Description of a new education method or tool

Integration of a Novel Interprofessional Oral Health Module into Medical Student Clinical Skills Curriculum

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Abstract

Background: The 2011 Institute of Medicine report Improving Access to Oral Health Care for Vulnerable and Underserved Populations acknowledged that to increase access to oral health care for vulnerable populations, oral health should be integrated into primary care. Subsequently, the Health Services and Resources Administration (HRSA) published the Integration of Oral Health and Primary Care Practice, which recommended five core competencies to be included in the training of non-dental primary care providers in oral health evaluation and prevention.

Objective: This study describes the design, implementation, and evaluation of a peer-to-peer, interprofessional, oral health module integrated into the existing physical exam curriculum for first-year medical students (MS1).

Methods: A survey was sent to graduating medical students to assess need and interest in adding an oral health component to medical school curriculum. A working group of dental and medical students and faculty designed and implemented an oral health module incorporating HRSA’s five core competencies and a skills session on basic oral health exam and fluoride varnish application. Pre- and post-module evaluations were administered and analyzed. Qualitative construct analysis was used to analyze open-ended responses.

Results: Eighty-eight percent of graduating medical students that completed the needs assessment supported the addition of an oral health module in medical school curriculum. Eighty-four percent of MS1 participants completed the pre- and post-module evaluations; response comparisons showed significant increased positive opinion of the importance of oral health to overall health, increased comfort examining and describing patient's oral health, assessing caries risk, and applying fluoride varnish (all p < 0.0001). Open-ended response themes included quality of the module and peer-to-peer teaching, appreciation for the topic, and applicability of oral health to future practice.
Conclusion: Integration of oral health into the undergraduate medical curriculum is desired and valued. Interprofessional peer-to-peer learning is an effective method for promoting oral health education.

Keywords: Oral Health, Inter-professional Education, Primary Care

Introduction

The 2011 Institute of Medicine (IOM) report Improving Access to Oral Health Care for Vulnerable and Underserved Populations, brought to light the vast oral health disparities that exist in the U.S. The report highlighted how vulnerable populations such as the elderly, disabled, racial minorities and those below the poverty line are less likely to obtain dental care. The IOM further acknowledged that to reduce the burden of oral disease and increase access to dental care for vulnerable populations, increased integration of oral health into primary care was necessary. In response to this charge by the IOM, Health Services and Resources Administration (HRSA) published the report Integration of Oral Health and Primary Care Practice. This report recommended 5 core competencies to be included in the training and education of non-dental primary care providers: Risk Assessment, Oral Health Evaluation, Preventive Interventions, Communication and Education, and Interprofessional Collaborative Practice. Imbedding oral health into primary care in this way was hypothesized to increase access to care for vulnerable populations and reduce dental disease in the U.S.

Many organizations have further acknowledged the need to include oral health into primary care. In 2008, the American Academy of Medical Colleges reported the necessity to include oral health competencies in formal medical education and the U.S. Medical Licensing Examination now includes oral health questions on their Step 2 and Step 3 examinations. Furthermore, the U.S. Preventive Services Task Force published in 2014 that primary care providers should perform preventive dental interventions at well-child visits. Following this recommendation, the American Academy of Pediatrics added fluoride varnish application to their Recommendations for Pediatric Preventive Health. Additionally, the Commission on Dental Accreditation instituted a requirement that pre-doctoral dental students must interact with other higher education, health provider or health services students to foster increased interprofessional relationships and skills in the dental profession. Studies have shown that interprofessional collaboration between physicians and dentists is mutually beneficial with both physicians and dentists benefiting from more interprofessional integration.

Since the IOM report, governmental and professional organizations have supported the inclusion of oral health in overall health care by non-dental professionals. However, the fulfillment of this call to action has been largely the responsibility of individual educational institutions. A 2009 study reported that 70% of medical schools had less than five hours of oral health training and of those schools, only one in ten had any hands-on training. Furthermore, 10% of medical schools reported having no oral health component in their undergraduate medical curriculum at all. The majority of programs implementing oral health into primary care have focused on residency training programs in pediatrics and family medicine. In 2015, MedEdPortal published an online resource for medical students and other health professionals to learn about tooth decay. Smiles for Life is another online resource containing a curriculum commonly referenced for teaching oral health competencies to non-dental professionals. However, medical student competency in oral health skills is maximized with blended didactic and face-to-face, hands-on training.

