INTERPROFESSIONAL COLLABORATION AMONG DENTAL HYGIENE AND NURSING STUDENTS ON THE ORAL HEALTH OF CANCER PATIENTS

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A thesis submitted to the faculty at the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Master of Science in the Adams School of Dentistry in the Department of Periodontology (Dental Hygiene Division).

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ABSTRACT

Debin Lea Warren: Interprofessional Collaboration Among Dental Hygiene and Nursing Students on The Oral Health of Cancer Patients
(Under the direction of Jennifer Brame)

Objective: Educate nursing and dental hygiene (DH) students regarding oral considerations during cancer treatment; evaluate changes in knowledge, confidence, and willingness to provide oral screening, counseling, and referrals. Methods: Mixed-methods using baseline and post-intervention surveys and debriefing session including all first-year DH and accelerated nursing (ABSN) students at the University of North Carolina at Chapel Hill (UNC).

Results: 93 matched surveys returned (61 ABSN, 31 DH). Baseline surveys revealed 82% (n=76) indicated no knowledge to complete screenings, 68% (n=63) counseling, or 65% (n=60) referral; post-survey data indicated knowledge in screening (72%, n=67), counseling (81%, n=75) and referral (89%, n=83). Post-survey results showed confidence increases to screen (75%, n=70), counsel (83%, n=77), and refer (91%, n=82). Ninety-nine percent (n=92) agreed shared learning would foster development of a more effective team. Conclusion: Interprofessional education can increase knowledge, confidence, and willingness for screenings, counseling, and referrals for patients undergoing cancer therapies.
To my mom and “Ninny”, you are the inspiration for this project. Thank you for all your love and support. You are the strongest women I know.
ACKNOWLEDGMENTS

I would like to thank my family for your unconditional love and support throughout these last two years. You have always pushed me to reach for the stars and that I am capable of reaching my dreams. There are not enough pages in the world for me to explain to each of you what an impact you made on my life. Just know all that you have done for me has not gone unnoticed and I would not be where I am at today if it weren’t for you.

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<th>Abbreviation</th>
<th>Full Form</th>
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<tr>
<td>ABSN</td>
<td>Accelerated Bachelor of Science in Nursing</td>
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<td>DH</td>
<td>Dental Hygiene</td>
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<td>IPC</td>
<td>Interprofessional Collaboration</td>
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REVIEW OF THE LITERATURE

Introduction

Traditional medicine was historically taught in occupational-specific programs with limited interaction among other health professions. This resulted in little understanding about different health provider’s roles and responsibilities in proposing treatment. With the advancement of health care, changes in population characteristics, and how healthcare personnel address patients’ changing needs, the future education of all medical specialties is headed towards a comprehensive patient model.¹ The World Health Organization (WHO) recognized the need for united care among the world’s different health care systems to be improved through collaborative practice.² Collaborative practice is described as “health workers who have received effective training in interprofessional education”.² WHO believes that through collaborative practice, today’s healthcare workforce will be more knowledgeable and equipped to treat the everchanging health needs.

Interprofessional education (IPE) occurs when two or more professions learn about, from, and with each other to aid in effective collaboration among varying professions and improve health outcomes.² IPE is imperative among health care professionals because it promotes the Interprofessional Collaboration Care (IPC) model that is vital in addressing disease prevention and overall health for patients.³ IPC is defined as multiple healthcare workers from different professions making individual contributions to work together with the patient, families, caretakers and communities to provide the highest quality care.²⁴ The Interprofessional Education Collaborative (IPEC) was originally six national associations of schools of health
professions in 2009 that formed a collaborative to promote and encourage efforts that would advance interprofessional learning experiences. The goal was and still is to help prepare future health professionals for enhanced team-based care of patients and improved population health outcomes. An updated outline of four core competencies for interprofessional collaborative practice was issued in the 2016 update: (IPEC Competencies)

1). Work with individuals of other professions to maintain a climate of mutual respect and shared values. (Values/Ethics for Interprofessional Practice)

2). Use the knowledge of one’s own role and those of other professions to appropriately assess and address the healthcare needs of patients and to promote and advance the health of populations. (Roles/Responsibilities)

3). Communicate with patients, families, communities, and professionals in health and other fields in a responsive and responsible manner that supports a team approach to the promotion and maintenance of health and the prevention and treatment of disease. (Interprofessional Communication)

4). Apply relationship building values and the principles of team dynamics to perform effectively in different team roles to plan, deliver, and evaluate patient/population-centered care and population health programs and policies that are safe, timely, efficient, effective, and equitable. (Teams and Teamwork)

By multiple health care providers coming together and recommending treatments from their specialty and based on their professional education, it offers a unique, individualized, comprehensive, treatment design that could be overlooked by a single medical profession.
**Importance of IPE and IPC**

IPE is essential in education of our healthcare providers because it aids in preparing them for new delivery methods medical care will see, and aids in their understanding of their role and other medical providers roles in patient care.\(^3\) Review of the literature shows forming IPE partnerships helps create opportunities to become a team member of an IPC.\(^4\) The WHO recognizes that both IPE and IPC address the lack of healthcare workers in today’s society.\(^2\) Together IPE and IPC are meant to improve patient’s individual health outcomes and safety in patient care through sharing input from each profession and coordinating care.\(^4,6\) Each profession giving input allows them to share their unique professional expertise which aids in preventing needs being overlooked. Blending individual skills special to each profession allows each team to utilize the best resources and provide optimal care. IPC also allows for individuals to increase their knowledge and abilities not only among their profession, but also in other healthcare specialties.

**Barriers**

Applying IPE and IPC in all health care professions does not come without difficulty. Some documented barriers include lack of understanding amongst other health care disciplines, lack of support by faculty and administration, and institutional resources.\(^4\) Lack of understanding or misconceptions about other healthcare professions can create barriers in communication and hierarchies that prove difficulty in professionals working together.\(^3\) Coordinating schedules between multiple professions to allow for an IPE experience or IPC experience is one of the most common barriers in implementing these methods. Due to the packed curriculum schedule of all health care professions it is difficult to find a time that works for both groups that does not take away class time from an individual program.\(^3\)
Cancer

