

Scholarly Communication in the Dentistry Classroom

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Introduction

After formal classification in the mid-90s, the concept of evidence-based practice has become widespread throughout medical education. When the College of Dentistry at the University of Illinois at Chicago (UIC) launched a new curriculum based on small-group learning in the fall of 2011, a liaison librarian was embedded in the classroom to assist in educating students in information literacy as it related to evidence-based dentistry (EBD). Scholarly communication concerns, including the scholarly research process, access to literature, open access, copyright, etc., were integral components of the information literacy and subject material being taught, which provided an opportunity to introduce these subjects within the context of the curriculum and with ready applicability to the students. The embedded librarian taught four sessions with dentistry faculty, exploring information resources, the EBD process, and community information. In the fall of 2012, the curriculum developed is being repeated and expanded with plans for formal evaluation. In addition to working with the traditional dental students, the liaison librarian also participated with the curriculum for international dentists who are gaining two-year certification, whose knowledge of scholarly resources, processes, and access issues varies widely depending on country of origin. The role of the liaison librarian within the international dentistry program continues to develop and become more formalized. Primary successes to date include increased awareness demonstrated by students of aspects of scholarly communication insofar as these aspects relate to their current educational and clinical

cal needs, and opportunities for expanded discussions with faculty regarding current scholarly communication trends and challenges. Some barriers exist to successful replication of this format, with the greatest being the time dedicated by the liaison librarian. However, this is countered by the many opportunities that exist to expand the discussion to developing understanding of scholarly communication issues and opportunities, to improve student and faculty research, and to promote the library and the liaison librarian as an authority on these subjects when questions arise.

Background

Dentists differ from other medical and nursing students in that following their graduation, they are often unaffiliated with a medical institution. Though they may participate in a group practice, the burden of accessing scholarly literature to maintain current awareness of trends and new research often falls to the sole practitioner. On their own, dentists are far less likely to fund purchasing access to full-text databases and multiple journals, or even to be able to regularly purchase articles through interlibrary loan. A physician, in comparison, is often affiliated with a hospital that provides access to databases such as UpToDate or DynaMed, whose focus is getting current research trends to working professionals. Professional dental organizations, such as the American Dental Association, allow members access to a few select journals and provide some assistance in accessing literature, but this help comes with a fee. Thus, practicing dentists face barriers to accessing full-text literature in medicine, which could inhibit their ability to find the best research to support patient care.

This burden is particularly onerous in relation to the adoption of evidence-based practice (EBD). Defined in 1996, EBD is the idea that treatment decisions should be based on a combination of the practitioner's expertise, the best research studies available at the time of treatment, and the patient's medical history and preference (Sackett et. al 1996). Though initially defined for use by medical doctors, evidence-based practice rapidly expanded to other areas of medical practice, such as dentistry and nursing. Along with their clinical and medical training, dental students must begin the practice of EBD so that they may be confident practitioners once they have graduated. Dentists must be able to identify sources of research studies, evaluate the studies for accuracy as well as relevancy to their patients, find or suggest alternative treatments, and identify the outcome that they

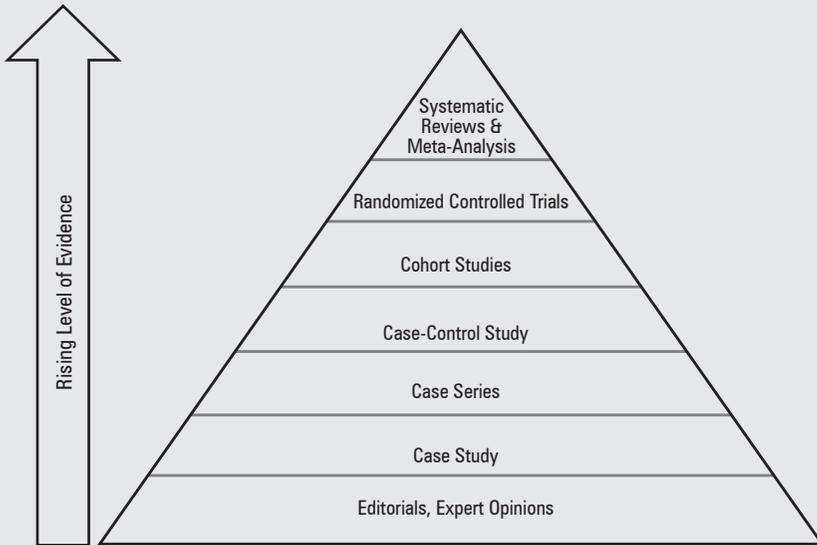
are seeking from their literature search. In addition, these treatments must be evaluated specifically for the patient and explained so that the patient is able to provide informed consent when participating in the treatment (ADA 2012).

