



## Interprofessional education in dental schools: Results of a national survey

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### 1. Introduction

Interprofessional education (IPE) has been widely published in the health professional education literature, dating back to the 1960s.<sup>1</sup> The Institute of Medicine (IOM) held its first conference on IPE in 1972 and included leaders across the health professions (allied health, dentistry, medicine, nursing, and pharmacy). Shortly thereafter, the IOM published a report focused on the interrelationship of different professions in healthcare.<sup>2</sup> In the 1980s, IPE gained momentum with two reports from the World Health Organization (WHO), “Continuing Education for Physicians” and “Learning Together to Work Together”.<sup>1</sup> The focus on IPE during this time came from the growing concern regarding medical errors and inefficient use of medical expertise.<sup>3</sup> At this time, dentistry was not yet a part of the IPE discussion. It was not until 2008 when Wilder et al. wrote that little IPE had been introduced into dental education, and dental educators became concerned about its isolation from other health professions.<sup>4</sup>

Over the years, as health systems shifted to a collaborative care approach, an interdisciplinary perspective in training new healthcare workers became paramount. Many professional schools, their accreditation bodies, and national and international organizations started developing standards for IPE training. In 2010, the WHO published “The Framework for Action on Interprofessional Education and Collaborative Practice” which “highlights the current status of inter-professional collaboration around the world, identifies the mechanisms that shape successful collaborative teamwork, and outlines a series of action items that policymakers can apply within their local health system” (WHO, 2010, p.9). Furthermore, accreditation boards not only established IPE core competencies individually but also worked collaboratively. The Interprofessional Education Collaborative (IPEC), an expert panel of representatives from national associations in nursing, pharmacy, medicine, dentistry, public health, and osteopathic medicine, developed core competencies in 2011.<sup>3</sup> IPEC not only set educational standards but also modeled a true example of interprofessional collaboration.

In 2011, the American Dental Education Association (ADEA) Team Study Group on Interprofessional Education was formed to assess the

state of IPE in dental schools in the U.S. and Canada. The following year (2012), the ADEA IPE team distributed its first survey since the group's creation and the development of IPEC's core competencies to assess: 1) IPE educational activities; 2) the relationship of these activities to IPE standards; and 3) how IPE-related competencies were addressed. They found that despite 82% (51/62) of respondents having reported either a medical or nursing school on campus, only 63% (39/62) collaborated with the medical program and 47% (29/62) with the nursing program. Other specialty programs that dental schools collaborated with included pharmacy, physical therapy, psychology, social work, and other dental programs (hygiene, assisting, etc.). Soon after the study's results were distributed, the new Commission on Dental Accreditation (CODA) standards related to IPE were implemented in 2013. The authors acknowledged that these standards would likely change the culture of IPE in dental education. Thus, a follow-up analysis of the state of IPE in dental schools was recommended.<sup>5</sup>

In 2014, ADEA surveyed U.S. dental schools to determine their progress in IPE curricular activities. They found that 90% (56/62) of dental schools offered IPE experiences. The most common professions included in these experiences were nursing (82%), medicine (75%), pharmacy (68%), and other (61%). The authors reported that between 2012 and 2014, dental school IPE experiences went from 66% voluntary to 69% mandatory for all students, indicating the commitment to an IPE curriculum. However, despite this progression, dental schools reported two areas that required more development: 1) learner assessment regarding IPEC core competencies; and 2) evaluation of IPE program effectiveness. Furthermore, dental schools claimed that the academic schedule was the most difficult barrier to overcome.<sup>6</sup>

In 2016, the Center for Integration of Primary Care and Oral Health (CIPCOH), one of six national centers under the Academic Units for Primary Care Training Enhancement program, was created through funding from the U.S. Department of Health and Human Services, Health Resources and Services Administration (US DHHS HRSA). CIPCOH, a multi-institution and multidisciplinary center, is committed to evaluating oral health integration within primary care training using a systems-level approach.<sup>7</sup> As one of its Year 1 research projects, CIPCOH conducted surveys with thirteen primary care disciplines (e.g.,

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family medicine and pediatrics residency, physician assistant, nurse practitioner, and midwifery program directors) to determine the disciplines' current scope of oral health curriculum in primary care training. The survey was then adapted to evaluate interprofessional curricular activities in dental schools. While the goals of this survey aimed to follow-up on dental schools' progress in IPE after the aforementioned ADEA studies, this survey did not directly stem from the ADEA studies. The aim of the current study was to examine IPE within pre-doctoral curriculum across U.S. dental schools.