In 2019, it is estimated that 1,762,450 new cases of cancer will occur in the United States. However, this number does not include noninvasive cancer (carcinoma in situ) or skin cancers because those types of cancers are not required to be reported. Individuals battling cancer are at a higher risk of oral complications during and after treatments. Often times, oral health is not considered a priority to oncology patients and their physicians, so many times oral ramifications may go unnoticed or be overlooked. More than one third of patients treated for cancer develop some variation of oral complications. Common oral complications related to cancer therapies include oral mucositis, salivary gland dysfunction, opportunistic infections, difficulty swallowing, difficulty speaking, nausea and vomiting, and caries. Such complications can lead to secondary complications such as malnutrition and further discomfort, potential treatment delays, and infections. One study revealed that a majority of cancer patients did not comply with their recommended dental treatment or oral hygiene care regimen. Investigations show delaying treatment or altering administration of treatment therapies, have a negative outcome for the patient’s recovery, removal of tumor, and overall survival rate. When the patient understands the importance, their oral health has on their treatment outcome, they are more likely to follow an oral care routine. Research has proven adequate oral health contributes to optimal whole-body health. By making patients aware of potential side effects prior to treatment, education on how to manage common oral side effects, and using good oral care practices during their oncology treatments, the occurrence of oral ramifications decreases. Studies have shown that patients’ cognizance of potential side effects prior to treatment, education on how to manage side effects, and using oral care practices during oncology treatments, greatly reduce the occurrences of oral complications.
Role of the Dental Hygienist

The role of a dental hygienist is preventive in nature which makes their profession a great model to be incorporated into the collaborative healthcare model. As stated by the American Dental Hygiene Association, dental hygienists are oral health professionals who provide education, clinical, and therapeutic services to individuals. Dental hygiene practice is being incorporated into more nontraditional settings like hospitals, community health clinics, long-term care facilities and more. Thus, dental hygiene curriculum must include IPE experiences that will help prepare students to serve in the non-traditional facilities. Dental hygienists are part of the primary care team that may treat patients before, during, and after cancer therapies. Dental hygiene programs give professionals the education and training needed to provide oral care to variety of patients, but lack the education in knowing the biophysiological effects of chemotherapy and radiation.

Role of the Nurse

Similar to the role of dental hygienists, nurses also embrace prevention and health education. With the new medical delivery model of interprofessional care, nurses may work in non-traditional settings like dental facilities. Even nurses working in traditional locations like hospitals can help screen and assist patients experiencing oral pain with the proper education. Nursing programs provide professionals with the knowledge of how cancer treatments work and the biological effects, but fail to educate them on the oral side effects experienced by many patients. Nurses who work in oncology departments have a rare opportunity to be the main oral health provider for most cancer patients.

Difficulty arises in educating cancer patients through other medical staff working in oncology centers or with oncology patients’ due to the lack of oral health knowledge and
experience. Most doctorate degrees in nursing and medicine, as well as Bachelor of Science in nursing programs, have very little oral health instruction within their curriculum. Nurses who work in oncology departments have a rare opportunity to be the main oral health provider for most cancer patients. Dental care is already limited for a number of individuals due to lack of insurance, insurance restrictions, and decreasing number of dental providers. A majority of nurses spend more face-to-face time with patients than do the physicians treating the patient. With the trend of outpatient treatment facilities growing, it is important patients and families receive the needed instructions for adequate oral care. Nurses also have the unique ability to advocate for hygienists on the importance of maintaining regular and possibly more frequent visits to their oral healthcare provider.

**Accreditation for Nurses and Dental Hygienists**

The Accreditation Commission for Education in Nursing 2017 Accreditation Manual states in Standard 4.6 that curriculum and instructional process for all students must reflect interprofessional collaboration. Standard 4.4 for clinical doctorate nursing programs also states the curriculum is designed to prepare graduates to practice from an evidence-based perspective in their role through effective use and collaborative production of clinically-based scholarship.

For dental hygiene programs there are standards stated by The Commission on Dental Accreditation that suggest hygienists be able to provide oral health care in a manner that is congruent with their patient’s other health needs through interprofessional collaboration. Specifically, standards 2-14, 2-15, and 2-23 refer to the implications of interprofessional education.
Statement of the Problem

The literature demonstrates that IPE and IPC are beneficial because it helps address a multitude of issues faced by the healthcare workforce today. This includes issues like real-world experience, lack of care in communities, and provide optimal patient-centered care. The literature also illustrates a lack of oral care for cancer patients. Dental intervention is considered an integral element of overall cancer management for patients undergoing treatments and the interdisciplinary health care team model has been recognized as the best example to deliver such educational.

As revealed earlier, cancer patients place oral health at a low priority compared to their life-threatening battle with cancer. This results in decreased dental visits among this population. With approximately 4,630 cases of cancer being diagnosed daily, it is imperative that dental hygienists take the initiative to collaborate with other medical professionals to help reduce the number of patients suffering with oral complications from cancer treatments. The healthcare team should initiate a conversation with their patient about the importance of maintaining oral health and be able to answer any questions they may have about what is to be expected. An important issue to address among recently diagnosed individuals is the potential need for extensive oral treatments prior to beginning cancer therapies. A way to achieve this goal would be professional collaboration with other medical staff such as oncologists or nurses. Both the nursing and dental hygiene professions focus on prevention and education when addressing treatment needs of patients. They are also at the forefront of care and often spend more time with the patient than physicians and dentists. Nurses collaborating with dental hygienists can better identify oral complications and appropriately treatment plan options for care. This provides a unique opportunity for each profession to benefit one another. The literature also
illustrates a lack of oral care for cancer patients. Thus, the idea of this study was to help educate both groups of students on the oral ramifications of cancer therapies, the importance of oral health during treatment therapies and how interprofessional collaboration can better serve and treat patient’s overall health. Reaching these groups at the educational level will have a greater impact, will provide consistent and calibrated information with the goal of increasing their knowledge, confidence, willingness, and behaviors when treating patients with cancer.
REFERENCES


Introduction and Review of the Literature

Traditional medicine was historically taught in occupational-specific programs with limited interaction among other professions. This resulted in little understanding about different health providers roles and responsibilities in proposing treatment. With the advancement of health care, changes in population characteristics, and how healthcare personnel address patients’ changing needs, the future education of all medical specialties is headed towards a whole-patient model.\textsuperscript{1} This comprehensive model utilizes a teamwork approach that has been defined as interprofessional education (IPE).\textsuperscript{2,3} By multiple health care providers coming together and recommending treatments from their specialty, it offers a unique, individualized, comprehensive, treatment design that could be overlooked by a single medical profession.\textsuperscript{3}

Cancer is a major health concern worldwide. In 2018, it is estimated that 1,735,350 new cases of cancer will occur in the United States.\textsuperscript{4,5} Individuals battling cancer are at a higher risk of oral complications during and after treatments.\textsuperscript{6–8} More than one third of patients treated for cancer develop some variation of oral complications.\textsuperscript{9} Thus, it is essential that a multidisciplinary oncology team is warranted to achieve better overall health and to manage the oral complications of the cancer patient before, during, and after cancer treatment.\textsuperscript{9} Often times, oral health is not considered a priority to oncology patients and their physicians, so many times oral ramifications may go unnoticed or be overlooked.\textsuperscript{10}
Nurses and dental hygienists are part of the primary care team that may treat patients before, during, and after cancer therapies. They are also at the forefront of care and often spend more time with the patient than physicians and dentists. This provides a unique opportunity for each profession to benefit one another. Nurses collaborating with dental hygienists can better identify oral complications and appropriately treatment plan options for care. When the patient understands the importance, their oral health has on their treatment outcome, they are more likely to follow an oral care routine.

