

Spring 2021

Interprofessional education between Dental Hygiene and Occupational Therapy students in relation to stroke care

Morgan Umlauf

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ORAL CARE FOR THE STROKE PATIENT: IPE FOR OT & DH

**Interprofessional Education Between Dental Hygiene and Occupational Therapy Students
in Relation to Stroke Care**

A Thesis

Presented in Partial Fulfillment of the Requirements for the

Degree of Master of Science

in

Dental Hygiene

in the

College of Graduate Studies

Eastern Washington University

by

Morgan Umlauf, RDH, MSDH (c)

Spring 2021

Major Professor: Lisa Bilich RDH, MEd

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Human Subjects Approvals

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6004

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For students only: Is this research being done to meet a course, thesis or other academic requirement? Yes If yes, please specify: To evaluate the effects of interprofessional education at the academic level on students understanding of their own professional as well as the other professions' roles in relation to other professions when dealing with stroke patients. If not, what is it being done?			
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Rationale for exemption. Why should this project be exempt? The survey is completely confidential, and the PI will have no identification of participants. The research is conducted based on student's perception and has no potential to cause harm. Participants have no obligation and participation is completely voluntary.			

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Please state the purpose and methodology of the research: The aim of this research is to investigate if dental hygiene (DH) students and occupational therapy (OT) students can describe their roles in interprofessional collaboration (IPC), if they can identify their roles in caring for a stroke patient. The study also aims to find out if a virtual IPE is effective in establishing collaboration among the two professions in communication and teamwork, and assess if each respective discipline feels confident in identifying their roles and responsibilities. The PI will recruit students by having Professor Lisa Bilich and Dr. Lucretia Berg post an invitation announcement in each program's respective Canvas course pages. The post will have the link to SurveyMonkey which includes a consent form for the first page, along with the mRIPLS 5-point likert questions, demographic questions, and the two questions specific to the IPE event developed by the PI. The students will effectively sign up by entering their identification code[,], which consists of their respective program's abbreviation and the first two digits of their house address in the last slot of the SurveyMonkey. The PI will not be gathering emails due to use of the anonymous code. The code will also be written down for the PI to use for the incentive drawing when the two surveys have been completed. The PI will also post the ZOOM invitation link in the Canvas course for the actual IPE event. The tentative date for the presentation is Wednesday evening March 3rd, 2021. The PI utilized an existing module from an academic open-sourced resource called MedEd Portal and adapted to fit this event. The event will also consist of a case study conducted in break-out rooms during the event. Lastly, the PI will recap the event with a discussion, and following the 90-minute IPE event[,], the PI will send out the posttest survey link in the ZOOM messenger.

Describe the procedures: what specifically will subjects do? If data are anonymous, describe the data gathering procedure for insuring anonymity.

The PI will recruit students through an announcement in their respective program's canvas courses. Participants will sign up through a link provided to the second-year cohort students of DH and OT programs. When the students click the link, it will take them to SurveyMonkey where the first page will be the informed consent. Once the students have given consent the SurveyMonkey will open into the mRIPLS likert questions on a scale from 1-5. It consists of 19 mRIPLS questions, and 2 questions developed by the PI on a likert scale. The pre-test will also have 4 demographic questions. Students can opt out of any question, at any time.

The Posttest will be the same mRIPLS and 2 questions generated by the PI but not demographic. The PI is offering a \$50 amazon gift card as incentive for completion and has chosen to keep student identities anonymous and asks that students use an anonymous code, the two letters of their department (DH or OT) followed by the first two numbers of their house address. At the end, the PI will not know who the student is who won and will leave the giftcard with either Lisa Bilich or Dr. Lucretia Berg. In the case of two people having the same anonymous code, the PI will leave two giftcards so that identities are kept anonymous.

Canvas Invitation Post:

My name is Morgan Umlauf, I am a graduate student from Eastern Washington University. I am implementing a virtual IPE event for second year DH and OT students to collaborate on patient care for a stroke patient. My intended implantation date is Wednesday March 3, 2021 at 7:00pm. The virtual event will consist of a 30-minute PowerPoint presentation on oral hygiene, strokes, and respective professional roles. There will be a presentation of a case study followed by a 10-minute break. When we all reconvene, students will be broken up in groups of 4 to discuss the case study for 15 minutes. We will come back together and discuss our ideas in a large group about the case study. The event will only last 90 minutes and at the end the PI will send out a link to the posttest survey. For attending the event, filling out the pre-test, and posttest all who complete their surveys will be entered to a \$50 drawing. The PI will not know who answers which questions, and identities will remain anonymous. Follow the link below to sign up by completing consent and the pre-test survey.

<https://www.surveymonkey.com/r/98VTHK3>

Thank- you,

Morgan Umlauf, RDH, BSDH, MSDH (c)

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SurveyMonkey links: Pretest Survey Link <https://www.surveymonkey.com/r/98VTHK3>

Posttest Survey Link

<https://www.surveymonkey.com/r/B067N8L>

Oral Care Case Study Stroke Patient

Patient information:

53 Year Old African-American Female

History of smoking

Missing Teeth

Stroke History — hemorrhagic stroke 2012, ischemic (currently seeking

OT care) States last dental visit was 10+ years ago.

Hemi-paralysis since 2012 — says she has just learned to live with it, never sought care due to not having insurance. HX of HBP, type II diabetes

Currently seeking care to manage — diabetes, and IIBP, now OT care for stroke

1. As an OT what is your first role for this patient regarding oral health since she is complaining of a bad taste?
2. What homecare aids would be recommended'?
3. What treatment plan would you recommend'?
4. What is the role of the OT and DH?
5. How can outcomes be improved?
6. What other providers may you want to include?

Patient Information:

61 -year-old Caucasian Male

History of Smoking

Seeks regular dental care every 3mo.

History of NSPT

HHX update - just got diagnosed with TIA, was told to quit smoking or will become a bigger issue, said his PCP wants him to seek OT care since he has minor facial paralysis and a small tremor since the TIA.

As a DH, you notice that his tissue is far more inflamed, recommend repeating SRPs. At subsequent appointments, you notice tissue is getting worse instead of better. When asking the patient what his habits at home are, you find out that he is having a hard time grasping his toothbrush and remembering to brush.

1. What could you as the dental hygienist do to help the patient?
2. How can you adapt the tools to fit this patient's needs?
3. What treatment plan would you recommend?
4. What is the role of the OT and DH?
5. How can outcomes be improved?
6. What other providers may you want to include?

In both scenarios could collaboration occur?

What are your respective roles in treating the patient in both scenarios?

Would there be opportunity for collaboration in each situation? How'?

Will attach adapted PPT to email.

Attach all proposed recruitment materials (scripts, texts, emails, flyers and/or social media posts), surveys, questionnaires, cover letters, information sheets, consent forms. etc.

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<p>I certify that the information provided above is accurate and the project will be conducted in accordance with applicable Federal, State and university regulations:</p> <p>PI Signature: (unnecessary signature lines can be deleted)</p> <p><u>X Morgan Unruh</u></p>

<p>RPI Signature (Needed only if PI is a student):</p> <p><u>X Lisa Bilich</u></p>	
<p>IRB Rep. or Dept. Chair: (Needed if PI is a student OR for faculty PI if required by department)</p> <p><u>>< Z.-ziæ 3Z.Z</u></p>	
<p><u>X Theresa J. Mast</u> approved 3/10/21</p> <p>IRB Signature:</p>	A D
<p>the following conditions: per email discussion March 10, 2021 to March 9, 2022</p> <p>Link to the IRB system is provided to the PI</p>	

Approved from

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Abstract

Purpose: To determine if interprofessional education (IPE) program with dental hygiene and occupational therapy students help determine roles and responsibilities in patients post-stroke.

Methods: A virtual 90-minute educational module was presented to occupational therapy and dental hygiene students, hosted over zoom with a 30-minute presentation followed by an open discussion over two case studies. A pretest was administered before the event and followed by an immediate posttest. Both tests included the Modified Readiness for Interprofessional Learning (mRIPLS) items that are on a 5-point Likert scale.

Results: The virtual IPE showed that there were positive changes in pretest to posttest scores. The results showed changes in perceptions from pretest to posttest on three items. The changes in perception suggest a change in students' confidence in working with post-stroke patients on their oral health. Item 12 assessed students' perception of who can be involved in IPE events. Items 20 and 21 assessed students' confidence in discussing oral health with patients who are post-stroke and understanding the oral-systemic implications for strokes and periodontal disease.

Conclusion: A virtual IPE educational module was presented to dental hygiene and occupational therapy students resulting in a notable difference in students' understanding of strokes and oral health. The long-term impact could result in better health outcomes for patients who have had a stroke.

Acknowledgments

As my MSDH journey comes to an end, I want to thank all who have been a part of my education. Writing a thesis did not come naturally to me, it has grown me into a better writer. My success is in part due to the following people:

- Lisa, you have been such an encourager, to the point, constructive, and supportive. I could not have done this without you.
- Sarah, you have always been available whenever I needed, you always have something positive to say.
- Lucretia, you stepped up to help the hygiene program and shared so much of your own expertise and were always so kind. Thank you for working with another discipline; it gives me hope for IPE.
- Lorin, thank you so much for being available to help keep me accountable and on track with my thesis. The fellowship through EWU's writer center has helped me to achieve something I did not know I could do.
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Introduction/Literature Review

Introduction to the Research Question

Interprofessional education (IPE) is defined as several health care providers from different disciplines working together to provide a complete health care experience for a mutual patient (World Health Organization [WHO], 2010). As a patient educator, dental hygienists (DHs) can be an oral health care team member who is the most prepared to consult with other health care providers regarding prevention and provision of complete dental patient care through IPE. According to Reeves et al. (2017), IPE intervention is essential for advancing patient care and professional practice.

