Research

Impact of an Interprofessional Education Intervention and Collaborative Practice Agreements of Expanded Practice Dental Hygienists in Oregon

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Abstract

Purpose: The state of Oregon developed the expanded practice dental hygienist (EPDH), to address oral health care disparities. The establishment of collaborative practice agreements between dental hygienists (DH) and physician assistants (PA), has created a need for interprofessional education (IPE) for future interprofessional collaboration with EPDHs. The purpose of this study was to assess the impact of an IPE intervention on future interest in collaborative practice agreements.

Methods: Current and former DH and PA students from Pacific University Oregon (n=420) were invited to participate in an electronic survey. The 39-item survey included questions related to an annual IPE activity and questions related to collaborative practice agreements between PAs and EPDHs. Descriptive statistics were used to analyze the data.

Results: A total of 80 DHs and PAs completed the survey for a response rate of 19%. There were high levels of agreement between DHs and PAs in regards to valuing the expertise of other health care providers, teamworking skills and interprofessional collaboration for a better understanding of a patient's condition. Only 18.9% (n=7) of the DH respondents and 25.6% of the PA respondents (n=11) were aware of the collaborative practice agreements for Oregon EPDHs.

Conclusion: Participants from DH and PA disciplines agreed patient care is improved by collaborative practice fostered through interprofessional education activities. Multiple approaches may be needed to increase knowledge on the EPDH collaborative practice agreements with PAs in Oregon.

Keywords: interprofessional education, dental hygiene workforce models, collaborative practice, dental hygienists, physician assistants

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Introduction

It has been almost two decades since the landmark Surgeon General's report cited that oral health is an important component of general health. Dental hygienists (DH) were identified as practitioners that could aid in improving the public's access to oral health care.[1] Oregon was one of the first states to implement the Surgeon General's recommendation of utilizing DHs to increase access to oral health care by granting dental hygienists a "Limited Access" permit (LAP) enabling them to provide care to individuals with either limited or no access to oral health care.[1,2] Through the completion of additional courses and increased clinical practice hours, the LAP allowed a DH to complete oral health assessments to identify unmet needs, create a treatment plan to address the needs, and provide preventive services without the supervision of a dentist.[1,2] In 2007, the name LAP was changed to "Expanded Practice" permit (EPP), and dental hygienists holding this permit were identified as expanded practice dental hygienists (EPDH).[2] The EPDH may provide services in "public and nonprofit community health clinics, extended care facilities, facilities for the mentally ill or disabled, correctional facilities, schools and pre-schools, hospitals, medical clinics, medical offices or offices operated or staffed by nurse practitioners, physician assistants (PA) or midwives, and in job training centers."[3–5]

In order to collaborate with other healthcare providers such as PAs or nurse practitioners, DHs need to learn to function on interprofessional teams.

Interprofessional collaboration has become a significant topic in health care and "advocates that health care providers value, support, and build relationships with each other" in order to work as a team.[6] An EPDH employed by a PA is an example of such a team. Interprofessional collaboration between these providers can be encouraged and established through interprofessional education (IPE) experiences prior to licensure. Presently, a variety of approaches in "teamwork training for interprofessional collaborative practice in education" are being used by health professions.[7] The legal ability to enter a collaborative practice agreement between a licensed PA and EPDH exists in the state of Oregon. However, there was no mechanism in place to educate these two disciplines regarding their unique contributions to patient care. Expanded practice dental hygienist and PA collaborative practice agreements appears to be underutilized, therefore, both disciplines need to be made aware of opportunities for patient care collaboration to make this practice agreement a viable option.[8]

In August 2016, the Commission on Dental Accreditation (CODA) updated the Accreditation Standards for Dental Hygiene Education Programs, Standard 2-15 to explicitly include IPE.[9] Standard 2-15 now states that "dental hygiene graduates must be competent in communicating and collaborating with other members of the health care team to support comprehensive patient care."[9] The goal of IPE is to provide students from different health professions experiences to work together and learn from one another. These experiences allow students to gain a better understanding of the other profession's role in patient care, leading them to "value working within interprofessional teams."[7] Acquiring this knowledge can serve to motivate continued teamwork throughout one's professional career. Furgeson et al. studied IPE within dental hygiene programs in the United States (U.S.) and identified that the majority of IPE activities developed within dental schools and dental hygiene programs consisted of joint volunteer activities, clinical activities, and service-learning projects.[10] These joint service-based activities do not necessarily fit the widely accepted definition of IPE, of students of two or more professions associated with health or social care, engaged in learning with, from and about each other.[11] Developing and implementing IPE activities would be less challenging if students from multiple health professions were located on the same campus or nearby campuses. The American Dental Hygienists' Association (ADHA) has reported a limited number of dental hygiene programs located within dental schools (23) or on health science campuses (37) that teach other health care groups.[7] Only 18% of dental hygiene programs are located within these campuses, which creates challenges for developing and implementing IPE experiences for DH students.[7]

