Interprofessional Pharmacy Observation Activity for Third-Year Dental Students


Abstract: Interprofessional learning is a key component of today’s health sciences education. Within a two-course series in dental pharmacology and therapeutics, a dental curriculum was revised to provide an interprofessional activity to expose dental students to a community pharmacy setting. The objectives of this activity were to augment students’ learning about drug laws and prescription writing, as well as to foster interprofessional relationships and collaboration between pharmacists and dentists. Dental students were scheduled for one-hour observations at community pharmacies on campus. Learning objectives to guide this activity focused on demonstrating community pharmacy operating procedures, identifying ways to minimize prescribing and dosing errors, and understanding how pharmacists can assist dentists in prescribing. Following the observation, students were required to submit a written assignment, which accounted for 14 percent of their course grade. All 119 dental students (100 percent) enrolled in the course for the summers of 2012 and 2013 completed the activity. The average grade on the written assignment was 96.2 out of 100. At the end of the course, students were asked to participate in an online course evaluation survey, for which response rates were 37 percent and 43 percent for 2012 and 2013, respectively. The students rated the pharmacy observation activity favorably on this course evaluation. The pharmacy observation activity provided a successful interprofessional component to the didactic pharmacy course and was well received by the dental students as well as the community pharmacists.

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“Health professionals should be educated to deliver patient-centered care as members of an interdisciplinary team,” according to the Institute of Medicine Committee on the Health Professions Education Summit.1 When health care professionals work effectively in a team, communicate productively, and understand each other’s roles, patients receive safer, higher quality care. This outcome is increasingly important for a patient population that is aging and becoming more medically complex.

Interprofessional learning is an important educational approach for developing health sciences students into collaborative health care professionals. Definitions for interprofessional education are varied and wide-ranging. One definition offered by an American Academy of Colleges of Pharmacy Task Force is as follows: “Interprofessional education involves educators and learners from two or more health professions and their foundational disciplines who jointly create and foster a collaborative learning environment. The goal of these efforts is to develop knowledge, skills, and attitudes that result in interprofessional team behaviors and competence.”2 An expert panel representing health professions education associations in dentistry, medicine, nursing, pharmacy, and public health defined four key domains for interprofessional collaborative practice: teams and teamwork, interprofessional communication, value and ethics for interprofessional practice, and roles and responsibilities of one’s own and others’ health care professions.3 Barriers and challenges to implementation of interprofessional education include crowded curricula, finding a location, scheduling conflicts, and lack of institutional collaborators.3,4

An American Dental Education Association (ADEA) Team Study Group identified four key reasons why interprofessional education (IPE) is critical for dental schools: dentistry is a critical component of the primary care system; chronic disease state management is impacted by and has consequences on oral health; quality oral health care is best achieved when dentists work collaboratively both intraprofessionally and interprofessionally; and dentistry is expected to
interact with community public health systems.\textsuperscript{4} The Commission on Dental Accreditation (CODA) has also emphasized the need for IPE in its new standards implemented on July 1, 2013.\textsuperscript{5} Standard 1-9 states that “the dental school must show evidence of interaction with other components of higher education, health care education, and/or health care delivery systems.” Standard 2-19 requires that “graduates must be competent in communicating and collaborating with other members of the health care team to facilitate the provision of health care.” The CODA standards specify that the educational environment should provide collaboration with other health care professionals and that curricula should be revised to provide opportunities early in dental education to engage other health care professionals.

Despite this recent and significant emphasis on IPE, there is substantial room for growth at many dental schools to improve interprofessional learning opportunities. An ADEA survey of U.S. and Canadian dental schools (with 86 percent responding) found that 63 percent had IPE collaborations with medical schools, 58 percent with dental hygiene programs, and less than 50 percent with other health care disciplines.\textsuperscript{4} The survey also found that interprofessional learning most often occurred within joint volunteer activities (66 percent), clinical activities (60 percent), and service-learning projects (52 percent).