Dental hygienists are disease prevention specialists who work with patients to combat oral disease by reducing and controlling bacterial biofilm. The DH mitigate disease through mechanical means of non-surgical periodontal therapy (NSPT) when active oral disease is present, or recare dental hygiene treatment is ongoing for patient maintenance. The DH provides significant effort during appointments to educate patients on methods for controlling biofilm. Biofilm consists of multiple microorganisms which contribute to the periodontal disease process through the inflammatory pathways because of the high collection of gram-negative bacteria. Periodontitis is an oral inflammatory disease caused by a bacterial infection in the mouth. While hygienists can treat active disease during patient appointments, effective control occurs through patient understanding and homecare efforts.

Occupational therapists (OTs) work with patients to establish their new daily habits specific to each patient's disabilities. The OTs' goal is "achieving health, well-being, and participation in life through engagement in occupation" (American Occupational Therapy Association [AOTA], 2020). These goals include daily self-care routines, such as dental care.

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Reeves et al. (2017) found that healthcare professionals support patients' quality of life when collaborating. For DH and OT, this could be through examining neuromotor functions, dysphagia, hemi-paralysis, and various other lifestyle implications. Together they can develop appropriate dental homecare modification techniques to promote maximal independence and better oral health and management of periodontitis. Periodontitis is the oral inflammatory disease caused by a bacterial infection in the mouth. Dental hygienists work to control oral inflammation, while OTs aid in rehabilitation, and together they can help the patient reduce oral inflammation.

Statement of Problem

The link between poor oral health and accompanying periodontal inflammation with systemic disease is established in the literature (Hasturk & Kantarci, 2015). Current results have identified the bi-directional links between oral inflammatory disease and cardiovascular disease, rheumatoid arthritis, respiratory disease, chronic kidney disease, and other conditions (Sen et al., 2018). The oral-systemic link is well-established, and patient care can benefit from a multi-professional approach.

Strokes are an inflammatory disease. The connection of stroke with periodontal disease can be better approached through an interdisciplinary team. Occupational therapists are vital to rehabilitation post strokes. Interdisciplinary teamwork often leads to more favorable outcomes for the total health of a patient post-stroke. Interprofessional collaboration could improve patient outcomes by having OTs work with DHs to understand the relationship between oral hygiene, periodontal inflammation, and strokes. Educating and teaching OTs on how to provide proper brushing and flossing techniques and using various homecare aids potentially lowers the amount of oral plaque and biofilm for patients after a stroke. To improve managing periodontal disease

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for patients with strokes, OTs demonstrate the process of oral hygiene then have the patient mimic the skill. Web-based models showed that oral care confidence was improved among nursing care providers for patients who are post-stroke (Malik et al., 2017). Furthermore, researchers have shown that a reduction in inflammation is linked to a reduced risk of strokes (Sabharwal et al., 2018). Thus, people with inflammation are at higher risk of strokes, especially when not seeking regular dental care (Sen et al., 2018). Furthermore, patients with a history of strokes may be at a higher risk of suffering future inflammatory disease complications (Sabharwal et al., 2018).

This research attempted to answer the following research questions:

- Do DH and OT students understand their own professional roles and responsibilities regarding oral care for the stroke patient?
- Do DH and OT students understand the role of the other professionals related to caring for the stroke patient in an IPE setting?
- Do DH and OT students effectively communicate the importance of teamwork in patient-centered care for the stroke patient?

Overview of Research

Periodontal Disease

When seeking treatment, patients and DHs often have conversations about periodontal disease and the correlations between hypertension, diabetes mellitus, cardiovascular disease, bacterial pneumonia, and even erectile dysfunction. According to the American Dental Hygienists Association (ADHA), DHs are responsible for screening and educating patients on potentially life-threatening diseases related to oral disease. They also encourage patients to follow up with their primary care providers when necessary (ADHA, 2008).

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A comorbidity risk factor for periodontal disease is a stroke. A stroke has multiple associated risk factors, such as hypertension and diabetes mellitus (Drake et al., 2011). Throughout patient care, hygienists use systemic health clues to discuss oral health and disease prevention. Providers' conversations with patients concerning periodontal disease, hypertension, and/or diabetes mellitus should include the importance of regular dental care for better regulation of systemic illnesses. The need for conversations on oral health leads to the following question, what role does disease prevention play concerning the potential for strokes? Patients with a history of strokes can discuss with their DH about homecare habits and dental hygiene treatment to reduce oral inflammation. A gap in patient education and care can exist due to a focus that has been chiefly on periodontal care through dental hygiene treatment with less discussion of the control of inflammation and its relationship to systemic health. Understanding systemic health for patients with stroke can be supported through research on IPE and the benefits of addressing this gap in care (Hasturk & Kantarci, 2015). According to the ADHA (2020), the currently recommended DH scope of practice includes providing oral hygiene instructions, dental hygiene therapy, discussion of oral-systemic links to periodontal disease, and blood pressure measurement. Collaboration is not formally defined in DHs' scope of practice as described by the functions listed above. When DHs provide care to patients, they screen for more than just periodontal disease, and collaborating allows them to exercise comprehensive patient care in conjunction with other professionals (Hasturk & Kantarci, 2015).

The Dental Hygienists' Role

Currently, licensed DHs perform effective treatment of periodontal disease. The first step in effective treatment is through NSPT followed by regular recare appointments (i.e., periodontal maintenance, 4910) at 3-month intervals. When NSPT is ineffective, patients can seek surgical

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interventions. The current standard of care includes instrumentation of tissues and teeth to remove the plaque, calculus, and inflammation subgingivally; thus, lowering the body's immune response to bacteria (Belkaid & Hand, 2014). Periodontal disease occurs due to genetics, epigenetics, patient habits, such as smoking, drinking, oral hygiene, and oral pathogenic presence (Tettamanti, 2017).

Hasturk and Kantarci (2015) stated that inflammation is a process that leads to long-term implications for health. This connection was originally discussed by Glurich et al. (2002), who suggested that gum disease has a bidirectional relationship to systemic illness. Led by the pioneering work of Genco, Glurich et al. (2002) were first to identify that inflammatory markers in cardiovascular disease paralleled the same inflammatory markers found in patients with periodontal disease. To understand the role periodontal disease plays in oral-systemic health, researchers and dental professionals need an understanding of how periodontal disease causes oral inflammation.

Periodontal disease is classified as uncontrolled oral tissue infection, which leads to the destruction of the tissues surrounding teeth. When left untreated, periodontal disease becomes a chronic infection characterized by destruction through inflammatory pathways (Hasturk & Kantarci, 2015). Hasturk and Kantarci (2015) stated that uncontrolled inflammation leads to systemic problems.

In summary, the longer inflammatory processes are left untreated, the higher the risk of systemic illnesses and diseases that affect various systems and tissues differently. Periodontal disease was initially suspected as only leading to tooth loss and has been the focus for dental professionals. According to Hasturk and Kantarci (2015), periodontal disease affects systemic health and affects various tissues in the body differently. The links between systemic health and

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periodontal disease suggest that periodontal disease and inflammation are not only of concern to dentists but have become issues for all health care professionals.

Strokes and Periodontal Disease

Sen et al. (2018) examined whether regular dental care for periodontal disease in conjunction with regular dental care led to fewer strokes. High oral levels of gram-negative bacteria lead to inflammation, and thus, periodontal disease. Sen (2018) found significant correlations among periodontal disease, cardiovascular health, and a higher risk for strokes. They focused on whether regular dental care reduced the risk of strokes. The results yielded a ($p < .0001$) from the ($N = 6,736$) dentate participants. Among the patients, 299 had a stroke within 15 years. The results showed a higher risk of strokes associated with periodontal disease due to high gram-negative bacteria. Based on the evidence, this researcher concluded that regular dental care reduced the risk of strokes (Sen et al., 2018). Because OTs' primary focus is self-care, adapting effective oral hygiene to the homecare routine falls under the purview of these professionals. Patients who suffer strokes are at a higher risk of inflammation post-stroke and re-occurrence of another stroke, leading to a need for regular dental care and the importance of adaptable homecare habits to reduce inflammation.

Occupational Therapy and Stroke Care

Occupational therapists are charged with helping patients rehabilitate after strokes and other traumatic events, which have altered their ability to function daily. Because OTs provide individualized care for each person's specific needs, their skills position them to assess and impact patient care. According to the AOTA (2020), OTs' scope of practice includes adapting basic tools such as toothbrushes and various homecare aids to meet the new demands of their

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patient's needs. These activities could include dental homecare items such as toothbrushes, floss, or various other periodontal aids.

