practicality of critical appraisal, such methods are widely acknowledged to be useful when applied with sensitivity and discretion.

Nevertheless, we believe that if evidence-based medicine continues to focus exclusively on this aspect of the teaching agenda, many additional opportunities for improving the quality of research and clinical practice will be missed. We outline some of these opportunities below.

The design of clinical trials

A high proportion of both research proposals and original research articles are known to be rejected by funding bodies and peer review medical journals because of fundamental flaws in the methods. Unless practitioners internalise the principles of how to plan and execute a research study during their training, the UK government's strategic intention to involve a greater proportion of doctors and nurses in original research as part of higher professional training is likely to exacerbate rather than solve the problem of poor standards in clinical research.

The conduct of research

The conduct of a research study is an iterative process; plans at each stage are inevitably shaped by what is possible to do. Critical appraisal checklists encourage the reader to consider whether published studies were adequately powered to address the central hypothesis, and whether follow-up was long enough and complete enough to make the results credible. The same systematic reflection is surely necessary while the study is in progress and may, for example, spur the researcher to put adequate energy into 'chasing' participants who default from the study or otherwise fail to respond. The publication of a randomised trial that recruited over 2,000 participants with transient ischaemic attack and did not lose a single patient in follow-up is a humbling example of what can be achieved if the critical appraisal checklist is applied consistently throughout the trial rather than only after publication.

The presentation of research findings

A high proportion of medical articles are badly written, poorly presented, and timorously edited, even when the research they report is sound. If a structured approach to the reading of medical articles helps effective evaluation of that article, then a structured and logical approach to writing the article should help more readers understand the controlled trial and choose consciously whether to apply its clinical guidelines. Structure is, of course, a necessary but not sufficient criterion for linguistic clarity. The standard format used in most systematic reviews on the Cochrane database, and in particular the presentation of aggregated trial results in a forest plot showing individual and pooled odds ratios, allows the busy reader to assess rapidly whether the results are valid, relevant and definitive. Yet the same or comparable formats are rarely found outside the Cochrane Library. We find it surprising and illogical that the processes of 'critical appraisal' and
**Key Points**

Critical appraisal – the systematic assessment of the validity and relevance of published research papers – is an important but limited aspect of evidence-based practice.

The skills and attitudes needed for the critical appraisal of published articles should be routinely applied to all other aspects of research: project planning; conducting research and ensuring adequate follow-up; presenting results; and peer review of papers submitted for publication.

The training of both undergraduates and postgraduates in critical appraisal should include its application to this broader agenda.

'systematic review' are seen by many as two separate tasks, and that the methodological work of the Cochrane review groups appears to be virtually isolated from other developments in the design, presentation and evaluation of medical research.

**The peer review process**

Those who act as referees for the appraisal of either grant applications or papers submitted to clinical journals, and, indeed, the editors of such journals, should consistently and objectively assess the quality and relevance of each submission. Subjective impressions of the quality of published papers, even those held by experts in a field, may be invalid. The same is true for unpublished papers. In a covert assessment of the peer review process, editors at the British Medical Journal inserted deliberate errors into manuscripts before sending them out to 420 referees; most errors went undetected. Standard checklists are used increasingly in the peer review process by large grant givers such as the MRC and the Wellcome Trust, but few, if any, journals currently require referees to use them routinely.

**Conclusion**

The term ‘evidence-based medicine’ has become synonymous in some fields with that of ‘critical appraisal’, which in turn has come to mean the application of a structured checklist to assess the validity and relevance of published research. We suggest that the skills of critical appraisal, acquired and sharpened through critique of published research, should be applied to each stage of the research sequence (Fig 1).

We suggest that undergraduate and postgraduate training should give specific attention to using critical appraisal skills in the effective conduct of one’s own research, and in the presentation and dissemination of results. Critical appraisal training should include a session in which the same scientific material is analysed from the perspective of the individual planning a research study, the grant-giving body, the researcher in the field, the referee or peer reviewer, and the journal editor.

**References**

1. Guyatt GH, Sackett DL, Sinclair JC, Hayward R, et al. Users’ guides to the medical literature IX. A method for grading health care recommendations. JAMA 1995;274:1800–4.
2. Dowie J. ‘Evidence-based’, ‘cost-effective’, and ‘preference-driven’ medicine: decision analysis based medical decision making is the pre-requisite. J Health Serv Res Policy 1996;1:104–13.
3. Sullivan FM, MacNaughton RJ. Evidence in consultations: interpreted and individualised. Lancet 1996;348:941–3.
4. Rosenberg WMC, Deeks J, Lusher A, Snowball R, et al. Improving searching skills and evidence retrieval. J R Coll Physicians Lond 1998;32:557–63.
5. Greenhalgh T, Macfarlane FB. Towards a competency grid for evidence-based practice. J Eval Clin Pract 1997;3:161–5.
6 Altman DG. The scandal of poor medical research. Br Med J 1994; 308:283-4.
7 Research and Development Task Force. Supporting research and development in the NHS (Culyer Report). London: The Stationery Office, 1994.
8 UK Central Council for Nursing, Midwifery and Health Visiting. Standards for postgraduate education. Registrar's letter 20/1994. London: UK Central Council, 1994.
9 MacIntyre IMC. Tribulations for clinical trials. Poor recruitment is hampering research. Br Med J 1991;302:1099-100.
10 Farrell B, Godwin J, Richards S, Warlow C. The UK transient ischaemic attack (UK-TIA) aspirin trial: final results. J Neurol Neurosurg Psychiatry 1991; 54:1044-54.
11 Hall M. How to write a paper. London: BMJ Publishing Group, 1994.
12 Altman D. Better reporting of randomised controlled trials: the CONSORT statement. Br Med J 1996;313:570-1.
13 Hayward RSA, Wilson MC, Tunis SR, Bass EB, et al. More informative abstracts of articles describing clinical practice guidelines. Ann Intern Med 1993;118:731-7.
14 Mulrow C. Rationale for systematic reviews. In: Chalmers I, Altman DG (eds). Systematic reviews. London: BMJ Publishing Group, 1995.
15 Smith R. Peer review: reform or revolution? Br Med J 1997; 315:759-60.

Address for correspondence: Dr Trisha Greenhalgh, Senior Lecturer, Unit for Evidence-based Practice and Policy, Royal Free Hospital and University College School of Medicine, Archway Campus, Whittington Hospital, Highgate Hill, London N19 5NF.