Since prescribing medications to patients is a critical role of practicing dentists, a community pharmacy observation activity was developed at the University of Oklahoma (OU) College of Dentistry as an interprofessional learning opportunity. The exposure of dental students to pharmacists and community pharmacy practice was hypothesized to enhance students’ knowledge of pharmacology and therapeutics and to provide an improved understanding of how to work collaboratively with pharmacists in their future practices.

### Methods

The OU College of Dentistry is part of the University of Oklahoma Health Sciences Center (OUHSC), which encompasses seven colleges (pharmacy, medicine, dentistry, nursing, allied health, public health, and graduate), two hospitals, numerous clinics, and three community outpatient pharmacies. A traditional four-year Doctor of Dental Surgery (D.D.S.) program is offered with approximate class sizes of fifty to sixty students. In 2012, the D.D.S. curriculum underwent multiple revisions including targeted improvements in pharmacology and therapeutics.

Prior to 2012, there was a single didactic course, Pharmacology for Dentistry, that was four credit hours in the third year and was taught by the College of Medicine molecular biology department. Beginning in 2012, this course was replaced by a two-course series in pharmacology and therapeutics, which consisted of a four-credit hour course, Pharmacology and Therapeutics for Dentistry, in spring of the second year and a one-credit hour course, Special Subjects in Dental Pharmacology and Therapeutics, in the following summer semester. The new course series was delivered with didactic lectures supplemented with active learning components and was taught by the OU College of Pharmacy clinical and pharmaceutical sciences departments. The core content changes in the two-course series included the addition of the top 200 prescribed drugs, therapeutics components for drugs commonly used in dentistry, and multiple special subjects including drug laws, prescribing, special population considerations, peri-procedure anticoagulation management, adverse drug events, and drug abuse. To augment the didactic material covered, a community pharmacy observation activity was developed as part of the Special Subjects course. Evaluation of this educational activity was reviewed and approved by the OUHSC Institutional Review Board.

### Pharmacy Observation Activity

Course coordinators sought input from recent dental school graduates, College of Dentistry administration, Special Subjects course faculty, and community pharmacists in the design of the observation activity and corresponding learning objectives. Observation periods were set up in one-hour time blocks at all three community pharmacies on the OUHSC campus. Students self-scheduled their observations at one of these three community pharmacies, choosing from multiple time blocks offered at each of the pharmacies over the eight-week course period. The scheduling was transitioned from a paper-based system in year 1 to utilizing an online sign-up system (SignUpGenius, Charlotte, NC) in year 2. Time block availability was determined with input from the community pharmacists and dental class officers.

Observations were scheduled so as to avoid orientation days for new pharmacy students and residents, the first few business days of the month due to
predictable higher prescription volume, and the last business hour of each day to allow pharmacy staff to finish the last rush of prescriptions and perform closing procedures. Avoiding these times allowed for enough physical space in the pharmacy without overcrowding and time for the pharmacist to give focused attention to the dental students. In addition, students were allowed to attend the observation in pairs to minimize workload on the pharmacies.

Learning objectives specific to the observation were provided to the dental students and community pharmacists to guide this activity. These objectives focused on community pharmacy operating procedures (including personnel roles, workflow procedures, insurance issues, and medication storage/security), identifying ways to minimize prescribing and dosing errors, describing regulatory and security measures when prescribing and filling controlled substances, recognizing dosage forms and strengths available for commonly prescribed drugs in dentistry, listing various measuring devices used for administration of liquid preparations, and understanding how community pharmacists can assist dentists in prescribing medications. Pharmacists were briefed by course coordinators on previous and concurrent dental student coursework in pharmacology and therapeutics as well as details of the observation activity and assignment.

Pharmacy Observation Assessment

To evaluate whether objectives of the observation activity were met, students were required to complete a written assignment that accounted for 14 percent of their course grade. The assignment aligned with the learning objectives and required students to complete short answer questions related to common prescription errors, steps taken by pharmacists to correct prescription errors, diversion tactics used by patients to illegally obtain controlled drug substances, ways to avoid or minimize drug diversion, dosage formulations for hydrocodone/acetaminophen and amoxicillin, liquid measuring devices for children, and ways pharmacists and dentists can work collaboratively. The dental students submitted the assignments electronically by the last day of class using the online program Turn-It-In (iParadigms, LLC, Oakland, CA) to ensure original work was submitted and no plagiarism occurred.