In *Occupational Therapy's Role with Stroke Rehabilitation*, the AOTA (2014) described that an OT's focus is helping patients return to health and participate in daily activities. According to AOTA, stroke is a leading cause of disability in the United States. Stroke survivors seek occupational therapy care to address the need to re-train self-care skills, deficits in musculature, sensory loss, and visual and cognitive impairments. OTs treat swallowing difficulties, offer coping strategies, and promote healthy lifestyles.

Strokes result from an inflammatory process (Anrather & Iadecola, 2016). When patients are recovering from a stroke, OTs are involved in establishing patients' adaptations to support daily life activities (AOTA, 2014a). To address recovery effectively, lowering inflammatory disease risks is crucial for addressing strokes and periodontal disease.

Interprofessional education between DHs and OTs could lead to comprehensive patient care, potentially lowering the risk of recurrent strokes. Despite current research suggesting poor oral health could be a risk factor for recurrent strokes, patients and health practitioners have often overlooked oral health. Periodontal disease is an inflammatory disease that compounds multiple other diseases and traumas, including strokes. After a patient suffers a stroke, they can face multiple side effects, some of them altering a person's ability to perform daily functions such as oral hygiene. An OT delivers an individualized treatment plan to help patients who suffered from a stroke learn how to achieve independence in their daily habits (AOTA, 2020). Educating occupational therapy students on essential oral hygiene habits in an interprofessional educational (IPE) experience with dental hygiene students could lead to more positive outcomes for those patients recovering from a stroke.

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Interprofessional Education

According to WHO (2010), IPE is defined by “collaboration in education and practice as an innovative strategy that will play an important role in mitigating the global health workforce crisis” (WHO, 2010, p.7). IPE occurs when multiple students or professionals from different areas of study learn about each other’s process of care to better address patient outcomes (WHO, 2010). Interprofessional education occurs on the professional level but can begin on the academic level through IPE events. The benefits of education consisting of IPE can lead to collaboration in careers post-graduation.

The Interprofessional Education Collaborative (IPEC, 2016) defines competencies for the benefits of a multidiscipline approach to better patient health outcomes. These competencies were developed by IPEC in 2011 and revised in 2016. Participants in multiple disciplines have used current IPEC competencies to achieve calibrated collaboration. The four IPEC competency domains of sub-competencies are necessary for the achievement of IPE. The four domains are values and ethics, roles, and responsibilities, interprofessional communication, and teams and teamwork (IPEC, 2016). The focus of this study was on sub-competencies highlighted within roles and responsibilities and team and teamwork. Researchers have yet to evaluate the benefits of an educational experience with a case study to enhance future collaborations between DHs and OTs. This study utilized two IPEC competencies (see Table 1). Bligh (2015) described using the modified Readiness for Interprofessional Learning Scales (mRIPLS) to evaluate the IPEC competencies. The mRIPLS scale was developed to assess learning in IPE events by tying the mRIPLS to IPEC competencies (Bligh, 2015).

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Table 1

Relevant IPEC Competencies

IPEC Competency No.	Competency Domain
RR4.	Explain the roles and responsibilities of other providers and how the team works together to provide care, promote health, and prevent disease.
CC8.	Communicate the importance of teamwork in patient-centered care and population health programs and policies.

Note. Roles and responsibilities (RR4), interprofessional communication (CC8). Adapted from the IPEC Sub-competencies related to Roles/Responsibilities and Interprofessional Communication related to this study (IPEC, 2016).

Considering the benefits of team approaches might provide insights into defining DHs' role in educating OTs regarding oral hygiene care with patients recovering from strokes. DHs receive education on the oral-systemic link, and the role inflammation plays in the recovery and management of total body health. OTs could help patients recover and lead their daily lives post-stroke by adapting homecare tools for better oral outcomes. By integrating the functions of two professional groups, patients could benefit from decreased inflammatory disease risks (Reeves et al., 2017).

Brady et al. (2011) studied the benefits that various healthcare teams can provide; specifically, dental professionals, OTs, and dietitians can play roles in addressing oral health in patients after a stroke. Reeves et al. (2017) and Brady et al. (2011) found a lack of oral hygiene care in stroke care settings. In incident reports, they found that periodontal disease and strokes are inflammatory diseases, and team approaches could address these conditions to help patients have better health outcomes (Brady et al., 2011; Reeves et al., 2017). Brady et al. (2011) found that a one-hour event implemented by a dental professional had little effect on OTs' and

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dietitians' efforts to reduce patients' dental plaque. Success in reducing dental plaque was due to dietitian and OT clinicians' readiness and knowledge to provide oral care.

Obembe et al. (2019) found dental practices were among the most frequented healthcare providers for patients who had a stroke, placing dental professionals in a position to educate patients on the importance of oral health and help manage disease risk. Obembe et al. suggested that dental care post-stroke should be significantly increased because of the connection between strokes and oral health. However, Obembe et al. found no change in the frequency of dental care for patients' post-stroke. Sfyroeras et al. (2012) found that gingivitis and periodontitis are among the most common infections across populations. However, health caregivers have no apparent collaborative strategies for addressing oral health in patients with a history of stroke. Strokes are the third leading cause of death in the United States, and notably, periodontal disease affects 35% of adults over the age of 30 (Sfyroeras et al., 2012). Sfyroeras showed that statistically, periodontitis leads to elevated inflammatory markers, which correspond with strokes. DHs typically treat periodontitis.

An IPE approach could support more favorable patient health outcomes than other approaches to address oral health post-stroke. The IPEC competencies teams using teamwork with defined roles and responsibilities could determine how to use IPEs. Lumague (2006) found that opportunities exist for more comprehensive patient care if the curriculum focuses on interprofessional scopes of practice. Lumague (2006) stated that when introducing IPE, the benefit of learning other professionals' scope of practice becomes apparent in better patient health outcomes.

Malik et al. (2017) explored the effectiveness of a web-based health program in educating providers on the basics of oral home care habits. The researchers aimed to determine if the

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promotion of oral health supported stroke survivors in hospital settings. Often oral health is the last issue addressed with hospitalized patients, despite that oral health significantly impacts total body inflammation. Continuing professional development can impact and promote learning for the providers, allowing them to change the general intention for administering oral hygiene to patients after a stroke (Malik et al., 2017). In Malik et al.'s (2017) study, the sample size was ($N = 247$) patients and over ($N = 600$) nurses. The findings showed significant improvements in the patients' oral health when the RNs performed daily oral hygiene for patients with a stroke.

Lam et al. (2013) determined that rehabilitation is a key component in managing patients' post-stroke. Approaching these patients using multidisciplinary teams is important because health professionals have overlooked oral health in the past. Lam et al. addressed the effectiveness of health promotion interventions on clinical oral health due to a lack of complete care. Lam et al. assessed 102 patients ($N = 102$, $p > .05$) over a three-week period. Patients with stroke experienced a lower oral health bioburden when chlorhexidine mouth rinse was used in conjunction with intermittent toothbrushing. Each participant used an electric toothbrush and received help as needed. Providers could protect patients' oral health post-stroke in hospital settings using chlorhexidine rinses and mechanical removal of biofilm. However, according to Lam et al. (2013), the long-term implications have yet to be determined due to a lack of evidence-based research evaluating oral health after patients who are post-stroke go through discharge.

Similarly, Ferguson et al. (2019) assessed which health professionals are best situated to address oral health for patients after strokes and found allied healthcare personnel and nurses are more prepared than others when employed in hospital settings. These professionals could be OTs working in the hospital setting with patients who had strokes. The results showed that some

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hospital professionals had misconceptions about oral health care, such as denture maintenance being more manageable than maintaining patients with full dentition. Hospital health care workers found a need for oral health among patients. Ferguson et al. (2019) found that some workers lacked knowledge on performing oral hygiene care for patients. The lack of understanding shows the possible benefit of receiving IPE at the academic level.

Obembe et al. (2019) conducted a cross-sectional survey ($N = 35,759$) to determine the extent of healthcare usage by stroke survivors compared to those who had not suffered a stroke. Obembe et al. (2019) reported that the mean number of visits to a family doctor was 4.9 visits/person/year after a stroke ($SD = 5.9$), and the mean was 3 visits/non-stroke person/year ($SD = 4.8$). The stroke group showed that survivors visit their health providers more frequently than those who have not suffered a stroke. Stroke survivors are used more health care resources due to ailments from strokes (Obembe et al., 2019). Through collaboration, the potential exists for healthcare professionals to reduce patient visits to multiple providers.

Post-stroke, most patients tend to have physical and motor difficulties. Lam et al. (2013) stated that oral functional impairments are prevalent after a stroke leading to an increased risk of oral disease. Some impairments that patients who have had a stroke face are hemi-paralysis, xerostomia, dysphagia, loss of cognitive function, food pouching, weakened facial muscles, oral apraxia, and motor impairment (Lam et al., 2013). Food pouching occurs when food remains in the oral cavity after eating. Patients with hemi-paralysis could be unaware of pouching food because they have no sensation in half of their faces or bodies. Xerostomia (dry mouth) creates an acidic environment for bacteria, which leads to a higher risk for decay and gum disease. Saliva protects the gums and teeth and supports digestion as well as many other functions. Gingiva suffers from alteration to the oral biome due to the loss of a neutral pH. Dysphagia or

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trouble swallowing can lead to food pouching, and the remnants of food act as a source of nutrients for the bacteria. Loss of cognitive function could occur when patients do not remember to brush their teeth and increase their oral bioburden. Motor impairment results in improper oral hygiene habits. When considering these risk factors, IPE can reduce the bioburden and improve patient outcomes post-stroke (Lam et al., 2013). These side effects can alter the ways patients take care of their mouths. Ferguson et al. (2019) found that having support from health professionals and a referral system assists patients who need dental treatment. These supports could be crucial for IPE concerning oral health in hospital settings. The results from both studies showed the need for IPE in healthcare settings (Ferguson et al., 2019; Lam et al., 2013).

