

# Advancing Oral Health in Physician Assistant Education: Evaluation of an Innovative Interprofessional Oral Health Curriculum

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**Purpose:** The impact of an oral health curriculum was evaluated by measuring increases in knowledge about oral health topics and implementation of oral health skills in the clinical year. **Methods:** A 3-year, longitudinal oral health curriculum was developed and implemented. Student knowledge of oral health concepts was evaluated before and 2 years after the curriculum was implemented. Student performance of oral health skills was evaluated in the clinical year by electronic patient logging. **Results:** Students demonstrated significant and persistent gains in knowledge following the initiation of the curriculum. Students used oral health skills in the clinical year, particularly in the area of patient education about oral health. **Discussion:** Incorporation of an oral health curriculum can lead to lasting knowledge about basic oral health concepts and increased performance of oral health skills in the clinical year.

## INTRODUCTION

The burden of oral diseases and disorders is significant. The landmark US surgeon general's report in 2000, *Oral Health in America*, brought the issue of oral health to the minds of medical providers, yet the oral health needs of Americans are not being met, particularly among vulnerable and underserved populations.<sup>1</sup> Among racial and ethnic minorities, the elderly, persons with special needs, and persons of lower socioeconomic status or those who live in rural areas, access to oral health care is inadequate. In 2008, 4.6 million children were unable to obtain needed dental care because their families could not afford it.<sup>2</sup> A recent report estimated that 130 million US adults and children lack dental insurance.<sup>3</sup> Children who lack access to good oral care are particularly vulnerable, and dental caries remains the most prevalent disease of childhood.

In April 2011, the Institute of Medicine (IOM) released the report *Advancing Oral Health in America*, which was the culmination of a study carried out by the IOM at the request of the US Health Resources and Services Administration (HRSA) to assess the current state of oral health in the United States and make recommendations. This report put forth a set of recommendations that included emphasizing disease prevention and oral health promotion, reducing oral health disparities, and enhancing the role of nondental health care professionals.<sup>4</sup> This report was followed, in July 2011, by a second IOM report, *Improving Access to Oral Health Care for Vulnerable and Underserved Populations*. Among the strategies recommended in this report were providing oral health services in a variety of settings, relying on a diverse and expanded array of providers, and including

### Feature Editor's Note:

This article, one of three presented on oral health in this issue, describes one physician assistant (PA) program's implementation of an oral health curriculum combined with interprofessional, interactive experience pairing PAs with dental students and faculty. Students demonstrated that the 3-year enhanced curriculum improved knowledge and resulted in sustained learning over time and yielded practical results in clinical practice. This program's experience also has positive implications for creating team-based, interprofessional educational opportunities.

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collaborative and multidisciplinary teams working across the health care system. The report specifically acknowledged that physician assistants (PAs) have great opportunities and responsibilities to be involved in oral health care.<sup>5</sup>

With a focus on primary care, care of the underserved, and a legacy of team-based medical practice, PAs are well-positioned to bring the message of the importance of good oral health to their communities. Danielsen et al (2006) developed a set of oral health competencies for PAs and nurse practitioners that was based on the results of a national survey.<sup>6</sup> While the results of this survey suggested that PAs were interested in and recognized the importance of oral health, a study by Jacques et al (2010) found that only 21% of PA education programs include dental disease prevention in their curricula, and just over half (55%) of the programs teach assessment for childhood caries as part of their pediatric content.<sup>7</sup>

There is a growing body of evidence that interprofessional education (IPE) is associated with positive outcomes in medical training.<sup>8</sup> A 2008 report by the American Association of Medical Colleges (AAMC) urged collaboration between medical and dental education programs and developed a set of oral health competencies that cut across the professions.<sup>9</sup> With increasing awareness among medical and dental providers about the connection between oral health and systemic disease, an interprofessional educational model augments a more traditional approach to educating new medical and dental providers.

The purpose of this study was to evaluate a recently implemented, interprofessional oral health curriculum by measuring increases in knowledge about oral health topics and improvement in oral examination, counseling, and referral skills.

## METHODS

The oral health curriculum was designed to span all 3 years of the education of PA students at the University of Colorado. In the first year of training, PA students were presented with an introductory lecture covering caries etiology and prevention; the oral systemic connection; the oral, head, and neck examination; and common oral pathology. Following the lecture, all PA students (n1 = 40) participated in a 2-hour interprofessional lab experience, pairing PA students with third-year dental students and dental faculty. Dental students and faculty provided hands-on instruction in oral health prevention and diagnosis including physical exam skills and techniques of fluoride varnish application. Each pair of PA students practiced these skills on each other under the supervision of the dental students and dental faculty. Written surveys were administered to PA students before the introductory lecture to establish baseline knowledge and attitudes. These surveys assessed the PA students' knowledge of basic oral health concepts, the oral/systemic connection, the oral examination, the PA role in oral health, and the perception of the benefits of interdisciplinary education. The survey was repeated after the interprofessional workshop and again, 2 years later, near the end of the students' clinical year.

