

The Critically Appraised Topic: A Practical Approach to Learning Critical Appraisal

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Summary

This article describes a practical, patient-based and evidence-based tool for learning and applying skills in critical appraisal: the critically appraised topic (CAT). From a real-patient encounter, a clinical question is generated, which drives a search for studies that address this question. From this search, the most rigorous and relevant article is chosen and critically appraised. Key study results are summarized and translated into clinically useful measures of efficacy, risk or accuracy. This process is summarized in a structured, one-page CAT. CATs are being generated by housestaff and faculty members at several universities to address clinical questions about diagnosis, therapy, and prognosis.

As an interactive educational tool, CATs can enrich the quality of ward rounds or journal clubs, thereby promoting critical appraisal skills; as a clinical tool, they have limitations. In summary, CATs provide a structured approach to helping learners teach themselves how to formulate clinical questions; search for relevant evidence; appraise, organize and summarize the evidence; and practise evidence-based medicine.

Résumé

Cet article portant sur l'examen critique d'une question (ECQ) décrit une technique pratique, fondée à la fois sur le malade et les faits, qui a pour but d'éveiller et de développer l'esprit critique. À partir d'une rencontre réelle avec un malade, une question sur un sujet clinique prend forme, laquelle débouche sur la recherche des publications s'y rapportant. Les participants choisissent, parmi ces dernières, l'article le plus pertinent et le plus rigoureux. Les résultats de l'étude choisie sont alors résumés et transposés en mesures d'efficacité, de risque ou d'exactitude. Le processus débouche sur un ECQ d'une page. Les ECQ, qui portent sur des questions de diagnostic, de traitement et de pronostic sont produits par les résidents et le personnel enseignant dans plusieurs universités.

Outils de formation interactive, les ECQ peuvent augmenter la qualité des séances anatomo-cliniques et des groupes de lecture, améliorant ainsi l'esprit critique des participants. Sur le plan de la formation clinique, ils ont pourtant leurs limites. En somme, les ECQ favorisent le traitement logique d'un sujet, ce qui aide les médecins en voie de formation à apprendre par eux-mêmes à formuler des questions se rapportant à la clinique, à rechercher les faits pertinents, à apprécier, organiser et résumer ceux-ci et à pratiquer une médecine fondée plus sur des preuves que sur des impressions.

Introduction

Research has shown that typical medical in-patient clinical encounters generate five questions per patient, one of which can be answered by a proper literature search and critical appraisal.¹ In one out-patient study, approximately two questions were generated for every three patients encountered, though only 30 per cent were answered during the office visit.² Moreover, physicians reported being generally dissatisfied with their outdated texts, their poorly organized journals, their lack of knowledge about how to find answers, and their lack of time to spend on tracking suitable sources of information needed to solve patient-problems.

More and more, residency training programs are incorporating critical appraisal skills in their curricula,³ while clinicians report that they want to improve their skills,⁴ and educators are evaluated for their ability to teach these skills to others.⁵ In this article, we describe a practical tool for learning critical appraisal from real-patient encounters, starting with an example, and following with a discussion of its educational merits and clinical limitations. This tool is the critically appraised topic (CAT).

Creating CATs: The Educational Scenario

During morning report on a clinical teaching unit, a patient was described, who had presented the previous night on call with continuing transient ischemic attacks (TIAs) despite three months of Aspirin therapy (he was not a candidate for carotid endarterectomy). A lively discussion ensued, punctuated with claims and counter-claims about the usefulness of Aspirin, ticlopidine, dipyridamole, sulfapyrazone, anticoagulants, and watchful waiting in such patients, based on clinical experience, pathophysiology, pharmacodynamics, appeals to authority, and 7:30 a.m. recollections of study results. One of the general internal medicine fellows decided to look it up.

He performed a Grateful Med search, using the terms TRANSIENT ISCHEMIC ATTACK and ASPIRIN and TICLOPIDINE and RANDOM ALLOCATION (the former

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TABLE 1 CRITICALLY APPRAISED TOPIC - THERAPY

Topic: Is ticlopidine better than Aspirin for preventing strokes in patients with TIAs or minor strokes?