The role of OTs in rehabilitation is to help patients learn to adapt to daily life. Education on the oral-systemic link can lead to better patient outcomes when DHs and OTs work together. According to researchers, IPE needs further study to understand these outcomes. Reeves et al. (2017) aimed to discover whether strategies to improve IPE impact patient care outcomes. Reeves et al. (2017) also stated that most IPE studies are focused on the healthcare provided and patient outcomes, meaning duplication of studies is challenging due to variances in patients.

IPE Events

Lumague (2006) stated that IPE education for students could address the need for a patient's complete care. Lumague (2006) studied students' perspectives on IPE and suggested that health care providers who work as a team to address patients' health provide more complete care (Lumague, 2006). To support success, IPE events must identify and meet IPEC competencies. According to IPEC, courses should have the core competencies embedded in the curriculum for future success (IPEC, 2016).

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The development of a working model of IPE among DHs and OTs could lead to better patient care through understanding that strokes are a trauma caused by multifaceted inflammatory disease; thus, the treatment of patients should aim to lower inflammation. Evidence supported that rehabilitation is a crucial component of successful stroke management (Ferguson et al., 2019; Lam et al., 2013; Malik et al., 2017). Lam et al. (2013), Ferguson et al. (2019), and Malik et al. (2017) showed consistent findings that patients with strokes had poor oral hygiene. These findings showed a significant decrease in plaque scores among all the groups. These results showed that patients in a healthcare environment with professionals engaging in IPE had lower plaque levels after they had a stroke.

Researchers have supported virtual education as becoming increasingly important and prevalent due to societal norms. Virtual meetings, online learning, social media, and the internet have changed curricular construction. Most people use the internet for higher education, work, and even entertainment. Using the ease of administering learning programs online, the prospect of increasing virtual participants is rising. The movement of work from home and attaining online degrees has allowed society to raise their overall knowledge through convenient access to education. For this study, reviewing the efficacy of a virtual IPE is critical. In the current climate of the 2020 global pandemic, virtual communication is used for collaboration and education due to social distancing measures and reducing exposure of large groups (Centers for Disease Control [CDC], 2020).

Lee et al. (2019) looked at the feasibility and acceptability of using the virtual world for IPE. For this study, the IPE event included DH and OT students learning to collaborate on care for patients after a stroke. Lee et al. (2019) defined a virtual world as computer-based simulations, allowing students to interact in real-time. Lee et al. (2019) used the Second Life

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platform. Students who partook in the IPE event used an open discussion format to review the group case study. Lee et al. (2019) showed that participants perceived the virtual event as effective for the potential treatment of patients. These results supported the motivation for virtual IPE events.

Summary

Periodontal disease is an inflammatory disease treated in part by dental hygiene. Evidence supports that periodontal disease links to systemic health (Glurich et al., 2002). The DHs provide oral hygiene care through NSPT and regular recare appointments. Hasturk and Kantarci (2015) showed that uncontrolled oral inflammation leads to systemic implications. Strokes have inflammation as their basis and have a high prevalence in the United States (AOTA, 2014). OTs provide rehabilitation for patients' post-stroke. This rehabilitation has the goal of creating maximum independence for patients. Interprofessional education could be crucial to providing complete patient care (WHO, 2010) and has been successful in educating healthcare providers on how to provide oral hygiene care to change oral health (Ferguson et al., 2019; Brady et al., 2011; Malik et al., 2017; Lam et al., 2013; Lumague, 2006). For clinicians to understand their roles and the ways they can collaborate for better patient care, educative efforts should emphasize student understanding of other professionals' roles as well as their own. This study included a virtual IPE event with a team case study for DH and OT students. The event included an open discussion for students to solve the case study.

Methodology

Research Design

The study was a non-experimental quantitative study aimed to measure the effectiveness of an IPE educational module regarding IPE for DH and OT students. The premise was to measure baseline (pre-event) learning and then measure learning after using the module to determine the potential gain in knowledge. Consent was gained first through an invitation email and SurveyMonkey link (see Appendix A). The quantitative measures were in the form of confidential surveys (see Appendix B). The survey data was analyzed for the influence of IPE on DHs and OTs using the mRIPLS. The principal investigator (PI) developed two 5-point Likert items to gauge students' confidence about providing stroke care. The pretest survey requested student demographics, including age, educational background, previous experience with stroke, and department affiliation, i.e., dental hygiene or occupational therapy.

Procedures

Human Subjects Protection/Informed Consent

The PI gained IRB approval from Eastern Washington University (EWU). The study consisted of an educational module (see Appendix C) with a case study to foster IPE at the students' academic level. All responses from students remained confidential. Students followed a link in the invitation found on Canvas, which contained the first survey in which the first page was the informed consent (see Appendix A). After clicking on the next page, the students' consent was obtained. The PI administered a posttest immediately after the event took place and was closed after an hour. Students created a unique code to allow the PI to use these codes to maintain confidentiality for each person. The identification code consisted of the first two letters of their program, followed by the first two numbers of their home address. The PI and statistician

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were the only individuals who had access to the data; the PI stored the data on the PI's password-protected computer. Participation in the event and completing the surveys was voluntary and separate from programmatic requirements in the dental hygiene and occupational therapy departments. Participants were offered an incentive to attend the IPE module and complete both study surveys, which consisted of an opportunity to win a \$50 Amazon gift card.

Criteria for Sample Selection

The PI used a convenience sample of second-year cohort students in occupational therapy and dental hygiene. An inclusion criterion was that students should be enrolled in the occupational therapy or dental hygiene programs on the Spokane, WA Campus. Dental hygiene students have a departmental requirement of attending at least two interprofessional events each year per accreditation standards (L. Bilich, personal communication, November 10, 2020). Occupational therapy students at the graduate level are encouraged to participate in community-based IPE events throughout their two-and-a-half-year program.

Description of the Setting

For the convenience and accessibility of the PI, this study was conducted virtually, with EWU occupational therapy and dental hygiene students as participants. The participants received a 30-minute presentation on inflammation and strokes (see Appendix C), followed by the case study presentation. After students had the opportunity to ask questions, the PI allowed a 10-minute break. The PI intended to use break-out rooms for students to interact and work through the case studies (see Appendix D). Due to the low number of participants, the PI opted for an open group discussion. The PI led the discussion of the first case study, then asked participants for a volunteer to lead the second case study. A dental hygiene student led the discussion of the second case study. Students took about 20 minutes to discuss beneficial ways to work

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collaboratively and better patient health outcomes. After the group discussed the case studies, the PI provided a recap of the discussion and highlighted opportunities not mentioned by the group members. At the end of the event, the PI opened the discussion to clarifying questions and sent out the posttest survey link to participants through Zoom's messenger. The event was 90 minutes in duration.

Size

The event was open to all second-year dental hygiene students and second-year occupational therapy students currently enrolled at EWU. For the event, 10 dental hygiene students and one occupational therapy student participated ($N = 11$). The minimum capacity needed for logistics and effective pedagogy is a sample size of 14 (B. Foster, personal communication, November 10, 2020); this sample size was unmet.

Data Collection

The PI used a pretest-posttest quantitative design with the mRIPLS (see Appendix B) to collect data. The goal was to measure the effect of the IPE module (see Appendix D) on dental hygiene and occupational therapy students' understanding of their professional roles and responsibilities and communications related to stroke care. Two quantitative items were used on the pretest-posttest to assess their comfort level in providing oral care for patients with strokes and their roles on the health care team. All quantitative data was pretest-posttest scores obtained from the 5-point Likert scale items based on items generated by the PI and IPEC competencies (see Appendix B). The students followed the link embedded in the Canvas course announcement to gain access to SurveyMonkey. By collecting data in SurveyMonkey, the PI could view and compare data. The PI delivered the posttest survey link to students using Zoom chat.

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Variables

The independent variable was an IPE educational module for dental hygiene and occupational therapy students concerning oral care for patients who have had strokes. The dependent variable was the students' understanding of their roles and the effectiveness of establishing communication for IPE for the patients.

Instruments

The PI used the mRIPLS (see Appendix B) to collect data for pretest-posttest scores. This instrument is based on research concerning IPE and the scope of practice for DHs and OTs. The pretest was distributed one week before conducting the event using an embedded code for SurveyMonkey posted to the Canvas courses. Thus, the students enrolled in the IPE using this code and received access to SurveyMonkey and the pretest survey. Each student created a unique code associated with their data collected through SurveyMonkey, and thus, the data remained confidential. The posttest consisted of the mRIPLS as used in the pretest to collect quantitative data. The PI gained consent to use the mRIPLS; according to Bligh (2015), the mRIPLS is public domain if the intended use is for education (see Appendix B).