In the U.S. today, most medical students are taught the head, eyes, ear, nose and throat (HEENT) exam—however, only limited aspects of the oral cavity are taught as part of the standard exam. The aim of this report is to describe
the design, implementation and evaluation of an interprofessional oral health module for first year medical students at the University of California, San Francisco (UCSF). This undergraduate medical education module aimed to instruct medical students on the five core competencies of HRSA’s integration of oral health into primary care and change the standard HEENT exam to the HEENOT-- head, eyes, ear, nose, oral cavity, and throat exam.

Methods

The UCSF Institutional Review Board determined that this study did not require human subjects approval.

Needs Assessment:

A needs assessment survey was conducted in July 2014 to measure interest among UCSF medical students for implementing a basic oral health curriculum in the existing School of Medicine Physical Exam Skills curriculum. The survey was distributed via class email listservs to 300 second- and fourth-year medical students. These two groups of students were selected to participate in the needs assessment due to their perspectives on the current medical school curriculum. Second-year students have completed a didactic year of organ-based medical instruction, and are familiar with existing oral health content in the curriculum; while fourth-year students have completed a year of clinical rotations in various settings, and may have experienced oral health exam skills while in these settings.

The needs assessment survey asked four questions; questions one and four, were "Yes/No", and questions two and three collected responses using a 1 to 5 Likert-type scale where 1 = very uncomfortable and 5 = very comfortable (Table 1).

Program Design:

Following the completion of the needs assessment, a working group of students and faculty from the Schools of Dentistry and Medicine formed to design and implement an oral health module for all first-year medical students at UCSF. From September 2014 to June 2015, this group designed the curricular components, including a "flipped classroom" format, online video lecture, small-group hands-on training session and post-training online resources. This group worked closely with faculty from the School of Medicine clinical skills course to coordinate the inclusion of the new module. The style of the oral health curriculum was designed to fit within the existing yearlong longitudinal physical exam course for first-year medical students rather than to be a stand-alone addition to the curriculum.

The online video lecture consisted of a 30-minute overview of 13 topics and 4 objectives, shown below, and was developed using HRSA’s recommendations for integrating oral health and primary care practice.²

Topics of Online Video Lecture:

1. Oral and Systemic Health
2. Global Burden of Disease
3. Oral Anatomy
4. Tooth Anatomy
5. Carious Lesions
6. Caries Risk Assessment
7. Soft Tissue Lesions/Oral Pathologies
8. Periodontal Disease
9. Dental Medical Emergencies
10. Writing a Referral to a Dentist
11. Fluoride Mode of Action
12. Performing a Brief Oral Examination
13. Applying Fluoride Varnish

Objectives of Online Video Lecture:

1. Discuss the relationships between oral health, systemic health, and global health.
2. Perform an oral exam that screens for disease, dysfunction, and discomfort, and provide a descriptive referral of your findings.
3. Assess the risk and protective factors for dental caries.
4. Perform a preventive fluoride varnish application.

Online resources were created and compiled, including a guide to common oral pathologies, caries risk assessment form, a referral list of dental providers in the California Bay Area, and two 3-minute review videos on how to perform an oral exam and apply fluoride varnish.

Small groups of medical students met for 1-hour during the hands-on skills session as part of the longitudinal physical exam course. Dental student preceptors instructed the medical students on how to perform an oral exam and apply fluoride varnish. The session also provided an opportunity for medical students to practice these skills in pairs under the supervision and guidance of the trained preceptors.

Program Implementation:

During the summer of 2015, seven fourth-year dental students and seven dental faculty were recruited to be preceptors for the small-group active learning session. A one-hour calibration session was held to instruct preceptors on the objectives and topics of the overall oral health module and the curriculum plan for the small-group session. All module materials including the online lecture video and resources were provided to preceptors for review prior to teaching the small-group session to medical students.

In the fall of 2015, one week prior to the scheduled small group sessions, 154 first-year medical students received an email from the school's administration alerting them of the upcoming oral health module. This email requested students to anonymously complete the pre-module evaluation, and to watch the online video lecture prior to their scheduled small group session.

First-year medical students were assigned to groups of 7 to 8 to meet with dental student and faculty preceptors for a one-hour session. During this time, dental student preceptors, supervised by dental faculty, reviewed topics from the online module, instructed how to perform an oral exam and how to apply fluoride varnish, and answered questions from medical students. The medical students then had the opportunity to pair up and practice performing the oral exam and apply fluoride varnish under the supervision of preceptors. Following the small-group session, medical students anonymously completed a post-module evaluation, and preceptors anonymously completed evaluations of the session.

