

The Impact of Oral-Systemic Health on Advancing Interprofessional Education Outcomes

**Judith Haber, PhD, RN, FAAN; Erin Hartnett, DNP, APRN-BC, CPNP;
Kenneth Allen, DDS, MBA; Ruth Crowe, MD, PhD; Jennifer Adams, MD;
Abigail Bella, MPH; Thomas Riles, MD; Anna Vasilyeva, MPH**

Abstract: The aim of this study was to evaluate the effectiveness of an interprofessional education (IPE) clinical simulation and case study experience, using oral-systemic health as the clinical population health example, for nurse practitioner/midwifery, dental, and medical students' self-reported attainment of interprofessional competencies. A pretest-posttest evaluation method was employed, using data from the Interprofessional Collaborative Competency Attainment Scale (ICCAS) completed by two large cohorts of nurse practitioner/midwifery, dental, and medical students at one U.S. university. Data from faculty facilitators were collected to assess their perceptions of the value of exposing students to interprofessional clinical simulation experiences focused on oral-systemic health. The results showed that self-reported interprofessional competencies measured by the ICCAS improved significantly from pre- to posttest for all three student types in 2013 ($p < 0.001$) and 2014 ($p < 0.001$). Faculty facilitators reported that the IPE clinical simulation experiences were valuable and positively influenced interprofessional communication, collaboration, patient communication, and student understanding of patient care roles. These results suggest that the Teaching Oral-Systemic Health Program Interprofessional Oral-Systemic Health Clinical Simulation and Case Study Experience was effective as a standardized, replicable curriculum unit using oral-systemic health as a population health exemplar to teach and assess interprofessional competencies with nurse practitioner/midwifery, dental, and medical students.

Dr. Haber is Ursula Springer Leadership Professor in Nursing and Executive Director, Teaching Oral-Systemic Health and Oral Health Nursing Education and Practice Programs, New York University Rory Meyers College of Nursing; Dr. Hartnett is Director, Teaching Oral-Systemic Health and Oral Health Nursing Education and Practice Programs, New York University Rory Meyers College of Nursing; Dr. Allen is Clinical Associate Professor, New York University College of Dentistry; Dr. Crowe is Clinical Associate Professor, New York University School of Medicine; Dr. Adams is Clinical Assistant Professor, New York University School of Medicine; Ms. Bella is Coordinator, Teaching Oral-Systemic Health Program, New York University Rory Meyers College of Nursing; Dr. Riles is Frank Spencer Professor of Medicine, New York University School of Medicine, and Executive Director, New York Simulation Center; and Ms. Vasilyeva is Coordinator, Oral Health Nursing and Education and Practice Program, New York University Rory Meyers College of Nursing. Direct correspondence to Dr. Judith Haber, New York University Rory Meyers College of Nursing, 433 First Avenue, New York, NY 10010; 212-998-9020; jh33@nyu.edu.

Keywords: dental education, medical education, graduate nursing education, oral health, interdisciplinary health team, interprofessional education

Submitted for publication 6/14/16; accepted 8/30/16

Interprofessional education (IPE), according to the World Health Organization, “occurs when students from two or more professions learn about, from, and with each other to enable effective collaboration and improve health outcomes.”¹ National commissions and expert reports have identified the potential for IPE to improve interprofessional practice and patient, population, and health systems outcomes.²⁻⁴ While the value of IPE is lauded nationwide, strengthening its evidence base and linkage to collaborative practice behaviors remains a priority.³ There is a lack of evidence demonstrating which type

of IPE most effectively prepares the future primary care workforce, which includes the dental profession.

Often, health professions education is implemented in silos. Health professions schools prepare students to practice in their own disciplines, minimizing collaboration and teamwork between professions.⁵ It has been reported that professional practice silos have a negative impact on the quality and safety of patient care and population health.^{2,4} The 2003 publication *Health Professions Education: A Bridge to Quality* catalyzed the goal that health professions students be educated as “members of in-

terdisciplinary teams” to improve patient outcomes.⁶ Evidence supports early IPE in health professions education because clinical practice patterns endure post-graduation.^{7,8} The Interprofessional Education Collaborative (IPEC), comprised of six professional organizations including those of dental, nursing, and medical education, produced the *Core Competencies for Interprofessional Collaborative Practice* report, which articulates a set of interprofessional competencies to improve interprofessional relationships, increase care coordination, improve patient safety, and enhance health outcomes.⁹ The impact of the IPEC competencies on policy is significant: accreditation standards across the professions have been revised to require that academic programs provide evidence of IPE in their curricula.¹⁰⁻¹²

IPE initiatives commonly involve medical, nursing, pharmacy, social work, and physical therapy students, yet documentation of interprofessional experiences, in the classroom or clinical settings, that include dental students or oral-systemic health is limited.^{13,14} Reports documenting the effectiveness of collaborative clinical simulation and case study experiences using oral-systemic health as a population health exemplar are lacking.