It has been reported that the greatest effect of IPE can be attained when students are exposed to other health care professional students early in their education and presented with frequent IPE experiences while enrolled in school.[10] In order for EPDHs and PAs to pursue existing collaborative practice agreements once they are licensed, it is vital that they learn to work with each other as students. Boyce et al. found that support from various professional organizations has made implementing collaboration in health care more evident to educators and has help to turn the focus towards creating IPE experiences that will ultimately enable successful interprofessional collaboration. Interprofessional teams that are able to collaborate well can lead to improvements in efficiency, quality, and overall patient outcomes.[12] For this reason, the more prepared individuals are to work as part of an interprofessional team to deliver patient care, the greater the likelihood that they will find employment in a health care system.[12]

Recognizing the importance of IPE and interprofessional collaboration, Pacific University Oregon created an interprofessional educational experience designed to promote and prepare DH and PA students for future collaborative practice. Both the DH and PA students have the opportunity to provide general health and oral health care to homeless individuals as part of the Project Homeless Connect (PHC) event, an annual, nation-wide program dedicated to increasing access to an array of services such as dental, medical, vision, clothing, housing, food, pet care, haircuts, and employment for homeless communities.[13] During the PHC event, DH and PA students team up to collect a medical history and provide oral screenings to determine whether urgent or preventive dental care is needed. Urgent care is provided on site such as tooth extractions by Medical Teams International dentists, in addition to providing basic dental care. Patients requiring more in-depth care were shuttled to the Pacific University Oregon DH clinic and received referrals for restorative needs that could not be provided during the event. In 2014, the interprofessional interaction during this event was a limited intervention, involving a simple patient handoff from PA to DH student with a summary of the medical history. However, in 2015 and 2016, changes were made to ensure a more integrated interprofessional collaboration intervention by having the DH and PA students work together throughout the entire patient care appointment. During the appointment a medical history review, oral cancer screening,

periodontal screening and recording, caries examination, plaque and calculus determination were completed. The purpose of this study was to assess the impact of an IPE intervention between DH and PA students and explore the impact of this intervention on knowledge, attitudes and practices towards engaging in a collaborative practice agreement between EPDHs and PAs in the state of Oregon.

Methods

This study was determined to be exempt from Institutional Review Board (IRB) oversight by the University of Michigan Health Sciences and Behavioral Sciences IRB (HUM00129167). The sample consisted of 420 students and alumni from the Pacific University Oregon dental hygiene (n=160) and physician assisting (n=260) programs. For the purpose of this study, DH and PA participants from the classes of 2014-2016 were considered alumni. Students currently enrolled (2017-2018) in the DH and PA programs and who had participated in IPE programs, including the Pacific University Oregon annual PHC event, were classified as students. The 2014 PHC event involved a limited intervention consisting of a simple patient handoff, with a medical history summary, from the PA to DH student. During the 2015-2016 PHC event, the PA and DH students experienced an integrated interprofessional collaboration intervention, by working together throughout the entire patient care appointment. In 2017, PA students were unable to participate in the PHC event due to a scheduling conflict resulting in no interprofessional interaction. The lack of any interprofessional collaboration in this cohort provided the researchers with a control group. Dental hygienists and PA alumni who were licensed and practicing outside of the state of Oregon were excluded from participating in the study.