Outcome Measures/Program Evaluation Design:

A pre- and post-module evaluation was created for medical students, consisting of seven questions shown in Table 2.
Responses were measured on a 1 to 5 Likert-type scale, (1 = lowest level and 5 = highest level of agreement with the statement made or level of comfort with the skill being self-evaluated). No identifiers were included on the medical student evaluations; therefore the pre and post-module evaluations were unpaired.

An evaluation for dental student preceptors measured the experience of teaching small-group hands-on sessions to medical students. Six questions, with Likert-type scale responses ranging from 1 to 5, asked preceptors to rate their agreement with statements and their experience, as shown in in Table 3. Dental faculty preceptors completed a similar evaluation (Table 3).

**Qualitative Analysis of Open-Ended Questions:**

Medical students’ responses to the post-module open-ended questions were analyzed using standard procedures for qualitative data. Five major constructs were developed through an iterative coding process of data reduction and consensus. Data reduction consisted of sorting the students’ comments into categories that best described the detailed content of the comment, and then combining similar categories into broader-level themes, until ultimately a construct identifying a single overarching theme emerged. The five identified constructs were: 1) applicability of oral health to future practice, 2) quality of the session, 3) peer-to-peer teaching format, 4) appreciation of the session, and 5) suggestion for improvement. The number of times each construct appeared in all the comments was tallied. When a single student made multiple comments, each distinct construct associated with the comments was noted and multiple comments reflecting the same construct were counted just once. Three authors met to reach consensus on the constructs and then independently classified the comments into the various constructs, with a minimum of 86% agreement (Table 4).

**Statistical Analysis:**

Descriptive statistics were used to examine medical student, dental student and dental faculty evaluation results. Wilcoxon rank sum tests were used to evaluate the differences of median responses to individual evaluation questions in pre- and post-module evaluations, with the level of significance set at alpha 0.05. Data was analyzed using STATA (STATA, version 12) and SAS (SAS, version 9.4).

**Results**

**Needs Assessment:**

A total of 120 (40%) of surveys were completed by 2nd and 4th year medical students (Table 1). In response to: "Do you [the medical student] know substantially more about oral health than you did when you started medical school?" 73% responded No, 19% responded Maybe, and 8% responded Yes. Seventy-two percent of respondents reported being uncomfortable or very uncomfortable examining a patient’s mouth, while 80% reported being uncomfortable or very uncomfortable in describing what they see in a patient’s mouth. Eighty-eight percent of medical students supported the addition of an oral health module to their physical exam curriculum, 9% said Maybe, and 3% replied No.

**Evaluation Results:**

One hundred twenty-nine (84%) 1st year medical students completed the pre-module evaluation (Table 2). These results were shown to not have a normal distribution. Medical students strongly agreed (median = 5) oral health was
an important part of overall health. Medical students' comfort in examining the mouth, describing a patient's oral health, assessing caries risk and applying varnish were neutral (neither comfortable nor uncomfortable, median = 3) for all topics.

One hundred thirty-one (85%) medical students completed the post-module evaluation (Table 2). These results were also shown to not have a normal distribution. Medical students strongly agreed that oral health is an important part of overall health, the oral health module was a valuable part of their medical education and that the module substantially improved their oral health knowledge (all medians = 5). Following the oral health module, medical students were comfortable examining a patient's mouth, describing their findings, assessing caries risk, and applying fluoride varnish (all medians = 4).

As shown in Figure 1, compared to pre-module evaluations, post-module responses showed significant increased positive opinion for the importance of oral health as part of overall health, increased comfort examining patient's oral health, describing patient's oral health, assessing caries risk and applying fluoride varnish (all p < 0.0001).

A 100% response rate (n = 7) for dental student preceptor evaluations was achieved (Table 3). Dental student preceptors strongly agreed that medical-dental interprofessional education is valuable, they were comfortable teaching medical student learners and they would recommend teaching this module to future dental students (all medians = 5).

A 71.4% response rate was achieved for dental faculty preceptors (n = 5) for post-module evaluations (Table 3). The performance of dental students as preceptors was reviewed very positively, the oral health module for medical students was rated as a valuable interprofessional experience and dental faculty preceptors also rated their own experience of the session very highly (all medians = 5).

