THE DEVELOPMENT OF AN EDUCATIONAL RESOURCE ON MOUTH CARE AND ORAL MUCOSITIS FOR PATIENTS RECEIVING CHEMOTHERAPY IN NEWFOUNDLAND AND LABRADOR

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Abstract

Background: Oral mucositis is a common side effect of chemotherapy. The development of oral mucositis has many negative impacts on the patient receiving chemotherapy and the healthcare system, such as reduced oral intake, increased risk for infection, increased need for medical intervention, interruption to chemotherapy, and increased healthcare costs. Prevention measures and early intervention should be considered to reduce the impact of oral mucositis. Patient education can be used to educate patients receiving chemotherapy about oral mucositis, prevention, early identification and intervention to reduce the impact of oral mucositis. ***Purpose***: This practicum project aimed to develop an educational resource on mouth care and oral mucositis for patients receiving chemotherapy in Newfoundland and Labrador. ***Methods***: Three methods were used to gather information on mouth care and oral mucositis in patients receiving chemotherapy and explore education as an intervention to address this clinical issue. The three methods used included an integrative literature review, an environmental scan, and consultations with key stakeholders. ***Results***: An educational resource, including a resource manual and patient pamphlet, was developed based on the methods used. Orem's Self-Care Deficit Nursing Theory was used to guide the development of the educational resource. ***Conclusion***: An educational resource on mouth care and oral mucositis was developed for patients receiving chemotherapy in Newfoundland and Labrador. There was no implementation or evaluation component for this practicum project due to time restraints of the course. A plan for future evaluation of the resources will be outlined in this report.

Keywords: mouth care, oral mucositis, chemotherapy, patient education, integrative literature review, self-care

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Introduction

In recent years, remarkable progress in the treatment of cancer has been made, and the prognosis for patients diagnosed with cancer has significantly improved (Yuce & Yurtsever, 2019). In Canada, the predicted five-year survival rate for all cancers combined was 64% in 2017, up from 55% in the early 1990s and 25% in the 1940s (Ellison & Saint-Jacques, 2023). The clinical significance of improved prognosis of patients diagnosed with cancer related to the impact of adverse effects of cancer therapy for the patient has caused significant challenges for healthcare providers (HCPs), including increased healthcare needs for the patient and costs to the healthcare system (Yuce & Yurtsever, 2019; Mercadante et al., 2015). Patients receiving chemotherapy can experience a wide range of side effects including oral mucositis (OM), alopecia, myelosuppression, nephrotoxicity, and cardiotoxicity (Mollaoğlu & Erdoğan, 2014). The main side effects of chemotherapy are due to the lack of selectivity of the chemotherapy drugs for cancer cells (El-Nemer et al., 2015; Mollaoğlu & Erdoğan, 2014; Ottaviani et al., 2023). Chemotherapy induces not only damage to the cancer cells but also the healthy cells characterized by high proliferation, such as the epithelial cells of the oral mucosa and the gastrointestinal system (El-Nemer et al., 2015; Mollaoğlu & Erdoğan, 2014; Ottaviani et al., 2023).

As mentioned, OM is one side effect of chemotherapy. OM implies an inflammation to the oral mucosa and affects up to 40% of patients treated with standard chemotherapy (Chen, 2008; Ottaviani et al., 2023; Yuce & Yurtsever, 2019). OM presents with dryness, redness, pain, and sometimes ulceration of the oral mucosa (Chen, 2008; Ottaviani et al., 2023; Yuce & Yurtsever, 2019). Symptoms of OM generally manifest within three to five post chemotherapy and peak in intensity seven to fourteen days after chemotherapy administration (Yuce &

Yurtsever, 2019). It can take up to two to three weeks for full recovery from OM (Yuce & Yurtsever, 2019). OM can have many implications for the patient and healthcare system, including reduced oral intake, increased risk for infection, increased healthcare needs, interruption to chemotherapy, and increased healthcare costs (Mercadante et al., 2015; Borbasi, 2002; Kanagalingam et al., 2018; Ruescher et al., 1998; Heimdahl et al., 1989; Elting et al., 2003; Goldberg et al., 2004). Since chemotherapy is predominantly administered in the outpatient setting, almost all patient self-care activities related to the prevention and treatment of symptoms need to be managed at home without direct supervision by an HCP (Dodd & Miaskowski, 2000). For patients to manage side effects or symptoms of chemotherapy, such as OM, they require comprehensive information on the specifics of their disease, treatment, associated symptoms, and symptom management (Dodd & Miaskowski, 2000).

