Spring 2021

A pilot study of oral health related quality of life during gynecologic cancer treatment

Stephanie Kushnir

A Pilot Study of Oral Health Related Quality of Life During Gynecologic Cancer Treatment

A Thesis

Presented in Partial Fulfillment of the Requirements for the

Degree of Masters of Science

in

Dental Hygiene

in the

College of Graduate Studies

Eastern Washington University

by

Stephanie Kushnir, RDH

Spring 2021

Major Professor: Ann O'Kelley Wetmore, RDH, BSDH, MSDH

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Human Subjects Approvals

From: Martin, Theresa <tmartin@ewu.edu>
Sent: Thursday, February 18, 2021 1:15 PM
To: Kushnir, Stephanie <skushnir@eagles.ewu.edu>; Ann Wetmore <awetmore@ewu.edu>; Bilich, Lisa <lbilich@ewu.edu>
Cc: Office of Grant and Research Development <ogrd@ewu.edu>; Graduate Programs <gradprograms@ewu.edu>
Subject: Final Approval of HS-5986

TO: Stephanie Kushnir - Masters of Dental Hygiene program
FROM: Dr. Theresa J. Martin, Chair – EWU IRB Human Subjects
DATE: Feb. 18, 2021
SUBJECT: Final Approval of "Oral Health-Related Quality of Life During Gynecologic Cancer" (HS-5986)

Human subjects protocol HS-5986entitled "Oral Health-Related Quality of Life During Gynecologic Cancer" has been approved as an expedited application under federal regulations under 45 CFR Part 46.104 per our email discussions regarding appropriate edits to the original application.

A signed and approved copy of your application is attached.

Please be aware that, although the IRB has approved your project, you will need to submit your application to a special committee called the Academic Face-to-Face Learning and COVID committee (AFFLAC) due to the fact that there is a face-to-face component to your project. Specifically, you will personally have contact with the clinic personnel and they will have contact with the participants. **The AFFLAC review is to insure that appropriate COVID risk mitigation procedures will be implemented in your project**. Once their approval has been granted, you are free to begin your data collection. I am also part of the approval workflow for that process on behalf of the IRB. They are aware of your project and are awaiting your application for a timely turnaround.

The link for the AFFLAC review process is as follows: https://inside.ewu.edu/academic-affairs/application-process/

Student research qualifying for an IRB exempt review is valid for a period one year. If subsequent to initial approval, the research protocol requires minor changes, the Office of Grant and Research Development should be notified of those changes. Any major departure from the original proposal must be reviewed through a Change of Protocol application submitted to the IRB before the protocol may be altered. Please refer to HS-5986 on future correspondence as appropriate as we file everything under this number.

Cc: HS-5986 file
Ann O'Kelley Wetmore, RPI
Lisa Bilich, IRB rep.

For Internal Use Only:
HS-5986

Application for Non-Exempt Research
EWU Institutional Review Board for Human Subjects Research

Expedited request ☐ **OR Full request** ☐

Status: ☐ Administrator ☐ Faculty ☒ Graduate Student ☐ Staff ☐ Undergraduate	
Principal Investigator (PI): Stephanie Kushnir Title: Oral Health Related Quality of Life During Gynecologic Cancer Department: Dental Hygiene Phone number: (619) 240-4249 E-mail: skushnir@eagles.ewu.edu	*If PI is a student, complete this section:* Responsible Project Investigator (RPI) *(faculty/staff sponsor)*: Ann O'Kelley Wetmore Department: Dental Hygiene Campus phone number: (713) 408–1321 E-mail: awetmore@ewu.edu
For students only: Is this research being done to meet a course, thesis or other academic requirement? ☒ Y ☐ N If yes, please specify: Thesis, Dental Hygiene 600s-025 If not, why is it being done?	
Title of Project: Oral Health Related Quality of Life During Gynecologic Cancer	
Project anticipated start date: 02-2-2021	Anticipated termination date: 02-01-2022
Funding: ☒ Non-funded ☐ Internal funding ☐ External funding Funding agency (if applicable): Grant or Contract Number:	

Abstract:

Prevention and education of oral care prior to cancer treatments is important for quality of life (QoL) and oral health. During cancer treatment patients may have an increase in dental caries, hyposalivation, taste alterations, mucosal sensitivity, and loss of appetite. Research has shown changes to the oral cavity during oropharyngeal, breast, and head and neck chemotherapy and radiation, but changes to the oral cavity during gynecologic oncology treatments have not been evaluated. Oral and dental care have been recommended before, during, and beyond oncology treatment as well as oral hygiene education prior to treatment therapy. The purpose of this study is to determine if oral health education increases Oral Health Related Quality of Life (OHRQoL) in gynecologic oncology patients.

Attachments:
A Summary
B Demographic Survey and OIPD Pre and Post
C N/A
D Cover Letter/Consent
E N/A
F Copies of Educational Materials included in Dental Care Bag

I certify that the information provided above is accurate and the project will be conducted in accordance with applicable Federal, State and university regulations:

PI Signature(s) *(unnecessary signature lines can be deleted)*:
Stephanie Kushnir

× _____

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HS-5986

Application for Non-Exempt Research
EWU Institutional Review Board for Human Subjects Research

x _____ x _____

x _____ x _____

x _____

Submit this original, signed to the Office of Grant and Research Development through e-mail to ogrd@ewu.edu

Recommendations and Action:	**Date**	**Approve/Disapprove**
RPI Signature *(Needed only if PI is a student)*: ann o'kelley wetmore		☒ A D ☐
IRB Rep. or Dept. Chair: *(Needed if PI is a student OR for faculty PI if required by department)* Lisa Bilich		☒ A D ☐
IRB Signature: x Theresa J Mast		☒ A D ☐

☑ Subject to the following conditions: ~~Click or tap here to enter text.~~ email discussions

Period of approval: ~~Click or tap to enter a date.~~ Feb 18, 2021 to ~~Click or tap to enter a date.~~ Feb. 17, 2024

Rev 1/26/2021

Application for Non-Exempt Research 2

Abstract

Purpose: The purpose of this study was to determine if oral health education increases oral health related quality of life in gynecologic oncology patients.

Methods: In this pilot study, 23 participants (18 - 70+ years) with a history of gynecologic cancer were recruited to participate in the study. Participants completed an Oral Health Impact Profile (OHIP-14) questionnaire prior to and after given education packet.

Results: At baseline, the mean pre-test OHIP-14 score was 6.7 (SD 8.4) and mean OHIP-14 post-test score was 8.8 (SD 8.4). Pearson Correlation was .90. P (T<= t) one-tail $p < .008$. Demonstrating statistical significance.

Conclusion: OHIP-14 scores increased after four-weeks, higher scores of OHIP-14 will always be equal to a negative impact of quality of life, demonstrating that there was an overall decrease in OHRQoL amongst this population of gynecologic cancer patients after implementation of oral health education. However, when data was analyzed individually participants who had been treated with surgery + radiation as well as participants who had been diagnosed with uterine cancer OHRQoL improved after implementation of education, but no significance was found.

Acknowledgements

I would like to thank my husband, my son, and my family for their continued support and unconditional love throughout my educational journey. I would also like to thank the Oncologists and staff at the Women's Cancer Center of Nevada for collaborating, permitting me to conduct my study in their office, and for recruiting patients to participate in my study. Lastly, I would like to thank Ann O'Kelley Wetmore for her guidance throughout my time at Eastern Washington University. I am so grateful for her friendship and mentorship.

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Introduction/Literature Review

Introduction to the Research Question

Prevention and education of oral care prior to cancer treatments is important for quality of life (QoL) and oral health. During cancer treatment patients may have an increase in dental caries, hyposalivation, taste alterations, mucosal sensitivity, and loss of appetite (Aktas & Terzioglu, 2015). Research has demonstrated changes to the oral cavity during oropharyngeal, breast, and head and neck chemotherapy and radiation. However, changes to the oral cavity during gynecologic oncology treatments have not been evaluated.

According to the Centers for Disease Control (2019), between 2012 and 2016 94,000 women were diagnosed yearly with a gynecologic cancer. Gynecologic cancer is categorized into eight categories: cervical, ovarian, uterine, vaginal, vulvar, fallopian tube, peritoneal, and gestational trophoblastic disease. Gynecologic cancer treatments can directly affect a woman's self- esteem as well as physical and social well-being, and complicating daily life activities, thus potentially reducing QoL (Aktas & Terzioglu, 2015). However, there is a paucity of research on how gynecologic cancer treatments can affect oral health related quality of life (OHRQoL). Health-related quality of life (HRQoL) assessment of women with ovarian cancer has been implemented into patient care in most trials by NRG Oncology and is being adapted to standard of care (Grzankowski & Carney, 2011). The benefits of using OHRQoL assessment include better patient-provider communication and overall improvement of QoL (Grzankowski & Carney, 2011). However, research lacks in the impact gynecologic oncology therapies

have on oral changes during oncology treatments and how those changes effect OHRQoL. Assessing cancer patient's OHRQoL has important implications for the clinical practice of dentistry and dental research. A multidimensional construct, OHRQoL includes a subjective evaluation of the individual's oral health, function, emotional well-being, expectations and satisfaction with care, and sense of self (Sicho & Broder, 2011). Within the dental community there is an interest in increasing dental care knowledge and understanding oral changes that may occur during gynecologic oncology treatments. Oral and dental care have been recommended before, during, and beyond oncology treatment as well as oral hygiene education prior to treatment therapy. The purpose of this study is to determine if oral health education increases OHRQoL in gynecologic oncology patients.

Statement of Problem

Research suggests the positive impact of oral health education for oncology patients before, during, and beyond oncology treatment. However, there is a paucity of evidence in evaluating gynecologic oncology treatments on oral health and in turn effects on QoL. Implementing and providing oral health education has the potential to improve the OHRQoL during and beyond treatment.

Research Questions

This study identified whether educating gynecologic oncology patients on oral hygiene had an impact on oral health and QoL. This study aimed to answer the following research questions.

1. What is the impact of gynecologic cancer treatments on OHRQoL?
2. Is there an improvement in OHRQoL secondary to oral hygiene education?

Overview of Research

Assessing oral health education and OHRQoL of gynecologic oncology patients is a relatively ignored area of research. There is literature on other cancer treatments suggesting positive impact of oral health education and outcomes. Therefore, one can extrapolate that the same educational efforts in gynecologic oncology patients would have the same observed benefits. Implementing and providing oral health education prior to treatment has the potential to improve the OHRQoL during and after treatment, thus affecting patients' QoL.

Research conducted by Toth et al., (1995) provides evidence that cancer therapies place patients at a greater risk for oral health complications during treatment. Unfortunately, prevention, education, and treatment of such complications are often overlooked. Toth et al., suggests more emphasis is needed in oral health management, education, prevention, and dental treatment. The National Institute of Dental and Craniofacial Research (NIDCR) guidelines for the provision of oral care for patients with cancer recommended patients have a dental visit prior to beginning cancer treatment. The NIDCR also provides suggestions for care during chemotherapy and radiation; however currently there is no universally accepted dental protocol. It is well documented that poor oral health is associated with an increased incidence and severity of oral complications therefore, the dental team's involvement may reduce the risk of such complications (Taichman & Tindle, 2016). Cancer treatments can also directly affect a women's self-esteem, physical and social well-being, thereby complicating daily life activities, and thus potentially reducing their QoL. Patients receiving cancer treatments may be at a higher risk for developing caries (cavities), hyposalivation, taste alterations, mucosal sensitivity,

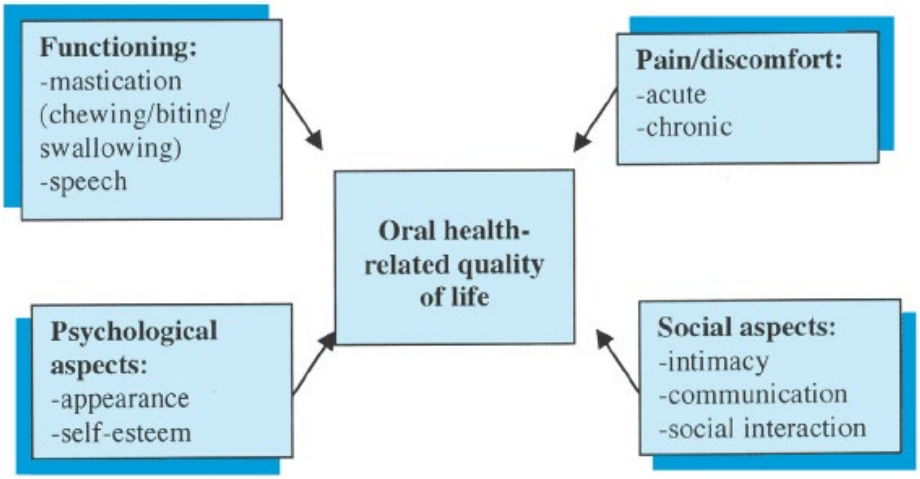
and loss of appetite (Aktas & Terzioglu, 2015); These complications may directly impact QoL. As the number of cancer survivors increases, it is becoming abundantly clear that aggressive management of oral toxicities is needed to ensure both short-term and long-term oral health, as well as general well-being (Epstein et al., 2012).

OHRQoL.