Steps to Implementation

First, the PI developed the powerpoint (PPT), case study, and SurveyMonkey for the IPE event, gained IRB approval and created an invitation post for Canvas. The PI retrieved an evidence-based, peer-reviewed, open-source educational module from the MedEd PORTAL (see Appendix D) and adapted it to fit this study. The module's focus oral care and stroke victims and is titled *Oral Health and the Stroke Survivor* (Morris & Sadowsky, 2013). The PI finalized the PPT, which included the roles of the respective professionals: DHs focus on strokes and inflammation, and OTs on stroke care. This PPT presentation was about 30 minutes in duration.

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Second, the PI supplied Lisa Bilich and Dr. Lucretia Berg with the invitation post containing the pretest link for the IPE event two weeks before implementation. The Zoom link was posted one week before event implementation. The students used their identification code to access the surveys. Thus, they kept their identities and responses confidential; the codes consisted of the first two letters of their program followed by the first two numbers of their home address. They entered their unique code into the SurveyMonkey identification tab to indicate they had completed the survey. Everyone's unique code was the same for both surveys. The surveys included items to assess knowledge about roles and responsibilities and communication for teamwork when dealing with patients' oral health needs after a stroke. As the students completed the survey, the PI entered the students' identification code into an Excel spreadsheet for the raffle. The winner was chosen using a random number generator to pick a number between 1 and 11.

Third, the PI hosted the virtual IPE event using Zoom on Thursday, March 25th, at 6:30 pm PST. The PI used the PPT to present information on oral health care basics to reduce plaque and biofilm to benefit systemic health. The PPT was hosted over Zoom due to a global pandemic and the necessity of social distancing. The PI did not use break-out rooms because of the small sample and specifically due to having one OT participant. Instead, the PI led the first case study discussion but allowed students to answer and spark discussion. The PI then asked for a volunteer to lead the second case study, a DH student volunteered, and the PI allowed students again to foster discussion. Near the end of the event, the PI opened the conversation to questions and hosted a question-and-answer session addressing concerns and ideas for when and where collaboration could occur and how these professionals could forge communications. After implementation, the PI sent out the post-event survey to obtain feedback.

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Fourth, after receiving the completed surveys, the PI entered the students' identification numbers into an Excel spreadsheet. Using a random number generator, the PI selected the winner of the incentive gift. For confidentiality, the PI emailed the prize to designated department chair.

Table 2

Steps to Implementation

Step	Timeline	Occurrence
First	Week 1	Developed a PPT, created an invitation email with a link to sign up
Second	Week 3-4	Supplied students who signed up with pretest survey and Zoom link
Third	Week 5	Hosted IPE event and supplied posttest survey link
Fourth	Week 6	Announced the raffle winner for a \$50 Amazon gift card

Note. Interprofessional education event steps for implementation.

Statistical Analysis

The data was quantitative, and the PI utilized a chi-square test to assess the data collected from the pre and posttest results provided from the mRIPLS survey. The dependent samples *t* test was not utilized due to a low sample size. The chi-square test is used to show if a fraction of responses changed from pretest to posttest. The answers were collapsed into agree and disagree from the 5-point Likert scale. Those who selected strongly agree or strongly disagree were converted to agree or disagree. Reducing the response categories allowed the chi-square test to be performed with 1 degree of freedom. The mRIPLS uses a five-point Likert scale (5 = *strongly agree*, 4 = *agree*, 3 = *neutral*, 2 = *disagree*, 1 = *strongly disagree*), which leads to a maximum score of 95 on the mRIPLS. To assess changes, the PI computed the mean scores of all the pretest and posttest items to compare these data descriptively. The aim of using the mRIPLS was to assess students' understanding of roles and responsibilities along with communication for teamwork. All responses were kept confidential and stored on a secured computer to protect

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student's identities. The data are presented in a tabular format with mean scores for each item.

The data was shared with a statistician for analysis. The statistician utilized SPSS (version 25) to analyze the data.

Summary

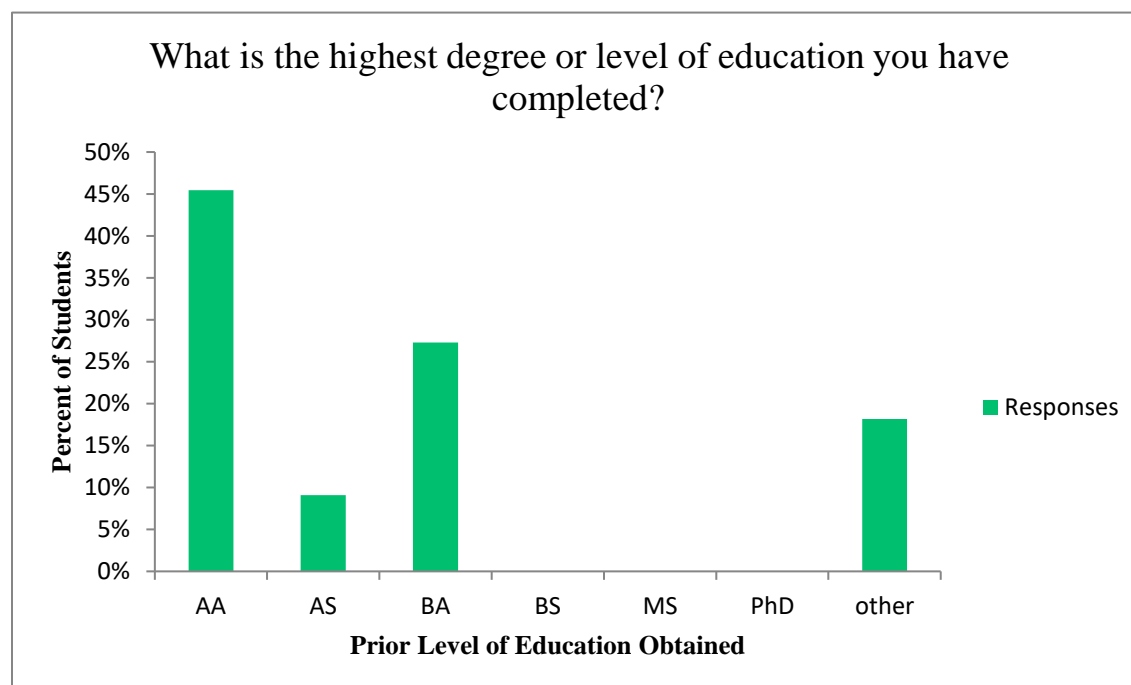
Interprofessional education is crucial to the future of healthcare. Beginning collaboration at the student level, through an IPE event, is teaching students ways collaboration can exist to further patient care. A portion of educational requirements is IPE. Allowing students to work together to solve a case study could lead to understanding the roles of patient care for other health care professions. In this study, the specific goal was to understand how DHs and OTs could decrease oral inflammation for patients post-stroke through collaborative efforts.

Results

Description of Sample

The PI invited second-year students from the EWU dental hygiene and occupational therapy departments on the Spokane campus via a Canvas announcement posted in the respective program's student pages. Participants $N = 11$ included $n = 10$ dental hygiene students and $n = 1$ occupational therapy student. Of the total participants 11 completed the pretest and 13 completed the posttest not every student answered every question, some were skipped which accounts for variants in the “ n ” response data. On Thursday, March 25th, 2021, at 6:30 pm pacific standard time, the PI hosted the virtual IPE on ZOOM; the 12 participants listened to a 30-minute presentation followed by a virtual discussion among participants. Because there was only one occupational therapy student, no opportunity was available for break-out discussions in separate rooms.

The PI assessed the demographics of students who participated in the IPE event using questions about age, previous education attained, and if the participants knew a person close to them who previously had a stroke. The pretest survey identified that 64% of participants had experienced a family member or someone close to them with a stroke. Students were mostly between the ages of 22 and 41, 45% having an Associate degree, and 25% having a Bachelor of Science degree (see Figure 3).

Figure 1*Degrees Earned*

Note. The average degree held by participants was an AA. Approximately 16% indicated other.

Statistical Analysis

Quantitative data was collected via SurveyMonkey using the mRIPLS survey items at the pretest and posttest. The survey also contained two items generated by the PI. All data was de-identified and anonymized using participant-generated codes. The PI kept the results on a password-protected computer. Because the mRIPLS contains 5-point Likert scale items, the mean score maximum is 5. In comparisons of the mean scores from the pretest to the posttest, there were slight differences in means on items 12, 20, and 21 (see Table 1).