## 2. Materials and methods

(Institution) (#H00012069) and (Institution) (#IRB17-0189) Institutional Review Boards approved this study and gave exemption waivers.

### 2.1. Study population

An eighteen-item survey was developed and distributed electronically to the Deans at sixty-six accredited U.S. dental schools. Contact information was obtained from ADEA. The Deans were asked to forward the survey link to another faculty member if that individual was more appropriate for responding to the survey.

### 2.2. Survey instrument and data collection

The survey was adapted from the original CIPCOH survey of primary care disciplines and relevant literature.<sup>8-12</sup> The intent of the original CIPCOH survey was to determine the scope of oral health curriculum taught in U.S. primary care training programs. The current survey was adapted to run a parallel investigation into dental students' IPE education with primary care students. The dental school survey (see Appendix) consisted of twelve questions pertaining to oral health education (e.g., curricular topics), the presence of dental professionals in teaching interprofessional sessions, the awareness and use of educational resources (e.g., *Smiles for Life* oral health curriculum), barriers to the inclusion of IPE, evaluation methods of learners regarding IPE competence, attitudes toward the integration of oral health and primary care, and satisfaction with learner's competence in IPE. Most of the survey questions were multiple choice; however, one question asked respondents to use a Likert scale (1 = 'strongly disagree' to 5 = 'strongly agree'). Five demographic questions about the schools were included such as location, size of community served, number of students trained per year, length of tenure as a dental institution, and current position of individual completing the survey. Finally, schools were asked whether they self-identify as being a "best practice" in IPE and asked for permission to be contacted for a follow-up telephone interview in a second phase of this study (not reported here). The initial survey was reviewed and modified by oral health experts. The survey was piloted with a few former deans of dental schools or dental school leaders and then edited before distribution.

A web-based survey tool and data collection software application (SurveyMonkey, Inc., Palo Alto, CA) was used following online survey methodology strategies.<sup>13</sup> One week prior to survey distribution, a cover letter was emailed to all dental school Deans. The cover letter described the study's purpose, its voluntary nature, and the anonymity of respondents. The survey was fielded between February and June, 2017. At two three-week intervals, reminders were sent to improve the response rate, as recommended by Dillman's Total Design Method.<sup>14</sup>

### 2.3. Data analysis

Data analysis was conducted with SPSS statistical software (SPSS V23, IBM Corporation, 2015). Survey items were described with univariate statistics (frequencies, percentages, and means). Bivariate analyses were conducted to assess the relationship between the number of

**Table 1**  
Demographic characteristics of dental school respondents (N = 29)<sup>a</sup>.

	N (%)
<b>Location (grouped by U.S. region)</b>	
Northeast	7 (25.0)
Midwest	5 (17.9)
South	10 (35.7)
West	6 (21.4)
<b>Community Size</b>	
Less than 30,000	0 (0.0)
30,001 to 75,000	2 (8.7)
75,001 to 150,000	3 (13.0)
150,001 to 500,000	7 (30.4)
500,001 to 1 million	4 (17.4)
More than 1 million	7 (30.4)
<b>Number of students enrolled per year</b>	
< 30	0 (0.0)
31-60	5 (20.0)
61-100	11 (44.0)
> 100	9 (36.0)
<b>Number of years in operation</b>	
1-5 years	4 (16.0)
6-10 years	1 (4.0)
11-15 years	2 (8.0)
> 15 years	18 (72.0)
<b>Current position of survey respondent</b>	
Dean	16 (64.0)
Dean of Education	6 (24.0)
Dean of Students	3 (12.0)

<sup>a</sup> Frequencies within each variable may not add up to twenty-nine due to sporadic missing data.

barriers to teaching more IPE and satisfaction with students' level of IPE preparation and competence by dental school graduation. For bivariate analyses, responses were categorized as 'strongly agree'/'agree' versus 'neutral'/'disagree'/'strongly disagree'. Significance was set at alpha = 0.05.