Thus, the idea of this study was to help educate both groups of students on the oral ramifications of cancer therapies, the importance of oral health during treatment therapies, and how interprofessional collaboration can better serve patients overall health. Reaching these groups at the educational level will have a greater impact, will provide consistent and calibrated information with the goal of increasing their knowledge, confidence, and behaviors when treating patients with cancer. Dental intervention is considered an integral element of overall cancer management for patients undergoing treatments and the interdisciplinary health care team model has been recognized as the best example to deliver such educational information to patients. The specific aims of this study were the following:

1). Educate dental hygiene and nursing students about oral complications during cancer therapy.

2). Educate these students on the importance of working collaboratively as interprofessional teams to provide patient-centered care.

3). Increase students knowledge, confidence, and willingness in: screening, counseling, and referral.
Methods & Materials

Methods

The study was granted IRB exemption (#18-0279) by the Institutional Review Board and the University of North Carolina at Chapel Hill. Participants of the study consisted of 31 first year dental hygiene (DH) students and 66 first year Accelerated Bachelor of Science Nursing (ABSN) students. Ninety of the student participants were females and seven were males (See Figure 1). Fifty-six students reported being between the age of 18-24, 32 students said they were between the age of 25-34. The remaining nine students said they were 35 and older.

Materials

Pre-and Post-Surveys.

A pre- and post-survey design was used to collect descriptive and quantitative data, to evaluate participants’ knowledge, confidence, and willingness to provide oral screening, counseling, and referrals. The pre and post-test surveys were pilot tested by three senior UNC DH and three senior A-BSN students that were not participating in this study. Upon completion of pilot testing, the surveys were revised for clarification and consistency. The pen and paper surveys used a Teleform™, scantron design.

The pre-survey (See Appendix A) included 24 questions: four demographic, five true/false questions to evaluate knowledge, three opinion questions, three confidence questions, four willingness questions, five IPE related questions and one pertaining to previous IPE experience. All students were asked to complete the two-page, pre-survey based on their current
knowledge, attitudes, and behaviors of the subject matter prior to delivery of the intervention. Students were assigned a Form ID number to transpose at the top of each survey so that comparisons could be performed on single individuals pre and post-survey results while keeping participants unidentified. Following pre-survey completion, all students received a presentation regarding oral considerations for cancer patients and ramifications of cancer therapies.

The post-intervention survey (See Appendix B) included all pre-intervention questions with the addition of three open-ended, follow-up questions. These questions asked the students to elaborate on what part of this IPE experience had a profound meaning on their thoughts, what surprised them the most about this experience, and what changes would they suggest making this experience more beneficial in the future.

*Intervention.*

Content provided in the presentation, “Oral Care in the Cancer Patient” (See summary in Appendix C) was a part of course requirements for both student groups (DHYG 267: Dental Hygiene Theory for the dental hygiene students, and NURS 366: Health Assessment for the nursing students). The presentation was created and given by Dr. Katharine Ciarrocca, a dental faculty member in the UNC School of Dentistry. The presentation contained information on types of cancer treatments, common cancer complications seen among individuals receiving treatment, along with potential treatment aids for common side effects, and detailed photographic descriptions.

*Case study*

A fictitious case (See Appendix D) was developed by an interdisciplinary team, which included nurse practitioners, dental hygienists and a dentist and pharmacist. Students used this case study to review and discuss. Twenty ABSN students and 15 DH students were randomly
selected from the class rosters and assigned to be the control group for the study. A control group was utilized to determine whether the small group case study was beneficial to the students for the IPE experience or if the intervention (lecture) was the only significant part of the study. The remaining 44 nursing students and 21 dental hygiene students were assigned to be the intervention group. These students were then randomly assigned to mixed small groups, composed of ten students each. The control group participants were asked to complete the post-survey immediately following the presentation. The intervention group were instructed to review the case study and work to answer ten questions. Queries posed from the case-study asked about medication, potential complications, potential treatment options for care, and referral practices.

The small groups reviewed the case study, discussed their interpretations of data presented, prioritized strategies to address the issues proposed, and reached consensus about the best way to respond to the case. All participating students were then asked to gather in the classroom for a debriefing session which focused on their experiences working as interprofessional learners to address the unfolding case. The lead investigator proposed three questions to initiate discussion and feedback amongst the students. This debriefing session was audio recorded and facilitated by the principal investigator of the project.
Results

Ninety-three matched pre- and post-surveys were completed (61 Accelerated Bachelor of Science Nursing Students, 31 Dental Hygiene students) (See Figure 2). One student did not select either program but answered the rest of the survey. Ninety-one percent (n=85) of the students were female (54 ABSN, 31 DH) and 7.5% (n=7) were males (7 ABSN). The majority of the students participating in the survey were between the ages of 18 and 34 years old (n=83) while nine students (9.7%) were 35 or older. Students were separated into control and intervention groups. The intervention group consisted of 16 nursing students and 8 dental hygiene students (n=24). The control group consisted of 45 nursing students and 31 dental hygiene students (n=68). Baseline surveys revealed 82% (n=76) of the students indicated no knowledge to complete oral health screenings, 68% (n=63) no knowledge of counseling, and 65% (n=60) no knowledge of referral. Post-survey results denoted positive changes to the students’ knowledge in screening (72%, n=67), counseling (81%, n=75) and referral (89%, n=83). Baseline confidence assessment revealed that 22% (n=20) had the confidence to complete oral screening, 25% (n=23) for counseling, and 47% (n=44) for referral. Post-survey results showed confidence increased in screening (75%, n=70), counseling (83%, n=77), and referral (91%, n=82). Baseline willingness to provide an oral health screening for a cancer patient was 75.3% (n=70), counsel 77.4% (n=72), and refer 88.2% (n=82). Baseline willingness to collaborate with health care team members from other disciplines was 97.8% (n=91); post-survey showed 97.8% (n=89) had a willingness to collaborate. Two students declined to answer this question. Baseline agreement that shared learning with other disciplines increases the ability
to understand clinical problems was 98.9% (n=92); post-survey revealed no change in levels of agreement. Agreement of shared learning helping the students become a more effective member of a health care team remained the same between the pre- and post-survey (98.9%, n=92). Ninety students (96.8%) agreed on the pre-survey that shared learning helped students think positive about other health care professionals; 92 students (98.9%) agreed with that statement on the post survey.