Appraisers: S. Sauve, J. Lang

Date appraised: October 31, 1992

Clinical scenario:

A 65-year-old woman with transient ischemic attacks (TIAs) and non-significant carotid artery stenosis was started on Aspirin (ASA) three months ago, but had several recurrent TIAs in the past week.

Clinical bottom line(s):

- If 100 TIA or minor stroke patients are treated with ticlopidine instead of ASA for three years, three strokes and one death will be prevented (NNT = 38), but one episode of severe reversible neutropenia will occur.
- Recommendations for use from a review panel² are: intolerance, allergy or contraindication (peptic ulceration) to ASA, or recurrent TIA or stroke while on ASA

The evidence:

- Double blinded randomized trial with risk stratification and no cointerventions. 2,069 patients >40 years of age with TIA or minor stroke within three months, treated with ticlopidine, 250 mg po BID, or ASA, 650 mg po BID.

TASS endpoints ¹ (three-year follow-up)	ASA (n=1540)	Ticlopidine (n=1529)	RRR (per cent)	ARR (95 per cent CI)	NNT
All strokes	0.13	0.10	21	0.03 (0.007 to 0.053)	38
All strokes and deaths	0.19	0.17	12	0.02 (-0.005 to 0.049)	37*
Neutropenia <450	0	0.009	-∞	-0.009	111
Neutropenia <1200	0.008	0.023	-300	-0.015	67

*NNT to prevent one death is 20 to ∞, but does not exclude harm.

Comments:

- Our local cost of ticlopidine 250 mg BID for one month (excluding dispensing fee) is \$80.40 (covered by the Ontario Drug Benefit Plan only under special circumstances).
- Need to check complete blood count every two weeks for three months when starting ticlopidine. Neutropenia is usually reversible with discontinuation of ticlopidine.
- Number needed to treat (NNT) to cause specific side effects (negative numbers imply reduced risk with ticlopidine as compared with ASA): peptic ulcer disease = -47; gastrointestinal bleed = -111; diarrhea = 9; rash = 15.
- Deaths from severe neutropenia have been reported.

References:

1. Hass WK, Easton JD, Adams HP, et al, for the TASS group. A randomized trial comparing ticlopidine hydrochloride with aspirin for the prevention of stroke in high risk patients. *N Engl J Med* 1989;321:501-7.
2. Haynes RB, Sandler RS, Larson EB, et al. A critical appraisal of ticlopidine, a new antiplatelet agent. *Arch Intern Med* 1992;152:1376-80.

three terms to define the topic, and the last as a "quality-filter" to limit the search to randomized trials) and found an article by Hass et al reporting a randomized trial in which patients with TIAs or minor strokes three months before presentation were randomly allocated to receive Aspirin or ticlopidine⁶. By applying the "Users' Guides to the Medical Literature II: How to Use an Article About Therapy or Prevention,"⁷ he decided that the study results were valid, clinically important (the relative risk reduction for all strokes on ticlopidine was 21 per cent), and applicable to the patient. He calculated that the number of such patients he would need to switch from Aspirin to ticlopidine to prevent one stroke was about 33, with a 95 per cent confidence interval of 20 to 200.

This story is an increasingly common occurrence in many educational settings, but it does not end here. Three weeks later, on a clinical teaching unit across town, a similar patient was presented during ward rounds. The ensuing discussion got off to the same start, but was interrupted and focused by a clinical clerk when she presented a one-page summary of the Hass trial that had been prepared as a CAT and stored, in both electronic and

paper form, in the clinical teaching unit (Table 1). The CAT's title stated the clinical question addressed therein. Salient descriptors of the patient and clinical setting that prompted the CAT were described under the heading "clinical scenario." This was followed by a "bottom line" of suitable clinical actions, including an answer to the specific question (with pertinent caveats). Next, "the evidence" section outlined important features of the research used to produce the CAT (which are reviewed in the "Users' Guide to the Medical Literature" series⁶). This section included a table summarizing the key study results translated into clinically useful measures of efficacy, with their confidence intervals.⁸ Under "comments," important issues in evidence-based medicine,⁹ pharmacology, and health economics were noted, and the CAT ended with the citation of the article.