According to the United States Surgeon General's report on oral health, OHRQoL is "a multidimensional construct that reflects (among other things) people's comfort when eating, sleeping, and engaging in social interaction; their self-esteem; and their satisfaction with respect to their oral health." (US Department of Health and Human Services, 2000, p.135). The World Health Organization (WHO) recognizes oral health and QoL as an integral part of general health and well-being and is an important section of the Global Oral Health Program (WHO, 2020).

Figure 1

Determinates of OHRQoL



Note. From "Oral Health Related Quality of Life," by de la Fuente Hernandez et al., 2014. Copyright 2015 by The Author(s). License IntechOpen.

The Oral Health Impact Profile (OHIP) is the most widely used QoL survey to evaluate the influence of oral diseases on individuals (Barrios et al., 2015). The short form OHIP-14 by Slade (1996), contains 14 items grouped into seven dimensions of impact: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. Research by Al Shamrany, 2006 found the OHRQoL survey has a broader appreciation of the impact of oral health and should provide the basis for any oral health program development. Oral health care providers are urged to integrate the OHRQoL concept into their daily practice to improve the outcome of their services.

Types of and Standard Therapy Protocols for Gynecologic Cancer.

Gynecologic cancer affects a woman's reproductive organs. According to Yale Medicine (2020), gynecologic cancers are rare and occur in about 100,000 women in the United States each year. That being said, all women are at risk for developing gynecologic cancers and this risk increases with age. It is imperative to know the warning signs, as treatments are most successful with early detection (Yale Medicine, 2020). There are eight categories of gynecologic cancers: cervical, uterine, ovarian, fallopian, peritoneal, vaginal, vulvar, and gestational trophoblastic disease. Each type of gynecologic cancer is unique with different signs and symptoms, risk factors, and prevention strategies (Robert H. Lurie Comprehensive Cancer Center of Northwestern University, 2020). Treatment for the gynecologic cancers can include surgery, chemotherapy, radiation, clinical trial, and a combination of the aforementioned. Furthermore, treatment is determined by the type of malignancy, staging and grade,

metastasis of the cancer, overall health of the patient, and treatment preference (American Cancer Society [ACS], 2020b).

Cervical Cancer

Cervical Cancer is a disease where cancer cells form in the cervix. The cervix is the lower end of the uterus that leads from the uterus to the vagina. Major risk factors for women developing cervical cancer include being infected with Human Papilloma Virus (HPV) and exposure to diethylstilbestrol (DES) in utero (National Cancer Institute [NCI], 2020a). There are usually no signs and symptoms with early cervical cancer; however, it can be detected with early and regular check-ups. Signs and symptoms of cervical cancer included vaginal bleeding, unusual vaginal discharge, pelvic pain, and pain during sexual intercourse. Tests to detect and diagnose cervical cancer consist of physical exams and review of health history, pelvic examination, Papanicolaou smear test (Pap smear test), HPV test, endocervical curettage, colposcopy, and biopsy. Prognosis depends on the stage of the cancer, type of cancer cells, patient's age and health, presence of HPV, HIV positive or negative status, and whether the cancer is newly diagnosed or recurrent (NCI, 2020a). Treatment for cervical cancer depends on the stage, type, patient's desire to have children, and their age. Staging for cervical cancer includes Stage I, Stage II, Stage III, and Stage IV (NCI, 2020a). See Figure 2 for staging and treatment options.

Uterine Cancer

Uterine or endometrial cancer is a disease where cancer cells form in the endometrium tissues. The endometrium is the lining of the uterus where a fetus may grow (NCI, 2020b). Major risk factors for uterine cancer are obesity and metabolic syndrome where the female has high blood pressure, high blood sugar, excess body fat around their

waist, and abnormal cholesterol levels. Other risk factors include taking estrogen only hormone replacement therapy (HRT) after menopause, taking tamoxifen to prevent or treat breast cancer, type 2 diabetes, nulliparous (never giving birth), start of menstruation at an early age, menopause at a later age, polycystic ovarian syndrome (PCOS), family history of uterine cancer, genetic conditions such as hereditary nonpolyposis colorectal cancer (HPNCC) or Lynch Syndrome, endometrial hyperplasia, and age (NCI, 2020b). Some signs and symptoms of uterine cancer are vaginal bleeding or discharge not related to menstruation, bleeding after menopause, difficult or painful urination, pain during sexual intercourse, and pelvic pain (NCI, 2020b). Tests used for diagnosis of uterine cancer are biopsy, dilation and curettage, hysteroscopy, physical exam, review of health history, and transvaginal ultrasound. A pap smear test is not recommended for this type of cancer because endometrium cancer begins in the uterus and does not appear in the results of a pap test (NCI, 2020b). Prognosis and treatment options depend on staging of cancer, microscopic evaluation of the cell growth, and if cancer cells are affected by progesterone. Staging for uterine cancer includes Stage I, Stage II, Stage III, and Stage IV and grouped for treatment as low-risk cancer or high-risk cancer (NCI, 2020b). See Figure 2 for staging and treatment options.

Ovarian, Fallopian, and Peritoneal Cancer

Ovarian, fallopian, and peritoneal cancer occurs when malignant cells are in the tissues that cover the ovaries, lining of the fallopian tubes, and peritoneum. Since these three types of cancers all form in the same types of tissue, they are all treated in the same manner (NCI, 2020c). The ovaries are a paired organ in a woman's reproductive system. They are about the size of an almond and positioned on both sides of the uterus. The

ovaries are responsible for producing eggs, called the ova or oocytes, and hormones. Other types of cancers affecting the ovaries include ovarian germ cell tumors, ovarian low malignant potential tumors, and childhood ovarian cancer treatment (NCI, 2020c). The fallopian tubes are a pair of tubes located on the sides of the uterus. Eggs from the ovaries pass through these tubes to the uterus (NCI, 2020c). The peritoneum is the tissue that lines a woman's abdominal wall and covers organs located in the abdomen. Cancer that forms in the peritoneum and has not metastasized is regarded as primary peritoneum cancer, however, cancer can begin in the peritoneum and metastasize to one or both ovaries (NCI, 2020c). Risk factors for women developing ovarian cancer consist of family history, *BRCA1* or *BRCA2* genes, hereditary conditions such as hereditary nonpolyposis colorectal cancer (HPNCC) or Lynch Syndrome, endometriosis, HRT, obesity, taller than average height, and age. According to the (NCI, 2020c), 20% of all ovarian cancer cases are caused by hereditary ovarian cancer. Women with an increased risk of developing ovarian cancer may choose a prophylactic oophorectomy, surgical removal of the ovaries, subsequently reducing cancer growth and lessening risk for future disease. In women who are identified as high-risk of developing ovarian cancer this procedure has been confirmed to considerably reduce their risk of developing ovarian cancer (NCI, 2020c). Unfortunately, there are no early signs and symptoms for ovarian, fallopian, and peritoneal cancer. When signs and symptoms are present, the cancer is likely in an advanced stage. These latent signs and symptoms include pain, swelling, or pressure in the abdomen or pelvis, sudden or frequent urge to urinate, trouble with eating and satiety, lump in pelvic area, and gastrointestinal problems such as gas, bloating, and or constipation (NCI, 2020c). Diagnostic testing involves a physical exam, review of

health history, pelvic exam, and a CA 125 assay (a blood test that measures the amount of CA 125 protein, in the blood). This test detects early signs of ovarian cancer in people who are at a high risk of developing this disease (Mayo Clinic, 2020). Other diagnostic tests for ovarian cancer included, ultrasound examination, Computer Tomography Scan (CT scan), Position Emission Tomography scan (PET scan), Magnetic Resonance Imaging (MRI), chest x-ray, and biopsy. Prognosis and treatment for women diagnosed with ovarian, fallopian, and peritoneum cancer depends on the type and how invasive the cancer is; stage and grade, fluid in the abdomen, if all the tumor can be removed by surgery, changes in *BRCA1* or *BRCA2* genes, age, health of the patient, new diagnosis, or recurrent cancer (NCI, 2020c). Staging for ovarian, fallopian, and peritoneum cancer includes Stage I, Stage II, Stage III, and Stage IV. See Figure 2 for staging and treatment options.

Vaginal Cancer

Vaginal cancer is a disease where malignant cells form in the vagina. The vagina is the canal from the cervix to the outside of a woman's body. During birth, a baby moves through the vagina or birth canal out of the body (NCI, 2020d). Vaginal cancer is rare and has been hard to study. There are no "standard" treatments that experts agree on. Most experts agree that treatment in a clinical trial should be considered for any type or stage of vaginal cancer (ACS, 2020a). There are two types of vaginal cancer: Squamous cell carcinoma and adenocarcinoma. Squamous cell carcinoma is the most common type of vaginal cancer and develops in the lining of the thin, flat lining cells of the inside of the vagina. This type of cancer can metastasize very slowly and usually stays close to the vagina; however, it can metastasize to the lungs, liver, or bone. Adenocarcinoma begins

in the granular cells; these cells create and release mucus in the vagina. This type of cancer is more prone to metastasize to the lungs and lymph nodes (NCI, 2020d). A rare type of adenocarcinoma known as clear cell adenocarcinoma is linked to women being exposed to DES in utero. Risk factors for women developing vaginal cancer include being 60 years of age or older, HPV, DES, and past hysterectomy for benign or malignant cancer (NCI, 2020d). Unfortunately, there are no early signs and symptoms for vaginal cancer, it may be found during a routine pelvic exam and pap smear test. Signs and symptoms of vaginal cancer involve bleeding or discharge not related to menstruation, pain during sexual intercourse, pain within the pelvic area, lump in the vagina, pain during urination, and constipation (NCI, 2020d). Diagnostic testing involves physical exam, review of health history, pelvic exam, pap smear test, HPV test, colposcopy, and biopsy. Prognosis and treatment for vaginal cancer depends on the stage of the cancer, metastasis, size, grade, location of the cancer within the vagina, signs and symptoms, and new diagnosis or recurrent cancer (NCI, 2020d). Treatment for vaginal cancer depends on staging and size, if the cancer is located near other organs that can be compromised by treatment, if the tumor is squamous cell or an adenocarcinoma, history of hysterectomy, and history of radiation to the pelvis. Stages for vaginal cancer included Stage I, Stage II, Stage III, Stage IV, and recurrent cancer (NCI, 2020d). See Figure 2 for staging and treatment.

Vulvar Cancer

Vulvar cancer is a rare disease where malignant cells develop in the tissue of the vulva. The vulvar area includes the inner and outer lips of the vagina, clitoris, opening of the vagina and its glands, mons pubis, and the perineum (NCI, 2020e). Risk factors for

this type of cancer include one or more of the following: Vulvar Intraepithelial Neoplasia (VIN), HPV, older age, genital warts, multiple sexual partners, first sexual intercourse experience at a young age, and abnormal pap smear tests (NCI, 2020e). Signs and symptoms of vulvar cancer can include a lump or growth that looks like a wart or ulcer on the vulva, itching that does not go away, bleeding not related to menstruation, and pain (NCI, 2020e). Tests and procedures that are used to diagnose and examine vulva cancer included physical exam, review of health history, pelvic exam, pap smear test, HPV test, biopsy, colposcopy, MRI, CT scan, and PET scan (NCI, 2020e). Prognosis for women diagnosed with vulvar cancer and treatment options depend on if the cancer has metastasized to other tissues, lymph nodes, new diagnosis, or recurrent cancer (NCI, 2020e). Stages of vulvar cancer include Stage I, Stage II, Stage III, Stage IV, and recurrent. See Figure 2 for staging and treatment options.

Gestational Trophoblastic Disease

Gestational trophoblastic disease (GTD) is a group of rare diseases where abnormal trophoblast cells grow inside of the uterus after conception (NCI, 2020f). These trophoblast cells normally surround a fertilized egg in the uterus and help to connect the fertilized egg to the wall of the uterus and form part of the placenta (NCI, 2020f). However, sometimes there is a problem with the fertilized egg and trophoblast cells. Instead of a fetus developing, a tumor forms. Most GTD is benign and does not spread, but some types may become malignant and metastasize (NCI, 2020f). GTD can be categorized into two types: Hydatidiform Moles (HM) and Gestational Trophoblastic Neoplasia (GTN). HM is the most common type of GTD also knowns as molar pregnancy. HM is a slow growing tumor and can be complete HM or partial HM. A

complete HM form is when sperm fertilizes an egg that does not contain the mother's DNA. The cells that were meant to become the placenta are abnormal (NCI, 2020f). A partial HM occurs when sperm fertilizes a normal egg and there are two sets of DNA from the father in the egg. Only part of the fetus forms and the cells that would have become the placenta are abnormal (NCI, 2020f). Risk factors that a HM will develop into cancer include: pregnancy before 20 or after 35 years of age, a high level of beta human chorionic gonadotropin (β-hCG), a large tumor in the uterus, an ovarian cyst larger than six centimeters, hypertension during pregnancy, hyperthyroidism, hyperemesis gravidarum, trophoblastic cells in blood, and serious blood clotting problems (NCI, 2020f). GTN includes invasive moles, choriocarcinomas, placental-site trophoblastic tumors (PSTT), and epithelioid trophoblastic tumor (ETT). Risk factors for developing GTD are pregnancy before 20 years of age or after 35 years of age and having a personal history of HM. Signs and symptoms include: vaginal bleeding not related to menstruation, large uterus during pregnancy, pain or pressure in pelvis, hyperemesis gravidarum, hypertension with headache and swelling of the feet and hands during early pregnancy, longer than normal vaginal bleeding that continues after delivery, fatigue, shortness of breath, dizziness, and fast or irregular heartbeat caused by anemia (NCI, 2020f). Diagnostic testing for GTD includes a physical exam, pelvic exam, blood sample, and urinalysis. GTD can usually be cured, however, treatment and prognosis depend on type, metastasis, number of tumors, size of the tumor, level on β-hCG in the blood, timing of diagnosis after pregnancy began, whether GTD occurred after a molar pregnancy, miscarriage, or normal pregnancy, and previous treatment for GTN (NCI, 2020f). Diagnostic staging for GTN may include chest x-ray, CAT scan, MRI with

gadolinium, and lumbar punction. Stages for GTN are Stage I, II, III, and IV (NCI 2020f). See Figure 2 for staging and treatment. There is no staging for HM.

