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An Interprofessional Small-Group Learning Experience in Early Childhood Caries With Fluoride Varnish Application

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Abstract

Introduction: Early childhood caries has become a significant public health issue in selected populations in the US and is one of the most common infectious diseases of childhood. It is imperative therefore that medical and dental professionals collectively advocate for children's oral health and establish a medical workforce that is comfortable screening and providing anticipatory guidance related to dental caries. To address this issue, we used an interprofessional small-group approach to teach oral health concepts to both first-year medical and dental students, who are at the same learning stage regarding infectious disease knowledge and its relationship to oral health. **Methods:** This small-group learning exercise uses the concept of the flipped classroom, in which students acquire foundational knowledge prior to the classroom experience, demonstrate their understanding prior to class by means of an online assessment, and actively apply this knowledge to a specific case. The instructional activities include a preparatory reading and assessment, a case-based interactive exercise, and a concluding hands-on oral exam and fluoride varnish application exercise. **Results:** More than 81% of participating faculty members and dental and medical students rated the experience as excellent or very good. Students stated they valued the presence of their peer counterparts in the learning experience. **Discussion:** This interprofessional experience, conducted early in professional school curricula, establishes a foundation for future cooperative working relationships as well as faculty development regarding oral health and local community health resources.

Keywords

Prevention, Small Group, Interprofessional, Case-Based, Oral Health, Fluoride, Hands-on

Educational Objectives

By the end of this interprofessional, small-group, case-based module, medical and dental students will be able to:

1. Demonstrate an understanding, through a written examination, of dental caries as an infectious disease that is transmissible, reversible at early stages, and progressive.
2. Collaborate to identify and classify dental carious lesions using risk-assessment tools, select appropriate preventive/referral choices, and present their findings during open-group discussion.
3. Collaboratively investigate and identify risk factors for early childhood caries and propose appropriate interventions.
4. Perform intraoral examinations focused on examination technique and the application of fluoride varnish on student partners or toddler patients.

Introduction

It is imperative that medical and dental professionals collectively advocate for children's oral health and establish a medical workforce that is comfortable screening and providing anticipatory guidance related to dental caries. For example, in 2010 and 2011, the state of Florida earned an F grade on the Pew Charitable

Appendices

- A. Oral Health Homework.docx
- B. Quiz.doc
- C. Early Childhood Caries Faculty Briefing.ppt
- D. Student Susie Lab Case.docx
- E. Instructor Susie Lab Case With Answers.docx

All appendices are peer reviewed as integral parts of the Original Publication.

Trusts' report *The State of Children's Dental Health: Making Coverage Matter*¹; it was one of only three states to receive this designation for 2 consecutive years. Florida continues to have one of the lowest Medicaid reimbursement rates in the US, even after a 50% increase in Medicaid dental reimbursement in 2011. As a result, approximately 8% to 12% of Florida dentists accept Medicaid.^{2,3}

A survey of oral health content in medical school curricula indicates that close to 70% of medical schools offer less than 5 hours of oral health curriculum and that 10% offer no curriculum.⁴ In order to have an impact on the oral health of our most vulnerable children, health care professionals need to be trained in oral health and prevention.

After the publication in 2000 of the U.S. Surgeon General's report *Oral Health in America*,⁵ the state of training and education for medical professionals on the front lines was assessed and targeted for improvement. In an article in *Academic Pediatrics*, Douglass, Douglass, and Krol made the recommendation to foster closer relationships between physicians and dentists at each level of the educational continuum to promote the development of high-quality, evidence-based educational content as well as to assure favorable referral environments.⁶ In addition, Lewis, Boulter, Keels, and colleagues' study assessing pediatricians' attitudes and practices surrounding children's oral health identified a lack of training as a barrier to participation in oral health activities.⁷ Less than 25% of pediatricians reported receiving oral health education in medical school or residency or through continuing medical education.⁷

To address this issue, we coordinated and implemented an interprofessional small-group educational experience for dental and medical students facilitated by both medical and dental faculty. The instructional activities included a preparatory reading and assessment, a case-based interactive exercise, and a concluding hands-on oral exam and fluoride varnish application exercise.