An electronic survey consisting of 39 questions divided into three sections was developed by the investigators. The survey was pilot tested by two DHs and one PA and revisions were made based on the feedback provided. Section one included demographic items. Section two retrospectively assessed the participant's experience as a DH or PA student with regards to collaborative practice while participating in the PHC event. Section three was an assessment of Oregon PA and EPDH practitioners' knowledge, attitudes, and motivation to engage in collaborative practice. Participants were asked to rate items on a Likert scale from 1 (Strongly Disagree/Not interested) to 5 (Strongly Agree/Very Interested) as well as respond to multiple choice and open-ended items. An invitation to participate email was sent in May 2017 by the respective Pacific University Oregon DH and PA program directors to the students/alumni (DH and PA classes 2015-2018). A reminder email was sent monthly and the Qualtrics administered electronic survey was closed after six months in November 2017.

An a priori power assessment was calculated to determine response rate needed for the study. Data was analyzed with the Statistical Package for the Social Sciences (SPSS) version 24 (IBM; Armonk, NY). Descriptive and inferential statistics were used to analyze the data. A p-value of <0.05 was used to indicate statistical significance. A factor analysis was performed using principal axis factoring extraction with varimax rotation and Kaiser normalization, and scree plot. Cronbach's Alpha was used to measure reliability and internal consistency.

Results

From the sample of 420 students/alumni (160 DH and 260 PA), 99 participants completed the electronic survey. However, 19 respondents were excluded because they did not practice in the state of Oregon bringing the number of participants to 80 for a response rate of 19% (n=80). Respondents with graduation years of 2017 and 2018 were considered current/recent students for this survey, while those graduating in 2014-2016 were identified as alumni. Overall the sample was comprised of 53.8% PA respondents (n=43) and 46.3% DH respondents (n=37). The number of years in practice for PAs ranged from zero to two while the number of years in practice for the DH respondents ranged from zero to more than two years. Respondent demographics are shown in Table I.

Table I. Overview of respondents' demographic characteristics (n=80)

Characteristic	Frequency	%
Gender:		
Male	17	21.3%
Female	63	78.8%
Year of Graduation:		
2014	4	5%
2015	4	5%
2016	5	6.3%
2017	36	45%
2018	31	38.8%
Health Profession:		
PA		
Student	16	20%
Alumni	27	33.8%
Total	43	53.8%
DH		
Student	20	25%
Alumni	17	21.3%
Total	37	46.3%

Physician Assistants

Among the PA participants, 25.6% (n=11) were aware of the possibility of employing an EPDH in the state of Oregon, while 74.4% (n=32) were unaware. Nearly all, 93%, (n=40) of PAs stated that they would consider employing an EPDH to treat patients who have limited access to dental care (if participants owned a practice, made hiring decisions, or practice was financially stable), while 7% (n=3) responded "no." More than one-half 55.9%, (n=24) indicated they were "Interested" or "Very interested" in employing an EPDH (if practicing conditions were met), with a mean response on the 1 to 5 scale (1=Not Interested to, 5=Very Interested) of 3.40 (SD=1.13). However, there was less interest in knowing more about how to pursue employing an EPDH, with 44.2% (n=19) indicating they were "Interested" or "Very interested" and a mean response on the 1 to 5 scale (1=Not Interested to, 5=Very Interested) of 3.09 (SD=1.19).

Dental Hygienists

Only 18.9% (n=7) of the DH respondents were aware of employment opportunities as an EPDH with a PA in the state of Oregon. Nearly all, (97.3%, n=36) would consider employment with a PA as an EPDH to treat patients who have limited access to dental care. Similarly, more than three-fourths (78.3%, n=29) indicated being "Interested" or "Very Interested" in knowing more about how to pursue employment with a PA as an EPDH with a mean response of 4.03 (SD=1.14) on a 1 to 5 scale (1=Not Interested to, 5=Very Interested).

Project Homeless Connect Event Ratings

All respondents (n=80) completed a question regarding their participation in the PHC event and the majority (95%, n=76) indicated "yes." There were 19 items pertaining to the PHC event with Likert scale responses ranging from 1=Strongly disagree to, 5=Strongly agree. Respondents were asked to retrospectively rate each statement as shown in Table II. The statements "I value the expertise of other health care professionals," "Team working skills are essential learning for all health care students," and "It is possible that a person from another health care discipline could have a better understanding of a patient condition or treatment than I do" had the highest level of agreement among the respondents.