Figure 2

Staging and Treatment Therapies

Type of Cancer	**Stage**	**Therapies**			
		Surgery	**Chemotherapy**	**Radiation**	**Other**
Cervical	Carcinoma in Situ	Laser surgery Hysterectomy		Internal radiation therapy for women who cannot have surgery	Cold knife conization Loop electrosurgical excision (LOOP)
During pregnancy	Carcinoma in Situ				No treatment during pregnancy Colposcopy may be done to check for invasive cancer
	IA1	Total hysterectomy with or without bilateral salpingo-oophorectomy			Conization
	IA2	Modified radical hysterectomy and removal of lymph nodes Radical trachelectomy		Internal radiation therapy for women who cannot have surgery	Clinical trials
During pregnancy	I	Radical trachelectomy			Conization
	IB, IIA	Radical hysterectomy and removal of	Chemotherapy	Radiation therapy to pelvis after	Clinical trials

		pelvic lymph nodes Radical trachelectomy	Chemotherapy followed by surgery	hysterectomy or alone	
	IIB, III, IVA	Removal of pelvic lymph nodes followed by radiation therapy with or without chemotherapy	Chemotherapy with radiation at the same time	Internal radiation therapy	Clinical trial chemotherapy followed by surgery Clinical trial of chemotherapy and radiation therapy given at the same time followed by chemotherapy
	IVB		Chemotherapy and targeted therapy Chemotherapy as palliative therapy to improve QoL	Radiation therapy as palliative therapy improve QoL	Clinical trials of new anticancer drugs or drug combinations
During pregnancy	II, III, IV	After delivery	Chemotherapy in second or third trimester	After delivery Radiation plus chemotherapy	Termination of pregnancy before treatment begins
	Recurrent	Pelvic exenteration	Chemotherapy Chemotherapy with target therapy Chemotherapy was palliative therapy to improve QoL	Radiation	Clinical trials of new anticancer drug or drug combination Immune-therapy

Uterine	I, II (Low risk)	Total hysterectomy and bilateral salpingo-oophorectomy Total hysterectomy and bilateral salpingo-oophorectomy with or without the removal of lymph nodes in pelvis and abdomen If spread to cervix, radical hysterectomy with bilateral salpingo-oophorectomy		Alone for patients who cannot have surgery Internal radiation or external radiation after total hysterectomy and bilateral salpingo-oophorectomy with or without removal of lymph nodes	Clinical trial
	I, II (high risk)	Radical hysterectomy and bilateral salpingo-oophorectomy lymph lodes in pelvis and abdomen may be removed and viewed for cancer cells	After radical hysterectomy and bilateral salpingo-oophorectomy	Sometimes after radical hysterectomy and bilateral salpingo-oophorectomy and chemotherapy	Clinical trial
	III, IV, recurrent	Radical hysterectomy and removal of lymph nodes in pelvis viewed for cancer cell	Adjunct chemotherapy after radical hysterectomy and removal of lymph nodes in pelvis viewed for cancer cell Chemotherapy and internal and external radiation (patients who cannot have surgery)	And/or radiation therapy after radical hysterectomy and removal of lymph nodes in pelvis viewed for cancer cell and chemotherapy	Hormone therapy (patients who cannot have surgery) Targeted therapy with MTOR inhibitors (everolimus or ridaforolimus) or a monoclonal antibody (bevacizumab) Clinical trials

Ovarian, fallopian tube, and primary peritoneal	I (early)	Debulking for stage Hysterectomy with bilateral salpingo-oophorectomy omentectomy lymph nodes Other tissues from pelvis and abdomen unilateral salpingo-oophorectomy for women who wish to have children	After surgery		
	II, III, IV (Advanced)	Debulking for stage Hysterectomy with bilateral salpingo-oophorectomy Omentectomy Lymph nodes other tissues from pelvis and abdomen	Intravenous (IV) Intraperitoneal (IP) With targeted therapy (bevacizumab) Targeted therapy with a poly (ADP-ribose) polymerase (PARP) inhibitor Targeted therapy followed by surgery possibly followed by IP chemotherapy Alone (patients who cannot have surgery)		Targeted therapy with PARP inhibitor (alaparib, rucaparib, niraparib) Clinical trial
	Recurrent	Using one or more anticancer drugs	And/or target therapy (bevacizumab)		Targeted therapy with a poly (ADP-ribose) polymerase (PARP)

					inhibitor (Olaparib, rucaparib, or niraparib) with or without chemotherapy Clinical trial
Vaginal	Vaginal intra-epithelial neoplasia (VAIN)				Pre-cancerous change in cells go away on own watched by doctor pap tests colposcopy
	VAIN 2	Removal of lesion or abnormal cells		Intracavitary radiation (brachytherapy)	Topical therapy (5 -FU or imiquimod) Laser treatment
	0 (VAIN 3 or carcinoma in Situ [CIS])	Local excision If cancer comes back, partial vaginectomy		Intracavitary radiation (brachytherapy)	Laser vaporization Topical therapy 5-FU cream or imiquimod 10 weeks
	I	Partial or radical vaginectomy Radical hysterectomy Bilateral radical pelvic lymph node removal and/or radical or partial vaginectomy		Cancer < 5mm thick (3/16 inch) intracavitary radiation used alone Tumors grown more deeply intracavitary radiation maybe combined with external beam radiation	

	II	Radical vaginectomy Pelvic exenteration	With radiation To shrink cancer before radical surgery	Brachytherapy and external beam radiation	
	III or IVA		Combined with radiation	Brachytherapy and external beam radiation	
	IVB		Combined with radiation Alone QoL live longer	To vagina and pelvis to ease symptoms reduce bleeding QoL	Clinical trial
	Recurrent				
	Local (comes back in same place) Stage I, II	Pelvic exenteration		Brachytherapy and external beam	Relieving symptoms palliative care Clinical trial
	Distant (comes back in another part of the body)	Surgery	Chemotherapy	Radiation	Clinical trial

Vulvar	Vulvar Intra-epithelial Neoplasia (VIN)	Separate excision of lesions Wide local excision Laser surgery Ultrasound surgical aspiration Skinny vulvectomy			Immuno-therapy with topical imiquimod
	I, II	Wide local excision Radical local excision with removal of lymph nodes in groin and upper thigh Modified radical vulvectomy Radical vulvectomy with removal of lymph nodes in groin and upper thigh Radical local excision and removal of sentinel lymph node		After modified or radical vulvectomy After radical local excision Alone	
	III	Modified radical vulvectomy Radical vulvectomy with removal of lymph nodes in groin and upper thigh with or		Alone or combined with chemotherapy and then followed by surgery	Clinical trial

		without radiation			
	IVB		Maybe used if patient can tolerate it		No standard treatment Clinical trial
	Recurrent	Wide local excision with or without radiation therapy Radical vulvectomy and pelvic exenteration	Chemotherapy with radiation with or without surgery	With or without chemotherapy And surgery Palliative treatment to relieve symptoms and improve QOL	Clinical trial

GTD	HM	Dilation and curettage to remove tumor	If disease remains after surgery		Blood test done every week until β-hCG level returns to normal. Monthly follow up visits up to six months
	GTN low-risk		With one or more anticancer drugs until β-hCG level is normal for at least three weeks after treatment. If β-hCG does not return to normal or metastasis chemotherapy regimens for high-risk GTN is given		
	GTN high-risk		Combination chemotherapy Intrathecal chemotherapy and High-dose chemotherapy and/ or intrathecal chemotherapy	radiation to the brain (cancer spread to lungs) and/or radiation therapy to the brain (cancer that spread to brain)	Clinical trial
	PSGTT & ETT Stage I	Remove uterus			Clinical trial
	Stage II	Remove the tumor	Combination chemotherapy		Clinical trial
	Stage III, IV	Surgery to remove metastasized cancer	Combination chemotherapy		Clinical trial

	Recurrent or resistant GTN	Surgery	Chemotherapy with one or more anticancer drugs Combination chemotherapy		Clinical trial

Note. From "Cervical Cancer Treatment (PDQ)-Patient Version," "Uterine Cancer Treatment (PDQ)-Patient Version," "Ovarian, Fallopian, and Peritoneal Cancer Treatment (PDQ) - Patient Version," "Vaginal Cancer Treatment (PDQ) - Patient Version," "Vulvar Cancer Treatment (PDQ) – Patient Version," Gestational Trophoblastic Disease (PDQ) – Patient Version," by National Cancer Institute, May 2020

The NIDCR (2009) estimates that 40% of patients receiving cancer treatment therapy are at risk of oral complications. The NIDCR, recommends seeing a dentist at least one month before starting chemotherapy and/or radiation therapy. With this proactive approach, the dentist, dental hygienist, and dental therapist can treat existing dental complications and provide palliative care as the patients' oncology treatment progresses, thereby, minimizing the patients' chance of serious oral complications. Interprofessional care involves the patient's dentist, dental hygienist, dental therapist, and oncologist working together on a custom home-care routine personalized for each patient and their specific condition.

Pretreatment Oral Care

First, a pretreatment oral assessment of the patient should be performed. Comprehensive patient education plays a central role, and a standard oral care protocol should be applied (Saadeh, 2005). Collective studies suggest the use of a systematic

protocol improves patient outcomes (Rubenstein et al., 2004). Preventive oral health care should be strongly emphasized along with oral hygiene instruction and education emphasizing the importance of effective plaque removal and regular dental visits to support oral health. A comprehensive oral care plan should include oral hygiene strategies that may change throughout the stages of oncology treatment(s). At this pretreatment visit, patients should have a thorough dental examination that includes examination of hard and soft tissues, radiographs, periodontal and dental charting to detect infections and pathology. Diagnosis and treatment of infections and, dental caries, and oral prophylaxis if indicated should be completed. Patients should be counseled on tobacco cessation, limiting alcohol intake, nutritional intake, effective oral hygiene practices, and early detection of oral lesions to reduce the onset of two to three weeks before initiating chemotherapy. Antibiotic prophylaxis is also necessary if granulocytes are under 2,000/mm^3 noted from a blood screening. Moreover, limited invasive procedures should take place at least two-weeks before the start chemotherapy. Prevention and management can greatly reduce the risk of secondary oral diseases and minimize any decline in the patient's QoL (Rhodes-Nesset & Laronde, 2014). See Table 1 for oral hygiene care guidelines for patients to follow before beginning cancer treatment.

Table 1

Oral Hygiene Care for Patients Before Beginning Cancer Treatment

General Guidelines
• Plaque removal is performed with an extra-soft nylon bristle toothbrush and gentle flossing so as not to cause trauma. • Recommend products that are easy to grasp and manipulate (floss handle, power toothbrushes). • Prescribe a 5000-ppm fluoride toothpaste/gel to reduce the risk of dental caries. Recommend products for topical management of xerostomia and oral lesions.
Specific Mucositis/Stomatitis Guidelines
• Suggest patient suck on ice chips for 39 minutes before and during chemotherapy to keep the oral cavity moist. • Recommend patients rinse with an alkaline saline mouth rinse that includes ½ teaspoon of baking soda and ½ teaspoon of salt in 16 ounces of water. Patients should rinse at least five times per day.

Note. From "Oral health maintenance for patients with breast cancer," by Taichman and Tindle., 2016, *The Journal of Multidisciplinary Care Decisions in Dentistry*. Copyright by 2016 The Journal of Multidisciplinary Care Decisions in Dentistry.

Oral Complications and Therapies During Cancer Treatment

Treatment for cancer typically involves surgery, chemotherapy, radiation and/or a combination of all three. Even with the encouraging evolvement in cancer management over the past decades, one should bear in mind that current treatment modalities do have the potential to result in devastating and sometimes deadly adverse effects that not only decrease the patients' QoL but also increase their morbidity and mortality. Chemotherapy can be associated with numerous side effects that can affect the patient's QoL. Unfortunately, the risk benefit ratio in oncology therapy results in most of these side effects being unavoidable. Several preventive measures are taken in order to limit their expression. Nevertheless, most oncology patients experience difficult situations in managing oral side effects and complications of oncology therapies. See Table 2 for

symptoms and therapies that alleviate complications that may occur from cancer treatment(s).