Pre- and post-survey results showed the same level of agreement for students wanting to have more opportunities to learn with other students in other health care disciplines (97.8%, n=91). When students were asked on the pre-survey if they had ever had a prior IPE experience, 42 students (45.2%) reported that they had not, 45 students (48.4%) reported that they had, and 6 students (6.5%) were unsure. Upon completion of the lecture and case study (for the intervention group) based on their IPE Participation- 89 students (95.7%) agreed that they had gained a more realistic expectation of other professionals on a health care team and they had gained awareness of the roles of other professionals on a team, 90 students (96.8%) agreed they were comfortable in accepting responsibility delegated to them within a team, that interprofessional practice was not a waste of time, and they gained an appreciation for the benefits in interprofessional team work. Ninety-one students (97.8%) agreed they could act as a fully collaborative member of the team. When asked if they believed that interprofessional practice was difficult to implement, 51.6% (n=48) agreed while 47.3% (n=44) disagreed.
Discussion

Review

Cancer is a major health concern worldwide and the number of people diagnosed each year continues to rise. Individuals battling this disease are at a higher risk of experiencing oral complications during and after treatments. Common oral ramifications of chemotherapy and radiation treatments range from xerostomia, mucositis, fungal infections, nausea, vomiting, and lack of appetite. Mucositis is one of the most common side effects seen in cancer patients. This is when the mucous membranes of the oral cavity become inflamed and/or ulcerated. This type of infection is accompanied by intense pain and discomfort. Oral mucositis often causes patients to be unable to eat and drink, which in turn can cause the patient to become dehydrated and malnourished. It also causes cancer patients to be more susceptible to other infections like candidiasis. All of the symptoms of mucositis can lead to the interruption or modification of treatments. Utilizing a multidisciplinary healthcare team can help manage oral complications experienced by cancer patients, leading to improved oral health and overall well-being. This study documents an IPE experience between different health care professions and evaluates the students’ knowledge, confidence, and willingness to screen, counsel, and refer a cancer patient to needed medical providers. The study also aided in determining if such an experience would educate and promote awareness among students for oral complications experienced by cancer patients. The results of this study support three main findings: the importance of interprofessional education, the improvement on knowledge, confidence and willingness, and the benefit of a small group case study.
Comparison

While many studies exist on IPE experiences and oral care for oral cancer patients individually, there is a lack of information on interprofessional collaboration on oral care for cancer patients. It is well established that oral care for cancer patients has the potential to be a positive or negative effect on the patient’s prognosis. Poor oral care can result in oral side effects becoming more severe, therefore delays or modifications of cancer treatments become necessary, leading to possible decrease in treatment outcomes. Studies show that patients’ cognizance of potential side effects prior to treatment, education on how to manage side effects, and using oral care practices during oncology treatments, greatly reduce the occurrences of oral outcomes. Part of the goal in this study was to educate students on common oral complications experienced by patients and how to treat and/or refer such side effects to the appropriate health care professional. Reaching these groups at the pre-licensure level will have a greater impact, will provide consistent and calibrated information with the goal of increasing their knowledge, confidence, and behaviors when treating patients with cancer.

Implications

Results from this study indicate that an informational presentation combined with a small group case study, followed by a debriefing session, allowed students to gain knowledge on oral complications of cancer patients. Through the debriefing session, it was found that including a case study after an informational presentation allowed the students to not only understand how to apply the knowledge gained during the lecture to address a patient’s health needs, but also gave students a chance to work collaboratively to treat a patient experiencing oral ramifications from cancer treatments. Increasing the student’s basic knowledge of common oral complications increases their confidence in their ability to counsel and refer a cancer patient experiencing these
difficulties to the right healthcare professional (Figure 3). Increasing a student’s knowledge and confidence in turn increases their willingness to refer a patient to the appropriate medical provider (Figure 3). As mentioned previously, the studies first specific aim was to help educate both dental hygiene and nursing students on the oral ramification of cancer treatment. This is a subject that both student groups do not receive much instruction on. Along with educating them about matters like oral mucositis, xerostomia, and oral infections, we desired to educate the students on referring patients to the correct medical provider if they did not know the answer to a patient’s issue. Many times, nurses do not know of treatments outside of pharmaceutical choices that can relieve oral side effects of cancer treatments like xerostomia. Dental hygienists are not always aware of potential medications that cancer patients can take that may relieve some of these ramifications like nurses do. Results from the pre- and post-survey, and debriefing session revealed that the students gained knowledge and understanding upon competition of the lecture and case study they previously did not have.

Results from this study can also help this project be applied to other programs such as dental, nursing, pharmacy, and medicine. Not only could more than two professions be incorporated, but one could also remove the oral focus of this project and apply the framework of this project to other health topics. Results indicate that a mixed-small group case study is beneficial in providing importance to what the student is learning. Previous studies also show that IPE is an important component in the medical field and that development of such opportunities is becoming a requirement for all healthcare professions. As reported in the literature, most medical programs outside of dentistry receive very little education on oral health and the management of oral health complications. Figure 4 shows responses for the IPE/Shared Learning survey questions. The intervention group showed an increase in agreement
to shared learning benefiting their thoughts and feelings toward other healthcare professions. This study demonstrates what the literature reports; IPE experiences can improve attitudes and understanding of other roles in healthcare. Our results also support our accomplishment of achieving the second aim of our study: educate these students on the importance of working collaboratively as interprofessional teams to provide patient-centered care.

All students participating in the intervention group of this study believed that this type of experience would benefit their ability to contribute as a fully effective team member in a health care collaboration. During the debriefing session and in the post-survey open ended questions it was consistently reported by students that they enjoyed the opportunity to work with another medical profession and appreciated the opportunity to apply what they learned through their program to work collaboratively on a case study. Students reported that it made them feel important being able to teach and show others what their profession includes. Results also show this type of IPE experience has the ability to influence attitudes of future health care professionals and increase their specific knowledge about the oral cavity relating to cancer treatments. Introducing IPE/IPC during the student’s educational journey not only normalizes the practice, but also better prepares the students for working collaboratively post-graduation to address patients’ health needs.

Due to the critical nature of this content and experience, study investigators wanted all students to have the same experience but for data purposes needed a control group. This control group completed the post-survey immediately upon the completion of the lecture. After answering the questions in the post-survey, the control group divided up into small groups and participated in the small group case study prior to coming back to participate in the debriefing.
session. This resulted in significantly less time to complete the case study which could have had a negative effect on that student.