In the second year of the program, the PA students received 4 hours of didactic content on recognition and appropriate treatment of oral health issues most commonly encoun-

tered in primary care. This content took the form of separate 2-hour lectures, delivered by a pediatric dentist and one of the PA program's core faculty, respectively.

In the third year of the program, the PA students participated in a 4-hour training to attain certification to bill Medicaid for oral health services as practicing PAs. The logging program was modified by adding four items specific to oral health (see Box 1). Data from an online patient logging system was used to evaluate use of the following skills during the clinical phase of training: screening for risk for oral disease, application of fluoride varnish, provision of oral health education, and appropriate oral health referral.

This study received an exemption (protocol #10-0313) from the Colorado Multiple Institutional Review Board.

## RESULTS

Forty CHA/PA students in their first year of training received a six-question survey to measure their medical knowledge on oral health topics prior to receiving their oral health didactic and clinical training with dental faculty (see Box 2). After completing the oral health training, the students were given the same survey to measure their medical knowledge to determine if a change had occurred. A total of 40 students were asked to complete the survey, and a 100% response rate was achieved. For all six questions, the first-year PA students' medical knowledge on oral health topics had increased (see Figure 1). Two years after their oral health training, the students (n2 = 36) in their

### Box 1. Custom Checkbox Questions in Online Logging System

- Oral health screening performed
- Oral fluoride varnish applied
- Oral health education provided
- Oral health referral made

**Box 2. Oral Health Knowledge Questions**

1. At what age do teeth begin to erupt in kids?
  - (a) 0–6 months
  - (b) 6–12 months
  - (c) 12–24 months
  - (d) 24–36 months
2. How many primary teeth do kids normally have?
  - (a) 16
  - (b) 20
  - (c) 24
  - (d) 28
3. What is the primary cause of dental caries?
  - (a) Strep mutans
  - (b) Bacteroides species
  - (c) Peptostreptococci
  - (d) Strep viridans
4. What exam finding on children's teeth are precursors of dental caries?
  - (a) White spots
  - (b) Gingival hyperplasia
  - (c) Impacted dentition
  - (d) Plaque
5. A complete set of adult dentition is comprised of how many teeth?
  - (a) 24
  - (b) 28
  - (c) 32
  - (d) 36
6. Oral cancer is most common in which area of the mouth?
  - (a) Hard palate
  - (b) Surface of tongue
  - (c) Inside of cheek
  - (d) Posterolateral tongue

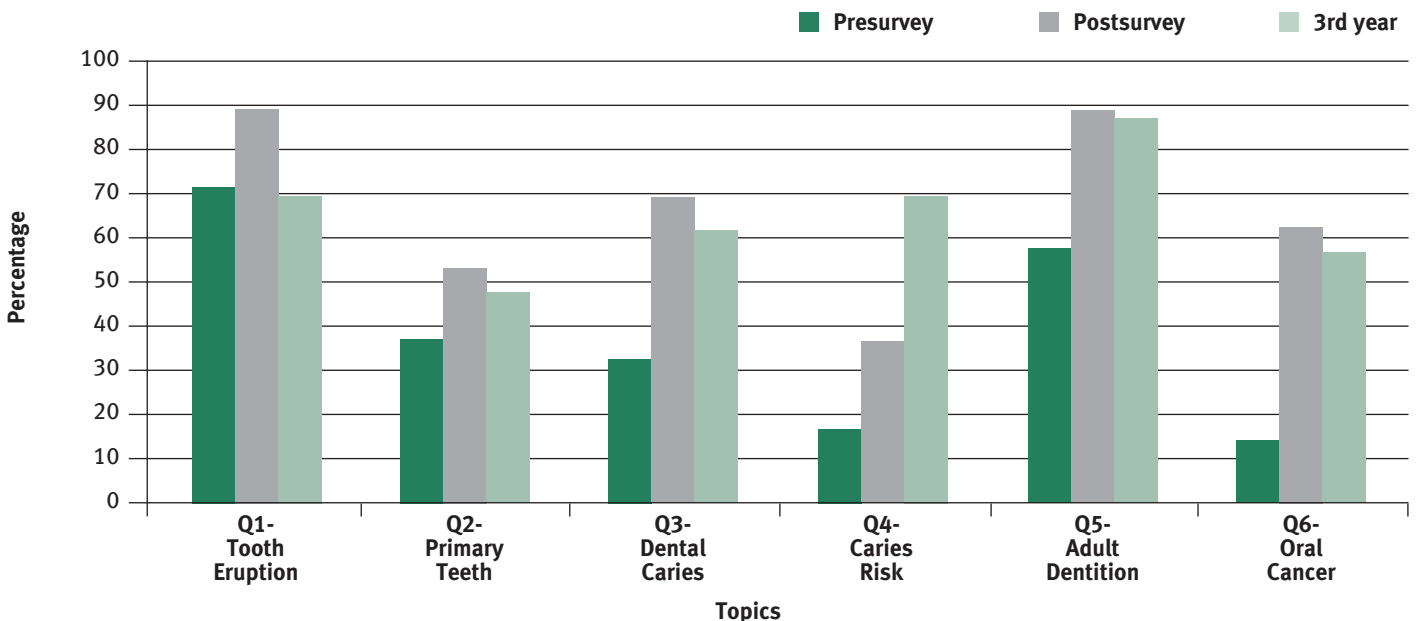
The retention of knowledge was high 2 years after the initial oral health training (see Figure 1). With the exception of tooth eruption, all other topics showed a persistent increase in knowledge relative to the baseline (pretest) level. Analyses using one-tailed unpaired t-test, confirmed significant knowledge increase following the initial intervention ( $P < .03$ ) and 2 years post-intervention ( $P < .02$ ).