Oral health is one of the Healthy People 2020 leading health indicators.¹⁵ In the United States, the incidence and prevalence of dental caries remain high, especially in socioeconomically disadvantaged and racial and ethnic minority populations.¹⁶ Dental caries is the most common chronic disease of childhood, more prevalent than asthma.¹⁷ One-quarter of children aged two to five and one-half of adolescents aged 12 to 15 suffer from tooth decay.¹⁸ Nationwide, children miss 51 million school days per year for oral health problems.¹⁷ Among adults, nearly 27% of those aged 20 to 64 years have untreated dental caries.¹⁸ Oral cancer morbidity and mortality rates have not declined over the past ten years, in part related to inadequate oral exams by primary care providers.¹⁹ The human papillomavirus is associated with the recent rise in the incidence of oropharyngeal cancer,²⁰ and evidence associates glycemic control with risk for periodontal disease in Type 2 diabetics.²¹

Non-dental educators and clinicians have been challenged by the report *Advancing Oral Health in America* to eliminate oral health disparities by using core oral health competencies to build interprofessional oral health workforce capacity.²² However, curricula preparing health professionals often lack oral health content and clinical experiences. Approximately 70% of medical schools have been found to

include five hours or less on oral health content, and 10% include no oral health training.²³ Until recently, nurse practitioner, midwifery, or physician assistant programs had no defined oral health education or set of oral health competencies.²⁴⁻²⁷

In 2014, the U.S. Health Resources and Services Administration (HRSA) published a key report, *Integration of Oral Health and Primary Care Practice*, to operationalize interprofessional oral health core competencies for primary care providers.²⁸ Haber et al. proposed integrating oral health with systemic health using the HEENOT versus the traditional HEENT acronym for the health history, physical exam, risk assessment, and management plan.²⁹ In 2015, another publication, *Oral Health: An Essential Component of Primary Care*, proposed a framework for integrating oral health in primary care (Figure 1).³⁰ Following these efforts, the Physician Assistant Leadership Initiative conducted a survey of 182 accredited physical assistant programs in the U.S. and found that 78% of respondents integrated oral health content into their curricula.³¹ Data from the Oral Health Nursing Education and Practice Program survey of the directors of midwifery education (n=39) found that 27 of the respondents (90%) included oral health in their curricula.²⁵ The National Organization of Nurse Practitioner Faculties included oral health in its latest *Nurse Practitioner Core Competencies Content*.³² Other reports have highlighted the importance of integrating more general health content into dental curricula, particularly in the areas of health promotion, screening, collaboration, and teamwork.^{9,13,30}

The aim of our study was to evaluate the effectiveness of an IPE clinical simulation and case study experience, using oral-systemic health as the clinical population health example, for nurse practitioner/midwifery, dental, and medical students’ self-reported attainment of interprofessional competencies. This article reports the pretest-posttest evaluation of the 2013-14 New York University (NYU) Teaching Oral-Systemic Health (TOSH) Program Interprofessional Oral-Systemic Health Standardized Patient and Case Study Experience conducted at the New York Simulation Center. The TOSH program is funded by an Advanced Nursing Education Grant from HRSA. We sought to answer the following research questions: 1) What were the changes in the self-reported interprofessional competence of nurse practitioner (NP)/midwifery (MW), dental (DDS), and medical (MD) students following a clinical oral-systemic health standardized patient and case study experience? 2) What were faculty perceptions of the



Figure 1. Oral health delivery framework

Source: Reprinted with permission from Hummel J, Phillips K, Holt B, Hayes C. Oral health: an essential component of primary care. 2015. At: www.niioh.org/sites/default/files/Oral_Health_white_paper_final.pdf. Accessed 12 Apr. 2016.

[Author: please confirm you have permission to reprint this figure]

value of the interprofessional clinical simulation and case study experiences?

Methods

The New York University Institutional Review Board determined that our protocol was exempt from federal oversight at 45 CFR 46 101(b) [1][2]. We used a pre- and posttest evaluation study design to investigate the impact of exposure to the interprofessional clinical simulation and case study experience on students' self-reported attainment of interprofessional competencies, including interprofessional learning, teamwork, and collaboration. The participants gave informed consent.