Table 2

Oral Complications of Cancer, Symptoms, and Therapies

Complications	Symptoms	Therapies
Hyposalivation	Dry mouth, thick ropey saliva	Saliva substitutes, sip water, suck on ice chips, avoid spicy foods and alcohol, fluoride varnish, toothpaste, or gel to prevent caries
Loss of sensory function	Alteration or loss of taste, bad breath, neuropathy	Pretreatment education
Limited opening	Pain, and /or trismus in muscle, TMJ, neck, shoulder	Warm compress, physical therapy, jaw exercises
Infection	Pain, odor, exudate, bleeding	Antibiotics, topical anesthetics, analgesics for oral pain
Mucosal changes	Mucositis, halitosis, neuropathy, pain	Oral hygiene, ¼ baking soda and 1 quart of water solution mouthwash followed by plain water rinse several times a day, “magic mouth wash”
Caries	Pain, lesions	Avoid candy, gum, and soda unless they are sugar free, fluoride toothpaste 5000 ppm, custom trays and fluoride gel,

		fluoride varnish, xylitol products
Periodontal disease progression	Clinical attachment loss, mobility	Periodontal maintenance visits
Risk of mucosal injury	Pain	Take precaution to protect against trauma, topical anesthetics, analgesics for oral pain
Osteoradionecrosis	Pain, bad breath, non-or slow healing soft tissue	Elective oral surgery should not be performed for the duration of radiation treatment, antibiotics, hyperbaric oxygen therapy
Poor esthetics	Low quality of life, depression	New dentures or partials may need to be reconstructed
Trouble speaking	Social withdrawal, depression	Jaw exercise, speech language therapy
Trouble eating and swallowing	Limited energy, discomfort while eating	Pretreatment education, soft food diet, saliva substitutes, hydration, avoid spicy food and alcohol

Note. From "Oral complications of cancer and cancer therapy," by Epstein et al., 2012 *CA: A Cancer Journal for Clinicians, 62*(6), 400-422. Copyright 2012 by American Cancer Society, Inc.

The NIDCR (2018), suggests most people are aware of the common side effects of cancer treatment, nausea, and hair loss. However, many may not realize more than one-third of people treated for cancer develop complications that affect the mouth. These

complications may impede cancer treatments and diminish the patient's QoL. Radiation and chemotherapy can lead to complications such as: mucositis, hyposalivation, poor oral hygiene, periodontal problems, increase in dental caries, oral pain, dysgeusia (altered taste), oral dryness, dysphagia (difficulty swallowing), and osteoradionecrosis (NIDCR, 2018). A preemptive treatment plan can promote optimal oral health and avoid or minimize oral manifestation of complications during and beyond treatment. See Figure 3.

Mucositis. One of the unfortunate consequences of cancer therapies is the development of painful mouth sores, known as oral mucositis. Mucositis is erythema and ulceration of the mucosa. Oral mucositis plays a significant role in the physical and psychosocial aspects of patients undergoing cancer therapy (Cawley & Benson, 2005). Oral mucositis has emerged as one of the most frequent causes of treatment delay and dosage reductions in cancer therapy and it affects patients across all treatment modalities. Cawley & Benson's research also concluded patients' QoL can be affected by pain, infection, modified nutrition, and destruction of oral function, resulting in potential treatment delays and economic burden. The frequency of oral mucositis is about 30% - 40% in the general oncology patient population (Lionel et al., 2006). Oncology patients consider oral mucositis to be the most difficult treatment-related complication to endure. The severity of mucositis has a direct influence on the treatment planning with the necessity of dose reductions, delays, or even discontinuations of treatment therapy. Oral mucositis can also promote the development of life-threatening infections such as neutropenia, where the patient has reduced white blood cell count, significantly increasing risk for infection (Lionel et al., 2006). Research suggests that prior to beginning oncology treatment, all patients should visit their dental health provider for a

thorough pre-treatment oral assessment as noted above. Comprehensive patient education plays a central role, and a standard oral care protocol should be applied, but there is not enough evidence to recommend one protocol over another (Saadeh, 2005). Collective studies suggest the use of a systematic protocol improves patient outcomes (Rubenstein et al., 2004). Some simple oral care should be suggested, for instance: brushing teeth twice daily using a new toothbrush at each chemotherapy cycle, daily flossing, and mouth rinsing with sterile water after brushing or flossing. In addition, spicy food, alcoholic beverages, and alcohol-based mouthwashes should be avoided (Larson et al., 1998). Individuals undergoing chemotherapy or radiation therapy are often advised to eat a soft or liquid diet. Mucositis is not an infectious process; therefore, it cannot be prevented with antibiotics or antiviral medications and cannot be passed to another person (American Academy of Oral Medicine (AAOM), 2015).

Salivary Disfunction. Salivary gland hypofunction or hyposalivation is a condition of having reduced saliva production which is different from xerostomia often referred to as “dry mouth”. The best way to diagnose hyposalivation is to measure the salivary flow. Salivary flow rates have been used as the basis for diagnosing hyposalivation in a large-scale study. The average unstimulated whole salivary flow rate is 0.3 – 0.4 ml/minute during waking hours. An unstimulated rate of .1ml/minute or less indicates hyposalivation (Wiener et al., 2010). People with hyposalivation experience inadequate bicarbonate and urea buffering, remineralization, and sugar and acid clearance that may result in an increased caries rate (Wiener et al., 2010). Although xerostomia often is a manifestation of impaired salivary gland function, it can occur with or without a noticeable decrease in saliva production. In most circumstances, xerostomia is

accompanied by salivary flow hypofunction, which reflects an objective, measurable decrease in salivary flow (hyposalivation). Symptoms of dry mouth range from mild oral discomfort to significant oral disease that can compromise patient's health, dietary intake, and QoL (American Dental Association Council on Scientific Affairs [ADACSA] 2015, p.1). Patients should receive detailed information about the potential causes of dry mouth and the potential sequelae of impaired salivary secretion, including dental caries, candidiasis, and mucosal complications. Preventive oral health care should be strongly emphasized including oral hygiene instruction and regular dental visits to promote oral health. A meticulous oral hygiene regimen to effectively remove biofilm is recommended, including twice-daily tooth-brushing, regular use of floss or another interdental cleaner, and use of alcohol-free mouth rinse (ADACSA, 2015, p.11). See Table 3 for management of hyposalivation.

Table 3

Saliva Management

Management
Preventative: cancer treatment planning, amifostine
Sialagogues: (with residual function)
Viscous saliva: mucolytic agents
Excess saliva: xerostomia (anticholinergic) medications
Palliation with lack of function: mouth-wetting agents (be aware of the pH of product), presence/absence of fluoride. Ca PO4, xylitol
Dental prevention: cariogenic microbial flora (chlorhexidine, xylitol), mineralization, local infection.

Note. Ca PO4 indicates calcium phosphate, F, fluoride. From "Oral complications of cancer and cancer therapy," by Epstein et al., 2012, *CA: A Cancer Journal for Clinicians, 62*(6), 400-422. Copyright 2012 by American Cancer Society, Inc.

Dental Caries. Dental caries or tooth decay is defined by the NIDCR as "damage to a tooth that can happen when decay-causing bacteria in a person's mouth makes acid that attacks the tooth's surface or enamel." If not treated, caries can cause an infection, pain, and tooth loss. The benefits of fluoride are well documented and topical fluoride is considered the gold standard in the prevention of dental caries (Rhodes-Nesset & Laronde, 2014). Fluoride increases the enamel structure's resistance to acid, inhibits bacteria, and re-mineralizes the tooth. During the pre-cancer dental assessment an oral healthcare provider such as a dentist, dental hygienist, or dental therapist may use a dental caries assessment tool, Caries Assessment Management By Risk Assessment (CAMBRA) to assess if a patient is at a high risk for caries. The NIDCR (2009) recommends the use of custom fluoride gel mouth trays or brush on fluoride gel that is either a 1.1% neutral pH sodium gel or 0.4% stannous fluoride gel. The NIDCR, also recommends the use of daily fluoride application to all patients who have hyposalivation due to radiation.

Fungal Infections. Candidiasis is the most common fungal infection caused by *Candida albicans* which is a human commensal and a major resident of the skin, mucosal surfaces, the gastrointestinal (GI) tract and the female genitourinary tract. *Candida albicans* can cause superficial disease in otherwise healthy individuals, but infection in immunocompromised individuals can progress towards a potentially lethal systemic form. Most studies place the crude mortality rate due to *Candida albicans* infections at approximately 30% – 40% (Teoh & Pavelka, 2016). *Candida albicans* is one of the leading causes of opportunistic microbial infections in cancer patients, often presenting in a life-threatening systemic form. Increased susceptibility to such infections in cancer

patients is attributed primarily to chemotherapy-induced depression of innate immune cells and weakened epithelial barriers, which are the body's first-line defense against fungal infections (Teoh & Pavelka, 2016). The most common forms of oral candidiasis conveyed in oncology patients are pseudomembranous and erythematous candidiasis. Hyperplastic candidiasis is rarely reported (Lalla et al., 2008). Lalla et al. (2008) report the prevalence of oral fungal infection from all forms of cancer therapy: 7.5% before treatment, 40% during treatment, and 30% after treatment. Pseudomembranous candidiasis may be accompanied by burning pain, taste changes when eating, and a foul taste when not eating. Erythematous candidiasis is often associated with a burning sensation of the mouth. Involvement of the dorsal tongue may lead to a diffuse loss of filiform papillae, leading to a "bald" and red appearance, often accompanied by discomfort and taste changes. Angular cheilitis, inflammation often caused by *Candida albicans* infection in the corners of the lips is, often uncomfortable and may cause pain when opening the mouth wide. Thus, the symptoms of oral candidiasis can have a significant impact on QoL and hinder nutritional intake. In addition, immunosuppressed oncology patients are at higher risk for oral candidiasis to spread throughout the oropharyngeal regions and subsequently to the systemic circulation (Lionel et al., 2006). Therefore, oral candidiasis can influence systemic outcomes of oncology therapy. Oral candidiasis is easily treated in the early stages. Early recognition and treatment are particularly important in oncology patients. However, there is limited information on the prevalence of oral fungal infection in gynecologic oncology population and its impact on QoL. The Infectious Diseases Society of America (IDSA), 2009 guidelines recommend the use of topical clotrimazole troches or nystatin as a first-line therapy for the

management of mild oropharyngeal candidiasis (OPC) and the use of systemic fluconazole for moderate to severe OPC.

Viral Infections. During cancer treatment, a patient may have oral reactivation of latent Herpes Simplex Virus (HSV) infections. Viral reactivation can cause oral mucosa damage, worsen already existing lesions caused by stomatotoxic effects of cancer therapy and, whether symptomatic or asymptomatic, sufficient spreading and promoting of viral transmission (Djuric et al., 2009). There are two types of HSV. Herpes Simplex Virus type 1 is mainly transmitted by oral to oral contact to cause symptoms known as "cold sores" but it can also cause genital herpes. Herpes Simplex Virus type 2 is a sexually transmitted infection that causes genital herpes (WHO, 2020). Infection with HSV type 1 can cause orofacial lesions with pain and blistering on or around the lips and within the mouth. Recurrent HSV type 1 infection in patients who are immunocompromised due to treatment for cancer may be more aggressive, painful, and slower to heal. These more extensive HSV lesions often require much longer treatment and leave the patient more susceptible to developing drug-resistant strains of HSV (Glenny et al., 2009). People with active symptoms of herpetic lesions should avoid oral contact with others and sharing objects that have contact with saliva. They should also abstain from oral sex to avoid transmitting HSV type 1 to the genitals of a sexual partner. Individuals with symptoms of genital herpes, HSV type 2, should abstain from sexual activity while experiencing any symptoms (WHO, 2020). Recurrent symptoms of genital herpes HSV type 2 may be painful, and the infection can lead to social stigma and psychological distress. These factors can have an important impact on QoL and sexual relationships. With time, most people with HSV type 2 adjust to living with the infection. Treatment for HSV type 1 and

type 2 include antivirals, such as acyclovir, famciclovir, and valacyclovir, and are the most effective medications available for people. These antiviral drugs can help to reduce the severity and frequency of symptoms but cannot cure the infection (WHO, 2020).

Gingivitis. Gingivitis is assessed by gingival erythema and bleeding on probing in the absence of bone loss. Intraoral bleeding is another complication associated with chemotherapy. This bleeding can be spontaneous, traumatically induced, or an effect from existing pathology (Wong, 2014). It can also result from thrombocytopenia secondary to hematopoietic tissues suppression. Laboratory tests should be used to assess bleeding potential. Thrombocyte count and bleeding time can give the dentist a clear picture of the quantity, quality, and function of platelets (Wong, 2014). Dental calculus removal, placement of fluoride, and chlorhexidine mouthwash are highly recommended. Chlorhexidine provides bactericidal activity against gram-positive and gram-negative bacteria by damaging the cell membrane and cellular enzymes. Chlorhexidine 0.12% has been found to reduce bleeding and plaque accumulation, as well as a reduction in *Streptococcus mutans* concentrations in saliva (Poulopoulos et al., 2017).