At the end of the course, students were asked to complete an online survey (Qualtrics, Provo, UT) that allowed for anonymity. The survey consisted of two major sections: evaluation of the overall course and evaluation of the pharmacy activity and assignment. A combination of quantitative and qualitative data was collected through this survey. Five-point Likert scales using levels of agreement were used throughout the survey, and free text comment boxes were used to assess areas of strength and suggestions for improvement. The dental student survey was adapted from a course evaluation survey that had been validated and used for several years at the OU College of Pharmacy. Standard descriptive statistics were used to describe the quantitative data from the surveys. In addition, informal feedback was sought from participating pharmacists to determine whether the objectives of the observation were met from their perspective as well as to assess the continued feasibility of this interprofessional learning activity.

Results

All 119 D.D.S. students enrolled in the Special Subjects course in 2012 and 2013 completed the one-hour pharmacy observation activity over the eight weeks of the corresponding summer semesters. This resulted in an average workload of twenty students and ten clock hours for each of the three pharmacies. The average grade on the written assignment was 96.4 out of 100 (standard deviation [SD]=5.5) for 2012 and 96 (SD=4) for 2013. Response rates on the course evaluation survey were 37 percent and 43 percent for 2012 and 2013, respectively. A summary of the quantitative responses is provided in Table 1. Overall, the students reported that the pharmacy observation activity was a worthwhile experience that facilitated achievement of the provided learning objectives. Their written comments highlighted that the activity led to an improved understanding of the pharmacists’ role as well as the importance of a collaborative practice relationship between dentists and pharmacists to provide optimized medication therapy. Feedback from the participating community pharmacists was also positive. The pharmacists reported that the observation activity appropriately exposed dental students to community pharmacy practice and common issues related to prescribing. They noted that the written assignment effectively complemented the observation experience. The pharmacists also commented positively on the professional interactions between dental students and pharmacy students completing rotations at these pharmacies, which allowed them to learn with and
ADEA Team Study Group on Interprofessional Education identified best practices at six dental schools, all included either a mandatory or elective interprofessional course with other health sciences students on their campuses. To implement such a course, a college is required to have institutional collaborators, add credit hours to its curriculum, find a class location to accommodate the larger assembly of students, and identify a time that works with all involved students’ schedules.

The ADEA Team Study Group’s survey found that only 32 percent of reporting schools’ current IPE activities involved basic science courses and 15 percent ethics classes, showing that only a minority had successfully implemented IPE through specific courses. The more typical activities utilized by dental schools to accomplish interprofessional learning were joint volunteer activities, clinical activities, and service-learning projects. While our pharmacy observation activity was simple and brief in design, it was an easily accomplished means to incorporate interprofessional learning for the dental students to understand pharmacy concepts and the profession.

The reported observation activity provided dental students with exposure to community pharmacy practice, real-world challenges in prescribing medications, and opportunities for collaboration with pharmacists in provision of patient care. The pharmacy observation assignment grades, student evaluation results, and narrative feedback provided evidence that this interprofessional activity met the stated learning objectives. The grading and evaluation occurred at the end of the course, so it was not possible to distinguish whether the learning

