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 useful measures of efficacy, risk or accuracy. This process is based tool for learning and applying skills in critical appraisal: 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.

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, sulfinpyrazone, 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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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 panel 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.

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

*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:
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. 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, 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 situation 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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**References**


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