The ward team used the CAT as a platform for discussion of the critical appraisal of articles on therapy, and the medical management of a specific clinical problem. They recognized a shortcoming of this particular CAT for their use: the inadequate description of study patients to allow confident application of the results to their patient, who was an elderly male of 90 years.

However, the recognition of this limitation during their discussion highlighted an important aspect of critical appraisal (generalizability of results).

The fellow who created this CAT next presented it at a general internal medicine fellows' meeting, where it was revised. The final version of the CAT was entered into the master CATs file to be made accessible to all housestaff.

Educational and Clinical Value

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 evidence-based medicine about the clinical examination, diagnosis, prognosis, and therapy.¹⁰ Because they are patient-based, CATs have appeal to clinical learners at all levels from medical students to faculty members. Because they are evidence-based, they promote the acquisition and polishing of literature-searching and critical appraisal skills, and the translation of evidence into patient-care decisions.

CATs are not limited to trials on therapy. Studies of diagnostic tests and physical examination techniques have been summarized in CATs addressing, for example, the diagnosis of osteomyelitis, and examination of the spleen. These CATs highlight critical appraisal issues unique to studies of diagnostic tests (patient-spectrum, reference standard, precision and inter-observer variation), and introduce the use of sensitivity, specificity, predictive value, and likelihood ratios. CATs of studies on prognosis (for example, the risk of cancer after diagnosis of idiopathic deep venous thrombosis) highlight the principles of an inception cohort, and patient-referral patterns.

As an educational tool, CATs can enrich the quality of many academic rounds. CATs have become centrepieces for discussion, debate, and revision during weekly rounds of the general internal medicine fellows and faculty at McMaster University; similarly, CATs are ideally suited for critical appraisal rounds that have been incorporated into the curricula of other residency training programs. They are stored on disk and in hard copy on clinical teaching units, and are used as part of ward rounds by those faculty members and housestaff interested in using the medical literature to solve patient-problems. Finally, CATs are suitable for journal clubs in which the design, results and relevance of published articles are discussed.

Because CATs are concise and portable in both concept and form, they are being generated at other universities. The dissemination of CATs is motivated by a desire to improve critical appraisal skills and evidence-based medicine practice and teaching; thus, CATs are primarily a tool for individual learners, with most of their educational value residing in their creation. We hope to promote their use as an educational tool, and we are seeking ways to encourage a "see one - do one" strategy.

As a clinical tool, CATs have their shortcomings. First is the limited applicability of individual CATs. Because they are conceived in the setting of a busy practice, CATs are based on quick searches for at least one useful article, not comprehensive explorations for all useful articles. Although many summarize systematic reviews, most are based on reports of single investigations, and thus may present incomplete, incorrect or outdated perspectives. Sources like the American College of Physicians Journal Club, the JAMA series on the Rational Clinical Examination,⁹ and the systematic reviews of the Cochrane Collaboration may serve as more clinically applicable resources for CATs. Meanwhile, citing the article(s) on which a CAT is based alerts subsequent learner-revisionists to their limited comprehensiveness. Ultimately, this shortcoming affects any situa-

tion in which busy clinicians decide that one piece of critically appraised evidence is better than none.

Second, because CATs are driven by sick patients rather than slick evidence, even the best-available evidence falls short of what would pass as rigorous. Producers of CATs can acknowledge the low quality of evidence in the "comments" section, to emphasize gaps in medical knowledge.

Third, their emphasis on real-time responses to real-time clinical problems means that CATs will first appear as drafts, without peer review. Thus, they may contain errors of fact, calculation, or interpretation. Producers of CATs can make a virtue of this by introducing and revising them in rounds.

Conclusions

CATS are a new approach to helping clinical learners teach themselves how to formulate clinical questions; search for relevant evidence; appraise, organize, and summarize the evidence; and practise evidence-based medicine. When others research and reappraise the same clinical problem the next time a patient presents it, the old CAT may be used as the starting point rather than the last word. The next edition of the CAT then becomes not only easier to generate, but is likely to be more useful at the bedside. We welcome feedback and collaboration from other housestaff, clinicians and educators about how this technique can be improved, and how its impact may be empirically evaluated for its effect on clinical behavior and patient-outcomes, using qualitative or quantitative (randomized controlled trials or before-after) studies.

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