In 2013 and 2014, students and faculty from the NYU College of Nursing, College of Dentistry, and School of Medicine participated in an interprofessional clinical simulation session, featuring both a standardized patient encounter and a case study experience to develop oral-systemic health, cardiac, pulmonary, and interprofessional (IP) core competencies. Our student participants were at different points in their professional education. The DDS students were in the fourth year of dental school. The NP/MW students were in the final year of their Adult-Gerontology NP, Family NP, or Nurse-Midwifery Master's program. The MD students were beginning their second year of medical school. The faculty facilitator participants were clinical faculty members in the three programs.

Measures

We selected the Interprofessional Collaborative Competency Attainment Scale (ICCAS) for students to complete before and after the experience.³³ The ICCAS pre- and posttests used identical validated scales designed to measure self-reported competencies in interprofessional care. Although the ICCAS survey is intended by its authors to be completed retrospectively following an IPE activity, we chose to have the students complete the pretest prior to the IPE experience to minimize recall bias and the posttest following the experience.

The ICCAS survey consists of 20 items that ask respondents to assess their interprofessional competencies (e.g., communication, collaboration, roles and responsibilities, collaborative patient/family-centered approach, conflict management/resolution, and team functioning) using a seven-point Likert scale (1=strongly disagree to 6=strongly agree and 7=not applicable). The pretest asked the students to self-assess their baseline competence before participating in the IP learning activity, and the posttest asked them to self-assess their change in IP competencies after participating in the IP learning activity. The ICCAS reports strong internal consistency and reliability with a pre-exposure Cronbach's alpha of 0.96 and a post-intervention Cronbach's alpha of 0.98. Factor analysis provides evidence of construct validity as do significant mean rating differences from pretest to posttest for each pre-experience and post-experience item pair on the ICCAS.³³

Our faculty facilitators completed a 16-item post-experience Likert scale survey developed by our TOSH team to assess their perceptions about the value/importance of exposing students to IP clinical simulation and case study experiences. Content validity for the faculty survey was established following review of the items by a group of faculty IPE experts.

Trained administrators collected baseline data when students registered for the IPE experience and gave them identifiers to match the pre- and post-tests. Faculty members collected the post-experience ICCAS surveys. The faculty facilitators completed an online survey after the conclusion of the IPE experience.

The Intervention

Our TOSH IP experience exposed NP/MW, DDS, and MD students to a simulated clinical encounter using standardized patients and a small-group case study discussion. The experience took place over three days with approximately 100 NP/MW, DDS, and MD students participating each day. Prior to the pretest and IPE experience, we asked students to complete two Smiles for Life modules (The Relationship of Oral to Systemic Health and The Oral Examination)³⁴ and to view a nine-minute video about the IPEC competencies.³⁵

We developed the standardized patient and case study encounters as well as an IPE faculty facilitator guide used to train the facilitators. Faculty facilitators attended an IPE faculty development session and a “Just-in-Time” review immediately prior to the IPE experience. Prior to the experience, we gave the 14 standardized patients (actors recruited through the NYU standardized patient database) the protocol, including the objectives, character description, setting, interview and physical examination tasks, and timing.

During our standardized patient encounter, teams of four students (one NP or MW, one DDS, and two MD students) met in a simulation center exam room with one standardized patient. The 60-minute session was facilitated by an NP/MW or MD faculty member; a DDS facilitator toggled between two adjacent exam rooms. The physical examination of three organ systems—oral, cardiac, and pulmonary—was addressed in the session. All students had a faculty-facilitated session that prepared them to provide their respective teaching/teach-back component of the experience. The DDS student taught the oral exam, the NP/MW student taught the pulmonary exam, and the MD student taught the cardiac exam, with teach-

backs by each student. The encounter began with a five-minute brief facilitated by faculty facilitators that included introductions, directions, and a brief explanation of each student’s roles and responsibilities for collaborating on an action plan. The student team gathered a brief health history (last dental visit, recent or current oral health problems, chronic illness/es, and/or medications) and proceeded with the physical examination demonstration and practice. The session concluded with a ten-minute, faculty-facilitated debrief focused on the oral-systemic health assessment and team functioning.