To evaluate the application of the students' knowledge and skills in oral health, four custom checkbox questions were added to our online patient logging system in June 2011 to track what elements of oral health were being performed by the student in their clinical rotations (Box 1). Data from the online patient logging system were obtained from the third-year PA students between June 2011 and December 2011. The data were further filtered to include only third-year PA students ( $n3 = 40$ ), whether one or more oral health checkbox questions were answered by a student for a given patient log, and whether the student used an ICD-9 code that was specific

third year of training received the same six-question survey to measure their medical knowledge on oral health topics to determine if they had retained the information from their

first-year oral health training. This survey was administered to a total of 36 students during spring call-back, when four students were out of state. A 100% response rate was achieved.

**Figure 1. Oral Health Knowledge**



to oral health (ICD-9 codes 520–529) on the patient log.

After the filters were applied, there were 279 oral health encounters for the third-year PA students from June 2011 through December 2011. Students reported the provision of oral health services. Of those encounters, providing patient oral health education was completed by more students than screening, varnish application, or referral (see Figure 2).

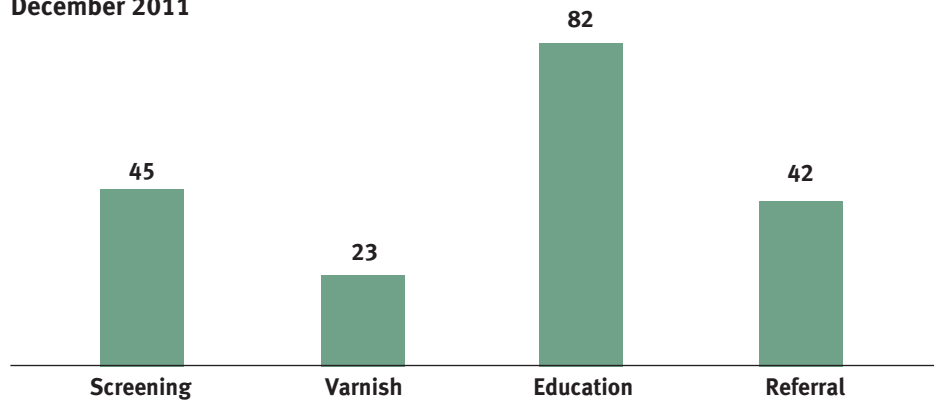
**DISCUSSION**

With Medicaid reimbursement available for PAs in over 40 states, there is great potential to have a significant and lasting impact on oral disease, particularly within high-risk populations. We have shown that with a relatively minor modification of the curriculum to add longitudinal oral health content, we can create a meaningful experience for students and instill oral health knowledge that persists and translates to practical application in the clinical setting. In addition to knowledge of basic oral health concepts, we identify four specific outcomes as measures of oral health competency: the performance of a caries risk assessment, application of fluoride varnish, patient education, and appropriate dental referral. Electronic patient logging systems can be used to gather data on these outcomes.

A potential limitation of this study is that oral health practices have not yet been widely adopted across practices where our students are precepted. Thus, the failure of students to perform oral health procedures may be a reflection of the practice environment, rather than student knowledge or intention. As this study continues, we will gather data on barriers to utilization and opportunities for implementation of oral health behaviors.

Nationally, there is an intense focus on interprofessional training across the health professions.<sup>8</sup> Oral

**Figure 2. Number of Oral Health Procedures Performed from June 2011 – December 2011**



health is a potential catalyst for creating interprofessional, team-based learning experiences that could involve learners from various nursing, medical, and dental professions. In this interprofessional oral health workshop, we found that students from both PA and dental schools benefitted from the interaction.

**ACKNOWLEDGEMENTS**

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