What is a CAT?

- Introduction
- The Need for CATs
- Sample Scenario
- Educational Value of CATs
- Limitations of CATs
- Summary
- References

Introduction

Every encounter with a patient identifies gaps in our knowledge about the aetiology, diagnosis, prognosis, or therapy of their illness. Recent research reveals that even as seasoned clinicians we generate about 5 knowledge "needs" for every in-patient we encounter [1], and about 2 "needs" for every 3 out-patients we see [2]. In practising evidence-based medicine [3], [4] we:

1. translate these needs into answerable questions;
2. track down the best evidence to answer them;
3. appraise that evidence for its validity (closeness to the truth) and applicability (usefulness in our clinical practises) [we'll call the written summary of these first 3 steps a "Critically Appraised Topic" or CAT];
4. integrate that evidence with our clinical expertise and apply it in practice; and
5. evaluate our performance.

But even when we break the time barrier and carry out steps 1-3, we face additional barriers that threaten the success of our efforts to create, store, and share the resulting CAT.

The Need for CATs

Once we've found the evidence and are critically appraising it, we face 3 additional barriers: we often make mistakes in carrying out important clinical calculations (especially when they involve confidence intervals); we frequently misplace our critical appraisal as soon as it's done! it's a hassle making copies of it for our colleagues, students and trainees.

This series of CAT-Makers are being developed at the NHS R&D Centre for Evidence-Based Medicine in Oxford, UK to overcome these barriers: they carry out the important clinical calculations for us; they store our questions, search-strategies, and appraisals for us (both as working drafts [Kittens!] and in their final form [CATs]); and they generate a file that we can format with our favourite word processor, and save, store and print to our heart's content. They are the electronic offspring of a paper-based system invented by General Internal Medicine Fellows at McMaster University in Canada [5].

Sample Scenario

You learn that a 54 Y/O man with NIDDM whose myocardial infarction you treated 6 months ago has died suddenly at home. Wondering whether you could have done more for him, you review his notes and confirm that he was, in fact, a low risk inferior MI with no complications whose blood sugar was elevated on admission (13 mmol/L) but settled down within three days. In view of the success of "tight control" of IDDM in preventing or postponing retinopathy and neuropathy, you wonder if a more aggressive treatment of his NIDDM might have postponed his untimely death. On the other hand, you well recall how one of your profs back in medical school insisted that insulin was atherogenic and how you should back off insulin doses when diabetics developed angina pectoris.

So you form the clinical question:
"Among patients with NIDDM who are having MI's, does tight control of their blood sugar reduce their risk of dying?"

You ask the librarian at your local Post-Graduate Centre to help you, and she helps you do a computerised literature search using the MeSH terms: diabetes mellitus AND myocardial infarction, limited by publication type = randomised controlled trial. You find a possibly useful article: Malmberg K et al: Randomized trial of insulin-glucose infusion followed by subcutaneous insulin treatment in diabetic patients with acute myocardial infarction (DIGAMI Study). J Am

Coll Cardiol 1995;26:57-65.

By applying the appropriate users' guides for evidence on therapy [6], you decide that its results and conclusions are both valid and potentially important. The NNT with high-intensity insulin therapy for at least 3 months to prevent one more death within the next year in patients like yours was only 11. You generate a 1-page CAT, summarising your patient and this evidence, and add it to your file of CATs.

On your next month "on service," a diabetic (NIDDM) patient is admitted with characteristic chest pain, and despite thrombolysis he goes on to myocardial infarction. At the "post-take" round you raise the question of whether he should be started on an intensive insulin regimen. Your team-mates are sceptical, but you make a copy of your previously constructed CAT and show it to them. They are sufficiently impressed that they urgently study the full article, agree with your appraisal, and within hours the patient is begun on an intensive insulin regimen.

Educational Value of CATs

General internal medicine fellows at McMaster University invented CATs as a means for sharpening their critical appraisal skills and improving their abilities as bedside teachers of EBM [5]. At Oxford, learners generate CATs in response to the Educational Prescriptions [7] they receive when they present patients recently admitted to the clinical service. Concise and portable in both concept and form, CATs have been adopted by several other institutions and incorporated into their undergraduate and postgraduate training programmes.

Because they are patient-based, CATs have appeal to clinical learners at every stage of their careers, from medical students to senior clinicians. Because they are evidence-based, they promote the acquisition and polishing of literature- searching and critical appraisal skills, as well as the integration of evidence with clinical expertise to form patient-care decisions.