The subject matter of this study is relevant to both educational programs. With cancer being an ongoing problem in the world, the probability is high that both professions will treat someone experiencing oral side effects from cancer therapy. By nursing and dental hygiene incorporating a study of this standing into their schedule on a yearly basis, it provides important information to better treat patients with patient-centered care. Along with providing improved patient care, improving the health of the population, and reducing healthcare costs, this study utilizes practices that help address improving the work life of healthcare staff. Improving the work life of healthcare personnel is the last aim in the Quadruple Aim Theory.\textsuperscript{15} IPC is shown to improve enthusiasm in the workplace which leads to less burnout experienced by healthcare workers.\textsuperscript{15} High burnout rates threaten patient-centered care by causing reduced feelings of compassion when dealing with patients, early retirement, lower levels of patient safety and patient outcomes.\textsuperscript{15} By creating a positive work environment like IPE and IPC do, healthcare personnel can better meet the ever increasing demands of society in regards to healthcare delivery.\textsuperscript{15}

This pilot study helped educate nursing and DH students on oral complications that have life-altering effects for many patients such as xerostomia. DH students in the small group were able to suggest their methods of treatment and explain why to the nursing students. In turn, nursing students were able to help educate the dental hygiene students on their treatment recommendations and process of addressing the patients concerns. By allowing each group to educate one another on what services their respective professions provide, appreciation for other healthcare providers is gained. Along with increasing appreciation between healthcare workers,
IPE/IPC increases individual’s communication skills. In this study students had to communicate with other members in their small group to answer queries posed in the case study. Lack of communication would have meant failing to provide the “patient” with resources need to address her oral ramifications.

**Limitations**

One limitation to this study was the small sample size. Results from this study are not generalizable to all dental hygiene and nursing students. Another limitation was the different course schedules for each program. As reported in the literature, finding a common time where both student groups were available was incredibly difficult and constraining. Not only was it difficult to find a day that coordinated with both groups the amount of time that each group had was limited. Many of the students reported in the post-survey open ended questions that they wished for more time during the lecture, more time to work on the small group case study, and to incorporate a moderator in each small group discussion.

**Recommendations/Future Research**

As a pilot research project, this study will help improve future replicas of this project design. If duplicating this project, it would be valuable to incorporate more facilitators for the study. Having a facilitator for each small study group would benefit students by keeping them on track with the case study and allow them to have questions answered. With time being a constraint for many of these professional programs it is imperative that every moment be utilized for the discussion between student groups. The investigating team could utilize other faculty members in each program. For example, the nursing students were in the lab portion of their Health and Physical Assessment course (Nurs 366), the lab instructors from each class could be asked to facilitate a single group. The same could be asked of dental hygiene faculty members.
One of the ultimate goals for future development for this project would be to incorporate dental, medical, and pharmacy students into this session with nursing and DH students. However, for this to occur much thought and pre-planning would have to be completed. When incorporating more than two professional groups scheduling becomes a larger barrier. The only solution to this barrier is scheduling this IPE experience years in advance to allow for multiple professional programs to participate and allow adequate time for the students to discuss in their small groups the case study they were presented. Due to course loads being heavy for every health professional program early planning is the easiest way to find a common date.
**Conclusion**

Study results indicate a positive reaction from students on their willingness to collaborate with other healthcare personnel from other disciplines, desire to have more opportunities to work with students from other healthcare programs, and the ability to learn from different perspectives among different professions. Data also indicated that students had an increase in knowledge and understanding of the oral complications that occur among cancer patients. Through the post-survey open-ended questions, students commonly indicated the profound meaning the case study had on their learning experience. These open-ended questions also gave students the ability to suggest any changes that would make this experience more beneficial in the future. Results share common findings in the literature that support growth and development of IPE experiences for students to increase diversity of learning and support the evolving healthcare landscape of the future.
REFERENCES


5. Note: State estimates are offered as a rough guide and should be interpreted with caution. State estimates may not add to US total due to rounding. March 2019.


Figure 1: Study Process
Figure 2: Participant Demographics Completing Baseline Survey

<table>
<thead>
<tr>
<th></th>
<th>Nursing Students</th>
<th>Dental Hygiene Students</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Number of Participants</strong></td>
<td>61</td>
<td>31</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>88.5% (n=54)</td>
<td>100% (n=31)</td>
</tr>
<tr>
<td>Male</td>
<td>11.5% (n=7)</td>
<td>0% (n=0)</td>
</tr>
<tr>
<td><strong>Age Range</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-34 years old</td>
<td>88.5% (n=54)</td>
<td>93.5% (n=29)</td>
</tr>
<tr>
<td>35 or older</td>
<td>11.5% (n=7)</td>
<td>6.5% (n=2)</td>
</tr>
<tr>
<td><strong>Previous Experience</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical</td>
<td>57.4% (n=35)</td>
<td>3.2% (n=1)</td>
</tr>
<tr>
<td>Dental</td>
<td>1.7% (n=1)</td>
<td>80.7% (n=25)</td>
</tr>
<tr>
<td>Medical &amp; Dental</td>
<td>3.3% (n=2)</td>
<td>6.5% (n=2)</td>
</tr>
<tr>
<td>None</td>
<td>37.7% (n=23)</td>
<td>9.6% (n=3)</td>
</tr>
</tbody>
</table>
### Figure 3: Comparison of baseline and post-intervention survey responses for questions rating knowledge, confidence, and willingness.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Group</th>
<th>Baseline Survey Data</th>
<th>Post-Intervention Data</th>
<th>( P ) Values</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>No (n)</td>
<td>Yes (n)</td>
<td>No (n)</td>
</tr>
<tr>
<td><strong>Knowledge</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Screen</td>
<td>Control</td>
<td>91.7% (n=22)</td>
<td>8.3% (n=2)</td>
<td>20.8% (n=5)</td>
</tr>
<tr>
<td></td>
<td>Intervention</td>
<td>78.3% (n=54)</td>
<td>21.7% (n=15)</td>
<td>30.4% (n=21)</td>
</tr>
<tr>
<td>Control</td>
<td>62.5% (n=15)</td>
<td>37.5% (n=9)</td>
<td>30.4% (n=21)</td>
<td>25.0% (n=6)</td>
</tr>
<tr>
<td>Intervention</td>
<td>69.6% (n=16)</td>
<td>30.4% (n=21)</td>
<td>25.0% (n=6)</td>
<td>75.0% (n=18)</td>
</tr>
<tr>
<td>Counsel</td>
<td>Control</td>
<td>66.7% (n=16)</td>
<td>33.3% (n=8)</td>
<td>4.2% (n=1)</td>
</tr>
<tr>
<td></td>
<td>Intervention</td>
<td>63.8% (n=44)</td>
<td>36.2% (n=25)</td>
<td>13.0% (n=9)</td>
</tr>
<tr>
<td>Refer</td>
<td>Control</td>
<td>62.5% (n=15)</td>
<td>37.5% (n=9)</td>
<td>0.0% (n=0)</td>
</tr>
<tr>
<td></td>
<td>Intervention</td>
<td>49.3% (n=34)</td>
<td>50.7% (n=35)</td>
<td>11.6% (n=8)</td>
</tr>
<tr>
<td><strong>Confidence</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Screen</td>
<td>Control</td>
<td>87.5% (n=21)</td>
<td>12.5% (n=3)</td>
<td>25.0% (n=6)</td>
</tr>
<tr>
<td></td>
<td>Intervention</td>
<td>75.4% (n=52)</td>
<td>24.6% (n=17)</td>
<td>24.6% (n=17)</td>
</tr>
<tr>
<td>Control</td>
<td>79.2% (n=19)</td>
<td>20.8% (n=5)</td>
<td>20.8% (n=5)</td>
<td>79.2% (n=19)</td>
</tr>
<tr>
<td>Intervention</td>
<td>73.9% (n=51)</td>
<td>26.1% (n=18)</td>
<td>15.9% (n=11)</td>
<td>84.1% (n=58)</td>
</tr>
<tr>
<td>Refer</td>
<td>Control</td>
<td>62.5% (n=15)</td>
<td>37.5% (n=9)</td>
<td>0.0% (n=0)</td>
</tr>
<tr>
<td></td>
<td>Intervention</td>
<td>49.3% (n=34)</td>
<td>50.7% (n=35)</td>
<td>11.6% (n=8)</td>
</tr>
<tr>
<td><strong>Willingness</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Screen</td>
<td>Control</td>
<td>12.5% (n=3)</td>
<td>20.8% (n=5)</td>
<td>4.2% (n=1)</td>
</tr>
<tr>
<td></td>
<td>Intervention</td>
<td>5.8% (n=4)</td>
<td>15.9% (n=11)</td>
<td>1.5% (n=1)</td>
</tr>
<tr>
<td>Control</td>
<td>4.2% (n=1)</td>
<td>33.3% (n=8)</td>
<td>62.5% (n=15)</td>
<td>0.0% (n=0)</td>
</tr>
<tr>
<td>Intervention</td>
<td>5.8% (n=4)</td>
<td>11.6% (n=8)</td>
<td>82.6% (n=57)</td>
<td>1.5% (n=1)</td>
</tr>
<tr>
<td>Refer</td>
<td>Control</td>
<td>4.4% (n=1)</td>
<td>4.4% (n=1)</td>
<td>91.3% (n=21)</td>
</tr>
<tr>
<td></td>
<td>Intervention</td>
<td>0.0% (n=0)</td>
<td>11.6% (n=8)</td>
<td>88.4% (n=61)</td>
</tr>
</tbody>
</table>
**Figure 4: Shared Learning/IPE Responses**