Teaching EBD provides an opportunity to bring information literacy and scholarly communication to the forefront of dental education, supporting students' curricular and continuing-education needs. When information literacy instruction is integrated into the EBD curriculum, it is provided just as the students are developing and then demonstrating their ability to find information in the classroom and clinical settings. Teaching and collaborating directly with the subject faculty allows the instruction to be tailored so that students find more immediate relevancy and application and observe their clinical faculty's use of information. With repeated emphasis throughout EBD assignments and during clinical experience, information literacy is reinforced. Further, EBD instruction includes discussions on the professional responsibilities of the clinician to stay informed and current on research while seeking the best possible treatment for the patient. Within these discussions, access to information for both the clinician and the patient arises, lending a wealth of opportunities to discuss scholarly communication. As students continue to develop their understanding of resources and determining what access to resources exists within the university, they also are reminded of what access they may lose upon graduation. When scholarly communication is introduced in context of the resources regularly used in their own research and student dentists are asked to consider their own future professional interests and patient needs, they deepen and expand their understanding of the process by which scholarly literature is developed and disseminated.

In the practice of EBD, dentists must identify patient characteristics, interventions or treatments, comparisons to other treatments, and the desired outcome. This method is referred to as the PICO process and is designed to help practitioners quickly create a searchable clinical question at chairside (Huang, Lin, and Demner-Fushman 2006). The dentist may then take this question to scholarly resources in order to identify relevant literature. When searching, the dentist must also evaluate the authority of the literature that he or she has identified. This is taught as a hierarchy, with an editorial as the lowest level of evidence, progressing through individual cases or case studies up to clinical trials, and peaking with the systematic review, which is a comprehensive and unbiased critical review of all studies and literature on a specific topic (ADA 2012). Figure 12.1 displays the hierarchy traditionally used to teach evidence-based practice.

Figure 12.1

The Evidence-based Pyramid (with less authoritative literature at the bottom, progressing up to the “best” literature with the systematic review at the peak)



Practitioners must also be able to identify different types of studies, both by structure (case, cohort, controlled, randomized controlled, double-blind randomized controlled) and category (diagnosis, etiology, therapy, prognosis).

Librarian Liaison Embedding

In the fall of 2011, the UIC College of Dentistry transitioned traditional dentistry students from a lecture-based curriculum to one based on small-group and case-based learning. During creation of the new learning objectives, faculty identified that students would have greater need to locate and evaluate information for themselves, rather than receiving it from instructors. Students had two identified information needs: finding basic medical and dental information to answer questions that came up during their small-group learning sessions and identifying appropriate resources to provide evidence-based answers to clinical-style questions. Though the majority of the first-year dental curriculum continues to be focused on general medicine, during the subsequent three years, students would advance to assisting with or performing supervised dentistry in clinics at the school, where they would be answering clinical questions. Students would also engage in research in collaboration with faculty and be expected to write several

research papers as they proceeded through the curriculum. To promote success in these areas, faculty wanted to ensure the foundational information skills were progressively developed during the first year. The solution was to embed a dentistry liaison librarian as part of the professional development section of the curriculum, which includes EBD, ethics, health disparity, community awareness, and business skills. The liaison librarian was embedded specifically in a course that met in five sessions over the fall semester in order to cover aspects of information literacy, EBD, and the PICO process. The course takes ten weeks, with each session offered to half of the first-year class at a time, creating a structure that allows for more interaction between faculty and students and provides opportunity for smaller group work within the sessions. During the semester, students also have reading assignments and are assigned to complete an online tutorial provided by the library (UIC 2012). Questions from these sessions are included on periodic exams administered separately from the class.