A factor analysis was performed for the statements pertaining to the PHC event to identify groups of statements with similar responses by the participants. The analysis identified two factors for attitudes: collaboration and objective outcomes. Twelve statements were grouped together with the one factor related to the event's ability to encourage collaboration (*There was a real desire among team members to work collaboratively*) and seven statements were grouped together with the second factor related to the event's ability to enhance objective outcomes (*Team working skills are essential learning for all health care students*) as shown in Table III. There was excellent reliability for the statements about collaboration (Cronbach's Alpha = 0.958) and good reliability for the statements in regards to objective outcomes (Cronbach's Alpha = 0.814), indicating that the statements have high internal consistency and are compatible when grouped together.

Independent samples t-test were performed to investigate whether there was a significant difference in collaboration and objective outcomes for PAs as compared to DHs, and for alumni as compared to students. Physician's Assistants (M=4.16, SD=0.626) rated collaboration significantly higher than DHs (M=3.75, SD=0.681); t(73)=2.699, p=0.009. There was no significant difference between the PAs (M=4.45, SD=0.045) and DHs (M=4.47, SD=0.041) on objective outcomes, t(73)=-0.250, p=0.803. There was no significant difference between alumni (M=4.03, SD =0.747) and students (M=3.94, SD=0.672) on collaboration, t(73)=-0.413, p=0.681, nor between alumni (M=4.51, SD=0.431) and students (M=4.45, SD=0.432) on objective outcomes, t(73)=-0.421, p=0.675.

Collaboration was rated significantly higher by PA students (M=4.26, SD=0.530) than by PA alumni (M=3.68, SD=0.831); t(36)=2.364, p=0.024. No significant differences were identified between the PA students (M=4.45, SD=0.439) and PA alumni (M=4.45, SD=0.544) on objective outcomes, t(36)=-0.010, p=0.992. Dental hygiene alumni (M=4.43, SD=0.382) rated collaboration significantly higher than DH students (M=3.62, SD=0.649); t(35)=-2.957, p=0.006. No significant differences were found between the DH students (M=4.45, SD=0.432) and DH alumni (M=4.57, SD=0.286) on objective outcomes, t(35)=-0.640, p=0.527.

Intervention Level

Some respondents (n=31) indicated that they had no inter-professional interaction (intervention). These respondents were most likely from the 2017 cohort year when the PA students were unavailable to participate in the PHC. Forty-nine respondents experienced either the limited or integrated intervention that involved the patient handoff from PA to DH student with a summary of the medical history, while the integrated intervention involved the PA and DH students working together throughout the entire patient care appointment.

An independent samples t-test was performed to test significant difference in collaboration and objective outcomes for the limited intervention, compared to the integrated intervention. In the area of collaboration, there was no

Table II. Respondents' attitudes towards collaborative practice based on retrospective experiences as students participating in Project Homeless Connect

*Statement	n	Mean	SD	Minimum	Maximum
Our team mission embodied an interprofessional collaborative approach to patient/client care.	74	3.93	0.849	2	5
All team members were committed to collaborative practice.	74	4.01	0.802	2	5
Patient/client care plans and treatment goals incorporated best practice guidelines from multiple professions.	75	3.95	0.787	2	5
There was a real desire among team members to work collaboratively.	75	3.97	0.870	2	5
It was enjoyable to work with other team members.	75	4.16	0.806	3	5
Team members respected each other's roles and expertise.	75	4.19	0.800	2	5
Team members trusted each other's work and contributions related to patient/client care.	75	4.12	0.788	2	5
I value the expertise of other health care professionals.	***75***	***4.73***	***0.475***	***3***	***5***
Shared learning with physician assistant and dental hygiene students helped me to communicate better with patients and other professionals.	*74*	*3.73*	*0.955*	*2*	*5*
Learning between health care students before graduation improves working relationships after graduation.	75	4.36	0.747	2	5
Team working skills are essential learning for all health care students.	***75***	***4.61***	***0.590***	***3***	***5***
Team members acknowledged the aspects of care where members of my profession had more skills and expertise.	74	3.8	0.891	2	5
It was clear who was responsible for aspects of the patient/client care plan.	*75*	*3.76*	*0.819*	*2*	*5*
Team members had the responsibility to communicate and provide their expertise in an assertive manner.	*75*	*3.79*	*0.827*	*2*	*5*
Optimum patient care requires that the observations of every health professional serving a patient be included in the patient's treatment.	75	4.29	0.653	3	5
I feel confident in my knowledge and am willing to share my ideas with members of a health care team.	74	4.36	0.587	3	5
I trusted the accuracy of information reported among team members.	74	4.07	0.648	3	5
It is possible that a person from another health care discipline could have a better understanding of a patient condition or treatment than I do.	***75***	***4.48***	***0.554***	***3***	***5***
The best care for the patient is best arrived through joint decision making.	74	4.38	0.613	3	5