## 3. Results

Twenty-nine of the sixty-six dental schools completed the survey, for a response rate of 44%. (It is important to note that the total N may not add up to twenty-nine for all survey questions because of sporadic missing data.) Characteristics of responding institutions are listed in Table 1. A majority of respondents (64%) were Deans of the dental

**Table 2**

Number (and percent) of non-dental learners who participate in IPE sessions in dental curriculum (N = 29).

Learner Type	N (%)
Medical students	26 (89.7)
Pharmacy students	22 (75.9)
Nursing students	18 (62.1)
Physician Assistant students	12 (41.4)
Nurse Practitioner students	9 (31.0)
Pediatric residents	5 (17.2)
Family Medicine residents	4 (13.8)
Occupational Therapy students	4 (13.8)
Midwifery students	3 (10.3)
Optometry students	3 (10.3)
Social Work students	3 (10.3)
Geriatric fellows	2 (6.9)
Physical Therapy students	2 (6.9)
Internal Medicine residents	1 (3.4)
Obstetrical residents	1 (3.4)
Other learners (Allied Health Students, Clinical Psychology, Law, Podiatry)	4 (13.8)

<sup>a</sup>Frequencies within each variable may not add up to twenty-nine due to sporadic missing data.

**Table 3**  
Number (and percent) of reported barriers preventing more IPE teaching (N = 29).

Barrier	N (%)
Time in the curriculum	20 (69.0)
Lack of faculty expertise in oral health	8 (27.6)
Competing priorities	16 (55.2)
Lack of interest from faculty	5 (17.2)
Lack of dental school national competencies in IPE	1 (3.4)
Lack of dental school accreditation standards addressing IPE	1 (3.4)
Lack of a formal relationship with medical/non-dental programs	0 (0.0)
Lack of interest from medical/non-dental programs	1 (3.4)
None	8 (27.6)
Other: Defining outcomes for patients and students, logistics, perception of value of IPE	3 (10.3)

<sup>a</sup>Frequencies within each variable may not add up to twenty-nine due to sporadic missing data.

**Table 4**  
Number (and percent) of respondents using types of evaluation methods to assess learners' IPE competence (knowledge, attitudes, and skills) (N = 29).

Evaluation Method	N (%)
Written/computer testing	1 (3.4)
OSCE (Objective Structured Clinical Examination) or equivalent	12 (41.4)
Simulation experiences	8 (27.6)
Direct observation in clinical setting	11 (37.9)
Review clinical documentation	12 (41.4)
We do not assess our learnings on IPE topics	5 (17.2)
Other: Portfolios	1 (3.4)

<sup>a</sup>Frequencies within each variable may not add up to twenty-nine due to sporadic missing data.

school; the remainder were Deans of Education (24%) or Deans of Students (12%). Respondents, in general, represented all regions of the U.S., with a majority of schools located in large cities with population sizes either between 150,000 and 500,000 or over one million people. Dental school program sizes were mostly sixty-one to 100 students (44%) or over 100 (36%) students per year, while the average dental program has ninety-three students in its first year (calculated from American Dental Association: 2016–2017 Survey of Dental Education: Report 1, Table 2).<sup>19</sup> Almost three-quarters of the schools (72%) had been educating learners for over fifteen years, while the average US dental school has been educating learners for about eighty years (calculated from American Dental Education Association: Snapshot of Dental Education 2018–2019, p. 2).<sup>20</sup>

Nearly all (96%) respondents reported engaging in non-clinical and clinical interprofessional sessions. Medical (90%), pharmacy (76%), and nursing (62%) students were the most common learners to have co-

**Table 5**  
Number (and percent) of respondents aware of or utilizing documents or organizations to inform curriculum (N = 29).