Class-by-Class Inclusion

As no single class was specifically focused on aspects of scholarly communication, a brief description of the material covered in each class was provided with relevant elements highlighted. For purposes of this chapter, the elements are those identified by Duke's Scholarly Communication Librarian Kevin Smith (2011): publishing, copyright, open access, and research.

The first session focused specifically on finding resources for small-group questions and EBD. During this session, the liaison librarian led the instruction and activities, with the dental faculty offering supporting information as it related to future assignments. For the small-group questions, students were directed primarily to textbooks and other general medical resources, both assigned texts and other resources provided by the library. While these introductory materials would see them through the majority of the cases presented to their small groups, first-year students also have research opportunities and begin to prepare for evidence-based clinical care that starts in the second year. To develop their research skills, the library liaison had students use the PubMed database via the publicly accessible interface. The database was chosen for breadth and depth of content, but also because students would continue to have access to PubMed following graduation, and it would be part of their lifelong learning as practicing dentists.

As part of being introduced to PubMed and accessing journal articles, the dental students discussed how they currently find full-text articles as part of their searching strategies. At UIC, PubMed is prox-

ied through Serials Solutions to allow examination of all library resources. Before this was demonstrated, however, the librarian reviewed the total number of records and how many were available as full text through PubMed Central, a free full-text archive of biomedical literature provided by the National Institutes of Health via the National Library of Medicine. At present, PubMed contains more than 21 million citations of biomedical literature, with 2.4 million available as full text in PubMed Central (NCBI 2012). This presentation included discussion of the NIH Public Access Policy, which requires that researchers receiving funding from the National Institutes of Health submit final peer-reviewed manuscripts upon acceptance for publication, with an embargo of no more than one year allowed before the article becomes freely available (NIH 2012). To provide context, students were asked to consider how they would access full-text articles after graduation and how members of the public might gain access to this research literature. Open access, institutional and disciplinary repositories, and finding access to federally funded research were explained as part of the toolkit that students would take forward to find information. The opportunity was also taken to demonstrate the costs of access to literature without library resources (approximately \$30 per article), though students were encouraged to contact the liaison librarian and use inter-library loan while they were pursuing articles during their education.

Building on this foundational knowledge, the second class session introduced EBD and the process of using it, as well as using the PICO model to develop a structured question when working with a patient or starting to approach a research project. One of the advantages of introducing EBD early in the four years of dental school is that students who may not be interested in research see more immediate application of research literature to their daily practice. In this session, the dental faculty led the instruction with assistance from the liaison librarian. Dental students were introduced to the history of EBD and, using a case example, went through the basic five steps of formulating a question, identifying articles and other resources, critically appraising the evidence, applying the evidence, and re-evaluating the application of evidence.

Examining the EBD process required that students review the research process insofar as it leads to publication. Here the liaison librarian had the opportunity to discuss with the students not only at what stages research could be published but also what elements of copyright researchers are usually asked to relinquish, what access they personally may have following publication, and what access other professionals may have. The liaison librarian and faculty also discussed the tenure process for the academic researcher, using their own careers as examples, in order to provide students context for where the literature

was being generated. To conclude the session, students participated in an active learning exercise, creating sample PICO questions in groups and describing their intended research process using PubMed or other information resources. The exercise provided reinforcement of the process reviewed in class and the importance of searching the literature. It also gave students the opportunity to review material from the first session and to identify any remaining questions.

The third session was a focused discussion on health disparities, led by the associate dean of Prevention and Public Health Services. Although not one of the instructors for this session, the liaison librarian attended it to be able to include the examples and discussions in future sessions.