This small-group learning exercise uses the concept of the flipped classroom, in which students acquire foundational knowledge prior to the classroom experience, demonstrate their understanding prior to class by means of an online assessment, and actively apply this knowledge to a specific case.⁸ In addition, the in-class experience is interprofessional in nature as both student participants and faculty cofacilitators are from the colleges of dentistry and medicine.⁹

This resource, consisting of self-instruction and assessment, small-group guided case discussion, and hands-on activities (intraoral exam and fluoride varnish application), addresses a variety of student learning styles for more effective learning. As content experts from the fields of medicine, dentistry, and education, we recognized the need for educational activities to address the knowledge gap regarding this important public health issue. We also recognized that interprofessional education early in professional curricula provides the foundation for long-term partnerships needed to properly address this and other pressing public health issues.

Methods

The target audience for this learning experience is beginning and intermediate health care professional students who are in disciplines that work with children, have at least introductory-level communications skills, and have introductory-level knowledge of microbiology concepts.

This interdisciplinary small-group module should be conducted when all participating students are in a curricular block that includes an introductory course in microbiology and infectious diseases. Students participate in this module in interprofessional groups.

In the initial offering, this module was conceived and created using team-based learning to promote student engagement and active learning, two principles important to adult learners. Based on student and faculty feedback, the module was reconfigured in the second year as a small-group, case-based learning module with medical and dental faculty cofacilitators in each small group. This approach allowed us to retain the active learning and student engagement components while simultaneously taking advantage of the participating content-expert faculty as small-group facilitators. This approach was much more favorably reviewed by both students and faculty.

Preparation

In preparation for the small-group activity, participating students are asked to complete the oral health homework packet (Appendix A). Students are also asked to complete a quiz (Appendix B) prior to their small group. We release the quiz online to students for completion 48 to 72 hours prior to the small-group class.

On the day of the small-group activity, faculty facilitators from participating colleges (in our case, dentistry and medicine) meet together for a preclass briefing (Appendix C) regarding the objectives of the module and the importance of addressing early childhood caries interprofessionally, as well as to review details of the small-group module.

The following materials are needed for the hands-on application of fluoride varnish at the conclusion of the small-group activity:

- Good light source, such as a flashlight or headlamp, for each student pair.
- Gloves for each student.
- Tongue blade or mirror for each student.
- Gauze.
- Hand sanitizer.

Logistics

This half-day module was conducted with half of participating students on one day and the remaining half on the following day. However, the class could be conducted for all students simultaneously, resources permitting. The [Table](#) provides an example schedule.

Table. Example Half-Day Module Schedule

Time	Activity
1:00-2:00 pm	Faculty orientation (Appendix C).
2:00-2:20 pm	Icebreaker activity. A suggested activity is provided in the resource.
2:20-2:30 pm	Introduction to the module. Why learn about early childhood caries? Why an interdisciplinary approach?
2:30-3:15 pm	Susie Sippy Cup case discussion (Appendices D & E).
3:45-4:15 pm	Intro to oral examination and application of fluoride varnish exercise. Students perform examinations on student partner volunteers and apply fluoride varnish on partners.

Faculty start with an icebreaker activity. With no preparation, the students are given a bag of assorted candy to pass to each other, with each person taking one piece. The group is then told that each type of candy represents a fact they must share with the group. For example, if students choose a Kit Kat, they should share their favorite TV show. If they pick an Almond Joy, they should share a hidden talent; if a Hershey bar, their favorite vacation spot; and so on. Any type of small, wrapped candy will do.

After the icebreaker, take a short period of time to explore the rationale for this class. Why are we discussing this topic? Why are we discussing it together?

Next, students work through the Susie Sippy Cup case. Student and instructor versions of the case are provided (Appendices D & E). The instructor version of the case includes answers. After discussing the case, faculty can give students feedback on their performance on the quiz. If faculty do not have the students' grades available, they can still discuss the concepts.

Finally, students pair up for the hands-on oral exam and fluoride varnish exercise. Students perform the examinations and fluoride varnish exercise on their partner volunteers. Information on conducting the exercise is available in Appendix C.