	I am aware of N (%)	I utilize to inform competencies of curriculum N (%)
Interprofessional Education Collaboration (IPE) Core Competencies for Interprofessional Collaborative Practice	23 (79.3)	11 (37.9)
The American Association of Medical Colleges (AAMC) Oral Health Competencies	13 (44.8)	1 (3.4)
HRSA Integration of Oral Health and Primary Care Practice	15 (51.7)	4 (13.8)
Oral Health During Pregnancy: A National Consensus Statement (in collaboration with ACOG)	10 (34.5)	1 (3.4)
Qualis Health 2016. Evidence-based Care Supplement: Oral Health Integration	6 (20.7)	4 (13.8)
National Interprofessional Initiative on Oral Health ( <a href="http://www.niioh.org">www.niioh.org</a> )	6 (20.7)	3 (10.3)
Institute of Medicine Advancing Oral Health in America	14 (48.3)	5 (17.2)
Institute of Medicine Improving Access to Oral Health Care for Underserved and Vulnerable Populations	8 (27.6)	1 (3.4)
Other:		
• ADA/CODA		
• WHO Report: Framework for action on interprofessional education and collaborative practice		

<sup>a</sup>Frequencies within each variable may not add up to twenty-nine due to sporadic missing data.

participated in these sessions (Table 2).

Over three-quarters (79%) of the schools reported dental faculty with teaching responsibilities in other health professional schools, while nearly all (93%) schools reported faculty from other health professions teaching in their dental curriculum. Furthermore, 82% of schools gave academic appointments to faculty from other health professional schools.

As a way to mirror the primary care surveys simultaneously distributed, the CIPCOH team also asked dental schools about the oral health topics covered in their curriculum. Almost all (97%) schools reported covering caries/cavity risk assessments, oral conditions that impact overall health (e.g., periodontitis), medical conditions that impact oral health (e.g., diabetes), impact of medications on oral health, and pregnancy oral and systemic health issues. Furthermore, nearly all schools responded 'yes' to three additional oral health topics: disparities in oral health/social determinants of health (93%); assessment of the impact of oral health on a patient's quality of life (86%); and geriatric oral and systemic health issues (93%).

As for barriers to teaching more IPE, deans reported the following to be the most common: time in curriculum (69%); competing priorities (55%); and lack of faculty expertise in IPE (28%). Just over one-quarter (28%) of programs responded that they experienced no barriers to teaching more IPE (full results in Table 3 below).

When asked about evaluation, almost half of the dental schools (41%) reported evaluating their students for IPE competence with the Objective Structured Clinical Examination (OSCE; or equivalent) or a review of clinical documentation. Direct observation was less common (38%). Seventeen percent of respondents reported not assessing their learners on IPE topics (full results in Table 4 below).

While institutions reported awareness of national interprofessional and oral health educational resources, there was no consensus on which of these resources were used to inform curriculum competencies for IPE. The IPEC Core Competencies for Interprofessional Collaborative Practice were used by over a third of the schools (38%) compared to the other documents or organizations (e.g., Institute of Medicine Advancing Oral Health in America, HRSA Integration of Oral Health and Primary Care Practice (17% and 14% use, respectively)) (full results in Table 5 below).

Respondents were asked to rate their level of agreement with several IPE topics (see Table 6). Seventy-six percent strongly agreed that it was important for medical providers to address oral health, while 84% strongly agreed dental providers should address systemic health issues. Fewer were satisfied with their graduates' level of preparation to work collaboratively with medical providers (8% strongly agree, 52% agree). Additionally, no respondent strongly agreed with the statement that they were satisfied with their students' level of competence in IPE by dental school graduation; the majority of respondents (44%) were neutral in their response.

**Table 6**  
Survey respondents (N = 29) level of agreement on the importance of IPE, preparation of their students, and satisfaction with level of student competence<sup>a</sup>.

Statement	N (%)					Mean (SD)
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	
It is important for medical providers to address their patients' basic oral health care issues (e.g., caries prevention, dental referrals).	1 (4.0)	0 (0.0)	0 (0.0)	5 (20.0)	19 (76.0)	4.64 (0.86)
It is important for dental providers to address their patients' systemic health issues (e.g., diabetes).	1 (4.0)	0 (0.0)	0 (0.0)	3 (12.0)	21 (84.0)	4.72 (0.84)
Upon graduation, our dental students are well prepared to work collaboratively with medical providers on oral health issues.	1 (4.0)	0 (0.0)	9 (36.0)	13 (52.0)	2 (8.0)	3.64 (0.70)
I am satisfied with the current level of competence that our dental students achieve in interprofessional education by graduation.	1 (4.0)	7 (28.0)	11 (44.0)	6 (24.0)	0 (0.0)	2.88 (0.83)

<sup>a</sup> Four schools did not report their level of agreement for the statements.

