



ELSEVIER



CrossMark

Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

ScienceDirect

Currents in Pharmacy Teaching and Learning 8 (2016) 667–671

Currents  
in Pharmacy  
Teaching  
& Learning

<http://www.pharmacyteaching.com>

Research Article

# An investigation of pharmacy students' perceptions of their oral health knowledge and education: A preliminary study

Paul Gavaza, PhD<sup>\*</sup>, Nguyen Ta, PharmD Candidate, Rashid Mosavin, RPh, PhD, MBA

Department of Pharmaceutical and Administrative Sciences, Loma Linda University School of Pharmacy, Loma Linda, CA

## Abstract

**Purpose:** To investigate the California pharmacy students' perception of their oral health education and knowledge.

**Methods:** In Spring 2015, we e-mailed experiential directors from all the eight accredited pharmacy schools in California requesting them to forward the survey cover letter, including a link to a 16-item online survey, to all their senior students. The e-mail also explained the purpose of the study. The survey measured students' opinions on oral health and its interface with general health and students' demographic characteristics.

**Results:** A total of 58 responses were received from students from five schools. Many ( $n = 25$ ; 44%) students reported that oral health was not taught in any course of their pharmacy curriculum. Most ( $n = 43$ ; 75.4%) students believed there was limited collaboration between primary care providers in managing patients' oral and overall health concerns. Most students ( $n = 51$ ; 89.5%) indicated that "limited time is devoted to oral health topics in pharmacy education" and that they needed more education on oral health ( $n = 41$ , 73.2%).

**Conclusions:** Many students have limited knowledge and education on oral health and indicated that they needed more education on oral health topics. Further research using larger and more representative samples is needed.

© 2016 Elsevier Inc. All rights reserved.

**Keywords:** Oral health; Oral-systemic link; Pharmacy education; Pharmacy students

## Introduction

Oral health is integral to and inseparable from one's overall health. To maintain health, it is important for people to maintain oral health. Many conditions such as diabetes mellitus,<sup>1,2</sup> cardiovascular disease,<sup>3,4</sup> HIV/AIDS,<sup>5</sup> cancer, osteoporosis,<sup>4</sup> and Sjogren's syndrome, among others<sup>6,7</sup> have been linked to chronic oral diseases. Many medications that are commonly used in treating systemic diseases and conditions can directly or indirectly affect patients' oral health.<sup>8</sup>

Pharmacists play an important role in ensuring appropriate use of medications many of which have oral side effects such as xerostomia, dysgeusia, and stomatitis. This is critically important, as many medical professionals do not recognize the link between oral health and overall health. Pharmacists can educate their patients about the potential oral side effects of their medications as well as work with dentists to improve oral health as part of whole-person care.

In order to be able to provide optimal whole-person care pharmacists should be ready to offer consultation for patients regarding oral health and medications that may impact oral health. Pharmacists can play an important role in enhancing oral health if they are appropriately educated or trained on oral health. However, the US Surgeon General report noted that "Too little time is devoted to oral health and disease topics in the education of non-dental health professionals."<sup>8</sup> A previous preliminary study investigated the inclusion of

<sup>\*</sup> Corresponding author: Paul Gavaza, PhD, Department of Pharmaceutical and Administrative Sciences, Loma Linda University School of Pharmacy, Shryock Hall 226, Loma Linda, CA 92350.

E-mail: [pgavaza@llu.edu](mailto:pgavaza@llu.edu); [pgavaza@gmail.com](mailto:pgavaza@gmail.com)

oral-systemic health education in pre-doctoral/undergraduate curricula of pharmacy, nursing, and medical schools around the world (e.g., in Canada, the United States, Europe, Asia, Australia, and New Zealand) by surveying pharmacy school administrators responsible for curricula.<sup>9</sup> Most of respondents mentioned that there was limited or no requirement to include oral health education within their training curricula. Most respondents considered that their current curricula inadequately covered oral-systemic health topics.<sup>9</sup> However, little is known about how and the extent to which pharmacy schools in California and the rest of the United States prepare future pharmacists to prevent and address their patients' oral health concerns.

### Study aims and objectives

The aim of the study is to investigate the California pharmacy students' perception of their oral health education and knowledge. The specific objectives of the study were to

- (1) determine pharmacy students' opinions of their oral health education in their Doctor of Pharmacy program,
- (2) determine pharmacy students' awareness and perception of the interface between oral and overall health,
- (3) determine pharmacy students' knowledge about dental diseases and the effects of medications on the oral cavity, and
- (4) determine pharmacy students' readiness and competence to offer consultation regarding oral health and medications that have oral health side effects.