<table>
<thead>
<tr>
<th>Statement</th>
<th>Group</th>
<th>Pre-Survey Data</th>
<th>Post-Intervention Data</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Disagree</td>
<td>Agree</td>
</tr>
<tr>
<td>Shared learning with other disciplines would increase my ability to understand clinical problems.</td>
<td>Control</td>
<td>0.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>Intervention</td>
<td>1.4%</td>
<td>98.6%</td>
</tr>
<tr>
<td>Shared learning with other health care disciplines would help me become a more effective member of a health care team.</td>
<td>Control</td>
<td>0.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>Intervention</td>
<td>1.4%</td>
<td>98.6%</td>
</tr>
<tr>
<td>Shared learning would help me to think positively about other health care professionals.</td>
<td>Control</td>
<td>4.2%</td>
<td>95.8%</td>
</tr>
<tr>
<td></td>
<td>Intervention</td>
<td>2.9%</td>
<td>97.1%</td>
</tr>
<tr>
<td>I want to have the opportunity to learn with health care students from other disciplines.</td>
<td>Control</td>
<td>0.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td></td>
<td>Intervention</td>
<td>2.9%</td>
<td>97.1%</td>
</tr>
<tr>
<td>Based on my participation in IPE activities and/or clinical practice I have gained more realistic expectations of other professionals on a team.</td>
<td>Control</td>
<td>12.5%</td>
<td>58.3%</td>
</tr>
<tr>
<td></td>
<td>Intervention</td>
<td>11.6%</td>
<td>62.3%</td>
</tr>
<tr>
<td>Based on my participation in IPE activities and/or clinical practice I have gained an enhanced awareness of the roles of other professionals on a team.</td>
<td>Control</td>
<td>8.3%</td>
<td>58.3%</td>
</tr>
<tr>
<td></td>
<td>Intervention</td>
<td>10.1%</td>
<td>63.8%</td>
</tr>
<tr>
<td>Based on my participation in IPE activities and/or clinical practice I have gained an appreciation for the benefits in interprofessional team work.</td>
<td>Control</td>
<td>4.2%</td>
<td>58.3%</td>
</tr>
<tr>
<td></td>
<td>Intervention</td>
<td>1.4%</td>
<td>71.0%</td>
</tr>
</tbody>
</table>
Figure 5: Post Survey Open-Ended Questions and Common Responses

**What part of this IPE experience had a profound meaning on your thoughts?**
- Being able to hear another healthcare professional’s perspective on the same issue
- Ability to interact and work with another professional program

**What surprised you the most during the IPE experience?**
- How important oral health is
- How cancer treatments impact oral health
- The different knowledge basis between the 2 different professions had more overlap than expected
- Pictures shown during the lecture

**What changes would you suggest to make this experience more beneficial in the future?**
- Have more facilitator present for each small group
- More time for group discussion/collaboration
APPENDIX A: PRE-SURVEY FORM

UNC SCHOOL OF DENTISTRY
Oral Health Survey for Nursing and Dental Hygiene Students
2018: V0 Pre-Survey

INSTRUCTIONS: Please write directly on the survey with a BLACK BALLPOINT PEN. Answer all the questions to the best of your ability. Choose only ONE response per question. Fill in circles completely or fill in the boxes and blanks as indicated. Your responses are confidential. Thank you for your participation.

1. Please indicate the program in which you are currently enrolled.  ○ Nursing  ○ Dental Hygiene

2. What is your gender?  ○ Female  ○ Male  ○ Prefer not to say

3. What is your age?  ○ 18-24 yrs  ○ 25-34 yrs  ○ 35-44 yrs  ○ 45-54 yrs  ○ 55+ yrs

4. Have you had any previous experience working in the following treatment outcomes?  ○ Oncology  ○ Medical  ○ Dental

For statements 5-9 please indicate whether you believe each of the following statements are true or false.

5. Overall health can be directly related to controlling infection and inflammation within the oral cavity.  ○ True  ○ False

6. Reduction in saliva increases a person’s risk to dental caries formation.  ○ True  ○ False

7. Pre-existing oral disease may negatively impact cancer treatment outcomes.  ○ True  ○ False

8. Malnutrition can be a common complication of cancer therapy.  ○ True  ○ False

9. Oral mucositis is the least common oral complication for patients undergoing cancer therapy.  ○ True  ○ False

For statements 10-12 please indicate your answer.