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Table 3*Mean Scores of Pretest-Posttest*

mRIPLS Items	<i>M</i> Score Pretest	<i>M</i> Score Posttest
1. Learning with other students/ professionals will make me a more effective member of a health and social care team.	4.81	4.85
2. Patients would ultimately benefit if health and social care students/ professionals worked together	4.81	4.85
3. Shared learning with other health and social care students/ professionals will increase my ability to understand clinical problems	4.91	4.85
4. Communication skills should be learned with other health and social care students/ professionals	4.73	4.85
5. Team-working skills are vital for all health and social care students/professionals to learn	4.9	4.85
6. Shared learning will help me to understand my own professional limitations	4.81	4.85
7. Learning between health and social care students before qualification and for professionals after qualification would improve working relationships after qualification/ collaborative practice	4.72	4.83
8. Shared learning will help me think positively about other health and social care professionals	4.91	4.92
9. For small-group learning to work, students/professionals need to respect and trust each other	5	4.92
10. I do not want to waste time learning with other health and social care students/professionals	1.36	1.54

Table 3 continued

mRIPLS Items	<i>M</i> Score Pretest	<i>M</i> Score Posttest
11. It is not necessary for undergraduate/ post-graduate health and social care students/professionals to learn together	1.72	1.46
12. Clinical problem solving can only be learnt effectively with students/ professionals from my own school/organization	1.72	1.62
14. I would welcome the opportunity to work on small group projects with other health professionals	4.54	4.69
15. I would welcome the opportunity to share some generic lectures, tutorials or workshops with other health and social care students/professionals	4.63	4.77
16. Shared learning and practice will help me clarify the nature of patients' or clients' problems	4.63	4.77
17. Shared learning before and after qualification will help me become a better team worker	4.72	4.77
18. I am not sure what my professional role will be/is	2.36	1.85

Note. Sample sizes were 11 for pretest and 13 for posttest. The $p > .05$ for all items.

The highest score possible is 5; thus, a slight difference exists in the numbers for some items.

The differences of the pretest and posttest scores for each of the items 12, 20, and 21 led to relatively large values of the chi-square statistics; thus, the probability of attaining statistical significance is unlikely. That is, a large number of the respondents did not change from pretest to posttest. For each item analyzed using the chi-square, those participants responding with agree or disagree were separated into the two groups; thus, the degrees of freedom were computed as one.

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Chi-Square Test on Items 12, 20, and 21

Chi-square (X^2) tests for differences in response frequency on items 12, 20, and 21 showed the most notable net differences between pretest and posttest response agreement. To assess these data, all responses were collated into two categories: agree and disagree. The chi-square test was used to determine if significant changes occurred between pretest and posttest numbers of participants who agreed or disagreed with the statements in items 12, 20, and 21 (see Tables 4, 5, and 6). Overall, these chi-square tests show that the proportion of students who agreed in the pretest did not differ significantly from those in the posttest. If there were no apparent changes in the pretest versus posttest responses, then a statistical test is invalid. The degree of freedom ($df = 1$) was for each test was found by taking the number of groups and subtracting one.

Item 12 (see Table 3) concerned how students felt about the effectiveness of learning alongside students from another program. The pretest scores suggested that students disagreed that they could only learn from students in the same university and program as themselves. In the posttest, the mean was slightly higher, showing that one or more students agreed they could only learn effectively from students within the same university. However, the results yielded a ($p > .05$), suggesting no statistical significance between groups. The result shows that the students at EWU value IPE and understand that diversity is essential for the event. There were changes between the groups from pretest to posttest, but the small sample limits the interpretation of results, and the test indicates no significant difference.

Item 12 was “Clinical problem solving can only be learned effectively with students/professionals from my own school/organization” (see Table 3). The pretest scores suggested that students disagreed that they could only learn from students in the same university

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and program as themselves. In the posttest, the mean was slightly higher, showing that one or more students agreed they could only learn effectively from students within the same university. However, the results yielded a ($p > .05$), suggesting no statistical significance between groups. The result shows that the students at EWU value IPE and understand that diversity is essential for the event. There were changes between the groups from pretest to posttest, but the small sample limits the interpretation of results, and the test indicates no significant difference.

Students in the pretest answered predominately in disagreement with the posttest showing a slightly different response in agreement posttest. The number of respondents agreeing did not differ significantly from pretest to posttest for item 12, $\chi^2(1, n = 7) = 0.60, p = .569$ (see Table 4). Because the ($p > .05$), the difference between pretest and posttest scores appears to be statistically non-significant (see Table 4); however, the small sample size ($n = 7$), for this question, renders indeterminant test significance. Nonetheless, some changes are seen among the pretest versus post-test responses.

Table 4

Title Item 12 χ^2 Results

	Value	df	<i>N</i>	<i>p</i> value
Pearson Chi-Square	.60	1	7	
Fisher's Exact Test				.569
<i>N</i> Valid Cases	15			

Item 20 was “I am confident discussing oral health with a patient who has had a stroke.” The students who agreed to this statement in the pretest ($n = 4$) versus those who agreed in the posttest ($n = 8$; Table 6) suggests some possibility of a significant difference. Responses on item 20 reflected some differences between pretest and posttest, but these were not significant, $\chi^2(1, n$

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$= 8) = 4.29, p = .077$ (see Table 5). For this item, the ($p = .077$) is relatively close to the assumed level for statistical significance; however, it cannot be interpreted as significant due to the small sample size. For example, when only one to two answers differ between pretest and posttest, these small changes affect a p value, as is likely in this case. Therefore, the results could be more definitive if a larger sample size were available. Despite the implications, no conclusion can be asserted that the IPE event helped students understand the primary importance of oral health-related strokes.

The data pretest indicated that students were likely neutral; they neither agreed nor disagreed with the statement. However, at posttest, the students appeared to have gained confidence. The shift in responses shows the IPE event could have contributed to equipping students with confidence and knowledge to provide oral health recommendations for patients who are post-stroke. The results yielded a ($p < .05$); thus, no statistically significant changes in mean scores are likely for this sample.

Table 5

Title Item 20 χ^2 Results

	Value	df	<i>N</i>	<i>p</i> value
Pearson Chi-Square	4.29	1	7	
Fisher's Exact Test				.077
<i>N</i> Valid Cases	15			

Item 21 is, "I am confident I understand the adverse outcomes related to poor oral health in patients who have had a stroke." The descriptive results showing the frequency of responses indicate that more participants agreed in the posttest condition than when responding to the

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pretest survey. Consistent with these results, fewer respondents disagree on the posttest survey, as seen in the lower frequency of responses on the posttest. Thus, students' confidence appeared to increase after the event. The statistical test comparing the number of participants who agreed pretest ($n = 4$) with those who agreed posttest ($n = 7$) yielded a non-significant result ($p = .192$; Table 6). The low sample size limits the interpretation of the results; thus, no conclusion is drawn concerning whether the IPE presented students with information on how patients who have had a stroke likely require distinctive dental care.

Item 21 concerned students' confidence in understanding the implications of a stroke on oral health. On average, students in the pretest answered that they agreed; however, the result could be related to having more dental hygiene than occupational therapy students participating in the event. The DHs have more education concerning the oral-systemic link. However, all participants appeared to agree in the posttest; they tended to perceive that the virtual IPE event improved their confidence concerning the oral-systemic implications of strokes ($M = 4.38$). The responses show a change in pretest ($n = 4$) to posttest ($n = 7$), with the ($p > .05$) (see Table 6).

Table 6

Title Item 21 X^2 Results

	Value	df	<i>N</i>	<i>p</i> value
Pearson Chi-Square	3.89	1	7	
Fisher's Exact Test				.0192
<i>N</i> Valid Cases	14			

Note. Item 21 chi-square test.

Discussion

Summary of Major Findings

The results of this study are not statistically significant regarding the change in students' perceptions of IPE after the IPE event. The results may be partly due to the small sample size. Descriptive results from three questions suggest changes in responses between pretest to posttest perceptions; thus, the reason for using chi-square and Fisher Exact tests. As discussed above, with a small sample size, only a few response changes could alter the potential statistical significance, and the apparent differences in frequency of responses suggested the use of statistical tests.

The PI analyzed the data using the mean score on the 5-point Likert scale (see Table 3) and descriptively by observing the frequencies of responses; minor changes are apparent in students' perceptions from pretest to posttest. These changes highlight the importance of further research with a larger sample size to increase the robustness of the statistical tests and more accurately determine the effectiveness of IPE for DHs and OTs when delivering care to patients with strokes. The two items developed by the PI showed the most considerable change which reflected that the IPE was impactful regarding information on strokes. An interpretation is that while students may understand IPE, they might not be confident giving stroke care related to oral hygiene.

Discussion

Brady et al. (2011) and Reeves et al. (2017) showed the benefit of professionals from diverse disciplines working together to address the oral health of patients who have had a stroke. The WHO (2010) claimed that IPE is crucial to managing the healthcare crisis effectively. This crisis

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consists of an increasing prevalence of disease; IPE could be the key to decreasing the crisis. The aim of this study was to demonstrate that students could understand their professional roles and responsibilities related to oral care for patients after a stroke. The small sample size limited tests for statistical significance in the study. While low participation affected the statistical testing, responses on a few questions suggested changes in pretest to posttest scores. It can be inferred that the IPE event helped educated students on how a stroke patient may require different dental care post stroke because the mean score for question 20 and 21 showed that students valued the IPE module on strokes and oral health. Overall, the assessment from students via the mRIPLS is consistent with an outcome that the IPE module did not influence students' perceptions of their roles and responsibilities for healthcare teams' communications during care for patients with strokes.

Demographics

The study included EWU dental hygiene and occupational therapy second-year students. Participants from the dental hygiene department included 10 students in the pretest and 12 in the posttest, and only one participated from the occupational therapy department in the pretest and posttest. While CODA mandates that IPE must be a part of DHs' education, IPE is only encouraged for occupational therapy students. This lack of mandate might influence the number of participants in occupational therapy who volunteered. The PI noticed greater interest from DHs than the OTs. The average age of the participant was 25, and the highest degree previously earned was a bachelor's degree. Approximately 75% of participants stated that they knew someone close to them had a stroke.

