Critically Appraised Topics

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This article describes the critically appraised topic (CAT) as a means to disseminate evidence from research literature to rehabilitation professionals. A CAT is a standardized, one-page summary of research evidence organized around a clinical question. A CAT includes a clinical bottom line that reflects synthesis of a research article and clinical application of the results. The synthesis includes a critique of the internal, external, and statistical validity of the research. The process of writing CATs has been used in the preparation of evidence-based practitioners. Commonly used websites for preparation and posting of CATs are included as well as an example of a CAT on the topic of cerebral palsy. (Pediatr Phys Ther 2004;16:19–21) Key words: evidence-based medicine/methods, cerebral palsy, motor skills, physical therapy/methods

INTRODUCTION

The movement toward evidence-based practice (EBP) in physical therapy as well as in medicine has been hastened by the spirit of openness in communicating and sharing evidence that has been critically evaluated. One of the main formats for sharing information in EBP is the critically appraised topic (CAT).

A CAT is a standardized, one-page summary of research evidence organized around a clinical question. CATs were first developed by three residents working with David Sackett in an effort to create a method to efficiently summarize the results of a research article. CATs provide both a critique of the research and a statement of the clinical relevance of the results. This distinguishes a CAT from an abstract. The critique is based on methodologic and statistical criteria, ie, internal, external, and statistical validity as well as clinical applicability. Internal validity is used to evaluate whether the treatment really caused the observed change. There are many aspects of internal validity that are evaluated to determine what contributed to a change in outcomes. A good study controls for these alternative explanations to the extent possible. For example, the person measuring patient outcomes should not know whether patients were in the treatment or control group so that the outcomes are not biased by the evaluator, ie, the evaluator should be masked to group membership. External validity refers to the extent to which study findings can be generalized to another group or to a specific patient. For example, if a study of strengthening included subjects after puberty, it may not be generalizable to a group of toddlers. Statistical validity refers to the use and reporting of the correct inferential statistics for the type of study, the question of the study, the type of data collected, and the analysis of the power of a study in relation to statistical outcome. There are many good references for physical therapists who wish to pursue further study of internal, external, and statistical validity.1,2

In contrast to a CAT, an abstract summarizes the procedures, methods, and conclusions of the research without critique or reference to clinical application. CATs provide easy access to the scientific literature for clinicians who do not have either the time or specialized training to critically appraise and draw conclusions from the scientific literature that can then be incorporated into clinical practice.

CATs as a Source of Evidence for Clinical Practice

A journal club group (or a clinician) searching for evidence on a particular clinical problem (eg, Do strengthening exercises improve gait in children with spastic diplegia?) can use the process of developing CATs to form clinical conclusions on the topic. After identifying a clinical problem, they search the literature for relevant research and then assign individual articles to group members who then write CATs or group members might search already written CATs that can be found on EBP websites (see list of websites). Group members would, of course, need the necessary skills and training to critique the literature and write a CAT. A set of CATs on the topic or problem of interest
could then be synthesized into a clinical approach that the group recommends and uses in practice.

In this article, we have included one CAT developed by our research team as an example that addresses the broad topic of cerebral palsy (see Appendix). We developed the following question related to treatment of children with spastic cerebral palsy: What is the most effective intervention to improve motor skills?

This question sharpened the literature search and focused our group on articles that had relevance to the clinical question. The literature search comprised the use of key words (eg, cerebral palsy, intervention, motor skills) to identify relevant articles from web sites such as PubMed (http://www.PubMed) and PsycINFO (http://www.PsycINFO). Once relevant articles were identified, the group members critically appraised them by evaluating the internal, external, and statistical validity and providing clinical bottom lines for each of the reviewed studies.

The clinical bottom line section of the CAT requires the author to judge the quality of the research based on the validity criteria and then to form statements regarding the clinical value of the research. The following statement is an example of a clinical bottom line: Three types of strengthening exercises, isometric, isotonic, and isokinetic, for five repetitions at the maximal load, do not increase spasticity as measured by the stretch reflex response in children aged 13 to 15 years with spastic cerebral palsy assessed immediately after exercise.

This statement summarizes the results of the study and specifies what was measured, how it was measured, and in whom. The clinical bottom line statement relies on the expertise of the CAT author to critically evaluate the quality of the research before writing the statement. For example, if the research cited above had poor internal validity (eg, subjects not randomly assigned to treatment groups, no control group to compare with the treatment group, or therapists who tested subjects after treatment who knew which subjects were in the treatment group and which were in the control group), the clinical bottom line statement might be written as: The internal validity of this study was not sufficiently rigorous to determine the effects of strengthening on spasticity in children with cerebral palsy.

Clinicians must decide whether the clinical bottom line from a rigorous study is useful for a specific patient. This is an issue of external validity. For example, if the patient being treated is of preschool age, then the results of a strengthening program conducted with adolescent athletes may not be clinically useful evidence. The clinical bottom line from a number of CATs could guide clinicians toward practice based not only on their clinical experience but also on scientific evidence.