10. At this point of my education, I possess the knowledge to complete an oral health screening on a patient undergoing cancer therapy.  ○ Yes  ○ No

11. At this point of my education, I possess the knowledge to counsel a patient.  ○ Yes  ○ No

12. At this point of my education, I possess the knowledge to refer a patient.  ○ Yes  ○ No

Continue on next page.
Oral Health Survey for Nursing and Dental Hygiene Students

2018: V0 Pre-survey page 2

Please indicate your level of agreement with the following statements:

<table>
<thead>
<tr>
<th>Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>13. I have the confidence to complete an oral health screening on a patient undergoing cancer therapy.</td>
</tr>
<tr>
<td>14. I have the confidence to counsel a patient undergoing cancer therapy on oral health.</td>
</tr>
<tr>
<td>15. I have the confidence to refer a patient undergoing cancer therapy to seek medical/dental treatment if needed.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

Using a scale from 1-7 (1=Not at all willing; 4=neutral; 7= absolutely willing), please indicate your level of willingness with the following statements:

<table>
<thead>
<tr>
<th>Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>16. How willing are you to provide an oral health screening for a patient undergoing cancer therapy?</td>
</tr>
<tr>
<td>17. How willing are you to provide oral health counseling for a patient undergoing cancer therapy?</td>
</tr>
<tr>
<td>18. How willing are you to refer a patient undergoing cancer treatment to seek other medical or dental therapy if needed?</td>
</tr>
<tr>
<td>19. How willing are you to collaborate with health care team members from other disciplines for patient care?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

Please indicate your level of agreement with the following statements:

<table>
<thead>
<tr>
<th>Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>20. Shared learning with other disciplines would increase my ability to understand clinical problems.</td>
</tr>
<tr>
<td>21. Shared learning with other health care disciplines would help me to become a more effective member of a health care team.</td>
</tr>
<tr>
<td>22. Shared learning would help me to think positively about other health care professionals.</td>
</tr>
<tr>
<td>23. I want to have the opportunity to learn with health care students from other disciplines.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

24. Have you ever had an interprofessional (IPE) activity or clinical experience?  ○ Yes  ○ No  ○ Unsure

(If response to question #24 is no, please stop here. If yes or unsure, please answer question #25.)

Continue on next page.
**Oral Health Survey for Nursing and Dental Hygiene Students**

2018: V0 Pre-survey page 3

Please indicate your level of agreement with the following statements:  

<table>
<thead>
<tr>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>

25. At this point in time, based on my participation in inter-professional education (IPE) activities and/or clinical practice:

a. I have gained more realistic expectations of other professionals on a team.

b. I have gained an enhanced awareness of the roles of other professionals on a team.

c. I feel comfortable in accepting responsibility delegated to me within a team.

d. I feel able to act as a fully collaborative member of the team.

e. I believe that interprofessional practice is not a waste of time.

f. I believe that interprofessional practice is difficult to implement.

g. I have gained an appreciation for the benefits in interprofessional team work.

Please add any additional comments here. Thank you for your participation!
APPENDIX B: POST-SURVEY FORM

UNC SCHOOL OF DENTISTRY
Oral Health Survey for Nursing and Dental Hygiene Students
2018: V2 Post-Survey

INSTRUCTIONS: Please write directly on the survey with a BLACK BALLPOINT PEN. Answer all the questions to the best of your ability. Choose only ONE response per question. Fill in circles completely or fill in the boxes and blanks as indicated. Your responses are confidential. Thank you for your participation.

For statements 1-5, please indicate whether you believe each of the following statements are true or false.

1. Overall health can be directly related to controlling infection and inflammation within the oral cavity. ○ True ○ False
2. Reduction in saliva increases a person's risk to dental caries. ○ True ○ False
3. Pre-existing oral disease may negatively impact cancer. ○ True ○ False
4. Malnutrition can be a common complication of cancer. ○ True ○ False
5. Oral mucositis is the least common oral complication for patients undergoing cancer therapy. ○ True ○ False

For statement 6-8 please indicate your answer.

6. At this point of my education, I possess the knowledge to complete an oral health screening on a patient undergoing cancer therapy. ○ Yes ○ No
7. At this point of my education, I possess the knowledge to counsel a patient regarding oral health while undergoing cancer therapy. ○ Yes ○ No
8. At this point of my education, I possess the knowledge to refer a patient undergoing cancer therapy to a physician and/or dentist when indicated. ○ Yes ○ No

Please indicate your level of agreement with the following statements.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>9. I have the confidence to complete an oral health screening on a patient undergoing cancer therapy.</td>
<td>○ ○ ○ ○</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. I have the confidence to counsel a patient undergoing cancer therapy on oral health.</td>
<td>○ ○ ○ ○</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. I have the confidence to refer a patient undergoing cancer therapy to seek medical/dental.</td>
<td>○ ○ ○ ○</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Continue on next page.

Revised 02/14/2018
### Oral Health Survey for Nursing and Dental Hygiene Students
#### 2018: V2 Post-Survey page 2

Using a scale from 1-7 (1=Not at all willing; 4=neutral; 7= absolutely willing), please indicate your level of willingness with the following statements:

<table>
<thead>
<tr>
<th>Question</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. How willing are you to provide an oral health screening for a patient undergoing cancer therapy?</td>
<td>1-7</td>
</tr>
<tr>
<td>13. How willing are you to provide oral health counseling for a patient undergoing cancer therapy?</td>
<td>1-7</td>
</tr>
<tr>
<td>14. How willing are you to refer a patient undergoing cancer treatment to seek other medical or dental therapy if needed?</td>
<td>1-7</td>
</tr>
<tr>
<td>15. How willing are you to collaborate with health care team members from other disciplines for patient care?</td>
<td>1-7</td>
</tr>
</tbody>
</table>

Please indicate your level of agreement with the following statements:

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>16. Shared learning with other disciplines would increase my ability to understand clinical problems.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>17. Shared learning with other health care disciplines would help me to become a more effective member of a health care team.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>18. Shared learning would help me to think positively about other health care professionals.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>19. I want to have the opportunity to learn with health care students from other disciplines.</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>20. At this point in time, based on my participation in inter-professional education (IPE) activities and/or clinical practice:</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>a. I have gained more realistic expectations of other professionals on a team.</td>
<td>○</td>
<td>○</td>
<td>○</td>
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</tr>
<tr>
<td>b. I have gained an enhanced awareness of the roles of other professionals on a team.</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<tr>
<td>c. I feel comfortable in accepting responsibility delegated to me within a team.</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<tr>
<td>d. I feel able to act as a fully collaborative member of the team.</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<tr>
<td>e. I believe that interprofessional practice is not a waste of time.</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<tr>
<td>f. I believe that interprofessional practice is difficult to implement.</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<tr>
<td>g. I have gained an appreciation for the benefits in interprofessional team work.</td>
<td>○</td>
<td>○</td>
<td>○</td>
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</tbody>
</table>

Continue on next page.
21. Did you participate in the small-group case study assignment following the didactic presentation?  ○ Yes  ○ No  
*If no, please go to question number 25.