Qualitative Results:

Table 4 presents a summary of the open-ended responses made by the medical students after completing the oral health module. A total of 102 distinct comments were identified; these addressed the quality of the module (28%), the peer-to-peer teaching (13%), appreciation for the topic (19%) and the applicability of oral heath to future practice (16%). Suggestions for improvement focused on increasing the length of time allotted for the small group session and that learners wished they had spent more time reviewing the pre-session instructional videos.

Table 1. Medical Student Needs Assessment Questions

|   | Question                                                                 |
|---|-------------------------------------------------------------------------|
| 1 | Do you know substantially more about oral health than you did when you started medical school? |
| 2 | How comfortable are you in examining a patient's mouth for tooth and gum disease (1 being the least comfortable, 5 being the most comfortable)? |
| 3 | From a scale of 1 to 5, how comfortable are you in describing what you see when you examine a patient's teeth and gums (1 being the least comfortable, 5 being the most comfortable)? |
| 4 | Would you like to see the PE skills curriculum include a training session for a BASIC oral screening exam? |

Table 2. Medical Student Pre- and Post-Module Evaluations

|                        | Pre-Module Median (IQR) N=129 | Pre-Module Mean (SD) N=129 | Post-Module Median (IQR) N=131 | Post-Module Mean (SD) N=131 |
|------------------------|-------------------------------|-----------------------------|-------------------------------|-------------------------------|
| Oral health is an important aspect of overall health. | 5 (4-5) | 4.36 (1.01) | 5 (5-5) | 4.91 (0.32) |
How comfortable are you in examining a patient’s mouth for tooth and gum disease?

| Post-Module Median (IQR) | Post-Module Mean (SD) |
|--------------------------|-----------------------|
| 3.16 (0.86)              | 4.02 (0.74)           |

How comfortable are you in describing what you see when examining a patient's mouth?

| Post-Module Median (IQR) | Post-Module Mean (SD) |
|--------------------------|-----------------------|
| 2.74 (0.88)              | 3.72 (0.85)           |

How comfortable are you in assessing caries risk for a patient?

| Post-Module Median (IQR) | Post-Module Mean (SD) |
|--------------------------|-----------------------|
| 2.60 (0.99)              | 3.6 (1.00)            |

How comfortable are you in applying fluoride varnish on a patient?

| Post-Module Median (IQR) | Post-Module Mean (SD) |
|--------------------------|-----------------------|
| 2.69 (0.96)              | 4.18 (0.86)           |

The Oral Health for Medical Students module is a valuable part of medical student education.

| Post-Module Median (IQR) | Post-Module Mean (SD) |
|--------------------------|-----------------------|
| N/A                      | N/A                   |

This module substantially improved my knowledge of oral health.

| Post-Module Median (IQR) | Post-Module Mean (SD) |
|--------------------------|-----------------------|
| N/A                      | N/A                   |

Table 3. Dental Student and Faculty Preceptor Evaluation

| Dental Student Preceptor Responses | Post-Module Median (IQR) | Post-Module Mean (SD) |
|-----------------------------------|--------------------------|-----------------------|
| N=7                               |                          |                       |
| Serving as a preceptor improved my knowledge on the importance of including oral health in overall health. | 4 (4-4) | 4.14 (0.38) |
| Serving as a preceptor improved my oral examination skills. | 4 (3-4) | 3.57 (0.53) |
| Serving as a preceptor improved my fluoride varnish application skills. | 3 (3-3) | 3.14 (0.38) |
| It is valuable for dentistry and medical students to engage in joint interprofessional activities. | 5 (5-5) | 4.86 (0.38) |
| I was comfortable teaching the first-year medical students in my group. | 5 (4-5) | 4.71 (0.49) |
| I would recommend teaching this module as a valuable opportunity for incoming dental students. | 5 (4-5) | 4.43 (1.13) |
| Overall I would rate my teaching experience as: 1 = very poor, 5 = excellent | 5 (5-5) | 5 (0) |

| Dental Faculty Preceptor Responses | Post-Module Median (IQR) | Post-Module Mean (SD) |
|-----------------------------------|--------------------------|-----------------------|
| N=5                               |                          |                       |
| The fourth-year dental students in my group provided a good overview of the session’s learning objectives. | 5 (5-5) | 5 (0) |
The fourth-year dental students in my group provided good, interactive teaching of how to perform a clinical exam and fluoride varnish application. 5 (4.5-5) 4.8 (0.45)