Our case study experience consisted of eight students per group (two NP/MW, two DDS, and four MD) who applied the IPEC competencies to collaborate on providing patient-centered, team-based primary care to the case of an older adult with symptoms of diabetes and periodontal disease and psychosocial barriers to care. The 60-minute case study experience began with a five-minute brief facilitated by trained NP faculty members, including introductions, clarification of directions and goals, a brief discussion of each student’s roles and responsibilities, and collaboration on an action plan. The team collaborated to determine assessment data needed to address the oral-systemic health problems; formulate a differential diagnosis; develop an IP oral-systemic risk assessment and management plan to collaboratively manage diabetes and periodontitis; identify oral and systemic health preventive interventions; and identify IP referrals (nursing, dental, medical, and/or social work). Students verbalized how, as an NP, MW, DDS, and MD student, they would manage the patient and collaborate with members of an IP team to achieve positive outcomes. The case study experience concluded with a ten-minute facilitated debrief focused on discussion of the oral-systemic assessment experience and how the students functioned as an IP team.

Data Analysis

We used the Statistical Package for Social Sciences (SPSS) version 20 for statistical analysis. Descriptive statistics reported student ICCAS mean scores for each pre- and posttest section. We obtained central tendencies by frequency analysis of each pre- and posttest section to determine mean scores of all respondents as well as student sub-types (nursing, dentistry, and medicine).

We used paired t-tests to determine significant differences in mean pre- and posttest scores. We

used a one-way ANOVA to determine statistical significance of differences between professions. We analyzed multiple comparisons using the Bonferroni post-hoc test. We analyzed data for each year's IPE experience, 2013 and 2014. Finally, we analyzed faculty post-encounter data using descriptive statistics and percent agreement within and across professions. Statistical significance was set at XXXX. [Author: please add]

Results

Of the 326 students who attended the IPE experience in 2013, a total of 318 (97.5%) completed both the pre- and posttests (ICCAS survey): 82 (26%) nursing students, 76 (24%) dental students, and 160 (50%) medical students (Table 1). Of the 325 students who attended the IPE experience in 2014, a total of 300 (92.3%) completed the pre- and posttests: 68 (23%) nursing students, 82 (27%) dental students, and 150 (50%) medical students.

In both 2013 and 2014, there was a significant change ($p < 0.001$) in mean scores from pretest to posttest for all three student types (Figure 2 and Figure 3). Our analysis also revealed that there was a statistically significant change ($p < 0.001$) in mean scores from pretest to posttest in each of the six IP competency domains measured by the ICCAS for all students participating (Table 2). There were no significant differences in the magnitude of change in ICCAS scores from pretest to posttest across student types ($p = 0.062$ in 2013; $p = 0.097$ in 2014).

In 2013, the medical students had significantly lower mean posttest scores than the other student types for each competency domain ($p < 0.05$). These findings indicate that student-reported levels of some IP competencies were not the same across student types at the end of the IPE experience. In 2014, there were some significant differences in mean pretest scores. This finding indicates that student-reported levels of some IP competencies were not the same

Table 1. Number of medical, dental, and nursing Interprofessional Collaborative Competency Attainment Scale respondents by year

Students	2013	2014
Medical	160	150
Dental	76	82
Nursing (nurse practitioner/midwifery)	82	68
Total	318	300

across student types at the beginning of the IPE experience. Medical students had significantly lower mean pretest scores ($p < 0.01$) than the NP/MW students in three survey topics (collaboration, roles and responsibilities, and team functioning), and dental students had significantly lower mean pretest scores ($p < 0.05$) than the NP/MW students in one survey topic (collaboration).

The faculty facilitators completed a post-encounter survey that assessed their attitudes about IP education and the value of the IPE experience. Both years had a high percentage of respondents who agreed that IPE fostered communication, IPE increased collaboration, IPE encouraged effective patient communication, and IPE enhanced student understanding of the patient care roles of different health professionals (Table 3). There was also a high level of agreement that the IPE experience was valuable for students and faculty and that they would recommend participation in the event to colleagues.

Discussion

Our first research question was to determine whether a clinical oral-systemic health standardized patient encounter and case study discussion experience for an interprofessional cohort of NP/MW, DDS, and MD students was associated with a change in self-reported interprofessional competencies. Our data analysis found a significant change from pretest to posttest in the self-reported competencies for two mixed cohorts of students each year. In 2013, the lower ICCAS posttest scores for MD students in comparison to NP/MW and DDS students may have been because the MD students were in their second year, whereas the NP/MW and DDS students were in the final year of their clinical education. The MD students had not yet begun clerkship training and were focusing on the physical examination assessment component of their Practice of Medicine course. In 2014, the variations in ICCAS mean pretest scores, with lower scores on three survey topics for MD students in comparison to NP/MW students and on one topic for DDS students in comparison to NP/MW students, may be explained by the larger amount of IPE pretest curriculum exposure for the NP/MW students in comparison to the DDS and MD students.