Periodontal Infections. The infected and inflamed periodontium can act as a focus for systemic infection in neutropenic cancer patients. The incidence of these oral infections is unknown, but likely underestimated. Periodontal infections can easily be overlooked, primarily because symptoms of gingival inflammation may be minimal, and the infection maybe located in deeper parts of the periodontium. Assessment of a patient's periodontal condition before the onset of profound neutropenia is critical to the diagnosis and the management of these potentially life-threatening infections (Raber-Durlacher et al., 2002). Research conducted by Vozza et al. (2014) studied the incidence of

periodontal disease in cancer patients ($N = 54$). All patients received oral hygiene instructions and the diseased patients received periodontal treatment at baseline. The prevalence of periodontitis was ($n = 19$) 35.2% at baseline and no significant difference was found in the follow-up assessments. There was a statistically significant reduction in probing depth (PD), plaque index (PI) and bleeding on probing (BOP). The attachment level (AL) did not vary significantly between the different follow-up periods ($p \geq 0.06$). Comparisons between the groups were performed using the McNemar test ($p > 0.05$) and the Wilcoxon test with Bonferroni correction ($p < 0.02$) using SPSS software. They concluded periodontal treatment was effective in reducing PI, BOP and PD and in maintaining AL in periodontitis cancer patients undergoing chemotherapy (Vozza et al., 2014). Pretreatment preventive periodontal and dental therapies are especially important aspects in treating the oncology patient. Diagnosis, treatment, and establishment of regular maintenance protocols are essential in treatment of periodontal disease through neutropenic periods and to prevent excessive oral bacterial changes (Decker et al., 2018). During treatment, it is recommended that periodontal maintenance should be continued in oncology patients in combination with good oral hygiene. Communication between oral care providers and oncologists is crucial for the dental treatment of cancer patients (Decker et al., 2018). Post cancer treatment, periodontal maintenance should be continued with careful and continuous evaluation of patients' periodontal and dental status.

Taste Dysfunction. The sense of taste is responsible for the detection and ingestion of food to cover energetic requirements in health and disease. A change in taste perception (dysgeusia) might lead to malnutrition, one of the frequent causes of

morbidity and mortality in patients with cancer. Similarly, dysgeusia may impair the QoL by affecting appetite, body weight, and psychological well-being (Murtaza et al., 2017). Dysgeusia in cancer patients is usually ignored by clinicians as this aspect does not represent the life-threatening events (Murtaza et al., 2017). In a study conducted on cancer patients undergoing chemotherapy, the prevalence of dysgeusia was reported to be as high as 69.9%, and a significant association was found between dysgeusia and a change in patient's QoL such as appetite and fatigue (Murtaza et al., 2017). It was suggested changes occurred both in the primary gustatory sense as well as in food perception in these patients. Research also indicates precancer treatment counseling should prepare patients' mentally for taste alterations that may occur during oncology treatment. This research supports the importance of pre-treatment education and demonstrates that if a patient is prepared psychologically for dysgeusia, they can tolerate taste changes easily and improve QoL (Rhodes- Nesset & Laronde, 2014). A close contact and relationship between health care professionals and patients is highly desirable to assess the nutritional status and improve the QoL of the patients (Murtaza et al., 2017)

Loss of Appetite. Loss of appetite is common in cancer patients, especially those with ovarian, lung, stomach, or pancreatic cancer (Cancer Treatment Centers of America, 2020). Loss of appetite is a frequent side effect of chemotherapy, radiation, and immunotherapy drugs. Loss of appetite is characterized by a diminished desire for food or to eat food thus a loss of weight often occurs. As noted by Murtaza, et al; loss of body weight may impair QoL.

Osteoradionecrosis. Osteoradionecrosis (ORN) is categorized by a nonhealing area of exposed bone at least six months after a patient has been treated with radiation

therapy. This debilitating condition is accompanied by pain and morbidity and, in advanced stages, usually requires surgical resection and reconstruction of the affected area (Peterson et al., 2009). Osteoradionecrosis develops as irradiation reduces the bone's ability to withstand trauma, avoid infection, and can be facilitated by poor nutrition and oral hygiene (The Oral Cancer Foundation, 2020). Viswanathan et al., (2014) concluded that gynecologic oncology patients who receive high dose radiation (HDR), specifically those treated with interstitial brachytherapy to the distal vagina, may be at greater probability for vaginal necrosis. Further conclusions included radiation to bone, such as pathologic fractures, osteoradionecrosis, and second malignancies, are associated with a decrease in QoL and increase in mortality (Viswanathan et al., 2014).

Research by Fehm et al. from the University of Teubingen Department of Gynecology and Obstetrics from April 1999 to May 2006 found that $n = 10$ of 345 (2.9%) of patients with breast cancer or gynecological malignancies developed osteonecrosis of the jaw (ONJ) during treatment while receiving bisphosphonate therapy. Six of the ten patients with ONJ had recently had a dental procedure. Results showed that time and exposure to bisphosphonates and the number of therapy cycles were significant risk factors for patients developing ONJ ($p < .001$). Patients who did develop ONJ had a mean number of bisphosphonate treatment cycles of 27 ±18 cycles. Patients who did not develop ONJ had a mean bisphosphonate treatment cycle of 12 ± 12 cycles. Fehm et al. concluded that time, dosage exposure, and the number of therapies with bisphosphonates are the greatest risk factors for breast and gynecologic oncology patients to develop ONJ followed by dental procedures.

Given the risk of oral complications as noted previously, it is important for the patient to maintain good oral hygiene throughout their cancer treatment and beyond. Oral assessment prior to and during active treatment (chemotherapy and radiotherapy), and following therapy is a critical aspect of oral health care for oncology patients (Taichman et al., 2015). Pretreatment oral health education for oncology patients is crucial in managing and potentially preventing the previously noted oral complications that are often manifested in the oncology patient during treatment (Taichman & Tindle, 2016). Because the oral cavity is a usual site of discomfort and pain caused by chemotherapy, an oral care provider's contribution to a patient's relief is extremely important (Poulopoulos et al., 2017). Due to a diminished immune response in oncology patients, the risk of infection due to oral complications is greater. Therefore, maintaining good oral hygiene and open communication with dentist, dental hygienist, dental therapist, and oncologist about any symptoms that arise is important (University of Texas MD Anderson Cancer Center, 2020).

Gynecologic Cancer Management Team

According to the American Dental Hygienists' Association (ADHA, 2016) the dental hygienist plays an integral role in assisting individuals and groups in achieving and maintaining optimal oral health. Dental hygienists provide educational, clinical, and consultative services to individuals and populations of all ages in a variety of settings and capacities. They play a beneficial role in providing periodontal therapy, oral health education, and supportive care for cancer patient(s). Dental hygienists often serve as primary oral health care providers for women and men undergoing cancer therapy. As

prevention specialists, dental hygienists are in a strategic position to provide information and care to those undergoing therapy for cancer.

Research shows collaboration and communication with both the patient and the patient's oncologists to determine current blood work and health status prior to dental hygiene treatment are critical. When chemotherapy has been used, the dental hygienist needs to be aware of the patient's immunosuppression levels by reviewing current blood work reports. Collaboration with the patient's oncologist is essential to ensure that it is safe to deliver dental hygiene therapy to this group of patients (Rhodes-Nesset & Laronde, 2014). The NIDCR, (2009) indicates an oral evaluation is necessary prior to cancer therapy for the identification of any outstanding dental needs that could increase the risk or severity of oral complications during cancer treatments. For patients undergoing chemotherapy, communication between the oncology and dental teams is essential for the safety of the patient (Taichan et al., 2015). There is a need for interprofessional collaboration between the dentist, dental hygienists, dental therapist, and oncologist. Collaboration and communication with other members of the multidisciplinary team can have a significant influence on the treatment and prevention of complications in the oral cavity (Toth et al., 1995). Because it is a team effort in managing oncology patients, it is also equally important for dental practitioners to communicate with medical practitioners and the patients to determine optimal managing plans for these patients in an individual basis (Moeintaghavi et al., 2013)

Summary

The reviewed literature suggests there are benefits to oral health education on OHRQoL prior to oropharyngeal, breast, and head and neck cancer treatments. However,

research lacks information pertaining strictly to gynecologic cancer treatments and the effects on patient's oral cavity thus affecting OHRQoL. Implementing gynecological cancer patient communication, education, and QoL concerning oral health changes during cancer treatments maybe improved through oral health education, however more research is needed.

Methodology

Research Method or Design

This pilot study was conducted at the Women's Cancer Center of Nevada (WCC) in Las Vegas, Nevada. The Oral Health Impact Profile (OHIP-14) survey (see Appendix A) was used to assess OHRQoL in gynecologic cancer patients pre and post dental health education. The Oral Health Impact Profile (OHIP-14) is the most widely used QoL measure to evaluate the influence of oral diseases on individuals (Lowal et al., 2014). The OHIP-14 is a suitable subjective indicator that provides information about the impacts of oral conditions on an individual's life and perceived need for dental treatment (Husain and Tatengkeng, 2017). The Principal Investigator (PI) recognized the benefits of face-to-face education, however, because of COVID-19, the PI chose to provide all participants with oral health educational packets that included oral health material specific to cancer therapy, oral health home care tools (extra soft toothbrush, floss, and sensitive toothpaste), and the PI's personal contact information if participants had questions or concerns. Pre-test and demographic surveys (see Appendix A and B) were given to all participants during their appointment with their oncologist during the weeks of 2/23/2021- 3/12/21. A four-week post-test survey (see Appendix A) was emailed to all participants via SurveyMonkey to the provided email. Initial recruitment and survey data collection took place 3/01/21- 3/15/21 and four-week post-test surveys were emailed 3/22/21- 4/5/21.

Procedures

The PI used a survey method approach by using the OHIP-14 to gather data and answer research questions. Oncologists at the WCC recruited gynecologic oncology patients who fit the inclusion criteria, collected signed consent forms, provided participants with oral health dental educational packets, and collected pre-test surveys during February and March 2021. Post-test surveys were emailed four-weeks later by the PI. Survey data was organized and analyzed using Microsoft Office Excel Differences were considered significant when $p < 0.05$. Data was imputed into an Excel spreadsheet and analyzed using a paired *t*-test.

Human Subjects Protection/Informed Consent

The PI obtained approval from the Eastern Washington University (EWU) Institutional Review Board (IRB) and informed consent (see Appendix C) from each participant before the study was implemented. Participation in this study was completely voluntary and all participants had the right to withdraw from the study at any time. To ensure confidentiality, data was stored on the PI's personal password and facial recognition personal computer all hard copy data was stored in a personal non transportable safe. To further ensure anonymity, participants were instructed to create a research ID by selecting their favorite color and three numbers (E.g.: Pink123). After pre-test surveys were completed, participants were instructed to place all material into a self-sealing envelope; envelopes were secured in a locked drawer in the manager's office at the WCC until the PI could collect them. The PI collected completed envelopes on 2/23/21, 3/1/21, and 3/8/21. Post-test surveys were emailed to participants four-weeks after initial surveys were completed to the provided email. When the study concluded, all

hard copy data was shredded and all data on PI's laptop was transferred to a thumb drive and stored in the PI's personal non transportable safe for five years.

Sample source, plan, sample size, description of setting.

Participants were recruited by a convenience sample of existing WCC patients. For pragmatic purposes, the private practice chosen was the WCC which is located in Las Vegas, Nevada where the PI resides. This private oncology practice provided easy accessibility to gynecologic cancer patients.

The population of this study included persons who were gynecologic cancer patients of the WCC at the time of the study and met the minimum inclusion criteria. Inclusion criteria included participants who had been diagnosed with a gynecologic cancer. Participants had to be at least 18 years of age, could read, and write English, and had access to email. Exclusion criteria included those participants who were not diagnosed with a gynecologic cancer, were under age 18, could not read and write English, and did not have an email address.

A cohort sampling method was employed through the WCC data base. Participants who met the inclusion criteria were invited to participate in the study on a volunteer basis. Patients were asked and recruited by oncologists at their scheduled appointment. The oncologists explained the study and what it entailed. The study took place from2/22/21- 4/5/21. Pre-test surveys and demographic surveys were collected by oncologists and oral health dental education packets was provided to the participants. Four-weeks after the initial surveys, a post-test SurveyMonkey link was sent via a secure email.

Variables

The independent variables were the oral health dental education packets, educational reading material, and dental hygiene tools (extra soft toothbrush, fluoride sensitive toothpaste, and floss). The dependent variables were post-test OHIP-14 scores and OHRQoL after education was implemented.

Instruments

Quantitative data on patient OHRQoL was collected by using Slade's 1997 short-form Oral Health Impact Profile (OHIP-14) questionnaire (Slade, 1997) (see Appendix A). This questionnaire measures social impact of oral disorders on a person's wellbeing. This 14-item questionnaire is divided into seven dimensions (see Table 4); functional limitation, physical discomfort, psychological discomfort, physical disability, psychological disability, social disability, and handicaps (Husain & Tatengkeng, 2017). Demographic data included age, race/ethnicity, educational experience, type of cancer, and type of treatment(s) (see Appendix B). Participants were emailed a four-week post-test survey via SurveyMonkey to the email that was provided.