### Table 1. Dental students’ evaluation of pharmacy observation activity

<table>
<thead>
<tr>
<th>Survey Item</th>
<th>2012 Mean Response (SD)</th>
<th>2013 Mean Response (SD)</th>
</tr>
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<tbody>
<tr>
<td>The pharmacy observation activity and assignment facilitated my learning and should be continued in the future.</td>
<td>3.77 (1.34)</td>
<td>4.38 (0.64)</td>
</tr>
<tr>
<td>After completion of the pharmacy observation activity and assignment, I can:</td>
<td></td>
<td></td>
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<tr>
<td>List 3 common prescribing errors seen in the community pharmacy setting and describe the steps necessary to correct them.</td>
<td>4.18 (1.01)</td>
<td>4.50 (0.58)</td>
</tr>
<tr>
<td>Describe the regulatory and security measures that must be taken in filling prescriptions for controlled substances and compare to non-controlled drugs.</td>
<td>4.36 (0.79)</td>
<td>4.46 (0.58)</td>
</tr>
<tr>
<td>Recognize dosage forms and strengths available for hydrocodone/acetaminophen and amoxicillin.</td>
<td>4.00 (1.02)</td>
<td>4.27 (0.72)</td>
</tr>
<tr>
<td>List and describe measuring devices used for administration of liquid preparations for children.</td>
<td>4.14 (0.94)</td>
<td>4.38 (0.75)</td>
</tr>
<tr>
<td>Discuss how a pharmacist can help a dentist in prescribing medications.</td>
<td>4.27 (0.70)</td>
<td>4.31 (0.74)</td>
</tr>
</tbody>
</table>

SD=standard deviation

Note: Scores were on a Likert scale in which 1=strongly disagree, 2=disagree, 3=neither agree nor disagree, 4=agree, 5=strongly agree.

from each other. The workload on the pharmacies was not perceived to be burdensome although in year 1 some students were scheduled for the observation during busier pharmacy times. The available time slots were refined in year 2 as a result of this challenge as well as changes in the dental students’ summer class schedule.

Based on feedback from the dental students and pharmacists in the first year, modifications were made to the written assignment. In the first year, students spent a great deal of their one hour at the pharmacies completing the assignment, which may have impacted the quality of the observation. In year 2, students were asked to complete the written assignment outside of their scheduled observation time, so that their time at the pharmacy would include more active engagement to maximize their learning experience. Also, for practicality and ease of grading, one assignment was turned in per pair of students who completed an observation together in year 2 versus one assignment per student in year 1.

### Discussion

Forms of interprofessional education described in a literature review include a wide variety of educational components and models. Examples of curricular themes used in IPE are medication adherence, communication skills, emergency preparedness, evidence-based medicine, professional ethics, tobacco cessation, and interprofessional team roles, responsibilities, and professionalism. When the ADEA Team Study Group on Interprofessional Education identified best practices at six dental schools, all included either a mandatory or elective interprofessional course with other health sciences students on their campuses. To implement such a course, a college is required to have institutional collaborators, add credit hours to its curriculum, find a class location to accommodate the larger assembly of students, and identify a time that works with all involved students’ schedules. The ADEA Team Study Group’s survey found that only 32 percent of reporting schools’ current IPE activities involved basic science courses and 15 percent ethics classes, showing that only a minority had successfully implemented IPE through specific courses. The more typical activities utilized by dental schools to accomplish interprofessional learning were joint volunteer activities, clinical activities, and service-learning projects. While our pharmacy observation activity was simple and brief in design, it was an easily accomplished means to incorporate interprofessional learning for the dental students to understand pharmacy concepts and the profession.

The reported observation activity provided dental students with exposure to community pharmacy practice, real-world challenges in prescribing medications, and opportunities for collaboration with pharmacists in provision of patient care. The pharmacy observation assignment grades, student evaluation results, and narrative feedback provided evidence that this interprofessional activity met the stated learning objectives. The grading and evaluation occurred at the end of the course, so it was not possible to distinguish whether the learning
objectives were met during didactic lectures or the one-hour observation itself; however, we feel the learning likely occurred from a combination of the two. The benefits of this activity were consistent with the Interprofessional Education Collaborative (IPEC) core competencies of teamwork, communication, values, and roles and responsibilities for interprofessional collaborative practice as well as the CODA standards for interprofessional education.\textsuperscript{4,5} The observation helped dental students understand the value of interprofessional practice as well as how dentists and pharmacists can successfully work as a team. It further emphasized the complexities of medication prescribing and dispensing in real life, giving students an appreciation of how such collaboration benefits patients. These complexities are not limited to drug selection based on the patient’s condition, but also the laws that govern prescribing and dispensing as well as third-party insurance issues and medication out-of-pocket costs. Because students worked directly with pharmacists in practice, they gained experience with interprofessional communication. The dental students also were given the opportunity to develop a clearer picture of their roles and responsibilities in prescribing medications, the pharmacist’s roles and responsibilities in providing safe and effective medication therapy to patients, and how these complement each other.