During post-encounter debriefs, students verbally reported that the experiences fostered a better understanding of each other's roles and responsibilities as well as the scope of practice, particularly MD

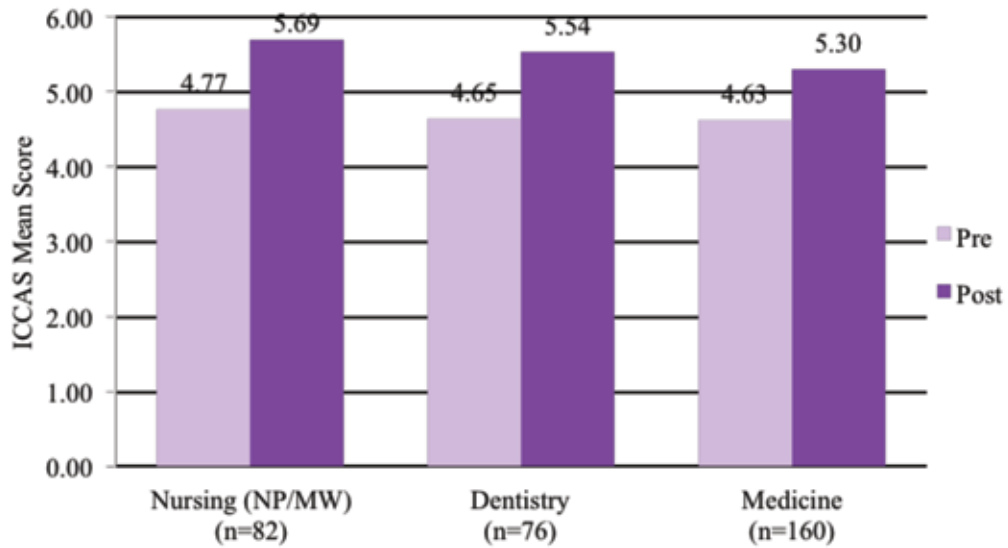


Figure 2. TOSH event Interprofessional Collaborative Competency Attainment Scale (ICCAS) mean pre- and posttest scores by student type, 2013

TOSH=Teaching Oral-Systemic Health
NP=nurse practitioner program; MW=midwifery program

Note: All p-values were <0.001, two-tailed.

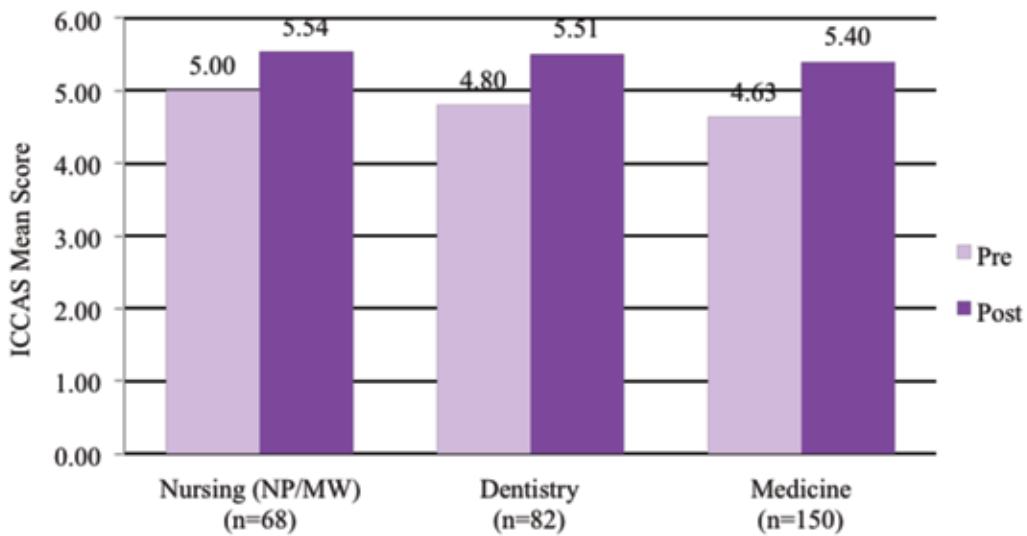


Figure 3. TOSH event Interprofessional Collaborative Competency Attainment Scale (ICCAS) mean pre- and posttest scores by student type, 2014

TOSH=Teaching Oral-Systemic Health
NP=nurse practitioner program; MW=midwifery program

Note: All p-values were <0.001, two-tailed.