### Methods

The protocol for this cross-sectional study was approved by the Loma Linda University Health Research Ethics Board. The survey was developed by the authors based on current pharmacy, dental, and medical literature. The content and validity of the survey was assessed by pharmacists and pharmacy faculty at Loma Linda University School of Pharmacy. Before distribution, the survey was pre-tested with ten fourth-year pharmacy students from the Loma Linda University School of Pharmacy for completeness.

The survey was divided into three sections with a total of 16 items measuring students' opinions on oral health and its interface with general health as well as students' personal and demographic characteristics (e.g., age, gender, and current academic year). To measure their opinions, students were asked to indicate their agreement or disagreement with given statements using a scale ranging from one (strongly disagree) to five (strongly agree) and three being neither agree nor disagree.

The study was targeted at students in their final year of pharmacy school from all the eight pharmacy schools in the state of California that were accredited by the American Council on Pharmaceutical Education (ACPE). At seven schools, these were fourth-year students and from one school they were third-year students. In Spring 2015, we e-mailed experiential education department directors from all the eight accredited pharmacy schools in California requesting that they forward the survey cover letter, including a link to an online survey, to all their final year students. Names and e-mail addresses of the experiential directors were obtained from the relevant university websites. The survey was administered using Qualtrics<sup>®</sup> software.

The e-mail also explained the purpose of the study. Students were informed that completing the survey indicated their consent to participate in the study. It took students about ten minutes to complete the survey. Data collection lasted six weeks. A reminder email with the link to the questionnaire was sent out three weeks after the first e-mail.

### Data analysis

Descriptive statistics were computed for all study variables. All the data were uploaded to Statistical Package for Social Sciences<sup>®</sup> (SPSS) software for analysis. A  $p \leq 0.05$  was considered statistically significant.

### Results

A total of 58 students from five pharmacy schools completed the survey. Most students were female ( $n = 33$ , 62.3%), Asian American/Pacific Islander ( $n = 34$ , 65.4%) and in their fourth year ( $n = 43$ , 74.1%). There were no respondents from the University of California at San Francisco, Touro University, or California Northstate University schools of pharmacy (Table 1).

#### Students' opinions on oral health issues

Totally, 90% of students agreed/strongly agreed that "Limited time is devoted to oral health topics in pharmacy education" ( $n = 51$ , 89.5%) and "The dental discipline remains relatively segregated from other health care disciplines" ( $n = 47$ , 82.5%) (Table 2). Furthermore, most students ( $n = 41$ , 73.2%) agreed/strongly agreed with the statement "I need more education and training on oral health (e.g., oral side effects of medications)" (Table 2). Only five (8.9%) students agreed/strongly agreed with the statement "I have adequate knowledge of periodontal diseases and their associations with systemic diseases. Overall, I have had good oral health education in my pharmacy curriculum." The five students who agreed with the later statement were from Loma Linda University ( $n = 3$ ), Western University of Health Sciences ( $n = 1$ ), and the University of Southern California ( $n = 1$ ).

Table 1  
Personal and demographic characteristics of respondents

Gender ( <i>n</i> = 53)	
Female	33 (62.3)
Male	20 (37.7)
Race/ethnicity ( <i>n</i> = 52)	
Asian American/Pacific Islander	34 (65.4)
Caucasian/non-Hispanic White	11 (21.1)
Mexican American/Hispanic	3 (5.8)
African American/non-Hispanic Black	2 (3.8)
Other	2 (3.8)
American Indian or Alaska Native	–
Current academic year ( <i>n</i> = 58)	
Third year	15 (25.9)
Fourth year	43 (74.1)
Pharmacy school ( <i>n</i> = 58)	
Loma Linda University	24 (41.4)
University of the Pacific	15 (25.9)
University of Southern California	10 (17.2)
Western University of Health Sciences	7 (12.1)
University of California, San Diego	2 (3.4)
Item	
Age ( <i>n</i> = 46)	Mean (SD) 27 (2.8)
Hours of work per week at primary place of internship ( <i>n</i> = 45)	19.3 (14.2)

There was no association between the pharmacy school students attended and their responses on the items: “I have adequate knowledge of periodontal diseases and their associations with systemic diseases,” “I have adequate