22. What resources did you use to find information to answer the case study questions?  
(Please check all that apply)  
○ Textbooks  
○ Class Notes  
○ Asking peers for answers  
○ Internet Search Engine (Please indicate which sites were used)  
○ Other resources: (please list)  

23. What type of learning experience did the small-group case study assignment provide?  
○ Individual  
○ Collaborative  
○ Both  

24. How did your group dynamics work to complete the small-group case study?  
(Please check all that apply)  
○ Individual assignments were delegated to answer questions  
○ Group collaboration occurred to answer questions  
○ Both individual assignments and group investigations occurred to answer collectively  
○ There was no collaborative approach to complete the case study  

Follow-Up Questions  
For questions 25-27 please write out your answer.

25. What part of this IPE experience had a profound meaning on your thoughts?  

26. What surprised you the most during this IPE experience?  

27. What changes would you suggest to make this experience more beneficial in the future?  

APPENDIX C: OUTLINE OF LECTURE PRESENTATION

• Oral Care of Cancer Patient Summary
  o Background
    ▪ Cancer Basics
    ▪ Statistics
    ▪ How cancer is treated
    ▪ Common complications
  o Cancer & the Oral Cavity
    ▪ Why is the mouth so susceptible?
    ▪ How often is the mouth effected?
    ▪ The role of oral care
  o What is the role of the healthcare provider
    ▪ Screen
    ▪ Counsel
    ▪ Refer
  o Chemotherapy Patient
    ▪ Before treatment
    ▪ During treatment
      ▪ Oral complications
    ▪ After treatment
  o Oral Mucositis
    ▪ Who gets it
    ▪ Clinical significance
    ▪ Picture Examples
    ▪ Management
  o Infection
    ▪ Candidiasis
      ▪ Picture examples
      ▪ Diagnosis & Treatment
    ▪ Herpes
      ▪ Picture examples
      ▪ Diagnosis & Treatment
  o Head & Neck Radiation Patients
    ▪ Facts of oral cancer
    ▪ Overview of head & neck cancer
    ▪ Picture examples
    ▪ How it is treated
    ▪ What life is like after surgery
    ▪ Radiation Therapy for head & neck tumors
    ▪ Oral complications
    ▪ Before treatment
    ▪ During treatment
    ▪ After treatment
  o Xerostomia
    ▪ Management
- Behavior modification
- Salivary substitutes
  - Osteoradionecrosis
    - Diagnosis
    - Management
APPENDIX D: UNFOLDING CASE STUDY

Case: Melanie Smith

CC/PMH: Melanie Smith is a 62-year-old female who presents to an interdisciplinary health department clinic complaining of “extreme fatigue and severe dry mouth.” She noticed a progressive worsening of these symptoms over the past 4 weeks. She reports that she has never experienced this type of fatigue and that it increases despite how much rest she gets. The fatigue has progressed to persistent weakness, and she now finds it difficult to perform activities of daily living (ADL). Ms. Smith also comments that she has a constant throbbing pain and neuropathy that goes from head to toe and gets worse with her fatigue. However, the pain mainly affects her joints in her fingers. This has made brushing and flossing her teeth nearly impossible, and she now rarely flosses and only brushes her teeth once a day. She does however use Listerine to rinse her mouth with. In addition, Ms. Smith reports an acute onset of severe mouth dryness. Despite the amount of water she drinks, she still has “cotton mouth.” Her speech and eating abilities are greatly affected, as she has no appetite, altered taste of all foods, and an exaggerated spicy sensation to most foods even if they are not spicy.

PMH: Stage II breast cancer (ER negative/HER positive) (Diagnosed 3 months ago) and is s/p lumpectomy with an oncoplasty. She is currently on PO chemotherapy and is planned for 28 weeks of radiation treatment in approximately 6-7 weeks.

Meds: Taxol (paclitaxel) once weekly x 12 weeks (on week 6); Herceptin (Trastuzumab), once every two weeks x 1 year (on week 6); Zestril (lisinopril) 10 mg daily; All: No known drug allergies

Family History: Father deceased (pancreatic cancer); Mother living (cardiovascular disease)

Social History:
20 pack/year - cigarettes (in the process of quitting - down to 2 cigarettes per day)
Denies use of alcohol and recreational drugs
Employment: CEO of her own company; her work involves extensive time on the computer and frequent speaking engagements.
Housing: She lives with her husband; no children

Past Dental History: Ms. Smith had extensive cosmetic treatment to maxillary and mandibular anterior teeth about 4 months ago, prior to her breast cancer diagnosis. This treatment involved the placement of all porcelain crowns and was performed to address tetracycline staining. She had dental prophylaxis prior to this treatment and she is currently caries free. In addition, she has porcelain fused to metal crowns on all posterior teeth.

Review of Systems:
General: (+) weakness, (+) fatigue, (+) weight loss, (-) night sweats, (-) fever
HEENT: (-) headache, (-) vision changes, (-) dry eyes, (-) epistaxis, (+) xerostomia, (+) mouth soreness/pain, (+) dysphagia
Cardiac: (-) chest pain/heart palpitations
Respiratory: (-) SOB (-) cough/wheeze
GI: (+) nausea (-) vomiting (+) diarrhea (+) constipation
Hematologic: (+) easy bruising (-) lymphadenopathy
Musculoskeletal: (+) joint pain in hands
Neurologic: (+) numbness/tingling in hands

Exam:
Height: 5’10” Weight: 212 lbs.
Vitals: Blood Pressure: 145/62 mm Hg, Pulse: 80 bpm, Respirations: 18 rpm

Head & Neck:
No lymphadenopathy
No salivary gland enlargement
No facial asymmetry
No lesions on skin of face
Oral mucosa dry, warm, pink without mass or lesion

Musculoskeletal
Joint swelling present bilateral hands R>L, no erythema, hand grip strength weak bilaterally, fine motor coordination decreased bilaterally

No pooled saliva in vestibules
Minimal thick, frothy saliva evident
No saliva expressed from parotids bilaterally
Tongue slightly deparaphilized without mass or lesion
Throat Clear
Case: Melanie Smith

DISCUSSION QUESTIONS:

1. What would be the first concern you would address with Melanie?

2. Comment on the staging of her breast cancer. What does ER (-)/HER (+) mean as far as the type and prognosis for this patient.

3. Look up the medications on Lexicomp. List their classification and any potential side effects (oral or otherwise) that would be pertinent to the symptoms the patient is having.

4. Comment on the patient’s vital signs.

5. What are some reasons that this patient is fatigued? What other questions might you ask in the medical history or during the ROS to help determine this?

6. What are some reasons that this patient’s mouth is dry? What other questions might you ask in the medical history or during the ROS to help determine this?

7. Nursing students, what would you recommend if you were creating a treatment plan?

8. Dental hygiene students, what do you recommend for a treatment plan?

9. What type of educational material might you give to this patient regarding her symptoms/management?

10. Would you refer this patient to other practitioners and if so, who?