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mRIPLS and IPEC

The mRIPLS was used to collect data and link IPEC's competencies to student perceptions. The PI explicitly examined the students' understanding of their professional roles and responsibilities in conjunction with their communications regarding oral hygiene and strokes. Other results have shown that oral hygiene is an essential factor in reducing strokes due to the high presence of gram-negative bacteria in periodontal disease leading to systemic inflammation (Anrather & Iadecola, 2016; Sen et al., 2018). The AOTA (2014) highlighted that OTs focus on helping patients return to health and participate in daily activities. ADHA (2008) stated that DHs' roles concern screening and educating patients on the potentially life-threatening disease related to oral health. The use of IPEC's competencies RR4 and CC8 was highlighted through the mRIPLS. While the responses to the mRIPLS showed slight changes in students' perception from pretest to posttest, further research with larger sample sizes could reveal the relationships among the variables.

From the results using this small sample size, no conclusion can be reached about whether the IPE event influenced a significant change in students' perceptions on IPE, collaboration, and confidence. EWU's health science campus incorporates IPE in the curriculum; thus, suggesting the importance of this type of education. Moreover, students are exposed to IPE events during their time at the university. Two of the questions generated by the PI, which were related to an understanding of caring for patients with strokes, showed the most considerable changes in responses. Brady et al. (2011) and Reeves et al. (2017) found a lack of oral hygiene care in the stroke care settings. The integration of IPE for the future of healthcare professionals is essential; the more collaboration occurs, the greater the potential of caring for the patients' total health. Concerning IPE specifically, the EWU college of health sciences has impacted the

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education of students regarding the importance of collaborating. The implications support future continuing education courses for practicing professionals.

Virtual IPE-ZOOM

Malik et al. (2017) showed that web-based health programs effectively educate students on basic oral hygiene habits. Based on the PI's observation, the virtual IPE event was successful because a robust discussion occurred. Participants had ample time to discuss and ask questions. Other researchers have shown improvement in clinician's perceptions concerning IPE's influences in providing complete patient care (Lam et al., 2013; Lee et al., 2019; Lumague, 2006). Lee et al. (2019) specifically found virtual implementation to be an effective platform. Although the results were not statistically significant in this study, the lack of significance is unlikely specific to the use of a virtual platform. The PI hosted this event about a year after education programs shifted to virtual platforms due to the Covid-19 pandemic. People are experiencing burnout with virtual meetings and may not have the motivation to participate. While being virtual does change things, it does not necessarily make it impossible for solid outcomes. Future IPEs could be held virtually, but the timing of such events could be a factor to consider for participation and effectiveness. The rich discussion in this event implies a potential benefit for instructors to use in the future. Virtual programs are convenient for students and instructors because the programs are flexibly implemented from many locations and can be delivered to almost everyone.

Future IPE

Instructors and researchers could change future IPE events in a variety of ways. First, it could be changed to make the IPE event mandatory for students in both departments. Mandatory attendance should increase the potential sample size, and if an evaluation is pursued, then a

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larger sample size will provide more data related to IPE presentations. Secondly, although the virtual nature of the event could not be avoided due to CDC (2020) guidelines for the pandemic, an in-person event might be preferred by participants. The results could be affected if the event is conducted in person because some verbal and certainly non-verbal interactions are lost in the virtual environment. Sometimes evaluation of an educational event is not measurable quantitatively; therefore, the addition of qualitative data and questions could further a greater understanding of IPE impacts on students' learning. Lastly, making this opportunity open to all students in both programs without placing limitations on the student cohort year eligible to participate could add a dimension to measuring students' gains in understanding. By inviting only second-year students, the PI eliminated some opportunities to determine if impacts differ depending on students' current knowledge. The PI chose students who were at the end of their educational program at EWU, and some had participated in other IPE events; however, including all students in each respective program could allow for a more significant change in students' understandings for those at earlier points in their education.

Limitations

These results support some insights into IPE for students. The PI designed the study to occur at one regional location with only a small sample of students. Although the sample size was an obvious limitation, it was not the only limitation. The PI conducted the study using a virtual platform; moreover, the participants were not represented equally between the two disciplines. The PI performed the study in an academic setting and not a caregiving setting where providers are involved with patients. Thus, clinical implications are not a part of the study outcomes. Another limitation to the study was that the PI conducted the research with OT and DH students involved with their board exams; this timing likely contributed to the low number of

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volunteers. The event took place on a Thursday at 6:30 pm, after most students have ended their academic day. By hosting the event outside of academic hours, the PI may have contributed to an inability to attract students to participate. The timing of holding the event could have affected the outcomes of this study.

Recommendations and Suggestions for Future Research

Adding a more diverse group of occupational therapy participants could prove beneficial in future studies. Hosting an in-person event rather than a virtual event could allow for a larger and broader participant draw. Due to social distancing requirements, the event was virtual, and after a year of using Zoom, students may well be experiencing virtual burnout. Another variable of interest could be conducting the study with professionals in the workplace. Reeves et al. (2017) found that IPE is crucial for advancing professional practices and patient care outcomes. The perceptions of providers in practice could diverge from students and be more varied as well. Interprofessional collaboration gained recognition in the 1980s but did not attain popularity until the early 2000s (Buring et al., 2009). Most healthcare providers are aged 20-65, with an average age of 42 years old (U.S. Bureau of Labor Statistics, 2021); therefore, more than half may not have yet experience IPE as part of their educational training.

Conclusions

Strokes are one of the leading causes of disability among the aging population (AOTA, 2014). Because the United States population as of 2020 is approximately 16.5% of the total and will be rising over the next 30 years to 22% (U.S. Bureau of Labor Statistics, 2020), strokes will likely become a higher health risk in the populace. Healthcare often focuses on how patient treatment is in alignment with clinicians' specific training. The aging population often faces multiple health problems, and IPE could help to bridge a gap in comprehensive care. With DHs positioned to address the oral-systemic link and OTs positioned to help individuals regain daily independence, the two groups of professionals could work together to decrease bioburdens through homecare instructions and adaptations.

Occupational therapists often work with patients after a stroke and could aid these patients in seeking care from dental professionals after quick oral screenings and homecare demonstrations. OTs can also assess the patient's ability to perform daily homecare habits and work to make the process one the patient can execute. An OT can also look for signs of dry mouth, food pouching, and dysphagia. If the patient has a relationship with a dental professional, OTs could establish communication with DHs to inform on the patient habits they address through occupational therapy.

Dental hygienists work with a wide variety of patients; however, when they treat patients after a stroke, they could ask if the patients have an OT and whether, as the DH, they could establish communication on behalf of the patient. The DHs are positioned to discuss oral health and possible homecare alternatives with OTs to reduce biofilm and the risk for periodontal disease relapse.

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Interprofessional education takes the willingness of two clinicians to establish a connection and work together as a team to potentially influence patient outcomes. Moving forward, there is not a set of guidelines for how IPE is to occur. Maintaining an open-mind and searching for areas to collaborate will help further the importance of IPE. Placing value on IPE at the academic level may help students look for collaborative practices in the future. Interprofessional collaboration is important for patient health outcomes. The future of healthcare is patient centered care.

Interprofessional education is one way to approach this change. Future IPE may look like this module, consult teams, or academic settings in which students learn from different professions. For instance, a pharmacist may teach pharmacology, medically compromised may be taught by a physician assistant, and ergonomics by a physical therapist. The future of IPE requires more emphasis at the academic level and clinician level.

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Video conferencing, web conferencing, webinars, screen sharing. Zoom Video. <https://zoom.us/>.

Appendix A

Consent Email and Summary

Consent Information

Title of Study: Oral Care for the Stroke Patient: An Interprofessional Module for Occupational Therapy and Dental Hygiene Students

Principal Investigator (PI) Name: Morgan Umlauf, RDH, BSDH, MSDH (c)

PI Email Address: mumlauf@ewu.edu

Responsible Investigator (RPI): Professor Lisa Bilich, RDH, MEd

Purpose of the Study

My name is Morgan Umlauf, I am a graduate student from Eastern Washington University. This research is being done as part of my master thesis – proposed graduation date May 3, 2021. The purpose of this study is to determine if Dental Hygiene (DH) students and Occupational Therapy (OT) students can describe their roles in interprofessional collaboration (IPC), their roles in caring for a stroke patient, if a virtual IPE is effective in establishing collaboration among the two professions in communication and teamwork, and assess if each respective discipline feels confident in identifying their roles and responsibilities.

Inclusion Criteria

To participate you must meet the following criteria: (1) be at least 18 years of age or older; (2) are a current EWU student currently enrolled in either the Dental Hygiene department or Occupational Therapy department.

Procedures and Duration

You will be asked to complete two surveys consisting of 26 and 22 questions; it will take you about 10 minutes to complete. I will be asking questions regarding DH and OT students' roles when it comes to IPC for stroke patients in both surveys. The pre-test survey will have demographic questions, that keeps your identities protected. Both surveys contain the same questions based on the mRIPLS which uses the Likert scale. The PI will keep access to all data on personal computer under password protection.