Table 2. TOSH event Interprofessional Collaborative Competency Attainment Scale mean pre- and posttest scores by domain for all students (2013 and 2014)

Domain	Pretest 2013 (N=318)	Posttest 2013 (N=318)	Pretest 2014 (N=300)	Posttest 2014 (N=300)
Communication	4.70	5.43*	4.79	5.42*
Collaboration	4.59	5.46*	4.73	5.50*
Roles and responsibilities	4.64	5.46*	4.73	5.45*
Collaborative patient/family-centered approach	4.60	5.36*	4.68	5.42*
Conflict management/resolution	4.85	5.54*	4.92	5.56*
Team functioning	4.54	5.46*	4.68	5.49*

TOSH=Teaching Oral-Systemic Health

*Significant change from pre- to posttest ($p < 0.001$, two-tailed)

Table 3. Percentage of faculty members who agreed with statements about interprofessional education (IPE)

Statement	2013 (N=49)	2014 (N=32)
IPE fosters communication.	94%	97%
IPE increases collaboration.	90%	84%
IPE encourages effective patient communication.	80%	75%
IPE enhances student understanding of the patient care roles of different health professionals.	78%	81%
This IPE experience was valuable for students.	96%	88%
This IPE experience was valuable for faculty.	90%	78%
I would recommend participation in the event to colleagues.	94%	91%

and DDS students' understanding of NP/MW roles. Numerous NP/MW and MD students remarked about the dental students' competence in teaching their counterparts about the importance of oral health. The dental students reported positive feelings about collaborating with students from other professions and developing a "bigger health picture of the patient." These data suggest that the IPE experience, and its use of oral-systemic health as a clinical example, was an effective approach to teaching interprofessional competencies in clinical simulation and case study experiences. These findings are consistent with results reported by other investigators about using oral-systemic health as a clinical example to develop students' interprofessional competencies.^{13,14} Our findings are also consistent with those of other researchers about the use of simulation and/or standardized patients in IPE.^{36,37}

Our second research question was to examine faculty perceptions about the value and importance of exposing NP/MW, DDS, and MD students to interprofessional clinical simulation and case study experiences. The combined sample of 2013 and 2014 trained faculty facilitators across disciplines reported a high level of agreement that IPE positively influenced students' interprofessional communication,

collaboration, patient communication, and understanding of professional roles and responsibilities. Faculty facilitators consistently reported that they felt the IPE simulation and case study experiences were valuable for both students and faculty.

The strengths of our study include intervention fidelity due to use of a faculty facilitator manual (<http://toshteam.org/ipe-faculty-toolkit/>) and the required training of faculty facilitators in IPEC competencies, IPE facilitation skills, and oral-systemic assessment, using the HEENOT approach.²⁹ Other strengths were the large sample of students from three health care professions and the consistently significant findings from year one to year two.

In addition, the use of the validated ICCAS tool strengthened the applicability and comparability of our study to other IPE initiatives. Accreditation standards for the nursing, dental, and medical professions state that all students should be competent in communicating and collaborating with other members of the health care team and require that curricula provide interprofessional experiences.¹⁰⁻¹² The TOSH IPE experience is a strategy to integrate the IPEC competencies⁹ and HRSA interprofessional oral health core competencies²⁸ into the curricula of health professionals, to provide standardized clinical

experiences that focus on working with those from other professions, and to highlight oral health and its relation to systemic health. Our findings support that oral-systemic health is an effective vehicle for encouraging medical-dental collaboration and interprofessional training, especially in oral health promotion and disease prevention.

A limitation of our study was the lack of a control group without similar IPE exposure, precluding meaningful comparison and generalizability. We were limited by discordances in class size and student availability: while all second-year MD students and all final-year NP/MW students were enrolled in the study, only about 80 out of over 300 fourth-year DDS students were included each year due to class size and lack of availability in their academic calendar. The MW students participated in the TOSH IPE experience because they, like the NP students, are primary care providers, and oral health in pregnancy is an important national issue.³⁸ In the future, we will design IPE clinical experiences to ensure that all DDS students have comparable exposure, and we will include other health professions, such as social work, pharmacy, and physician assistant students. Another limitation of the study was the self-reported student assessment strategy, which is associated with potential bias. The Institute of Medicine recommends the use of a mixed-methods design that correlates self-report scores with an observation checklist of critical behaviors as a more effective evaluation strategy that more closely aligns education and interprofessional clinical delivery systems.³⁹ However, that approach presented a teaching and assessment resource challenge due to our large class sizes. Checklists providing evidence of development of targeted interprofessional and clinical competencies are in progress. A final limitation was the lack of long-term posttest data points (e.g., six months, nine months) to assess the durability of the change in self-reported interprofessional competencies.