This practicum aims to address the clinical issue of OM in patients receiving chemotherapy in Newfoundland and Labrador (NL) by developing of an educational resource on mouth care and OM to be used by HCP in patient education. This practicum report aims to summarize the purpose of the practicum, the work completed in this practicum in N6660 and N6661, including the methods of a literature review, environmental scan, consultations with key stakeholders, and the development of an educational resource for patients receiving chemotherapy. A plan for implementing and evaluating the educational resources developed in this practicum will also be described. Lastly, discussion of advanced nursing competencies, as applied in this practicum, will be discussed. This practicum supports the development of an educational resource on mouth care and OM as an appropriate intervention to address the clinical issue of OM in patients receiving chemotherapy in NL.

Objectives

This practicum aimed to develop an educational resource on mouth care and OM for patients receiving chemotherapy in NL to prevent complications related to oral health in oncology patients receiving chemotherapy. The key practicum objectives are:

1. Complete a literature review of the occurrence, impact, and contributing factors to OM in patients receiving chemotherapy, as well as the effectiveness of patient education on mouth care and OM to prevent OM in patients receiving chemotherapy.
2. Demonstrate application of advanced nursing practice competencies of consultation, collaboration, leadership, and education throughout the practicum.
3. Explore Orem's Self-Care Deficit Nursing Theory (SCDNT) about educational resource development on mouth care and OM for patients receiving chemotherapy as supported in the literature.
4. Identify the clinical resources available on mouth care and OM in patients receiving chemotherapy in NL and across Canada, focusing on the British Columbia (BC) Cancer Agency and the Leukemia and Lymphoma Society of Canada (LLSC).
5. To conduct consultations with key stakeholders to gather information on current attitudes, beliefs, practices, and barriers to patient education of key stakeholders related to mouth care and OM in patients receiving chemotherapy.
6. Conduct consultations with key stakeholders to obtain feedback on current resources, the need for resource development, patient educational needs, and resource content on mouth care and OM in patients receiving chemotherapy in NL.
7. Analyze and summarize the data collected in the environmental scan and consultations with key stakeholders to inform the development of an educational resource on mouth

care and OM for patients receiving chemotherapy in NL.

8. Develop an educational resource on mouth care and OM for patients receiving chemotherapy in NL.

Overview of Methods

There were three methods for data collection used to gain information to inform this practicum and guide the development of an educational resource on mouth care and OM for patients receiving chemotherapy in NL. To meet the previously identified practicum objectives, a literature review, environmental scan, and consultations with key stakeholders were conducted. A summary of the methods, findings, and implications for the practicum of the literature review, environmental scan, and consultations with key stakeholders completed in N6660 will be presented in this section of this final report. Full reports for the literature review, environmental scan, and consultations with key stakeholders can be found in Appendix A: *Integrative Literature Review*, Appendix B*: Environmental Scan Report*, and Appendix C*: Consultations Report* of this report.

Literature Review

The purpose of the literature review for this practicum was to explore the clinical issue of OM in patients receiving chemotherapy based on occurrence, impact, and contributing factors as supported in the literature, and to investigate the use and outcomes of implementing patient education on OM and patient outcomes. A literature search was performed using the databases Google Scholar, CINAHL Plus, and PubMed. Grey literature was also searched using Google Scholar and the Memorial University of Newfoundland library database. The search terms for this literature review included *nursing, nurse, education, mouth care, oral hygiene, oral mucositis, chemotherapy, side effect, knowledge, self-care, Orem's self-care deficit nursing*

theory, and oncology. Articles were reviewed for applicability to this practicum. Seventeen studies found in this literature search were used in the literature review, six qualitative studies and eleven quantitative studies. The quantitative studies were critically appraised using the Public Health Agency of Canada's (PHAC, 2014) Critical Appraisal Toolkit (CAT), and the qualitative studies were critically appraised using the Lincoln and Guba (1985) criteria for trustworthiness and the Joanna Briggs Institute (JBI) CAT as described by Lockwood et al. (2015). The literature review findings and implications for this practicum will be discussed in the following sections of this report.