Deployment and Lessons Learned

We have taught this module for 4 years to interprofessional groups of first-year dental and medical students. The feedback from faculty and students has been positive. Based on feedback from the initial offering, we modified the structure of the lesson from a team-based learning format to a small-group, case-based learning activity with faculty cofacilitators from each participating college participating. Feedback on the reconfigured module from learners and educators has been very favorable.

The module was presented during the first year of professional training for dental and medical students. This experience could be enhanced by live demonstrations of the knee-to-knee oral examination technique in the small groups. In addition, this interprofessional educational experience could be enhanced with a community event that includes fluoride varnish application, so that newly trained students could have the opportunity to put their skills into action to benefit the public.

Results

Cohorts of approximately 130 first-year medical students and 80 first-year dental students collectively participate in this activity annually. Seventeen faculty from primary care disciplines in medicine and 17 dental faculty from general dentistry, pediatric dentistry, and public health have participated in the small-group experiences. College of medicine faculty had a range of prior exposure to oral health assessment and fluoride varnish application.

In a survey of participating faculty, the two factors rated as most effective in enhancing student learning were the small-group cofacilitators and the case. Students surveyed also rated the interprofessional small-group faculty cofacilitators as the most effective factor in enhancing student learning. Students rated the preparatory materials to study before class as the next most effective factor.

In both years the resource has been offered, over 81% of responding faculty members and dental and medical students rated the experience as excellent or very good. Student and faculty comments were constructive and positive. Faculty and students agreed on the value of interprofessional cofacilitation of small groups. Faculty comments made this particularly clear. Students stated that they valued the presence of their peer counterparts in the learning experience.

Discussion

The participating students were empowered by the knowledge gained and the practical application of this module as evidenced by the inclusion of topical fluoride varnish in student-led international service learning experiences.

In the pilot implementation of this program, we presented the module in the team-based learning format.¹⁰ Evaluation of the learning experience by students and faculty from both colleges provided the basis for substantial revisions to the pilot experience. Many students commented negatively on the team-based learning approach, including the amount of time required to discuss the individual readiness assurance test and the team readiness assurance test questions. A number of students observed that the small-group case discussion was more valuable educationally and a better use of allotted class time. Based on this feedback, the educational activity was redesigned as an interdisciplinary small-group activity involving case discussion and hands-on fluoride varnish application.

Also, students expressed the desire to meet each other prior to the beginning of instructional activities. An icebreaker activity was introduced into the small-group experience to permit students and faculty to introduce themselves and become more comfortable learning together. Both faculty and students have responded positively to these additions.

A more effective context for team-based learning would involve a longitudinal team structure, which was not logistically feasible for this institution. The medical primary care faculty were much more positive about and receptive to this content than was anticipated. Faculty from the two colleges were engaged and collaborated well together as small-group cofacilitators.

Our goals were to promote interprofessional training in the hopes of setting a foundation for future collegial partnerships across disciplines, to model this behavior through cofacilitation by faculty, and to educate both students and faculty on this challenging health topic. In addition, our hope was that by participating in a hands-on experience, trainees would be comfortable with continuing this preventative intervention once in practice.

This module does not absolutely require cofacilitation and thus could be used to train both pediatric and dental residents, as continuing medical education for faculty, and to train medical or dental students at schools where both disciplines do not exist.

Ideally, standardized pediatric patients would be identified and used for the actual fluoride varnish application. This is a concept we plan to consider in the future. Trainees are often intimidated by pediatric patients, and thus, practicing in an environment where faculty with more experience can guide learners through the procedure of applying fluoride varnish would likely decrease anxiety and build confidence.

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Prior Presentations

Lossius M, Sposetti V. Susie Sippy Cup: an experiment in interdisciplinary education and hands on learning. Poster presented at: American Association of Pediatrics National Conference & Exhibition; October 11-14, 2014; San Diego, CA.

Sposetti V, Lossius M. Susie Sippy Cup: tackling early childhood caries through interdisciplinary education. Poster presented at: American Dental Education Association Annual Session & Exhibition; March 7-10, 2015; Boston, MA.

Ethical Approval

Reported as not applicable.

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