Table 4

OHIP-14 Domains

Domain Item	Fourteen Questions
Domain 1: Functional Limitation	1. Had trouble pronouncing any words 2. Felt sense of taste has worsened
Domain 2: Physical pain	3. Had painful aching 4. Found it uncomfortable to eat any
Domain 3: Psychological discomfort	5. Been self-conscious 6. Felt tense
Domain 4: Physical disability	7. Felt diet has been unsatisfactory 8. Had to interrupt meals
Domain 5: Psychological disability	9. Found it difficult to relax 10. Been a bit embarrassed
Domain 6: Social disability	11. Been a bit irritable 12. Had difficulty doing usual job
Domain 7: Handicap	13. Felt life less satisfying 14. Been totally unable to function

Note. From "Oral Health-Related Quality of Life Appraised by OHIP-14 Between Urban and Rural Areas in Kutai Kartanegara Regency, Indonesia: Pilot Pathfinder Survey," by Husain & Tatengkeng, 2017, *The Open Dentistry Journal, 11*, 557-564. Copyright 2017 Akbar and Tatengkeng

Equipment

Participants were provided a copy of the U. S. Department of Health and Human Services, NIH *Oncology Pocket Guide to Oral Health* brochure, NIH *Oncology Team Oral Complications of Cancer Treatment: What the Oncology Team Can Do* brochure, NIH *Chemotherapy and Your Mouth* brochure, NIH *Three Good Reasons to See a Dentist Before Cancer Treatment* PDF, Memorial Sloan Kettering *Mouth Care During Your*

Cancer Treatment PDF, SurveyMonkey link for four-week post-test surveys, dental hygiene tools that included an extra soft toothbrush, fluoride sensitive toothpaste, floss, and the PI's personal contact information for questions and concerns.

Steps to Implementation

After Approval from the EWU IRB the PI implemented the following steps as outlined in Table 5.

Table 5

Steps to Implementation

Step One	Step Two	Step Three
Met with WCC oncologists and medical assistants (MA) Discuss study topic Educated oncologists and MA's on study, participation guidelines, and expectations for study (see Appendix D) Created dental health packets Printed educational material	Oncologists to recruit participants: Recruit participants who qualify during oncology appointment	Implementation of study Consent form signed Initial surveys completed, research ID created, and email provided Participants were provided with dental education packet which included, oral health education material, dental hygiene tools, and PIs contact information
Step Four	**Step Five**	**Step Six**
PI collected initial surveys and input data on personal computer February 22 - March 12, 2021 Stored hard copy data in safe	Four-week post-test surveys were emailed to participants via SurveyMonkey to provided email address. March 22 - April 5, 2021 Study concluded April 12, 2021	Statistical analysis of data by PI of quantitative data Excel *t*-test Pearson's Correlation

Summary

To evaluate all data related to the effectiveness oral health education on oral health side effects and changes due to gynecologic oncology therapies, data from the OHIP-14 was used. The oncologists at the WCC administered the initial surveys and gave all participants dental education packet which included, educational material, dental hygiene tools (extra soft toothbrush, sensitive toothpaste, floss, and PI's contact information.) The PI emailed participants four-week post-test survey links via SurveyMonkey to the provided email. To ensure anonymity of all participants, participants were asked to create a research ID. No names were included during initial surveys, post-test surveys, and data analysis.

Results

Description of Sample

Oncologists from the WCC recruited 63 initial participants however, only 36.5% of participants ($N = 23$) completed both pre and post-test surveys completely and correctly. To achieve a confidence level of 95%, margin of error of 5%, and 50% response distribution, a sample size of 23 ($n = 22$) is needed. Ages were split into six different ranges (18-31, 31-40, 41-50, 51-60, 61-70, 71+). Within these age ranges, 30.4% ($n = 7$) participants were in the 18-50 age range comprising the lowest age group represented, while 69.6% ($n = 16$) of participants comprised the 51+ age group, representing the largest participant population in the study. Education experience showed (34.8%; $n = 8$) indicated they had some college experience while 43.5% ($n = 10$) indicated they hold a bachelor's degree are higher. Race/ethnicity showed 65.2% ($n = 15$) White or Caucasian, 13.0% ($n = 3$) African American or Black, 8.7% ($n = 2$) Hispanic or Latino, and 8.7% ($n = 2$) Asian or Pacific Islander. Types of cancer selected were 17.4% ($n = 4$) cervical cancer, 56.5% ($n = 13$) ovarian, fallopian, or peritoneal cancer, 26.1% ($n = 6$) uterine cancer, and 4.2% ($n = 1$) GTD. Cancer treatments included 26.0% ($n = 6$) surgery, 13.0% ($n = 3$) chemotherapy, the majority, 34.8% ($n = 8$) surgery and chemotherapy, 13.0% ($n = 3$) surgery and radiation, 4.3% ($n = 1$) surgery, chemotherapy, and radiation, and 8.7% ($n = 2$) surgery, chemotherapy, and clinical trial. See Table 6 for full list of participants ($N = 23$) study demographics.

Table 6

Respondents Demographics/ Characteristics

Respondents Characteristics	Frequency	Percent (%)
Age	1	4.3
18-30	1	4.3
41-50	5	21.7
51-60	5	21.7
61-70	6	26.0
71-above	5	21.7
Educational Level		
High School	1	4.3
Some College	8	34.8
Associates Degree	4	17.4
Bachelor's Degree	7	30.4
Post-Graduate	3	13.0
Race		
Caucasian or White	16	69.6
African American or Black	3	13.0
Hispanic or Latino	2	8.7
Pacific Islander or Asian	2	8.7
Native Alaskan or Native American	0	0
Multiracial or Biracial	0	0
A race or ethnicity not listed	0	0
Type of Cancer		
Cervical	4	17.4
Ovarian, Fallopian, Peritoneal	12	52.2
Vaginal	0	0
Vulvar	0	0
Uterine	6	26.1
Gestational Trophoblastic Disease	1	4.3
Treatment		
Surgery	6	26.1
Chemotherapy	3	13.0
Surgery+ Chemotherapy	10	43.5
Surgery+Radiation	3	13.0
Surgery+Chemotherapy+Clinical Trial	2	8.7
Surgery+Chemotherpay+Radiation	1	4.3
Total	23	100

Statistical Analysis

OHIP-14 scores pre-test scores were used to identify if gynecologic cancer treatment affected OHRQoL in gynecologic cancer patients during and after treatment. Pre- and post-test scores were used to analyze if education intervention was successful in increase OHRQoL of gynecologic cancer patients. Data was also analyzed by OHIP-14 domains, type of treatment, type of cancer, and adverse impact report. A paired *t*-test was used to find significance. The null hypothesis there will be no change in OHRQoL after application of oral health educational.

All participants ($N = 23$) completed pre-test and post-test surveys. The 14 item OHIP-14 survey was scored using a five-point Likert-scale where 0 = never, 1 = hardly ever, 2 = occasionally, 3 = fairly often, 4 = very often. The OHIP-14 scores can range from 0 to 56 and are calculated by summing the ordinal values for the 14 items. Higher OHIP-14 scores indicated worse and lower scores indicated better OHRQoL (Slade & Spencer, 1994). When data was analyzed by all participants (see Table 7). The mean pre-test score was 6.7 ($SD = 8.4$) and a confidence level (95%) of 3.6. The mean post-test score was 8.8 ($SD = 8.4$) with a confidence level (95%) of 3.7. A paired *t*-test was performed to determine if the education was effective. The mean change in pre-and post-test scores ($m = -2.8$, $SD = 3.8$, $n = 23$) was significantly greater than zero, $t\ (22) = -2.63$. one-tail $p < .008$, providing evidence that education was effective in producing a change. A 95% confidence interval (CI) change is (-3.74, -0.438). A Pearson Correlation was found to be positively correlated, $r\ (22) = .90$, $p < .008$ indicating a strong correlation between intervention and a change in OHRQoL.

Table 7

Pre and Post-Test OHIP-14 Scores

Pre-test	Post-test	Difference
2	6	-4
8	12	-4
0	11	-11
6	8	-1
10	15	-5
18	21	-3
33	36	-3
5	6	-1
8	14	-6
2	8	-6
4	3	1
0	0	0
18	17	1
21	15	6
8	2	6
3	9	-6
0	0	0
4	8	-4
0	1	-1
0	0	0
0	0	0
5	7	-2
0	4	-4

OHIP-14 questions were categorized into seven different dimensions. Functional limitation, physical pain, psychological discomfort, psychological disability, physical disability, social handicap, and handicap. The domain scores ranged from 0 to 8. Table 8 shows OHIP-14 pre and post-test scores by domains.

Table 8

Pre and Post-Test OHIP-14 Scores by Domain for All Participants

Domain	Pre-Test	Mean	Post-Test	Mean
Functional Limitation	6	.26	18	.8
Physical Pain	43	1.9	50	2.2
Psychological Discomfort	31	1.3	45	2.0
Psychological Disability	19	.8	28	1.2
Physical Disability	30	1.3	32	1.4
Social Handicap	14	.6	12	.5
Handicap	12	.52	16	.7
Total	**147**	**6.4**	**201**	**8.7**

Domain mean pre-test score was 22.1 (*SD* = 13.0) and the confidence level (95%) was 12.0. The mean post-test score was 28.7 (*SD* = 14.6) with a confidence level (95%) of 13.5. A paired *t*-test was performed to determine if the education was effective. The mean change in pre and post-test scores (m = -6.6, *SD* = 5.7, n = 23) was significantly greater than zero, t (22) = -3.1. one-tail $p < 0.01$, providing evidence that education was effective in producing a change. A 95% confidence interval (CI) change is (-11.8, -1.4). A Pearson Correlation was found to be positively correlated, r (22) =. 92, $p < 0.01$ indicating a strong correlation between intervention and a change in OHRQoL.

Impacts reported “fairly often” or “very often” in pre and post-test. Table 9 demonstrates the prevalence of adverse impacts to QoL pre and post education.

Table 9

Prevalence of Adverse Impacts on Quality-of-Life Pre and Post-Test

Impact experienced due to problems with teeth, mouth, or dentures	***n* reporting Impact pre-test**	**%**	***n* reporting impact post-test**	**%**
Trouble Pronouncing	0	0	0	0
Taste Affected	0	0	0	0
Painful Aching	2	8.7	2	8.7
Uncomfortable to Eat	3	13.0	3	13.0
Been Self Conscious	3	13.0	5	21.7
Felt Tense	1	4.3	2	8.7
Diet Unsatisfactory	1	4.3	0	0
Interrupted Meals	1	4.3	1	4.3
Difficult to Relax	0	0	0	0
Been Embarrassed	4	17.4	3	13.0
Been a Bit Irritable	1	4.3	1	4.3
Difficult Doing Job	0	0	0	0
Life Less Satisfying	1	4.3	1	4.3
Unable to Function	0	0	0	0

Note. Adverse impacts reported when participants answered, "fairly often" and "very often."

Pre-test answers showed 13% of respondents answered they found it "uncomfortable to eat" and had "been self – conscious" while 17.4% participants reported they had "been embarrassed." Pre-test responses also showed there was no affect to QoL with trouble pronouncing, taste affected, difficult to relax, difficult doing job, and unable to function. Post-test showed 13% of respondents reported "uncomfortable to eat" and "been embarrassed," while 21.7% of respondents reported "been self-conscious." Post-test respondents felt no difficulty in their QoL in trouble pronouncing, taste affected, diet unsatisfactory, difficult to relax, difficult doing job, and unable to function. In the post-test there was a positive change in "been embarrassed" from 17.4% to 13.0%, this is a change of +4.4%. Data also shows a positive change in "diet unsatisfactory" from 4.3% to 0%, this is a change of +4.3%. This data shows a

low percentage of participants felt their OHRQoL had been impacted by gynecologic cancer treatment. Some areas showed improvement with education packets four weeks after pre-test, this is a change of +4.4%. Data also shows a positive change in "diet unsatisfactory" from 4.3% to 0%, this is a change of +4.3%.

Treatment could be categorized into six different categories, surgery, chemotherapy, surgery + chemotherapy, surgery + radiation, surgery + chemotherapy + clinical trial, and surgery + chemotherapy + radiation. Table 10 demonstrates pre and post-test OHIP-14 scores by treatment types.

Table 10

Pre and Post-Test OHIP-14 Scores by Type of Treatment

Type of Treatment	***n* = # of Participants**	**OHIP (pre-test)**	**Mean**	**OHIP (post-test)**	**Mean**	**Diff.**
Surgery	6	40	6.7	54	9	-14
Chemotherapy	3	22	7.3	37	12.3	-15
Surgery+Chemo	8	38	4.9	60	7.5	-21
Surgery+ Radiation	3	54	18	51	17	3
Surg+Chemo+CT	2	0	0	1	.5	-1
Surg+Chemo+Rad	1	0	0	0	0	0

The mean pre-test score was 25.8 (*SD* = 22.4) and a confidence level (95%) of 23.5. The mean post-test score was 33.8 (*SD* = 26.9) with a confidence level (95%) of 28.2. A *t*-test was performed to determine if education was effective. The mean change in pre and post-test scores (m = -8.0, SD = 9.9, n = 23) was significantly greater than zero, t (22) = -2.0. one-tail p = 0.05, providing evidence that education was effective in producing a change. A 95% confidence interval (CI) change is (-18.4, 2.4). A Pearson Correlation was found to be positively correlated, r (22) =.94, p = 0.05 indicating a strong correlation and significance.

When examining individual treatment types, surgery + radiation pre-test results showed a total score of 54 mean of 18 and post-test total score was 51 with a mean of 17. This reveals a difference of one, revealing that OHRQoL in the surgery + radiation group improved with education. Data also showed participants who were treated with surgery + chemotherapy + radiation had a score of zero, revealing that their teeth, mouth, or dentures had not been affect from treatment nor influenced by educational intervention.