Findings

Incidence and Prevalence. Seven studies found in the literature search explore the incidence and prevalence of OM in patients receiving chemotherapy (Mercadante et al., 2015; Ottaviani et al., 2023; Allana et al., 2024; Staudenmaier et al., 2018; Chen, 2008; Goldberg et al., 2004; Salvador, 2005). The following percentages of participants experienced OM in each study: 22.3% (Mercadante et al., 2015), 15.5% (Ottaviani et al., 2023), 58% (Staudenmaier et al., 2018), 75.4% (Chen, 2008), 32% (Goldberg et al., 2004), 55% (Allana et al., 2024) and 90% (Salvador, 2005). The following percentage of participants experienced moderate to severe OM in each study: 44% (Staudenmaier et al., 2018), 25% (Goldberg et al., 2004), and 53.57% (Salvador, 2005). These studies supported OM as a frequent side effect for patients receiving chemotherapy.

Impact of OM. The impacts of OM in patients receiving chemotherapy discussed in the literature review for this practicum include reduced oral intake, increased risk for infection, increased need for medical intervention, interruption to chemotherapy, and increased healthcare cost (Mercadante et al., 2015; Borbasi et al., 2002; Kanagalingam et al., 2018; Ruescher et al.,

1998; Heimdahl et al., 1989; Elting et al., 2003; Goldberg et al., 2004). Three studies explored reduced oral intake in the presence of OM in patients receiving chemotherapy and found that the occurrence of OM reduced oral intake in patients receiving chemotherapy (Borbasi et al., 2002; Mercadante et al., 2015; Kanagalingam et al., 2018). Three studies in this literature review specifically examine the increased risk for infection in patients with OM (Ruescher et al., 1998; Heimdahl et al., 1989; Elting et al., 2003). The studies discussed by Ruescher et al. (1998) and Elting et al. (2003) also demonstrate increased length of stay with the development of OM in patients receiving chemotherapy. Moreover, three studies demonstrate the increased need for medical intervention with the development of OM (Mercadante et al., 2015; Goldberg et al., 2004; Elting et al., 2003), and two studies demonstrate the concern for interruption to chemotherapy with the development of OM (Kanagalingam et al., 2018; Elting et al., 2003). Elting et al. (2003) and Goldberg et al. (2004) also examined the change in healthcare costs associated with the development of OM. These studies supported the magnitude of impacts of OM on the patient and healthcare system.

Contributing Factors. The contributing factors of OM in patients receiving chemotherapy discussed in the literature review include chemotherapy, disease, demographic factors, oral care, and lack of knowledge (Mercadante et al., 2015; Ottaviani et al., 2023; Goldberg et al., 2004; Allana et al., 2024; Chen, 2008; Borbasi et al., 2002; Salvador, 2005; Wilberg et al., 2014; Kanagalingam et al., 2018). The pathogenesis of OM as caused by the chemotherapy drugs themselves is the greatest contributing factor to OM in patients receiving chemotherapy (Lalla et al., 2008; Ottaviani et al., 2023). Being knowledgeable of the pathogenesis of OM and the risk of OM associated with certain chemotherapy drugs can help patients and HCPs identify the risk for the development of OM and implement appropriate

prophylactic interventions. The literature review presented conflicting findings on the risks associated with demographic factors such as age, gender, BMI, and education in the development of OM in patients receiving chemotherapy. Such factors are important to consider in preventing and treating OM in patients receiving chemotherapy. The studies by Borbasi et al. (2000), Allana et al. (2024), and Salvador (2005) demonstrate how patients' beliefs, attitudes and behaviours regarding mouth care influence the occurrence of OM. Three studies found that there is a lack of patient knowledge regarding mouth care and OM when receiving chemotherapy and that a lack of knowledge is associated with poorer outcomes related to oral health, highlighting the importance of patient knowledge (Mercadante et al., 2015; Wilberg et al., 2014; Ottaviani et al., 2023). Several contributing factors of OM in patients receiving chemotherapy have been identified in the literature such as chemotherapy, disease, demographic factors, oral care, and patient knowledge. Awareness of such contributing factors is significant in addressing the clinical issue of OM in patients receiving chemotherapy.