There was no statistically significant difference between the number of barriers (0, 1–2, 3+) to teaching more IPE and satisfaction with preparation (recoded as neutral/disagree vs agree;  $X^2 = 1.76$ ;  $p = 0.414$ ) and competence (recoded as neutral/disagree vs agree;  $X^2 = 1.05$ ;  $p = 0.593$ ) of students in IPE by graduation (data not shown).

#### 4. Discussion

This study assessed current IPE curriculum across U.S. dental schools. When compared to the 2012 and 2014 ADEA studies, the prevalence of IPE in dental schools' curriculum has increased. This is most likely a result, at least in part, due to the 2013 implementation of CODA IPE standards and the accreditation cycle. However, while incorporation of IPE is almost universal across responding schools, very few were strongly satisfied with the preparation and competence of their students in IPE by graduation, which was one of the most important findings. To close the gap between the presence of IPE and actual changes in competence, educators may need to develop better instruction and assessment of IPE in accordance with the WHO definition. The WHO reports that IPE occurs “when students from two or more professions learn about, from, and with each other to enable effective collaboration and improve health outcomes” (WHO, 2010, p.7).<sup>21</sup> Therefore, there are two goals of IPE: 1) changing learning and/or course structure to allow for learning “about, from, and with” different health disciplines to promote interprofessional collaboration, which ultimately results in 2) improving patient health outcomes. A WHO framework lays out these goals in a visual continuum, starting with healthcare needs which promote IPE, then develops into collaborative practice, and ends with a strengthened healthcare system with improved patient outcomes.<sup>15</sup>

Exposing faculty and students to individuals from other professions and presenting them with IPE curriculum is necessary, but alone, not sufficient. In the current study, we did not assess the difference between non-clinical and clinical IPE; however, the presence of clinical IPE is critical to help transition students from theory to practice. Classroom knowledge must be transformed into skills and attitude change within clinical practice with the goal that these changes lead to an improved system and better patient care.

Currently, the IPE-focused CODA standards (1–9 and 2–19) require dental schools to show evidence of student competence in the interaction, communication, and collaboration with members of the healthcare system.<sup>16</sup> As dental schools continue to work toward providing this evidence, they should also evaluate how students are influencing patient outcomes through collaborative practice or Interprofessional Practice (IPP). This could be a potential area for future research efforts.

This study showed no consensus on IPE evaluation methods and almost a fifth of programs had no evaluation of IPE among their learners. In 2015, Andrews completed a survey of U.S. and Canadian dental schools which found similar results.<sup>17</sup> The author reported that “many programs ... reported difficulty measuring the impact of their IPE programs, as team-based assessments and attitudinal survey, the most frequent methods of assessment, were not always sufficient to gauge tangible outcomes nor to assess competence” (Andrews, 2017, eS187). Furthermore, a challenge unique to IPE is that often these sessions can include learners of different degree programs (e.g., bachelors, doctoral, etc.) and at disparate training levels. Thus, assessment of their knowledge, skills, and attitudes may be complex because of where learners are in their education. Additionally, it is well-recognized across health professions (not just dentistry) that there is a need for establishing standardized and accepted instruments of evaluation in IPE.<sup>18</sup> This is an area for continued research and dissemination of best practices.

Sharing best practices across disciplines outside of dentistry may also be beneficial. As previously mentioned, CIPCOH conducted a parallel study of oral health curriculum in thirteen primary care disciplines.<sup>7</sup> The results of those surveys (not reported here) showed that,

overall, oral health curriculum varies drastically across the primary care training spectrum. For instance, physician assistant and pediatric nurse practitioner programs were champions in integrating oral health into their curricula. Conversely, family medicine residencies and geriatric fellowship programs have room for improvement. Furthermore, multiple programs within each discipline self-selected themselves as best practices in oral health integration. CIPCOH will be completing phone interviews with these programs and reporting on its findings.