Conclusion

This study found that a standardized, replicable, interprofessional curriculum unit on oral-systemic health was an effective way to teach and assess interprofessional clinical education competencies as measured by students' self-reported change. The experience supports the use of standardized patient and case study experiences to enhance learning about and implementation of interprofessional competen-

cies. Team-based clinical activities like the TOSH IPE experience focused on oral manifestations of chronic health conditions like diabetes provide increased understanding of oral-systemic linkages and the importance of a collaborative care model. The challenge will be to provide a sufficient number of interprofessional simulated and live clinical experiences across the curricula that integrate oral-systemic health and collaboration so that team-based whole person care becomes the norm. Based on our experience, we believe that academic leaders responsible for preparing nursing, dental, and medical graduates to provide interprofessional team-based care will find that integrating oral-systemic health is a powerful lever for advancing interprofessional education and practice.

Acknowledgments

The Teaching Oral-Systemic Health Program is funded by the Health Resources and Services Administration Advanced Nursing Education Grant # D09HP25019.

REFERENCES

1. World Health Organization. Framework for action on interprofessional education and collaborative practice. 2010. At: apps.who.int/iris/bitstream/10665/70185/1/WHO_HRH_HPN_10.3_eng.pdf?ua=1. Accessed 12 Apr. 2016.
2. Institute of Medicine. Crossing the quality chasm. Washington, DC: National Academies Press, 2001.
3. Institute of Medicine. Measuring the impact of interprofessional education on collaborative practice and patient outcomes. Washington, DC: National Academies Press, 2015.
4. McCannon CJ, Hackbarth AD, Griffin FA. Miles to go: an introduction to the 5 million lives campaign. *Jt Comm J Qual Patient Saf* 2007;33(8):477-84.
5. Angelini DJ. Interdisciplinary and interprofessional education: what are the key issues and considerations for the future? *J Perinat Neonatal Nurs* 25(2):175-9.
6. Greiner AC, Knebel E, eds. Health professions education: a bridge to quality. Institute of Medicine Committee on the Health Professions Education Summit. Washington, DC: National Academies Press, 2003.
7. Davis DA, Thomson MA, Oxman AD, Haynes RB. Changing physician performance: a systematic review of the effect of continuing medical education strategies. *JAMA* 1995;274(9):700-5.
8. Davis D, O'Brien MA, Freemantle N, et al. Impact of formal continuing medical education: do conferences, workshops, rounds, and other traditional continuing education activities change physician behavior or health care outcomes? *JAMA* 1999;282(9):867-74.
9. Interprofessional Education Collaborative Expert Panel. Core competencies for interprofessional collaborative