Table 11 demonstrates how participants could be categorized into four types of gynecologic cancers. Cervical, ovarian, fallopian, peritoneal, uterine, and GTD. Table 11 shows the difference in pre and post-test OHIP-14 scores by type of gynecologic cancer.

Table 11

Pre and Post-Test OHIP-14 Scores by Type of Cancer

Type of cancer	***n* = # of Participants**	**OHIP (pre-test)**	**Mean**	**OHIP (post-test)**	**Mean**	**Diff.**
Cervical	4	26	6.4	40	10	-14
O, F, P	12	89	7.34	123	10.25	-34
Uterine	6	38	6.3	34	5.7	4
GTD	1	2	2	6	6	-4

When data was analyzed by type of cancer the mean pre-test score was 38.8 (*SD* = 36.7) with a confidence level (95%) of 58.4. The mean post-test score was 50.8 (*SD* = 50.4) with a confidence level (95%) of 80.2. A paired *t*-test was performed to determine if the education was effective. The mean change in pre and post-test scores (m = -12.0, SD = 16.4, n = 23) was significantly greater than zero, t (22) = -1.5. one-tail $p < 0.12$, providing evidence that education was not effective in producing a change. A 95% confidence interval (CI) change is (-38.1, 14.1). A Pearson Correlation was found to be

positively correlated, r (22) =.98, $p < 0.12$ indicating a strong correlation but no significance.

Discussion

Summary of Major Findings

Upon statistical analysis participants ($N = 23$) a mean score of 6.7 in pre-test to a mean of 8.8 in the post-test. Pearson Correlation was .90 showing a strong correlation and a P (T < +t) one-tail of 0.008. p was set to ($p < 0.05$), this shows a significance when total sample was analyzed. Significance was found in data when participants were grouped by domains ($p < .001$). No significance was found when participants were grouped by treatment type ($p = 0.05$) and cancer type ($p < 0.12$). Therefore, the evidence in this study suggests the educational intervention did influence participants post-test OHIP-14 scores, thus decreasing OHRQoL in gynecologic cancer patients. Severity scores were calculated by summing responses and higher scores were indicative of poorer OHRQoL (Mata et al., 2015). This chapter discusses the use of the OHIP-14 survey to measure OHRQoL in gynecologic cancer patients pre and post dental education to answer the following research questions.

Discussion

Impact of gynecologic cancer treatments on OHRQoL

Results show that prior to education being implemented, gynecologic cancer patients had low OHIP-14 scores. When data was analyzed by all participants (see Table 8) the mean pre-test score was 6.7 ($SD = 8.4$). Pre-test scores revealed that gynecologic cancer treatment had a slight impact on OHRQoL. These pre-test results indicated most participants (see Table 8) did not have adverse effects that are usually seen in other types of cancers. The PI hypothesized that no matter what type of cancer a patient is being

treated for radiation, chemotherapy, and CT would affect the mouth thus affecting OHRQoL. These results indicated gynecologic cancer patients' mouths are not affected in the same way as head and neck cancer. This study's impact report post-test results concluded that 13% of respondents reported "uncomfortable to eat" and "been embarrassed" while 21.7% of respondents reported "been self-conscious." Zero respondents reported trouble pronouncing, taste affected, diet unsatisfactory, difficult to relax, difficult doing job, and unable to function. In the post-test there was a positive change in "been embarrassed" and "diet unsatisfactory." This study's result is inconsistent with results from other studies. Research by Bhallal et al. (2015) demonstrated patients with head and neck cancer about 53.16 % reported they were totally unable to function because of problems with their teeth, mouth, or dentures. About 45.57% felt that life in general was less satisfying because of problems with teeth, mouth, or dentures. The findings of this study were also inconsistent with the study by Lawerence et al. (2008) where 40.51% felt uncomfortable to eat, whereas 37.97% said they had unsatisfactory diet that interrupted meals. Similarly, 40.51% reported they felt self-conscious or tense about their teeth which could be the psychological effect of their oral taste. Research by Tesic et al. 2020 found lower OHIP-14 scores (i.e., lower impacts on oral health) for patients with head and neck cancer and most frequently present among patients who had only surgery as a therapeutic procedure compared to those who had surgery accompanied with radiation and chemotherapy ($p < 0.01$). This is consistent with findings from this study in that participants who only had surgery had lower pre-test and post-test OHIP-14 scores compared to those participants who had radiation and chemotherapy. The results from this study showed gynecologic cancer patients are less

likely to experience oral compromise of daily living during treatment, as a result lower OHIP-14 scores meaning healthier OHRQoL.

Since this type of research has not been studied on this type of population relatability is unavailable. What is apparent from these results is that this populations' oral health is not affected by cancer treatment, which is not what the PI anticipated. Research by Marquez-Arrico et al. (2019) found an association Chi2: $p = 0.000$ between educational level and oral health knowledge. It was observed that as subject's educational level increased, so did their level of oral health knowledge, with a linear tendency among the categories. This data can be related to this study because this population had higher education levels with ($n = 14$) 60.8% of participants having an associate degree or higher. Because these participants had higher educational experience, they may have known to seek dental care prior to starting treatment. This phenomenon could explain why this population had lower pre-test OHIP-14 scores. Research from Zandbergen et al. (2019) found that among endometrial and ovarian cancer patients, HRQoL improved within 6 months after initial treatment. This can be related to this study as the PI is unaware if participants were receiving treatment or had concluded treatment, however if most participants had finished treatment, then results would seem sensible as to why OHIP-14 scores were low prior to education intervention being implemented.

Is there an improvement in OHRQoL secondary to oral hygiene education

After education was implemented and data was analyzed (see Table 7), post-test mean score was 8.8, $p < .008$, showing significance and an increase in OHIP-14 scores (higher impacts on oral health). The PI hypothesized OHIP-14 scores to decrease over four weeks, however, results showed mean test results increased by -2.1, which is a very

slight change. However, this is a negative change in OHRQoL. These results were unanticipated. The PI predicted that OHIP-14 scores would decrease with the implementation of education material and oral hygiene care tools. These results are consistent with other studies with an increase in OHIP-14 scores during cancer treatment. When data was analyzed individually, (n = 4) 17.4% of participants' (see Table 7) OHIP-14 scores did decrease demonstrating an increase in their OHRQoL after education was implemented. This suggests education can improve OHRQoL in some individuals. However, (n = 15) 65.2% of participants had higher OHIP-14 scores and a decrease in OHRQoL after education was implemented. This increase in OHIP-14 scores was seen in research by Mata et al. (2015) who reported that where there is a wide range of responses, individual issues are usually camouflaged by reporting group mean scores.

Post-test results for type of treatment concluded that a $p = 0.05$ was shown, giving no significance. However, surgery + radiation (n = 3) pre-test results showed a mean of 18 and post-test mean of 17. This shows a difference of one, revealing the education intervention improved OHRQoL within this group, but no significance was found.

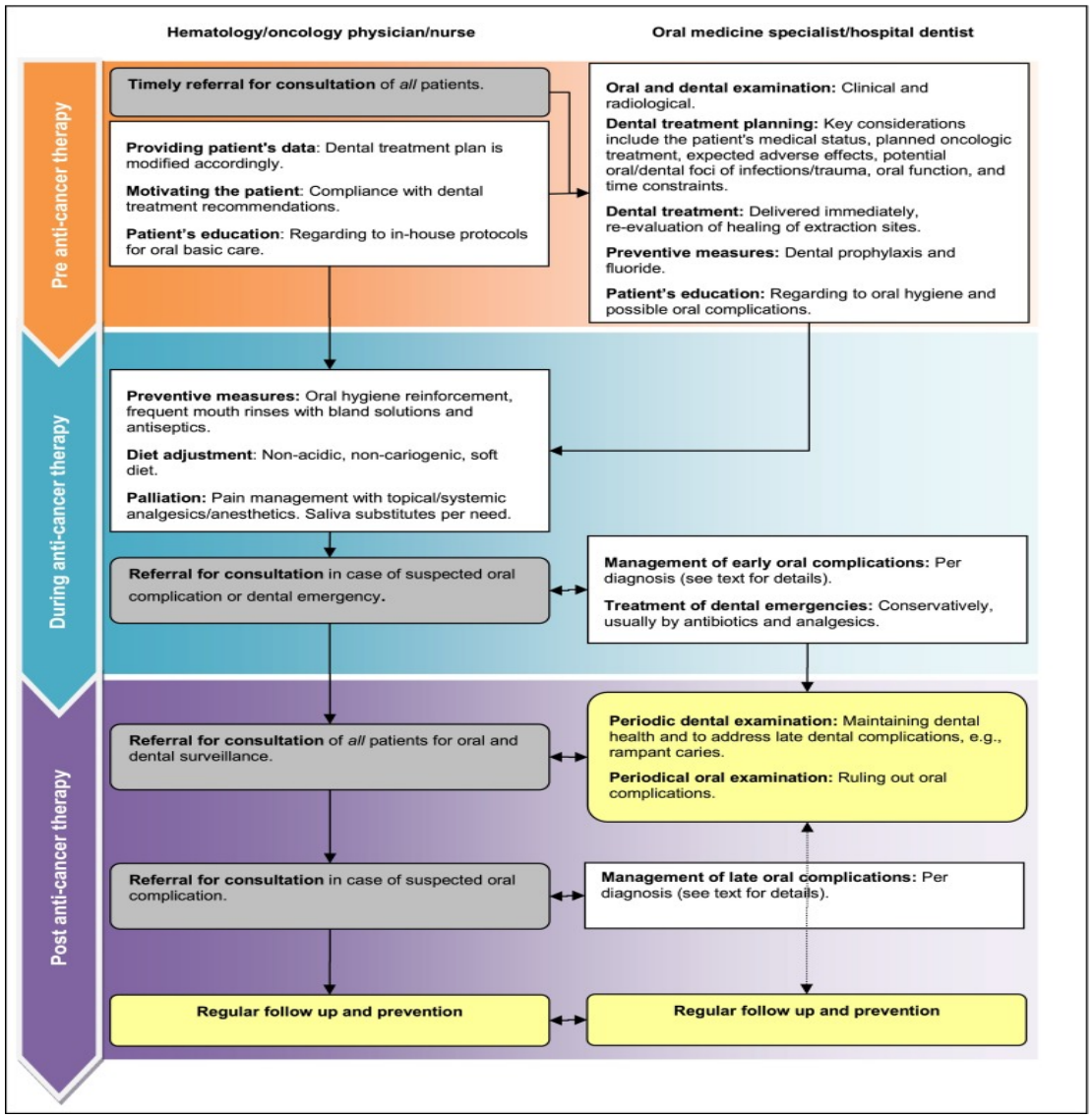
Post-test results for type of cancer, concluded $p < 0.12$ was shown, giving no significance. However, uterine cancer (n = 6) pre-test mean was 6.3 and post-test mean was 5.6 revealing a difference of 0.7 with no significance. This suggests an education intervention improved OHRQoL within this group. One may infer that in this pilot study, patients with uterine cancer either had less deleterious effects from treatment and or used the education materials.

Multi-disciplinary team approach

Results from this study indicate after implementation of education, OHIP-14 scores increased, signifying lower QoL over the four-week study. This demonstrates this population is still vulnerable to oral implications due to treatment even after education is implemented. Research from Zandbergen et al. (2019) shows that HRQoL changes over time. Similarly, OHRQoL has the ability to change over time based upon factors causing negative oral changes affecting OHRQoL prior, during, and after treatment concludes. For this reason, approaching oral health of gynecological cancer patients by a team approach (see Figure 3) may be beneficial to determine individual oral health needs and tailor oral health care tools and education to the individual. Research by Elad et al. (2015) emphasized the importance of advocating improved oral care of patients undergoing chemotherapy/hematopoietic stem cell transplantation by developing an integrated treatment team including medical, dental, nursing, nutrition, physical therapy, and counseling providers. Training and continuing education programs would ensure knowledge diffusion to an extensive community of health care providers, which in turn could make a positive impact on patients' health care. Figure 3 illustrates a flow chart on how this type of team-based collaboration can work together to improve OHRQoL in gynecologic cancer patients.

Figure 3

Suggested Collaboration of Hematology/Oncology and Oral Medicine/Dental Teams as Part of Basic Oral Care for Oncologic Patients



Note. From "Basic oral care for hematology-oncology patients and hematopoietic stem cell transplantation recipients: a position paper from the joint task force of the Multinational Association of Supportive Care in Cancer/International Society of Oral Transplantation (EBMT)," by Elad et al., 2015, *Support Care Cancer, 2*(1), 223-236. Copyright 2015 by Creative Commons.

Research by Velji et al. (2006) employed an individualized education program symptoms management for distressed women receiving radiation therapy for gynecologic cancers to improve their QoL. Their results showed women who utilized the individualized education program intervention showed a significant decrease in symptom distress and showed fewer worsening symptoms of distress pain, fatigue, and nausea at the end of the radiation treatment than those who received usual care. This research supports the creation of individual oral health programs being implemented into gynecologic cancer offices to decrease oral health symptoms during cancer treatment. This program has the potential to effectively manage patients undergoing treatment thus positively impacting their QoL. The results of the study indicated that implementing oral health education did show positive results in some individuals however results were not significant.