Based on the results of our study, the following are future endeavors to consider. With our quantitative assessment of barriers to more IPE teaching, qualitative studies could explore more fully the barriers specific to achieving student competence in IPE. Additionally, respondents were not asked to define their specific interprofessional activities; thus, IPE definitions could range from a full load of interprofessional coursework to a single volunteer activity. And lastly, an investigation into student opinions of IPE could also be helpful in exploring the gaps in IPE.

To our knowledge, this is the most up-to-date national reporting of current IPE activities in U.S. dental schools. The findings will be helpful in guiding program specific changes that will consequently affect health professional education as a whole as well as national IPE policies addressing oral health care. However, it is important to note that with a 44% response rate, the results of this study may not be generalizable to all U.S. dental schools. We did not have sufficient information about non-responders to assess for potential selection bias though our survey responses did reflect a wide geographic and school size representation. Furthermore, we did not provide a formal definition of IPE within our survey which may have led to subjective interpretations of some questions. We were also limited to a certain number of survey questions due to our need to parallel this survey with the larger primary care survey. Lastly, as survey responses are based on self-report, some level of information bias (particularly related to social desirability in overstating aspects of the school's curriculum) may have been present.

## 5. Conclusions

Interprofessional education has increased over the last five years reaching almost every dental school in the U.S. However, there remains needed growth to achieving competency in IPE by the time students are ready to graduate. Dental schools are working with a broad array of other health professionals, yet rigorous evaluation of IPE among learners is still lacking. Ongoing study of IPE should evaluate the types of IPE within schools and their effectiveness. A focus on clinical IPE skills may improve students' readiness for interprofessional practice leading to a better health system and patient outcomes.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.xjep.2019.04.001>.

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## Declarations of interest

None.

## APPENDIX

### Dental School Survey Questions

#### Oral Health Training:

1. Please indicate which of the following oral health topics are covered in your curriculum (please select 'Yes' or 'No' for each topic):

#### Risk Assessment

- a. Caries/cavity risk assessments
  - b. Oral conditions that impact overall health (e.g., periodontitis)
  - c. Medical conditions that impact oral health (e.g., diabetes)
  - d. Impact of medications on oral health
  - e. Disparities in oral health/social determinants of health
  - f. Assessment of the impact of oral health on a patient's quality of life
  - g. Pregnancy oral and systemic health issues
  - h. Geriatric oral and systemic health issues
2. Does your school have dental students engaged in educational interprofessional sessions (non-clinical and clinic) with other non-dental professional students (e.g., medical, nursing students?)
  3. Please indicate which type of student/learners participate in interprofessional sessions with your dental students (Please check all that apply):
    - Medical students
    - Nursing students
    - Physician Assistant students
    - Nurse Practitioner students
    - Midwifery students
    - Pharmacy students
    - Family Medicine residents
    - Pediatrics residents
    - Internal Medicine residents
    - Obstetrical residents
    - Geriatric fellows
    - Other learners (please specify):
  4. Please answer each of the following questions as 'Yes' or 'No.'
    - a. Do any of your faculty have teaching responsibilities in other health profession schools (e.g., nursing, medical, physician assistant)?
    - b. Do any faculty from other health profession schools teach in your dental school (e.g., physicians, nurses, pharmacists)?
    - c. Does your dental school give academic appointments to faculty from other health profession schools (i.e., physicians, nurses, physician assistants)?
  5. Are you aware of the *Smiles for Life* Oral Health Curriculum developed by the Society of Teachers of Family Medicine?
 

**If No – SKIP to Q9**
  6. What components of Smiles for Life are you currently using in your dental school? (please check all that apply)
    - Module or Course 1: The Relationship of Oral to Systemic Health
    - Module or Course 2: Child Oral Health
    - Module or Course 3: Adult Oral Health
    - Module or Course 4: Acute Dental Problems
    - Module or Course 5: Oral Health and the Pregnant Patient
    - Module or Course 6: Caries Risk Assessment, Fluoride Varnish and Counseling
    - Module or Course 7: The Oral Examination
    - Module or Course 8: Geriatric Oral Health