Table 2  
Students' opinion on oral health issues

Item ( <i>n</i> = 56)	Mean (SD)	Strongly disagree/ disagree (%)	Neutral (%)	Strongly agree/agree (%)
(1) The dental discipline remains relatively segregated from other health care disciplines. ( <i>n</i> = 57)	3.8 (0.7)	4 (7.0)	6 (10.5)	47 (82.5)
(2) There is limited collaboration between primary care providers in managing oral and overall health concerns of patients. ( <i>n</i> = 57)	3.8 (0.7)	3 (5.6)	11 (19.3)	43 (57.9)
(3) Limited time is devoted to oral health topics in pharmacy education. ( <i>n</i> = 57)	3.95 (0.6)	2 (3.5)	4 (7.0)	51 (89.5)
(4) I need more education and training on oral health (e.g., oral side effects of medications).	3.8 (0.6)	1 (1.8)	14 (25.0)	41 (73.2)
(4) I will be able to confidently counsel patients on oral adverse effects of medications when I graduate.	3.1 (0.9)	14 (25.0)	25 (44.6)	17 (30.4)
(5) I am aware of the common adverse effects associated with the most commonly used medications.	3.8 (0.7)	3 (5.3)	9 (16.1)	44 (78.6)
(6) I can confidently discuss the implications of systemic diseases and relevant medications on periodontal diseases with other health care professionals (e.g., dentists).	2.8 (0.9)	23 (41.1)	19 (33.9)	14 (25.0)
(7) I have adequate knowledge of periodontal diseases and their associations with systemic diseases.	2.5 (0.8)	31 (55.4)	20 (35.7)	5 (8.9)
(8) Overall, I have had good oral health education in my pharmacy curriculum.	2.5 (0.8)	31 (55.4)	20 (35.7)	5 (8.9)
(9) I have adequate knowledge regarding the oral impacts and side effects of medications.	3.1 (0.8)	12 (21.4)	23 (41.1)	21 (37.5)

knowledge regarding the oral impacts and side effects of medications” and “Overall, I have had good oral health education in my pharmacy curriculum.”

#### Coverage of oral health topics in pharmacy education

Many students (*n* = 25, 40.3%) indicated that oral health was not taught in any course of their pharmacy curriculum (Table 3). Oral health was a topic covered in a course in 26 (41.9%) students' pharmacy curriculum. Eight students indicated that oral health was offered as an elective at their school (Table 3); all but one of these students attended Loma Linda University.

#### Discussion

We found that most students believed that limited time was devoted to oral health topics in their pharmacy education. This finding suggests that pharmacy schools in California may not be providing comprehensive oral health education to their students. This also concurs with the results of a preliminary study among pharmacy administrators responsible for curricula that reported a lack of information pertaining to the significance of oral health in pharmacy education.<sup>9</sup> In addition, very few pharmacy schools had requirements to incorporate oral-systemic health in their curricula.<sup>9</sup> These pharmacy administrators believed that their oral health curricular content was inadequate.<sup>9</sup> Similar findings have been reported among internal medicine trainees.<sup>10</sup>

Most respondents indicated that they had inadequate knowledge regarding the impact and side effects of medications on oral health. Pharmacy students have been

Table 3  
Coverage of oral health topics in pharmacy curricula

Item ( <i>n</i> = 62)	Frequency (%)
Oral health is offered as an elective course in my pharmacy curriculum.	8 (12.9)
Oral health is offered as an individual study in my pharmacy curriculum.	–
Oral health is offered as an independent, required course in my pharmacy curriculum.	1 (1.6)
Oral health is a topic within a course(s) in my pharmacy curriculum.	26 (41.9)
Oral health is not taught in any course of my pharmacy curriculum.	25 (40.3)
Others	2 (3.2)

reported to receive less oral health education than medical and nursing students.<sup>9</sup> The limited oral health knowledge may negatively impact the respondents' confidence in counseling patients on oral adverse effects of medications upon graduation. Furthermore, it may hinder interprofessional collaboration with dentists and medical doctors and may result in sub-optimal patient care. Providing more oral health education to pharmacy students may help narrow the gap between pharmacy, dental, and medical disciplines, and thus catalyze this interprofessional collaboration in the future.