Far more educational value comes from creating a CAT than from just reading it second hand. Thus, although CAT "banks" have been created at various sites, their value to browsers is mainly to show what can be achieved and as starting points for updating CATs (please see the next section on Limitations of CATs!). Although most CATs are generated by individual learners, clinical teams or other groups (such as academic half-days for residents/trainees and "the different sort of journal club" [8]) have started to generate CATs as a group activity, every member having examined the original evidence and then coming together to generate and record their "clinical bottom line" in a CAT. CATs (and CAT- Makers!) are not limited to evidence about therapy. Evidence about diagnostic tests (including bits of the clinical history and physical examination) have been summarised in CATs, highlighting appraisal issues and calculations unique to diagnostics; so too for prognosis, causation, and systematic reviews.

Limitations of CATs

CATs have shortcomings:

1. Individual CATs can be wrong. Their emphasis on real-time responses to real-time clinical problems means that CATs will first appear as drafts, without peer review. These first drafts may contain inferior evidence, or errors of fact, calculation, or interpretation. This limitation can be transformed into an educational virtue by revising draft CATs in rounds and other educational events, and one feature of our CAT bank in Oxford will be the opportunity for feedback, criticism and revision.
2. Individual CATs contain a single element of the relevant liter- ature. Created in busy practices where busy clinicians decide that one piece of critically appraised evidence is better than none, CATs are based on quick searches for at least one useful article, not comprehensive explorations for all useful articles. Although many summarise systematic reviews, most are based on reports of single investigations, and thus are at least incomplete, and sometimes non-representative of the entire body of evidence...
3. Individual CATs may have a short shelf life. They become obsolete as soon as newer, better evidence becomes available. Unless they are updated on the basis of this newer, better evidence, their clinical bottom lines become out of date. For this reason, CAT-browsers will be wise to use them as the starting points for updated searches for newer, better evidence. To assist updating, users of the CATmaker are invited to specify their exact search strategy, and also are invited to specify "sell-by" dates after which their CATs should be considered obsolete.

Summary

CATs are a tactic for helping clinical learners teach themselves how to formulate clinical questions; search for the best evidence; appraise, organise and summarise this evidence; integrate it with clinical expertise; and practice evidence-based medicine. When generated by clinical teams, journal clubs, or in academic half-days, their educational value is multiplied. Existing CATs can be used as starting points for seeking and appraising updates in the relevant evidence. The CAT-maker assists this process by:

1. carrying out the important clinical calculations;
2. storing appraisals (as well as the search strategies that led to them); and

3. generating files that can be formatted with word-processors, stored and printed for other team members.

Feedback and suggestions for improving this process are welcomed, and can be addressed to Douglas Badenoch at the

Centre for Evidence-Based Medicine, John Radcliffe Hospital, Headington, Oxford, UK OX3 9DU.

References

1. Osheroff JA, Forsyth DE, Buchanan BG, Bankowitz RA, Blumenfeld BH, Miller RA. Physicians' information needs: analysis of questions posed during clinical teaching. Annals of Internal Medicine, 1991; 114:576-81.
2. Covell DG, Uman GC, Manning PR. Information needs in office practice: are they being met? Annals of Internal Medicine, 1985; 103:596-9
3. Sackett DL, Rosenberg WMC, Gray JAM, Haynes RB, Richardson WS: Evidence-based medicine: what it is and what it isn't. BMJ 1996;312:71-2.
4. Sackett DL, Richardson WS, Rosenberg WMC, Haynes RB: Evidence-Based Medicine: How to practice and teach EBM. London: Churchill-Livingstone, 1996.
5. Sauve S, Lee HN, Meade MO, Lang JD, Farkouh M, Cook DJ, Sackett DL: The critically appraised topic: a practical approach to learning critical appraisal. Ann Roy Soc Phys Surg Canada 1995;28:396-8.
6. Described in Chapters 3 (Critically Appraising the Evidence) and 4 (Can You Apply this Valid, Important Evidence in Caring for Your Patient?) in: Sackett DL, Richardson WS, Rosenberg WMC, Haynes RB: Evidence-Based Medicine: How to practice and teach EBM. London: Churchill Livingstone, 1996.
7. Described at the end of Chapter 1 (How to Ask Clinical Questions You Can Answer) in: Sackett DL, Richardson WS, Rosenberg WMC, Haynes RB: Evidence-Based Medicine: How to practice and teach EBM. London: Churchill Livingstone, 1996.
8. For a description of "a different sort of journal club" see the section "Teaching methods relevant to the clinical application of the results of critical appraisals to individual patients" in Chapter 4 of Sackett DL, Richardson WS, Rosenberg WMC, Haynes RB: Evidence-Based Medicine: How to practice and teach EBM. London, 1996.

Centre for Evidence-Based Medicine, Institute of Health Sciences Old Road Campus, Headington, Oxford, OX3 7LF, United Kingdom. T: +44 (0)1865 226991; F: +44 (0)1865 226845