Course coordinators attempted to address common challenges related to implementation of IPE in the design of this activity; however, minor modifications were necessary in the second year. The activity was incorporated into an existing summer course and required minimal student time (approximately two total hours for the assignment and observation), so it did not require a new course to be developed or an existing course to have its credit hour allotment expanded. Students were assigned to existing pharmacies on campus that are managed by the OU College of Pharmacy, so external sites and collaborators did not have to be recruited. However, other schools wanting to replicate this interprofessional activity could approach their local community pharmacies with pre-established relationships with their respective Colleges of Pharmacy or universities to collaborate on a similar project. Schools not located on a comprehensive academic health sciences campus and without other health sciences colleges with which to collaborate could especially benefit from use of this model to offer IPE relying on collaboration with local pharmacists rather than health professions students to achieve interprofessional learning.

Scheduling conflicts were avoided by allowing students the entire summer semester to complete the activity and by providing multiple time slots to choose from to work around students’ class, clinic, and personal schedules. Student hours were equally distributed among the three existing pharmacies on campus, which allowed for manageable increase in workload for each of the individual pharmacists and their practice sites, especially after observation scheduling was adjusted in year 2 to better accommodate the pharmacies and students’ class schedule. Pharmacists provided additional input as to which days and times would be best for providing students with optimal learning opportunities and minimizing stress on workflow. Student scheduling was adjusted from year 1, when everyone picked a time slot on the first day of class, to year 2, when students used an online scheduling system to sign up on their own time after verifying their academic and personal schedules.

Because the Special Subjects course is coordinated by College of Pharmacy faculty, institutional collaborators were available to develop and assess the observation activity. As with dental education, pharmacy education has had an evolving and increasing emphasis on interprofessional education.\textsuperscript{6} Therefore, other dental schools interested in adapting their own pharmacy observation activity would likely be able to identify institutional collaborators and champions in their respective Colleges of Pharmacy or other health care education disciplines.

There were limitations to this activity and its assessment. Each dental student was exposed to community pharmacy practice for only one hour. While this may have represented enough time to meet the specified learning objectives, additional course concepts could be reinforced if additional time was spent at the pharmacy practice site. Students completed the assignment individually in the first year and in pairs the second year and then submitted it online. A supervised assessment might provide course instructors more insight into the level of learning that resulted from the activity. The course evaluation survey was completed on a voluntary basis and thus had a less than optimal response rate of an average of 40 percent for the two years. The survey was based on a validated tool, but further validation was not done for the modified questions to assess the dental observation activity. Finally, pharmacy students interacted and engaged with dental students during the activity. However, interprofessional learning has not yet been assessed from the pharmacy student perspective.
Results showed that the pharmacy observation activity provided a successful interprofessional learning component to a didactic pharmacy course series and was well received by both dental students and participating pharmacists.

REFERENCES


There are multiple areas for growth of this interprofessional learning activity. While this activity was designed for dental students, an unanticipated impact was that the dental students interacted and engaged with pharmacy students who were completing practicums in the community pharmacies during the summers. The pharmacy students may have also benefited through a gained appreciation for teamwork, communications, values, roles, and responsibilities between dental and pharmacy practice. Future directions planned are to strengthen the interprofessional learning opportunity for our pharmacy students who interact with the dental students during this activity and to create specific objectives and an assignment to facilitate their learning and understanding of the dental practitioner. An additional future opportunity is to expand the interprofessional pharmacy observation activity to other health sciences students who will have prescribing privileges within their discipline. Expansion of the program will require collaborators from the other colleges as well as determining a location within the respective curricula and student schedules to accommodate the addition of the interprofessional learning opportunity.

Conclusion

This article described how, within a two-course series in dental pharmacology and therapeutics, the curriculum at a college of dentistry was revised to provide an interprofessional activity to expose dental students to a community pharmacy setting. The objectives of the activity were to augment students’ learning about drug laws and prescription writing and to foster interprofessional relationships and collaboration between pharmacists and dentists.