The fourth year dental students appeared comfortable giving feedback on the clinical skills of the medical students in my group. 5 (5-5) 5 (0)

It is valuable for dentistry and medical students to engage in joint interprofessional activities such as this. 5 (5-5) 5 (0)

Overall I would rate my experience as: 5 (5-5) 5 (0)

I was provided adequate information to supervise fourth-year dental students teaching first year medical students. 5 (4.5-5) 4.8 (0.45)

Table 4. Construct Frequencies for Open-Ended Responses

| Construct                                      | Comment Examples                                                                 | Frequency (Percent) |
|------------------------------------------------|----------------------------------------------------------------------------------|---------------------|
| Applicability of Oral Health to Future Practice| "This was a great demonstration why interprofessional teams are important and how they're applicable in the real world." "Helpful, especially for pediatrics." | 16 (16%)            |
| Quality of the Session                         | "Great addition to the curriculum." "Very informative."                          | 29 (28%)            |
| Peer-to-Peer Teaching Format                   | "Very friendly instructors – great to meet them and learn from them." "Dental student presentations were very helpful." | 13 (13%)            |
| Appreciation of the Session                   | "Thank you for taking the time to come to us." "Thanks for the fluoride treatment." | 19 (19%)            |
| Suggestion for Improvement                     | "I wish we had more time to practice." "I don't recall seeing any videos on our assignment list – wish I had watched." | 25 (24%)            |
| Total                                          |                                                                                 | 102 (100%)          |
Discussion

Integrating oral health and primary care can expand access to dental care, enhance primary care, and improve patient wellbeing.¹ A collaborative care model of assessment, referral, and patient education reinforces comprehensive, patient-centered care.² This study describes the development and evaluation of a competency-based oral health education and clinical skills curriculum in undergraduate medical education. Peer-to-peer teaching of first-year medical students by fourth-year dental students significantly improves the medical students’ positive opinion of the importance of oral health to overall health, increases their comfort examining and describing patients’ oral health, and raises their comfort assessing caries risk and applying fluoride varnish (all p < 0.0001).

Clinical skills in undergraduate medical education are traditionally taught through longitudinal ‘doctoring’ courses and include teaching of physical examination. While basic anatomy and exam of the oropharynx are often covered, finer aspects of the oral cavity are not, despite many calls to introduce this important content from numerous stakeholders.¹⁻⁵ We believe that much of the success of the current innovation is rooted in the early collaboration between students and faculty from the two schools as well as the deliberate connection made to the established medicine curricular structure. This coordinated effort allows for ease of integration and efficient implementation of the program – and an overwhelmingly positive response from learners and educators alike. As the clinical skills curriculum now evolves toward a hypothesis-driven approach, oral health has an important place in its footprint and can likewise grow and evolve.

This new curriculum serves many purposes in our educational program. With a growing focus on population health and healthcare disparities nationally, oral health is an excellent platform through which to address these important
areas in medical education. Additionally, while expertise in oral exams and diagnoses are critical, equally valuable to students is the understanding of common referral practices between primary and dental care. Costs of dental care in the U.S. exceed $111 billion, much of which is spent on restorations that could have been avoided with early detection and prevention. Dental caries and periodontal disease are chronic diseases with modifiable behaviors such as smoking, alcohol consumption, and diet that benefit from a population health management approach. This complements current emphasis on increasing systems learning for students. Such skills can empower students to critically examine and improve upon complicated clinical systems in an effort to augment patient-centered care.

Few undergraduate health professions programs have implemented or evaluated the competency-based integration of oral health and primary care training recommended by HRSA. Excellent online resources are available to assist in the incorporation of oral health in primary care training programs, residency and specialty programs such as pediatrics and geriatrics, and in clinical practice. Introducing oral health in undergraduate medical education reaches students at our institution who ultimately match in primary care as well as provides a sound foundation for those entering subspecialty fields. We believe the impact of early introduction to oral health concepts could be even greater with consolidative learning at later time-points. Coordinated efforts to teach a comprehensive oral exam at the graduate level for primary care residents could be a valuable second-tier of training and warrants further consideration.

**Take Home Messages**

The oral health curriculum for undergraduate medical education developed at our institution underscores the power and impact of interprofessional collaboration and education. Its success could serve as a driving force behind future partnerships between professional schools, which can create lasting mutual benefits in areas important to patient-centered care.

**Notes On Contributors**

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Declaration of Interest

The author has declared that there are no conflicts of interest.