The fourth session, led by the dentistry faculty with the assistance of the liaison librarian, returned to the EBD process that had been defined during the second session. Having developed questions and scenarios where they would need to use scholarly literature, students learned the levels of evidence. This refreshed the conversation on the publishing process from the second session and introduced the institutional review board process. Students also were introduced to different kinds of studies in the four therapy areas of etiology, diagnosis, therapy, and prognosis, as well as cohort trials, randomized controlled trial, double-blind controlled trials, systematic reviews, etc.

Next, students were tasked with bringing together the information-seeking skills and EBD concepts as presented in class, readings, and the online tutorial for an in-class group project. Presented with a case scenario, groups had to develop a PICO model to define their question, identify what kind of study they thought would be useful, use PubMed to identify relevant literature, evaluate the level of evidence in the literature they found, and report to the class. Faculty and other students provided feedback for each group, and there was further discussion about the research process.

The fifth session focused on community information. As part of their education, dental students intern at safety-net clinics throughout the Chicago region and with national and international partners. In this session, led by the liaison librarian following an interactive presentation by dental faculty, students discussed where they, as consumers, find information about services available within their community and statistics about their own community. This provided an opportunity to reprise the discussion from the first session about accessing information, the cost of that access, and how the NIH Public Access Policy is providing federally funded research for those without academic affiliation.

In class, students were put into pairs and given a regional safety-net clinic to use as their community base. For each community, stu-

dents identified available strengths, such as number of dentist offices, specialty dentists, water fluoridation, and grocery stores; potential barriers, such as lack of public transportation, parking costs, and liquor stores; features of the safety-net clinic; and local, state, and federal information data and requirements. Students then gathered again as a group to review the material collected, discuss barriers to information gathering, and identify their roles in providing public health information to patients. Pursuant to the last topic, consumer-focused health resources were discussed as ways to provide information to patients. Students identified potential needs from the websites of professional dentists providing public health information such as multiple languages, elementary reading level, and the possibility that commercial consumer health websites might contain bias. Students were also exposed to statistics captured on the city, state, and national levels, with open access to this data being pointed out as a benefit.

Outcomes

Because the inclusion of the liaison librarian is in its second year, formal evaluation is currently in development by the librarian and lead dentistry faculty member. The two faculty members have reviewed learning objectives for each session and are developing a combination of multiple-choice quizzes and survey questions. Incoming students will be given a quiz at the beginning of the semester to evaluate their information-seeking skills and EBD awareness; the quiz questions will then be used as a basis for test questions for evaluations that occur throughout the semester. The same instrument will be used again at the end of the semester to determine the effectiveness of the series of instructional sessions and to set benchmarks for the identified learning outcomes. The liaison librarian is developing questions related to information seeking and scholarly communication within the EBD process.

International Students

The international dentistry program at UIC accepts practicing dentists licensed in another country into a rigorous two-year program to become licensed in the United States. These practitioners come from a wide variety of educational backgrounds and as such have a broad range of abilities in locating scholarly literature, understanding of the publishing process, and knowledge of copyright. During the orientation and initial summer semester, the liaison librarian has met twice with the incoming class to discuss library resources and accessing scholarly literature through PubMed, which is a new resource for about half of the class. Following this session, the liaison librarian has introduced schol-

arly communication through one-on-one consultations with the international students who are undertaking research. In the fall of 2012, the liaison librarian will be more formally embedded into the EBD portion of the international student curriculum and will have an opportunity to review these subjects in more depth with the class as a whole.

Opportunities

While formal outcomes have not yet been established, informal appraisal indicates that students and faculty are becoming more aware of aspects of scholarly communication and see the liaison librarian as a resource for this information. With the discussions started in the classroom, the liaison librarian has been able to expand conversations about understanding current legislation surrounding open access, finding publishing opportunities, using other library resources such as the institutional repository, learning more about retaining copyright, and obtaining sponsorship from the library open access fund to produce open access articles.

There are a number of opportunities to further the inclusion of scholarly communication topics in the classroom. Newly introduced faculty development seminars will be an opportunity to review open access challenges and opportunities and use of open textbook materials. The liaison librarian will include rebranded library e-scholarship services on the dentistry research guide in fall of 2012.