Voluntary Participation

Your participation in this survey is voluntary. You may refuse to take part in the research or withdraw at any time without penalty. You may skip any question you do not want to answer for any reason.

Benefits and Risk

Any risks associated with answering the following questions are minimal and do not exceed those encountered in daily life. You are not likely to receive direct benefits from participating in this research study. However, your responses may help us learn more about IPC among dental hygienist and occupational therapists for better oral healthcare for stroke patients.

Storage of Data Collected

The data collected will be stored in a secure database—SurveyMonkey. My findings from the study will be included in my thesis write up, and defense presentation for my master's degree. All information will be destroyed by the RPI five (5) years after the conclusion of the study.

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Contact Information

If you have any questions about the study, please contact Morgan Umlauf, the Principal Investigator, using the contact information above. If you have questions or concerns about your rights as a participant in this study or any complaints you wish to make, please contact Charlene Alspach, Executive Director, Grant and Research Development, at 509-359-2517 or calspach@ewu.edu.

By answering questions on the survey, you are stating you are at least 18 years of age or older and your consent to voluntarily participate in this research is implied.

Appendix B

Pre/Posttest mRIPLS for DH and OT students: (same questions used each time)

Please complete the following questionnaire.

		Strongly agree	Agree	Undecided	Disagree	Strongly disagree
1.	Learning with other students / professionals will make me a more effective member of a health and social care team					
2.	Patients would ultimately benefit if health and social care students / professionals worked together					
3.	Shared learning with other health and social care students / professionals will increase my ability to understand clinical problems					
4.	Communications skills should be learned with other health and social care students / professionals					
5.	Team-working skills are vital for all health and social care students / professionals to learn					
6.	Shared learning will help me to understand my own professional limitations					
7.	Learning between health and social care students before qualification and for professionals after qualification would improve working relationships after qualification / collaborative practice.					

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		Strongly agree	Agree	Undecided	Disagree	Strongly disagree
8.	Shared learning will help me think positively about other health and social care professionals					
9.	For small-group learning to work, students / professionals need to respect and trust each other					
10.	I don't want to waste time learning with other health and social care students / professionals					
11.	It is not necessary for undergraduate / postgraduate health and social care students / professionals to learn together					
12.	Clinical problem solving can only be learnt effectively with students / professionals from my own school / organisation					
13.	Shared learning with other health and social care professionals will help me to communicate better with patients and other professionals					
14.	I would welcome the opportunity to work on small group projects with other health and social care students / professionals					
15.	I would welcome the opportunity to share some generic lectures, tutorials or workshops with other health and social care students / professionals					
16.	Shared learning and practice will help me clarify the nature of patients' or clients' problems					
17.	Shared learning before and after qualification will help me become a better team worker					
18.	I am not sure what my professional role will be / is					
19.	I have to acquire much more knowledge and skill than other students / professionals in my own facility / organisation					

1. I am

confident discussing oral health with a patient who has had a stroke.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
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2. I am confident I understand the adverse outcomes related to poor oral health in patients who have had a stroke.

Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
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Demographics will go at the beginning of the Pre-test ONLY

3. Please select which of the following programs you are enrolled in:

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Dental Hygiene

Occupational Therapy

4. Age in years
5. Has someone close to you ever suffer a stroke?

Yes No Prefer not to answer
- 6.
7. Have you ever provided care to a stroke patient?

Yes No Prefer not to answer
8. What is the highest degree or level of education you have completed?

AA AS BA BS MS PhD other

Appendix C

Measurement Instrument Terms of Use

Readiness for Interprofessional Learning Scale (RIPLS) Questionnaire

Permission Statement from Angus K McFadyen

(via email communication, August 26, 2013)

These instructions are provided by the National Center for Interprofessional Practice and Education as part of a curated collection of instruments used for interprofessional education and collaborative practice (IPECP) research. More information is available at nexusipe.org/measurement-instruments.

The instrument is in the public domain. Permission not really required and there has never been a license issue with our versions of RIPLS.

akm-stats

Dr Angus K McFadyen

Statistical Consultant

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www.akm-stats.com

UNIVERSITY OF MINNESOTA

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6-Sep-13

National Center for



Interprofessional
Practice and
Education

Appendix D

This is the link to the MedEd Portal where I found the module to adapt.

https://www.mededportal.org/doi/full/10.15766/mep_2374-8265.9315

Adapted presentation.



Oral Health and the Stroke Survivor PPT adapted.pdf

Case Study

Oral Care Case Study – Stroke Patient

Patient information:

53 Year Old African-American Female

History of smoking

Missing Teeth

Stroke History – hemorrhagic stroke 2012, ischemic (currently seeking OT care)

States last dental visit was 10+ years ago.

Hemi-paralysis since 2012 – says she has just learned to live with it, never sought care due to not having insurance.

HX of HBP, type II diabetes

Currently seeking care to manage – diabetes, and HBP, now OT care for stroke

1. As an OT what is your first role for this patient regarding oral health since she is complaining of a bad taste?
2. What homecare aids would be recommended?
3. What treatment plan would you recommend?
4. What is the role of the OT and DH?
5. How can outcomes be improved?
6. What other providers may you want to include?

Patient Information:

61-year-old Caucasian Male

History of Smoking

Seeks regular dental care every 3mo.

History of NSPT

HHX update - just got diagnosed with TIA, was told to quit smoking or will become a bigger issue, said his PCP wants him to seek OT care since he has minor facial paralysis and a small tremor since the TIA.

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As a DH you notice that his tissue is far more inflamed, recommend repeating SRPs. At subsequent appointments you notice tissue is getting worse instead of better. When asking the patient what his habits at home you are find out that he is having a hard time grasping his toothbrush and remembering to brush.

1. What could you as the dental hygienist do to help the patient?
2. How can you adapt the tools to fit this patient's needs?
3. What treatment plan would you recommend?
4. What is the role of the OT and DH?
5. How can outcomes be improved?
6. What other providers may you want to include?

In both scenarios where could collaboration occur?

What are your respective roles in treating the patient in both scenarios?

Would there be opportunity for collaboration in each situation? How?

Curriculum Vita**MORGAN UMLAUF, BS, MS, RDH**

10218 E Driftwood Ct, Spokane Valley, WA 99206 | 509-619-6321 | mumlauf@ewu.edu

GRADUATE EDUCATION**2021****Master of Science in Dental Hygiene**

Eastern Washington University

Cheney, Washington

UNDERGRADUATE EDUCATION**2015****Bachelor of Science in Dental Hygiene**

Eastern Washington University

Cheney, Washington

LICENSURE**2015 - Present****Registered Dental Hygienist**

Washington State Department of Health

CERTIFICATES**BLS/CPR**

American Heart Association (expires July 2020)

ACADEMIC APPOINTMENTS**May 2021****Thesis - Interprofessional Collaboration Between Dental Hygiene and Occupational Therapy Students in Relation to Stroke Care****2018 - current****Restorative Clinical Dental Hygiene Professor**

Eastern Washington University

DNHY480S – Restorative Dentistry II

DNHY481S – Restorative Dentistry III

CLINICAL EXPERIENCE**Dec 2019 - Current****Restorative/Clinical Dental Hygienist**

Wilder Dentistry Spokane Valley, WA

July 2018 – Dec 2019**Restorative Dental Hygienist**

Bates Dental, PS Spokane, WA

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May 2018 - Current

Temporary Clinical Hygienist

Multiple offices in the Spokane, WA region

2016 - 2018

Clinical Dental Hygienist

Dr. Brian Rutherford, Mill Creek Family Dental Mill Creek, WA

2015 - 2018

Temporary Clinical Hygienist

Multiple offices in the Seattle Metropolitan Area

2015 -2016

Clinical Dental Hygienist

Smiles on Madison Seattle, WA

COURSE WORK

2019

DNHY 502S – Graduate Seminar in Healthcare

DNHY 505S – Healthcare Leadership

DNHY 620S – Semester on Public Health & Health Promotion

PUBH 563S – Research Biostatistics & Other Ways

2020

DNHY 520S – Research Methodologies and Scholarly Writing

DNHY 530S – Introduction to Thesis

DNHY 605S – Components of Program Development

DNHY 610S – Healthcare Education Theories and Instructional Methods

2020

DNHY 600S – Thesis

DNHY 620S – Seminar on Concepts of Public Health and Health Promotion

DNHY 625S – Clinical Teaching Strategies

DNHY 640S – Seminar on Administration, Management and Organization

2021

DNHY 600S – Thesis

DNHY 630S – Seminar on Healthcare Policy and Finance

DNHY 635S – Practicum

HONORS & AWARDS

2015

Cum Laude – Eastern Washington University, Bachelor of Science in Dental Hygiene

2015

Sig Phi Alpha Dental Hygiene Honors Society

Alpha Alpha Mu Chapter – Eastern Washington University

2015

The American Association of Public Health Dentistry – Community Dentistry and Dental Public Health Award
Eastern Washington University – Dental Public Health 2015 Presented by Crest & Oral B

MEMBERSHIPS

2012 - Current

Washington State Dental Hygienists' Association

2012 - Current

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American Dental Hygienist's Association

2021 - Current

The Organization for Safety Asepsis and Prevention

COMMUNITY SERVICE

2018 – Current

Legacy Church – Liberty Lake, WA