

The Science Transfer Series: Keeping Up-to-Date

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The problem

Today's health care provider faces a significant challenge in keeping up-to-date with the burgeoning increase in biomedical information. A simple *PubMed* search for the term "dental" returned 105,749 references for the decade from 2000 through 2009. Furthermore, the current "half-life" of biomedical knowledge, the time until half the knowledge in a field becomes obsolete or is disproven, is estimated to be only a few years. At these rapid rates of evolution and decay, much of the information learned during dental education could be outdated or superseded within only a few years of entering practice. The practical implications of this situation are suggested by a recent systematic review that concluded, "... physicians who have been in practice for more years and older physicians possess less factual knowledge, are less likely to adhere to appropriate standards of care, and may also have poorer patient outcomes" (1). Over one-half (52%) of the 62 studies reviewed found decreasing performance with increasing years in practice.

The problem of keeping up-to-date also has serious implications for dental education, and it looks like dental schools are not keeping up. For example, 23% of U.S. and Canadian dental schools surveyed reported that they continued to endorse occlusal adjustment for the prevention and/or treatment of temporomandibular disorders despite opposing conclusions presented in three review articles and a Cochrane systematic review recommending against this approach (2). In this environment, where both practitioners and dental schools are challenged in their efforts to keep up-to-date, new models of education and science transfer must be explored.

A possible solution

Rather than passively reading several journals cover to cover each month, the progressive practitioner may be better served by allowing patients' needs to shape his or

her continuing education efforts. An alternative approach is for the practitioner to focus the limited time available for continuing professional education on seeking answers to specific treatment-related questions as they arise in the clinic. This philosophy views the modern dentist as a scientist-practitioner who will need not only to learn and retain much information, but also be equipped to constantly re-evaluate his or her knowledge and expect to quickly un-learn and re-learn information as the field progresses. Under this model, keeping up-to-date means shifting from the relatively passive regular updating of knowledge and skills "just-in-case" those are needed in the clinic to the active, self-directed seeking of targeted information relevant to the dentist's unique patient population, i.e., "just-in-time" learning. This strategy is being incorporated into medical education (3,4), and it is the strategy we recently adopted at The University of Texas Health Science Center Dental School in San Antonio.

The San Antonio CATs initiative

Our dental school recognized the need for new learning approaches and recently implemented an innovative education research program to address the problem of keeping up-to-date. The program teaches lifelong learning and critical thinking skills that students can apply during their 30-40 years of practice life. Based on models already being used in medical education, we developed a comprehensive, school-wide program that involves students at all levels as well as the clinical, basic science, and behavioral science faculty. The program emphasizes the teaching of skills that enable students and faculty mentors to collaborate in preparing Critically Appraised Topics (CATs). A CAT is a one-page summary of a five step evidence-based process for making an informed clinical decision. The five steps are 1) asking a focused clinical question, 2) searching for the strongest, most recent, and most relevant evidence, 3) assessing the quality and importance of the evidence found, 4) assessing

the applicability of the evidence to the particular patient's wishes and needs, and 5) writing a CAT that summarizes the process and provides an answer to the original question as the "clinical bottom line."

We revised our advanced education residency and undergraduate core curricula to include in-depth instruction on evidence-based practice skills and competency in the preparation of CATs. Our 18-hour sophomore Evidence-Based Dentistry course prepares students to formulate focused questions, search the literature, critically evaluate various sources of evidence, and make judgments about the applicability of the evidence to specific patient problems. The vehicle for teaching these skills is teaching students to write CATs.

We also established CAT exercises in several clinical didactic courses and in the junior and senior clinics. In their systematic review, Coomarasamy and Khan (5) noted that success in teaching evidence-based practice principles is greatly enhanced by integrating the concepts into students' clinical care activities as opposed to teaching the material in a didactic course. Didactic programs led to short-term changes in knowledge but no changes in attitudes, skills or behaviors. In contrast, programs that taught evidence-based practice skills in real time and integrated the instruction into the clinic routine were successful. So far, over 80% of our faculty members have received this training, and 60 faculty members now routinely collaborate with dental students in writing CATs. Twenty of our course directors now require CAT assignments in 26 different clinical courses. Such widespread acceptance demonstrates the institutional commitment and faculty enthusiasm that is possible for this type of innovative curriculum reform.

Online CATs library

We have started publishing CATs with high clinical relevance in an online CATs library to promote the transfer of new oral health science knowledge. This library will provide rapid and up-to-date evidence-based answers to clinical questions. The searchable library now is accessible to our students and faculty in the clinics. We anticipate that in two years the library will be populated with hundreds of CATs, and then private practice dentists, educators at other dental schools, and the public also will gain access. Library users will be invited to add their comments about the CATs, and these comments then will become part of the CAT and will be available to subsequent library users. Users also may submit a clinical scenario or question, and our student/faculty team will search for the best evidence and write a CAT to fill a knowledge gap in the library. The CATs included should be highly relevant because they stem from the day-to-day patient care problems seen in our dental school clinic. As new diagnostic and treatment modalities emerge, our student/faculty teams will write new CATs, and we will publish them in the library. To keep the library information current, CATs over two years old are reassigned to new students who will update the evidence in light of recent research.

FAST CATs Academic Detailing Program

An exciting component of our CATs initiative is the Faculty, Alumni, Student Team (FAST CATs) Program. This program is modeled after pharmaceutical detailing, where a drug company representative visits a clinician's office to explain and promote a product. The difference is that we seek to explain and promote recent scientific evidence of high clinical relevance with the intent of speeding the transfer of knowledge from the laboratory to the clinic. Twenty dental students participate each summer in an elective course, which involves writing a CAT with a faculty mentor then visiting five dental offices to discuss and obtain comments on the CAT. Practitioners are asked to comment on the practicality, incentives, and obstacles of adopting the new diagnostic tests and treatment modalities advocated by the student CAT authors. The practitioner receives one hour continuing education credit from our university for reviewing and commenting on the CAT. Over the past two summers, 39 students have visited 147 dental offices. The program has received very enthusiastic ratings from both students and community dentists.

Will CATs impact oral health care?

Will the San Antonio CATs initiative impact students' patient care behaviors when they enter practice? Available evidence suggests that it will. Faculty physicians and medical students in an emergency medicine department who received training and easy access to online searches reported that the availability of evidence prompted them to change 18% of their patient management decisions (6). The subjects in another study reported that 47% of their searches about patient problems affected their clinical decisions; 37% of the searches confirmed clinical decisions, 9% resulted in new clinical decisions, and 7% resulted in changed treatment decisions (7). In another study, various sources of evidence, including CATs, were made available on an "Evidence Cart" during medical rounds (8). The study showed that evidence can be accessed quickly (10.2-25.4 seconds) and put to good use even in a busy clinic setting. Of 71 successful searches during the study interval, 52% confirmed a diagnosis or treatment plan, 25% led to a new diagnostic skill, ordering an additional test or a new patient management decision, and 23% led to correction of a previous clinical skill, diagnostic test selection or treatment decision. When the searches were unsuccessful, students were given an "educational prescription" to search the literature, appraise the evidence and write a new CAT on the topic. We have adopted this model, and our faculty and students now have chairside access to the CATs library.

Summary

The overarching goal of this new educational program is to enhance the oral health of the population by

strengthening the integration of oral health sciences into dental education and practice. We believe that exposure of students, residents, faculty, and private practitioners to the scholarship and critical thinking skills involved in writing CATs will help prepare them to meet their obligation for keeping up-to-date. The “just-in-time” learning strategy, focusing on immediate patient needs, is key to dealing with the explosion of new knowledge and products.

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