Potential Barriers to Anticipate

There are inevitably some challenges that librarians wishing to take on this form of embedded librarianship and information literacy education will face. A faculty member in the department or discipline who is willing to share classroom time or a curriculum director who is willing to find time to ensure the students are working with the librarian is a must. The liaison librarian needs to coordinate closely with the discipline faculty to create a progressive syllabus that can lead students through different information literacy skills within discipline-specific content, especially as it may relate to scholarly communication issues and trends. Both the liaison librarian and the discipline faculty member must also be prepared to discuss publishing standards for that discipline, including open access mandates, institutional review board requirements, and study design and execution.

Perhaps the most obvious barrier is the time release needed from other responsibilities so that the librarian can prepare for class, teach, meet with students, and provide informal and formal feedback. In this instance, approximately thirty-five hours was spent in class with the

students over the course of the semester, with additional time needed for preparing materials and meeting with disciplinary faculty. This time requirement would make it more difficult for the library to scale embedded librarianship to multiple departments.

Conclusion

Despite the potential challenges of obtaining faculty collaboration, working with a new curriculum format, and finding the required time, the inclusion of the library liaison in the EBD coursework proved successful enough to repeat and expand upon in the following academic year. As the students advance through the new curriculum, the department faculty and liaison librarian will be looking at the students' research pursuits and papers to evaluate whether improvement has occurred in their information literacy and scholarly communication skills. Further evaluation of the program is under development, with quiz and survey questions as well as assignment modification under consideration.

While many liaison librarians have the opportunity to provide targeted instruction, a model where the librarian is present throughout the entire semester is rarer. These repeated instructional opportunities allow for a broader discussion of scholarly communications as applied to student interests and research. It also provides the opportunity for the librarian to establish the library as a resource to assist students as they examine and evaluate literature for inclusion in their own work and identify concerns about copyright, access, and the research process. By demonstrating equal footing with the disciplinary faculty in the classroom, the librarian can become a research partner for both students and faculty. The time required for this model is significant; however, by offering it specifically to graduate students in a professional program, students who are more likely to have research needs and run into the barriers within scholarly communication can be reached early in their careers as researchers or academics. Successful faculty-librarian collaboration and instruction can improve emerging awareness of scholarly communication issues while engaging a more informed student and faculty body and facilitate future engagement in the research process.

References

- ADA (American Dental Association). 2012. "About EBD." ADA Center for Evidence-Based Dentistry. Accessed June 25. <http://ebd.ada.org/about.aspx>.
- Huang, Xiaoli, Jimmy Lin, and Dina Demner-Fushman. 2006. "Evaluation of

- PICO as a Knowledge Representation for Clinical Questions.” In *Bio-medical and Health Informatics: From Foundations to Applications to Policy: AMIA 2006 Annual Symposium Proceedings*, edited by David W. Bates, John H. Holmes, and Gilad J. Kuperman, 359–363. Bethesda, MD: American Medical Informatics Association.
- NCBI (National Center for Biotechnology Information). 2012. “PubMed Central.” US National Library of Medicine, National Institutes of Health. Accessed June 25. <http://www.ncbi.nlm.nih.gov/pmc>.
- NIH (National Institutes of Health). 2012. “National Institutes of Health Public Access.” Accessed June 25. <http://publicaccess.nih.gov>.
- Sackett, David L., William M. C. Rosenberg, J. A. Muir Gray, R. Brian Haynes, and W. Scott Richardson. 1996. “Evidence-Based Medicine: What It Is and What It Isn’t.” *BMJ* 312, no. 7023 (January 13): 71–72.
- Smith, Kevin. 2011. “What Does Scholarly Communications Mean to You?” *Scholarly Communications @ Duke* (blog). August 12. <http://blogs.library.duke.edu/scholcomm/2011/08/12/what-does-scholarly-communications-mean-to-you>.
- UIC (University of Illinois at Chicago) Library of the Health Sciences. 2012. “Evidence-Based Practice in the Health Sciences: Tutorials.” Accessed June 25. <http://ebp.lib.uic.edu>.