- Videos
  - Smiles for Life phone/iPad app
  - Case studies
  - Test questions
  - Patient education posters or handouts
7. How do faculty in your dental school use Smiles for Life? (please check all that apply)
- Students complete on-line modules individually
  - Students complete on-line modules in pairs or groups
  - Faculty download and give PowerPoint presentations as lectures
  - Faculty have students review cases in groups
  - Unknown
  - Aware but do not use
  - Other:
8. What oral health educational materials in addition to or rather than Smiles for Life are you using in your dental school? (please check all that apply)
- American Academy of Pediatrics PACT curriculum
  - Oral health curricula from MedEdPortal
  - American Family Physician oral health articles
  - Pediatrics oral health articles
  - Oral Health During Pregnancy: A National Consensus
  - Statement (in collaboration with ACOG)
  - National Maternal Child Oral Health Resource Center resources
  - Prenatal Oral Health Program (pOHP from North Carolina)
  - Baby Oral Health Program (bOHP from North Carolina)}
  - None
  - Other:
9. What **barriers** prevent you from teaching more interprofessional education (IPE) with medical providers and about broader health topics in your curriculum?? (please check all that apply)
- Time in the curriculum
  - Lack of faculty expertise in oral health
  - Competing priorities
  - Lack of interest from faculty
  - Lack of dental school national competencies in IPE
  - Lack of dental school accreditation standards addressing IPE
  - Lack of a formal relationship with medical/non-dental programs
  - Lack of interest from medical/non-dental programs
  - None
  - Other:
10. How are you **evaluating** learners on their IPE competence (knowledge, attitudes, and skills)? (please check all that apply)
- Written/computer testing
  - OSCE (Objective Structured Clinical Examination) or equivalent
  - Simulation experiences
  - Direct observation in clinical setting
  - Review of clinical documentation
  - We do not assess our learners on IPE topics
  - Other:
11. Please indicate which of the following documents or organizations you are aware of and/or utilize to inform competencies for your curriculum:
- Interprofessional Education Collaboration (IPE) Core Competencies for Interprofessional Collaborative Practice
  - The American Association of Medical Colleges (AAMC) Oral Health Competencies
  - HRSA Integration of Oral Health and Primary Care Practice
  - Oral Health During Pregnancy: A National Consensus Statement (in collaboration with ACOG)
  - Qualis Health 2016. Evidence-based Care Supplement: Oral Health Integration
  - National Interprofessional Initiative on Oral Health ([www.niioh.org](http://www.niioh.org))
  - Institute of Medicine Advancing Oral Health in America
  - Institute of Medicine Improving Access to Oral Health Care for

#### Underserved and Vulnerable Populations

- Other:
12. To what degree do you agree/disagree with the following statements? (please select one response for each item)
- It is important for medical providers to address their patients' basic oral health care issues (e.g., caries prevention, dental referrals).
  - It is important for dental providers to address their patients' systemic health issues (e.g., diabetes)
  - Upon graduation, our dental students are well prepared to work collaboratively with medical providers on oral health issues.
  - I am satisfied with the current level of competence that our dental students achieve in interprofessional education by graduation

#### Demographic questions:

Please tell us a little bit about you and your dental school. This information is only being used to describe the sample of respondents for this national survey. Data collected about your program will not be tied to responses about your oral health curriculum.

13. In what state/territory is your school located?
- States grouped into regions
  - Northeast
  - Midwest
  - South
  - West
14. What is the approximate size of the community in which your program is located?
- Less than 30,000
  - 30,001 to 75,000
  - 75,001 to 150,000
  - 150,001 to 500,000
  - 500,001 to 1 million
  - More than 1 million
15. What is the number of students enrolled per year in your program?
- < 30
  - 31-60
  - 61-100
  - > 100
16. For how many years has your program been training learners?
- 1-5
  - 6-10
  - 11-15
  - > 15
17. What is your current position?
- Residency Director
  - Education Director
  - Faculty
  - Other
18. Lastly, we are interested in dental schools that would self-identify as being 'best practice' in oral health curriculum, and we would like to interview someone in your program who would be willing to share details of the program, successes, barriers overcome, etc. If you would be willing to allow us to contact you upon receipt of your survey, please provide contact information for us to follow-up. This information will be collected in such a manner that it will be separate from your survey responses.

Would you be willing to let us contact you for an interview?