The study results showed that only five (8.9%) students indicated that they had adequate knowledge of periodontal diseases and their associations with systemic diseases; most of these students attended Loma Linda University (*n* = 3) that offers a dental elective to students. This lends support for the need and importance of providing more dental health education to pharmacy students. However, there is no explicit requirement from the Accreditation Council for Pharmacy Education (ACPE) to include oral health education in the pharmacy curricula as part of accreditation. Such a requirement would contribute to expanding oral health education in the pharmacy curricula. Currently oral health education is only implicitly implied in the ACPE Standards under the Essentials for Practice and Care standard (Standard 2). For example, under the key element "health and wellness" ACPE stipulates that pharmacy graduates should be "able to design prevention, intervention, and educational strategies for individuals and communities to manage chronic disease and improve health and wellness."<sup>11</sup>

Similar to the results of a previous preliminary study, we found that many students agreed/strongly agreed that they needed more education on oral health implying that they considered this competence to be important.

The study had several limitations. First, is the small number of students who responded to the survey. The survey was distributed to students through the respective schools' experiential education department directors. It is possible that some experiential department directors did not forward the survey to their students. The small sample size makes non-response bias a concern and may limit the generalizability of the study. However, the study respondents had similar characteristics (e.g., the majority of respondents were female and Asian) to the population of California pharmacy students.

Second, social desirability response bias cannot be completely ruled out for this study. Third, the study only included students from California schools and hence may not be generalizable to students from other states. Fourth, the study relied primarily on students' recall. We did not verify this information with the students' respective curricula. However, we compared the students' responses alignment with the Loma Linda University School of Pharmacy curricula and found close alignment.

## Conclusion

Many students have limited knowledge and education on oral health. Most students indicated that they needed more education on oral health topics. Pharmacy curricula should expand the coverage of oral health education topics. Further research using larger and more representative samples is needed.

## Conflict of interest

None.

## Acknowledgment

The authors wish to thank the directors of experiential education departments at pharmacy schools in California who voluntarily facilitated our study and all the participating students for their involvement in this study.

## References

1. Engebretson S, Kocher T. Evidence that periodontal treatment improves diabetes outcomes: a systematic review and meta-analysis. *J Clin Periodontol*. 2013;40(suppl 14):S153–S163.
2. Borgnakke WS, Ylostalo PV, Taylor GW, Genco RJ. Effect of periodontal disease on diabetes: systematic review of epidemiologic observational evidence. *J Clin Periodontol*. 2013;40(suppl 14):S135–S152.
3. Scannapieco FA, Bush RB, Paju S. Associations between periodontal disease and risk for atherosclerosis, cardiovascular disease, and stroke. A systematic review. *Ann Periodontol*. 2003;8(1):38–53.
4. Kuo LC, Polson AM, Kang T. Associations between periodontal diseases and systemic diseases: a review of the inter-

- relationships and interactions with diabetes, respiratory diseases, cardiovascular diseases and osteoporosis. *Public Health*. 2008;122(4):417–433.
5. Yeung SC, Stewart GJ, Cooper DA, Sindhusake D. Progression of periodontal disease in HIV seropositive patients. *J Periodontol*. 1993;64(7):651–657.
  6. Scannapieco FA, Papandonatos GD, Dunford RG. Associations between oral conditions and respiratory disease in a national sample survey population. *Ann Periodontol*. 1998;3(1):251–256.
  7. Scannapieco FA, Ho AW. Potential associations between chronic respiratory disease and periodontal disease: analysis of National Health and Nutrition Examination Survey III. *J Periodontol*. 2001;72(1):50–56.
  8. U.S. Department of Health and Human Services. Oral Health in America: A Report of the Surgeon General. Rockville, MD: National Institute of Dental and Craniofacial Research, National Institutes of Health, US Department of Health and Human Services; 2000.
  9. Hein C, Schönwetter DJ, Iacopino AM. Inclusion of oral-systemic health in predoctoral/undergraduate curricula of pharmacy, nursing, and medical schools around the world: a preliminary study. *J Dent Educ*. 2011;75(9):1187–1199.
  10. Quijano A, Shah AJ, Schwarcz AI, Lalla E, Ostfeld RJ. Knowledge and orientations of internal medicine trainees toward periodontal disease. *J Periodontol*. 2010;81(3):359–363.
  11. Accreditation Council for Pharmacy Education: Accreditation Standards and Key Elements for the Professional Program in Pharmacy Leading to the Doctor of Pharmacy Degree (“Standards 2016”). Published February 2015. Available at: (<https://www.acpe-accredit.org/pdf/Standards2016FINAL.pdf>). Accessed June 1, 2016.