Because some clinicians might not have the training and experience to critically appraise the scientific literature, they can search for CATs that have been completed and posted on specialized websites. There are many websites posting CATs and other information on EBP. A Google search using the term critically appraised topics yielded more than 1,000 sites. Those searching for CATs should be ready to evaluate the source website just as they might evaluate a source journal. Examples of well-known and commonly used websites are listed here:

http://www.cebm.utoronto.ca/ (an excellent website for EBP and with a specific section on CATs)
http://www.cebm.net/catmaker.asp (information and software for learning to write CATs)
http://www.cebm.utoronto.ca/syllabi/physio (case-focused critical appraisals of evidence)
http://www.urmc.rochester.edu/medicine/res/CATS/ (this site offers CATs in pediatric medicine)
http://www.pedro.fhs.usyd.edu.au/ (this database of physical therapy evidence includes a rating of the quality of the research, although not in CAT format)

We have developed a website for the purpose of sharing the CATs developed by our team (http://www.bu.edu/pt/cat).

The CAT included in this article and the three additional examples that are found in the CAT feature in this issue of Pediatric Physical Therapy can also be found at this site. We will continue to add pediatric topics and CATs to this website.

Teaching EBP with CATs

We have successfully taught physical therapy students to write CATs and critique the research literature, thus providing some of the necessary skills for EBP. These necessary skills include the ability to rigorously critique the internal, external, and statistical validity of a given study. Because the CAT has an immediate clinical bottom line, students rapidly perceive the relevance of learning research topics that may otherwise appear clinically irrelevant. Our website on EBP in a physical therapy curriculum provides examples of the necessary conditions and critical skills for physical therapy students (www.edu.bu/sargent/rds/ebp-pt).

In summary, CATs are a succinct, written, clinical application of a research study to physical therapy practice. Sharing CATs can provide a means of disseminating research information to professionals, patients, and families toward improved practice.

REFERENCES

Critically Appraised Topic (CAT)

QUESTION: What is the most effective intervention to improve the motor skills of children with cerebral palsy?

Clinical Bottom Lines:

1. Physical therapy treatment that focuses on function, versus focusing on normalization of movement, leads to a greater increase in daily functional skills in children with mild or moderate cerebral palsy (CP).
2. Both treatment methods showed significant improvements over time in the Gross Motor Function Measure (GMFM), however the functional group showed higher gains in function as measured by the mobility, self-care, and caregiver assistance domains of the Pediatric Evaluation of Disability Inventory (PEDI).

Summary of Key Evidence:

1. Study Design: Randomized block design
2. Sample: 61 Dutch children with mild or moderate spastic CP. Age range = 24-87 months, n = 32 with hemiplegia, n = 11 with diplegia, n = 12 with quadriplegia. Functional therapy group (treatment) = 28 children, reference group = 27.
3. Procedure: Pretest and follow up at 6 mos, 12 mos, and 18 mos. Reference group continued with previous PT (all classified as neurophysiological treatment methods, such as NDT or Vojta). Functional group received treatment directed at promoting functional skills practiced in natural settings (i.e. home or outdoors). Interventions were not standardized due to the variability among patient functional limitations.
4. Outcome Measures: GMFM and the self-care and mobility domains of the PEDI.
5. Results: Both groups showed significant improvements over time in both outcome measures. No significant difference was found between groups with GMFM measures. Significant improvement was found for the mobility domain of the PEDI in the functional group. A large effect size was reported for self-care and a medium effect size for mobility, based on the care-giver assistance scale.

Appraisal and Application:

Strengths: 1) specific inclusion criteria (diagnosed CP, age 2-7 years, no special ed at school, no treatment received at rehab center, defined exact sample), 2) used block randomized sample (by therapist) pre-stratified on age and type of CP, 3) drop outs were described for each group, 4) group characteristics similar at baseline, 5) testers were blinded to group allocation, thus reducing potential bias, 6) therapists were trained following pretest, 7) data was tested for sphericity to adjust for non-normal distribution of data

Threats: 1) block randomization (not all subjects were randomized, some were randomized by therapist), 2) non-standardized treatment (it was individually designed), 3) inter and intra observer reliability literature was cited but not performed in the study for both GMFM and PEDI, 4) limited to children with mild to moderate CP, 5) unclear whether parent motivation may have affected outcomes, 6) therapists and parents volunteered and therefore may not be representative of the population of children with CP, 7) drop-outs were not included in statistical analysis (no intention to treat analysis).

Other elements: Both treatment methods are practical and cost-effective ways to treat children with CP. An interesting aspect that was not statistically analyzed was the increase in parental involvement in the functional treatment group with decision-making about problem definition, goal setting and the evaluation of goals.