#### References

1. Fransworth TJ, Seikel JA, Hudock D, Holst J. *History and Development of Interprofessional Education*. 2015; 2015 At: <https://www.omicsonline.org/open->

- access/history-and-development-of-interprofessional-education-jpay-1000101.php?aid=63418, Accessed date: 8 November 2017.
2. Institute of Medicine. *Educating for the Health Team*. Washington, D.C.: National Academy of Sciences; 1972.
  3. Interprofessional Education Collaborative Expert Panel. *Core Competencies for Interprofessional Collaborative Practice: Report of an Expert Panel*. Washington, D.C.: Interprofessional Education Collaborative; 2011.
  4. Wilder RS, O'Donnell JA, Barry JM, et al. Is dentistry at risk? A case for inter-professional education. *J Dent Educ*. 2008;27(11):1231–1237.
  5. Formicola AJ, Andrieu SC, Buchanan JA, et al. Interprofessional education in U.S. and Canadian dental schools: an ADEA team study group report. *J Dent Educ*. 2012;76(9):1250–1268.
  6. Palatta A, Cook BJ, Anderson EL, Valachovic RW. 20 years beyond the crossroads: the path to interprofessional education at U.S. dental schools. *J Dent Educ*. 2015;79(8):982–996.
  7. About CIPCOH. Center for Integration of Primary Care and Oral Health website. <https://cipcoh.hsdm.harvard.edu/about>. Accessed April 23, 2018.
  8. Ferullo A, Silk H, Savageau JA. Teaching oral health in U.S. medical schools: results of a national survey. *Acad Med*. 2011;86(2):226–230.
  9. Silk H, King R, Bennett IM, et al. *Assessing Oral Health Curriculum in US Family Medicine Residency Programs: A CERA Study*. 2012; 2012 At: <http://www.ncbi.nlm.nih.gov/pubmed/23148005>, Accessed date: 14 September 2017.
  10. Curtis M, Silk HJ, Savageau JA. Prenatal oral health education in U.S. dental schools and obstetrics and gynecology residencies. *J Dent Educ*. 2013;77(11):1461–1468.
  11. Langelier MH, Glick AD, Surdu S. Adoption of oral health curriculum by physician assistant education programs in 2014. *J Physician Assist. Educ*. 2015;26(2):60–69.
  12. Curtis M, Silk H, Savageau J. Prenatal oral health education in U.S. dental schools and obstetrics and gynecology residencies. *J Dent Educ*. 2013;77(11):1461–1468.
  13. Sue V, Ritter L. *Conducting Online Surveys*. Thousand Oaks, CA: Sage Publications Inc.; 2007.
  14. Dillman D. *Mail and Internet Surveys: The Tailored Design Method*. New York, NY: John Wiley & Sons, Inc.; 2007.
  15. *Source of Framework: Health Professions Network Nursing and Midwifery Office, Department of Human Resources for Health. A WHO Report: Framework for Action on Interprofessional Education & Collaborative Practice*. Geneva: World Health Organization; 2010.
  16. Commission on Dental Accreditation. *Accreditation Standards for Dental Education Programs*. Chicago: American Dental Association; 2017.
  17. Andrews EA. The future of interprofessional education and practice for dentists and dental education. *J Dent Educ*. 2017;81(8):eS186–eS192.
  18. Blue AV, Chesluk BJ, Conforti LN, Holmboe ES. Assessment and evaluation in inter-professional education. *J Allied Health*. 2015;44(2):73–82.
  19. American Dental Association. *Survey of Dental Education: Report 1 2016-2017; 2016-2017* At:[https://www.ada.org/~ /media/ADA/Science%20and%20Research/HPI/Files/2016-17\\_SDE1\\_final.xlsx?la=en](https://www.ada.org/~ /media/ADA/Science%20and%20Research/HPI/Files/2016-17_SDE1_final.xlsx?la=en).
  20. American Dental Education Association: Snapshot of Dental Education 2018-2019. At:<file:///Users/tien/Downloads/2018-2019%20ADEA%20Snapshot%20of%20Dental%20Education.pdf>. Accessed November 20, 2018.
  21. Health Professions Network Nursing and Midwifery Office, Department of Human Resources for Health. *A WHO Report: Framework for Action on Interprofessional Education & Collaborative Practice*. Geneva: World Health Organization; 2010.