* Statements with Highest Level of Agreement are ***Italicized in Bold***
Statements with Lowest Level of Agreement are *Italicized*

Table III. Collaboration and objective outcomes: Factor analysis of IPC survey

Item	Statements	*Factor Loadings	
		**Collaboration	***Objective Outcomes
Q20	Our team mission embodied an interprofessional collaborative approach to patient/client care.	0.866	
Q21	All team members were committed to collaborative practice.	0.825	
Q22	Patient/client care plans and treatment goals incorporated best practice guidelines from multiple professions.	0.727	
Q23	There was a real desire among team members to work collaboratively.	0.884	
Q24	It was enjoyable to work with other team members.	0.822	
Q25	Team members respected each other's roles and expertise.	0.845	
Q26	Team members trusted each other's work and contributions related to patient/client care.	0.797	
Q28	Shared learning with physician assistant and dental hygiene students helped me to communicate better with patients and other professionals.	0.68	
Q31	Team members acknowledged the aspects of care where members of my profession had more skills and expertise.	0.746	
Q32	It was clear who was responsible for aspects of the patient/client care plan.	0.723	
Q33	Team members had the responsibility to communicate and provide their expertise in an assertive manner.	0.686	
Q36	I trusted the accuracy of information reported among team members.	0.541	
Q27	I value the expertise of other health care professionals.		0.551
Q29	Learning between health care students before graduation improves working relationships after graduation.		0.694
Q30	Team working skills are essential learning for all health care students.		0.74
Q34	Optimum patient care requires that the observations of every health professional serving a patient be included in the patient's treatment.		0.473
Q35	I feel confident in my knowledge and am willing to share my ideas with members of a health care team.		0.718
Q37	It is possible that a person from another health care discipline could have a better understanding of a patient condition or treatment than I do.		0.455
Q38	The best care for the patient is best arrived through joint decision making.		0.609

* Q28 had a cross loading on the other factor of 0.454, no other cross loadings exceeded 0.400.
**Cronbach's Alpha for Collaboration = 0.958
***Cronbach's Alpha for Objective Outcomes = 0.814

Table IV. Descriptive statistics for collaboration and level of intervention

Intervention	PA or DH	Mean	SD	n
Limited Intervention	PA	3.292	0.629	4
	DH	4.438	0.448	4
Integrated Intervention	PA	4.257	0.550	34
	DH	4.417	0.354	2

Differences of the intervention level and PA or DH respondents on the Collaboration Mean

Source	df	MS	F	p	Effect Size
Intervention	1	0.866	2.911	0.096	0.068
PA or DH	1	1.656	5.563	0.023	0.122
Intervention x PA or DH	1	0.945	3.174	0.082	0.074
Error	40	0.298			

Legend: Two-way ANOVA MS=Mean squares

significant difference between the limited intervention (M=3.86, SD=0.794) and integrated intervention (M=4.27, SD=0.539; t(42)=-1.742, p=0.089. For objective outcomes, no significant differences were identified between the limited intervention (M=4.38, SD=0.489) and integrated intervention (M=4.48, SD=0.424); t(42)=-0.641, p=0.525.

A two-way ANOVA was performed to test the differences of the intervention level and PA or DH respondents on the collaboration mean. It was found that the DHs rated collaboration more highly than the PAs (p=0.023). Table IV provides descriptive statistics for the collaboration mean and displays the differences of the intervention level and the PA or DH respondents on the collaboration mean. There were no other significant findings based on the intervention level. Some of the non-significant differences may indicate that the overall integrated interventions may increase IP collaboration results.