Limitations

Data was collected from a small sample size of participants ($N = 23$). The PI was unaware of participants' prior dental health, history, education as well as if gynecologic treatment was on-going or had concluded. Participants were only recruited based-on their diagnosis of a gynecologic cancer; dental health, history, and education was unknown at the start of the study. Time was also a factor in the study. The PI was under a time constraint from what was originally planned. Because of COVID-19 and working with a vulnerable population, the PI was unable to implement face-to-face oral health educational presentation to all participants and provide one-on-one individualized oral health education and instruction to participants. Participants were not monitored during the four-weeks between pre- and post-test surveys and may have not read the dental

health education material nor used dental hygiene tools they were provided. As stated above, reading material may have been overwhelming for participants or written at a level that was not appropriate for this population. The PI also did not have participants fill out global transition questions after their post-test survey. These qualitative questions refer to participants' self-reporting oral health after the four weeks and if the educational material and dental hygiene tools made an impact in their QoL. The Hawthorne affect could have occurred because participants were given new knowledge and felt their scores were being observed, thus affecting OHIP-14 post-test scores.

Recommendations/Suggestions for Future Research

This pilot study proved the feasibility of such a study. Recommendations for study replication include use of a control group, recruiting newly diagnosed gynecologic cancer patients, and recording oral health before, during, and after gynecologic cancer treatment(s). Providing oral health education prior to the patient starting or receiving any type of treatment would provide a baseline on how oral health education plays a part in improving OHRQoL during and after gynecologic treatment. Future research should also include documenting if gynecologic cancer patients suffer from oral changes that are seen in other types of cancer treatment. These include hypersalivation, loss of sensory function, limited opening, infection, mucosal changes, caries, periodontal disease progression, risk of mucosal injury, osteoradionecrosis, poor esthetics, trouble speaking, eating, and swallowing. Finally, further investigation should evaluate the correlation between age, education level, income, and livelihood.

Conclusion

Although the results showed an increase in OHIP-14 scores thus decreasing OHRQoL, when data was analyzed individually some participants OHRQoL improved after implementation of education. This pilot study is the first of its kind to investigate if gynecologic cancer patients' OHRQoL is affected during cancer treatment and if so if education may help decrease negative changes and increase OHRQoL during and after treatment. Although the hypothesis that education would improve the OHQoL the study limitations and variables prevented meeting significance in data analysis. This pilot study proved the feasibility of such a study. Literature and this study support the need for advocating and implementing individualized oral health education and oral hygiene demonstration prior to beginning gynecologic cancer treatment. Additionally, data suggests a need for collaboration between dentistry and medicine in treating women with gynecological cancer.

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Appendix A

OHIP-14 Survey

Distribution of OHIP-14 items, ranging from 0 (Never), 1 (Hardly ever), 2 (Occasionally), 3 (Fairly often), to 4 (Very often)

Question #	**Description of item**					
		0	**1**	**2**	**3**	**4**
I	Have you had trouble pronouncing any words because of problems with your teeth, mouth, or dentures?					
2	Have you felt that your sense of taste has worsened because of problems with your teeth, mouth, or dentures?					
3	Have you had painful aching in your mouth?					
4	Have you found it uncomfortable to eat any foods because of problems with your teeth, mouth, or dentures?					
5	Have you felt self-conscious because of problems with your teeth, mouth, or dentures?					
6	Have you felt tense because of problems with your teeth, mouth, or dentures?					
7	Has your diet been unsatisfactory because of problems with your teeth, mouth, or dentures?					
8	Have you had to interrupt meals because of problems with your teeth, mouth, or dentures?					
9	Have you found it difficult to relax because of problems with your teeth, mouth, or dentures?					
10	Have you been a bit embarrassed because of problems with your teeth, mouth, or dentures?					
11	Have you been a bit irritable with other people because of problems with your teeth, mouth, or dentures?					

12	Have you had difficulty doing your usual jobs because of problems with your teeth, mouth, or dentures?					
13	Have you felt that life in general was less satisfying because of problems with your teeth, mouth, or dentures?					
14	Have you been totally unable to function because of problems with your teeth, mouth, or dentures?					

Note. From "Derivation and validation of a short-form oral health impact profile," by Slade., 1997, *Community Dentistry and Oral Epidemiology*. Copyright 1997 by John Wiley & Sons, Inc.

Appendix B

Demographic Survey

Age

a) 18-30
b) 31-40
c) 41-50
d) 51- 60
e) 61-70
e) 61-70
f) 71- above

Education Experience
a) High School
b) Some College
c) Associates degree
d) Bachelor's degree
e) Post- Graduate
f) Other

Race
a) Caucasian or White
b) African American or Black
c) Hispanic or Latino
d) Pacific Islander or Asian
e) Native Alaskan or Native American
f) Multiracial or Biracial
g) A race or ethnicity not listed here

Type of Cancer

a) Cervical
b) Ovarian, Fallopian, Peritoneal
c) Vaginal
d) Vulvar
e) Uterine
f) Gestational Trophoblastic Disease

Treatment (select all that apply)
a) Surgery
b) Chemotherapy
c) Radiation
e) Clinical Trial
f) None

Appendix C

Informed Consent Form

EASTERN WASHINGTON UNIVERSITY

Informed Consent Form

Oral Health Quality of Life During Gynecologic Cancer Treatment

Principal Investigator: Stephanie Kushnir, RDH, BS, Dental Hygiene Department, skushnir@eagles.ewu.edu, 619) 240-4249 Co-Investigator/ Responsible Party: Ann O'Kelley Wetmore, RDH, BSDH, MSDH, Professor, Dental Hygiene Department, awetmore@ewu.edu (713) 408-1321

Purpose and Benefits

Hello, my name is Stephanie Kushnir. I am a student at Eastern Washington University. This research study helps me complete my thesis requirement for a Master of Science in Dental Hygiene at Eastern Washington University. Because you were diagnosed with a gynecologic cancer, I am asking you to take part in my study on dental health and how it effects other parts of women's lives during cancer treatments. Through your helpful answers, I hope to show that when women are educated on dental care before their cancer treatment their mouths are healthier and more comfortable so they can feel better overall during cancer treatment.

Procedures

Participation in this research includes taking a pretest survey. This should not take more than 15 minutes. The first part of the survey are questions about you such as age range, education, race, type of cancer you have, and the treatments. Fourteen question then ask about how your current oral health effects your daily life. You will be asked to provide your personal email and create a research ID. A four week post- test survey using a SurveyMonkey link will be emailed to you about four weeks after your initial survey responses.

Risk, Stress or Discomfort

There is minimum risk to you participating in this study. Some people may feel some discomfort in answering questions about their dental health and can opt out at any time. The paper first survey that contains personal information and answers will be shredded when the study is complete. I am using SurveyMonkey for the second survey. It is an online software licensed through Eastern Washington University. You will be emailed a link through SurveyMonkey. Your answers from SurveyMonkey will be downloaded and stored on my password protected personal laptop. All your answers to both surveys will be confidential and kept either in my locked safe or password protected laptop. When I complete this study, I will download the data to a thumb drive and keep it in a locked safe and destroy it after 5 years.

Other Information

Taking part in this study is completely voluntary. You may quit this study at any time without penalty or jeopardizing any future care. I will keep all your personal information and survey answers confidential. Your name will not be included on any study materials, during data analysis or any future publications or research conference presentations. Whether you decide to take part or not to take part in this study, please accept the dental care bag and educational material you were given today.

If you have any concerns about your rights as a participant in this research or any complaints you wish to make, you may contact Charlene Alspach, Executive Director, Grant & Research Development, at (509) 359-2517 or calspach@ewu.edu.

Signature of Principal Investigator _____ Date _____

Subject's Statement

The study described above has been explained to me, and I voluntarily consent to participate in this study. I have had an opportunity to ask questions. I give permission to use my survey answers as part of this study. I understand that by signing this form I am not waiving my legal rights. I understand that I will receive a signed copy of this form.

Signature of Subject _____ Date _____

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Appendix D

Educational Script for Oncologists and Medical Assistants (Ma's) at the WCC

Hello, and thank you for allowing me to conduct my thesis study at the WCC. My thesis topic is oral health related quality of life (OHRQoL) during gynecologic cancer treatment. My study will be looking at how gynecologic cancer treatments affect OHRQoL and if supplying participants with dental hygiene tools and education will this improve OHRQoL using a four- week post survey. The survey that I will be using is the OHIP-14 by Slade. The Oral Health Impact Profile (OHIP) is the most widely used QoL survey that evaluates the influence of oral diseases on individuals. The short form OHIP-14 by Slade, contains 14 items grouped into seven dimensions of impact: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. OHRQoL survey has a broader appreciation of the impact of oral health. It should provide the basis for any oral health program development. Oral health care providers are urged to integrate the OHRQoL concept into their daily practice to improve the outcome of their services.

I am asking you to recruit all gynecologic cancer patients at the Women's Cancer Center, who fit the study's inclusion criteria, which includes any patient who has been diagnosed with a gynecologic cancer and is 18 years and older that can give their own consent and does not need an advocate. All participants will be asked to participate in a pre-test survey and a four- week post- test survey that will be emailed to them four weeks after initial surveys are completed. Participants will fill out consent forms, pre-test surveys (demographic survey and OHIP-14), and will be given a dental care package which includes at home instructions, extra soft toothbrush, fluoride toothpaste, floss, and dental education brochures that included; National Institute of Health (NIH) Oncology Team Oral Complications of Cancer Treatment: What the Oncology Team Can Do, NIH Chemotherapy and Your Mouth, NIH Three Good Reasons to See a Dentist Before Cancer Treatment, and NIH Oncology Pocket Guide to Oral Health: Prevention and management of oral complications Head and Neck

Radiation Therapy, Chemotherapy, and Hematopoietic Stem Cell Transplantation.

All Participants will complete consent forms, surveys, and place all documents in the included self -sealing envelope and seal it. Envelopes will be collected by oncologist or MA and will be placed into a locked drawer at the WCC until I can pick them up. Participants will be contacted four weeks after initial surveys by the email they provided with a SurveyMonkey link to the four-week post- test survey.

Please know that your own participation and your patients' participation are NOT required and you and your patients can opted out of the study at any time.

Thank you again for allowing me to conduct my study at your office and with your patients. Oral health is such a passion of mine and I look forward to working with all of you. Does anyone have any questions?

If you have questions in the future, please do not hesitate to call or email.

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Curriculum Vita

STEPHANIE KUSHNIR, RDH, BS

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Graduate Education:
Master of Science in Dental Hygiene — May 2021
Eastern Washington University
Spokane, Washington

Undergraduate Education
Associate of Science in Dental Hygiene — April 2014
Concorde Career College
Garden Grove, CA

Bachelor of Science in Kinesiology-Human Performance — December 2009
California State Polytechnic University
Pomona, CA

Professional Licensures
Nevada State Registered Dental Hygienist — September 2014 - Present
License # 102039
Including local anesthesia, curettage, and nitrous oxide

California State Registered Dental Hygienist — June 2014 - Present
License #28323
Including local anesthesia, curettage, and nitrous oxide

Professional Certifications
CPR/AED — January 2004 - Present
International Center for Laser Education — February 2015
Picasso Diode Laser Certification

Current MSDH Courses

Fall 2018
DNHY 502 Advanced Dental Hygiene
Practice with Lab
DNHY 620 Seminar on Concepts of
Public Health and Health Promotion
PUBH 563 Res Biostat & Other Ways of Knowing
DNHY 605 Components of Program Dev

Spring 2019
DNHY 610 Healthcare Ed & Inst Methods
DNHY 630 Sem On Health Policies and
Finance
DNHY 505 Healthcare Leadership

Fall 2019
DNHY 615 Principles of Dental Hygiene
Course and Curriculum Design

Spring 2020
DNHY 520 Research Methodologies and
Scholarly Writing
DNHY 530 Intro to Thesis
DNHY 635 Practicum
DNHY 625 Clinical Teaching Strategies

Fall 2020
DNHY 640 Seminar on Administration,
Management, and Organization
DNHY 600 Thesis

Spring 2021
DHNY 600 Thesis

Professional Experience

Dental Hygienist (full-time) July 2015 - Present
Island Dental Center of Summerlin
Dr. Michael Tomita & Dr. Stan Askew
Las Vegas, Nevada

Dental Hygienist (full-time) January 2015 - August 2015
All Smiles by Design
Dr. Terri Tran
Henderson, Nevada

Dental Hygienist (full-time) September 2014 - January 2015
Tender Dental
Dr. Monica Ponce
Las Vegas, Nevada

Honors and Awards
Sigma Phi Alpha
Eastern Washington University Honor Society
Eastern Washington University Current GPA: 4.0
Concorde Career College, Dental Hygiene GPA: 3.61

Professional Affiliations
American Dental Hygienists' Association June 2014 - Present
Southern Nevada Dental Hygienists' Association October 2015 - Present
Delegate to SNDH House of Delegates 2015, 2016, 2018, 2019

Community Service
Donated 100 dental hygiene bags January 2018 - Present
St. John The Baptist Greek Orthodox Church
Las Vegas, Nevada

Patients were given free whitening trays March 2015
If they donated blood
All Smiles by Design
Las Vegas Blood Bank

Provided dental service to the April 2013
Community of Garden Grove, CA
Concorde Career College
Garden Grove, CA

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