- practice. 2011. At: www.aacn.nche.edu/education-resources/ipecreport.pdf. Accessed 7 Apr. 2016.
10. Commission on Collegiate Nursing Education. Standards for accreditation of baccalaureate and graduate nursing programs. 2013. At: www.aacn.nche.edu/ccne-accreditation/Standards-Amended-2013.pdf. Accessed 7 Apr. 2016.
 11. Commission on Dental Accreditation. Accreditation standards for dental education programs. 2015. At: www.ada.org/~media/CODA/Files/predoc.pdf?la=en. Accessed 7 Apr. 2016.
 12. Liaison Committee on Medical Education. Functions and structure of a medical school. 2015. At: lcme.org/publications/. Accessed 7 Apr. 2016.
 13. Anders PL, Scherer YK, Hatton M, et al. Using standardized patients to teach interprofessional competencies to dental students. *J Dent Educ* 2016;80(1):65-72.
 14. Scherer YK, Anders PL, Antonson DE, et al. Incorporating standardized patients into an interprofessional oral-systemic health practicum. *J Nurse Pract* 2015;11(4):e29-35.
 15. U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion. Healthy people 2020 leading health indicators. 2010. At: www.healthypeople.gov/2020/Leading-Health-Indicators. Accessed 12 Apr. 2016.
 16. Dye BA, Li X, Thornton-Evans G. Oral health disparities as determined by selected healthy people 2020 oral health objectives for the United States, 2009-10. *NCHS Data Brief* 2012;104:1-8.
 17. U.S. Department of Health and Human Services. Oral health in America: a report of the surgeon general. 2000. At: www.nidcr.nih.gov/DataStatistics/SurgeonGeneral/Documents/hck1ocv@www.surgeon.fullrpt.pdf. Accessed 7 Apr. 2016.
 18. Dye B, Thornton-Evans G, Li X, Iafolla T. Dental caries and tooth loss in adults in the United States, 2011-12. *NCHS Data Brief*, May 2015:197.
 19. National Cancer Institute. SEER stat fact sheets: oral cavity and pharynx cancer. 2015. At: seer.cancer.gov/statfacts/html/oralcav.html. Accessed 9 Feb. 2016.
 20. Cohan DM, Popat S, Kaplan SE, et al. Oropharyngeal cancer: current understanding and management. *Curr Opin Otolaryngol Head Neck Surg* 2009;17(2):88-94.
 21. Borgnakke WS, Ylöstalo PV, Taylor GW, Genco RJ. Effect of periodontal disease on diabetes: systematic review of epidemiologic observational evidence. *J Clin Periodontol* 2013;40(Suppl 1):S135-52.
 22. Institute of Medicine. *Advancing oral health in America*. Washington, DC: National Academies Press, 2011.
 23. Ferullo A, Silk H, Savageau JA. Teaching oral health in U.S. medical schools: results of a national survey. *Acad Med* 2011;86(2):226-30.
 24. American College of Nurse-Midwives. Core competencies for basic midwifery practice. 2012. At: [www.midwife.org/ACNM/files/ACNMLibraryData/UPLOADFILE_NAME/000000000050/Core CompetenciesDec 2012.pdf](http://www.midwife.org/ACNM/files/ACNMLibraryData/UPLOADFILE_NAME/000000000050/Core%20CompetenciesDec%202012.pdf). Accessed 12 Apr. 2016.
 25. Dolce MC, Haber J, Shelley D. Oral health nursing education and practice program. *Nurs Res Pract* 2012;10:149673.
 26. Jablonski RA. Oral health and hygiene content in nursing fundamentals textbooks. *Nurs Res Pract* 2012;10(2):372617.
 27. Hooker RS, Berlin LE. Trends in the supply of physician assistants and nurse practitioners in the United States. *Health Aff* 2002;21(5):174-81.
 28. U.S. Department of Health and Human Services, Health Resources and Services Administration. Integration of oral health and primary care practice. 2014. At: www.hrsa.gov/publichealth/clinical/oralhealth/primarycare/. Accessed 12 Apr. 2016.
 29. Haber J, Hartnett E, Allen K, et al. Putting the mouth back in the head: HEENT to HEENOT. *Am J Public Health* 2015;105(3):437-41.
 30. Hummel J, Phillips K, Holt B, Hayes C. Oral health: an essential component of primary care. 2015. At: www.niioh.org/sites/default/files/Oral_Health_white_paper_final.pdf. Accessed 12 Apr. 2016.
 31. 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):60-9.
 32. National Organization of Nurse Practitioner Faculties. Nurse practitioner core competencies content. 2014. At: c.yimcdn.com/sites/nonpf.site-ym.com/resource/resmgr/Competencies/NPCoreCompsContentFinalNov20.pdf. Accessed 12 Apr. 2016.
 33. Archibald D, Trumppower D, MacDonald CJ. Validation of the interprofessional collaborative competency attainment survey (ICCAS). *J Interprof Care* 2014;1820:1-6.
 34. Clark MB, Douglass AB, Maier R, et al. *Smiles for life: a national oral health curriculum*. 3rd ed. Society of Teachers of Family Medicine. 2010. At: www.smilesforlifeor-alhealth.com. Accessed 27 July 2016.
 35. University of Arizona Interprofessional Education & Practice. Interprofessional education: what is it and why do we do it? YouTube. 2013. At: www.youtube.com/watch?v=Q-83eDYIFP4&feature=youtu.be. Accessed 27 July 2016.
 36. Robertson J, Bandali K. Bridging the gap: enhancing interprofessional education using simulation. *J Interprof Care* 2008;22(5):499-508.
 37. Wamsley M, Staves J, Kroon L, et al. The impact of an interprofessional standardized patient exercise on attitudes toward working in interprofessional teams. *J Interprof Care* 2012;26(1):28-35.
 38. Hartnett E, Haber J, Krainovich-Miller B, et al. Oral health in pregnancy. *J Obstet Gynecol Neonatal Nurs* 2016;45(4):565-73.
 39. Institute of Medicine. *Measuring the impact of interprofessional education on collaborative practice and patient outcomes*. Washington, DC: National Academies Press, 2015.