To explore differences between PAs and DHs in knowledge of the PA/EPDH collaborative practice agreement, a chi-square test compared the two groups on their awareness and no significant differences were found between the groups. Overall awareness of the collaborative practice agreement between PAs and EPDHs was low. To examine the differences between PAs and DHs in attitudes about collaborative practice agreement, ratings were analyzed from the statements about believing patient care and one's career are improved by collaborative practice. An independent samples t-test of agreement ratings (1=Strongly Disagree to, 5=Strongly Agree) showed no significant differences on the mean agreement of the two statements. However, there was an overall higher level of agreement among the respondents, and DHs have a slightly better attitude towards the benefits of collaborative practice when compared to PAs.

In the state of Oregon, PAs can hire an EPDH. In order to assess the motivation of PAs and DHs to engage in a collaborative practice agreement, responses to the question about consideration of employment between a PA and an EPDH were examined. A Fisher's exact test showed no significant difference between the groups. While overall awareness of the collaborative practice agreement was quite low, attitudes towards it and motivation to consider employment were quite high. There were no significant differences between PAs and DHs in their knowledge, attitude, or motivations.

During the 2017 PHC event, only DH students participated; therefore, only the DH students were compared across intervention levels. A one-way ANOVA tested the collaboration mean and objective outcome mean by the intervention level (limited, integrated, and none) for DH students. There was a significant main effect based on intervention level, demonstrating a significant difference between groups in regards to collaboration but not on the objective outcomes. Post Hoc test using Tukey HSD for collaboration showed a statistically significant mean difference between the limited and having no intervention, p=0.048. "No interprofessional intervention" was rated the lowest, indicating that some form of interaction between the PA and DH students is needed to encourage collaboration.

Discussion

The U.S. continues to work on improving the nation's oral health and access to dental care through the development of several direct-access workforce models. The EPDH is an example of a well-established direct access model in the state of Oregon. Extended practice dental hygienists

are permitted to practice in alternative settings and can be employed by PAs and other health care providers in order to deliver preventive dental services to patients with limited access. However, this workforce model continues to be underutilized.[8] In an effort to promote this workforce model, the PA and DH programs at Pacific University Oregon offer an IPE experience with a goal of increasing students' awareness of the future possibilities of incorporating EPDHs into primary care practices.

The type of IPE experience in this study was described by Furgeson et al., with joint volunteer activities, clinical activities, and service-learning projects, the most common IPE activities in dental hygiene programs.[10] The 2015 ADHA white paper addressing transforming dental hygiene education in the twenty-first century, along with other studies, reported that providing students the opportunity to work together allows them to become familiar with other health professions, as well as learning the various roles each plays in improving overall health.[7,10] In this study, gaining the knowledge about the dental hygiene profession may lead to PAs viewing an EPDH as an asset to their practice and hire them in the future. However, IPE activities must mimic actual practice dynamics and clearly lay out how each discipline contributes, and who is responsible for each aspect of care. Findings from this study demonstrate the importance of role definition, as this was one of the lowest rated statements revealing that participants were unclear as to who was responsible for the various aspects of the patient care plan.

Participants in this study were asked to rate statements retrospectively regarding their interprofessional collaborative experiences during one of the PHC events that occurred between 2014-2017. In general, there was a higher level of agreement for the collaboration statements (above a 3.7 on the Likert-scale), indicating a positive perspective on interprofessional collaboration particularly for cohorts who experienced the integrated intervention. Overall, PAs considered collaboration significantly more important than the DHs. Although there was no significant difference between the groups on the statements regarding objective outcomes, both groups identified objective outcomes as important. When comparing all the alumni versus all the students, collaboration and objective outcomes were considered slightly more important by DH and PA alumni in general. This could be a result of practitioners recognizing the need for interprofessional collaboration as a result of experiences in clinical practice.

Results from this study showed that the PA students considered collaboration to be significantly more important than the PA alumni, possibly due to fewer PA alumni in the sample. It is also possible that PA students may have anticipated a stronger collaborative relationship with physicians, however once in practice, they discover that they have greater autonomy than they envisioned as students. However, there were no significant difference in objective outcomes, and both groups identified these statements as important. In contrast, the DH alumni practitioners considered collaboration significantly more important their student cohorts. This could be a result of DH practitioners realizing that their scope of practice limits them from applying all of their knowledge and training, and the recognition that as members of collaborative interprofessional team, their knowledge and skills could be better utilized. These findings were of particular interest as it is assumed that both PA and DH practitioners are accustomed to collaborating with their supervising practitioners (primary care physicians or general dentists) and that this would be reflected among the PA and DH alumni.

Currently, 40 states allow direct access to DHs across a wide range of models.[5] Although direct access gives DHs the greatest autonomy, collaboration with a dentist is required and serves to illustrate the dental hygiene profession's ability to collaborate and work together in increasing access to oral health care. Findings from this study suggest that the integrated intervention IPE activity with PA and DH students broadens their outlook and may increase interprofessional collaboration. However, the results of this study are based on an isolated IPE activity, and other studies have indicated the greatest effect of IPE can be attained when students are exposed early in their education and presented with frequent IPE experiences.[10]

While interprofessional collaboration was valued in general, both the PA and DH participants lacked knowledge about the collaborative practice agreement for PAs and EPDHs in the state of Oregon. Interestingly, PAs in this study had more knowledge regarding employing an EPDH than the DH respondents. This could be due to the higher response rate from PAs, as there are currently very few PA providers employing an EPDH in Oregon. As highlighted by Coplen et al. and the ADHA white paper, this lack of knowledge of collaborative opportunities impedes the dental hygiene profession's ability to become part of team-based care and from advancements within the health care system.[7,14] This further emphasizes the importance of early exposure and frequent IPE experiences.[10] Results from this study also support the Coplen et al. findings regarding barriers faced by practicing EPDHs.[14] Without increased knowledge of the collaborative practice agreement,

this workforce model will not succeed in increasing access to oral health care.

Both PA and DH student participants indicated the benefits of developing collaborative practice agreements as licensed professionals. Although both groups agreed that patient care and professional development would benefit from a collaborative practice agreement, DHs had a slightly better attitude towards the benefits of collaborative practice agreement as compared to the PAs. Considering the low number of DH participants holding an EPP and working in settings requiring an EPP in this study, this was a particularly interesting finding. This lack of knowledge may indicate a need for continuing education (CE) courses and marketing of this collaborative working relationship to increase its implementation as an effective workforce model.

Another potential and ongoing barrier to the success of this workforce model is the low number of PAs and DHs currently working in the state of Oregon and the low number of DHs holding EPPs despite the opportunities. Further investigation is needed to determine why EPP practitioners are not being utilized. In 2016 Bell et al. reported there were 186 DHs in Oregon in 2011 holding an EPP, indicating an increase over the 71 DH's holding a LAP in the 2008 Battrell et al. study.[8] With a low number of DH alumni in this study indicating that they held EPP, one might assume that there has not been a significant increase in EPDHs in Oregon since 2011. However, in 2018 the number of EPDHs more than doubled to 729.[15] Since this collaborative agreement is permitted by the state of Oregon, if graduates are not staying within the state, the potential to increase the numbers of PA and EPDH collaborative agreements is lost despite the focused IPE interventions during their education.

Findings from this study suggest that an integrated intervention between the PA and DH students broadens their outlook and may increase future interprofessional collaboration. Although participants agreed that exposure to interprofessional education experiences among PA and DH students may improve working relationships after graduation, findings indicate that interprofessional collaboration has not transferred into clinical practice and there is a lack of knowledge regarding collaborative practice agreements for PAs and EPDHs in Oregon. Other approaches are needed to increase knowledge on the collaborative practice agreement between PA and EPDHs, and the EPDH scope of practice.

This study had limitations. A convenience sample was used representing a small population in Oregon, and there was a low response rate. There was a three-year time gap for respondents who participated in the 2014 PHC event, possibly preventing accurate recall of the specific event details. There was a much smaller sample size in the limited level of intervention group as compared to the integrated intervention group. The sample sizes for the limited and integrated interventions were much smaller than the those who had no intervention and the level of participation may limit the representativeness of the data collected. The survey instrument itself was a limitation because it was self-reporting, and therefore can introduce bias, or over/underreporting.

Conclusion

Overall ratings of the DH and PA respondent groups were positive regarding an IPE experience which occurred during their education. Levels of agreement were high in regards to patient care and the potential for career improvement through collaborative practice thus, indicating a positive perspective on interprofessional collaboration. Future studies should focus on assessment of deeper IPE interventions and assessment of practicing PAs across the state for insight into lack of utilization of this workforce model.

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