Patient Education. There were three studies found in the literature review which investigate the use of patient education to address the clinical issue of OM in patients receiving chemotherapy (Yuce & Yurtsever, 2019; El-Nemer et al., 2015; Mollauglu & Ergogan, 2014). Three outcomes associated with the implementation of patient education on OM for patients receiving chemotherapy are reduced occurrence and severity of OM, improved self-care practices and improved quality of life (Yuce & Yurtsever, 2019; El-Nemer et al., 2015; Mollauglu & Ergogan, 2014; Dodd & Miaskowski, 2000). Based on these outcomes, patient education on mouth care and OM for patients receiving chemotherapy is supported as an intervention to address the clinical issue or OM in patients receiving chemotherapy.

Implications for the Practicum

The literature review of this practicum resulted in various articles and research studies which support the significance of the clinical issue of OM in patients receiving chemotherapy. Interventions related to patient education on OM with improved patient outcomes to address the clinical issue of OM in patients receiving chemotherapy are supported in the literature review. The findings presented in this literature review support the goal and objectives of this practicum previously identified in the practicum proposal for this project and the advanced nursing competencies of leadership and education. The identification of Orem's SCDNT as a theoretical framework for this practicum and in planning resource development came from the literature support as demonstrated in this literature review. The literature review supports that HCPs are essential in advising patients of the possible occurrence of oral problems related to chemotherapy, and providing information on prevention as well as management of symptoms that may occur during chemotherapy (Dodd & Miaskowski, 2000; Mollaoğlu & Erdoğan, 2014; Ottaviani et al., 2023; Yuce & Yurtsever, 2019).

Nurses are essential in advising patients and providing information on OM and ways to prevent and alleviate OM (El-Nemer et al., 2015). Teaching patients about their chemotherapy treatment reduces fear, increases self-confidence, improves compliance, reduces complications and enhances patients' participation in self-care (El-Nemer et al., 2015). The results of the literature review support the purpose of this practicum, and underscores the need for patient education on mouth care and OM as an intervention to address OM in patients receiving chemotherapy.

Environmental Scan

Three sources of information were used for data collection for this environmental scan. A

local intranet search within NL Health Services, an internet search, and consultation with key stakeholders were conducted. The internet search involved a search of resources from the BC Cancer Agency and the LLSC as these are the main organizations used for cancer care drug information and patient resources in NL. Each search aimed to identify relevant informational resources, policies, guidelines, and assessment tools related to mouth care and OM in patients receiving chemotherapy. The data collected was grouped into the categories of educational materials, policies, guidelines, and assessment tools. This allowed related material from different sources to be compared and analyzed for relevance and applicability to the practicum. It also allowed for identification of the strengths and limitations of the various resources.

Findings

There were no online modules or education sessions for patients or HCPs on mouth care and OM in patients receiving chemotherapy identified through the three data sources used in this environmental scan. There were three online information booklets on managing side effects related to mouth care and OM (LLSC, n.d.-a, LLSC, n.d.-b, LLSC., n.d-c.) as well as two patient information documents (BC Cancer Agency, 2003; BC Cancer Agency, 2020). Only one resource, a paper pamphlet on mouth care, was found in the search of educational materials available by NL Health Services for patients and HCPs. There were three guidelines for mouth care and OM in patients receiving chemotherapy identified in this environmental scan: one guideline for mouth care in patients receiving chemotherapy by NL Health Services (2022), and two guidelines by BC Cancer Agency on symptom management guidelines for OM (BC Canada Agency, 2014) and mucositis nutritional guidelines for symptom management (BC Cancer Agency, 2005). No policies related to mouth care or OM in patients receiving chemotherapy were found in this environmental scan. There were two assessment tools for OM identified in

this environmental scan: one used by NL Health Services on 4NA as outlined in the guideline by Eastern Health (2022) and another assessment tool by BC Cancer Agency (2018). The assessment tool used in the Eastern Health (2022) guidelines is adapted from the World Health Organization (1979). The resources related to this practicum identified by key stakeholders in their responses to an email of inquiry were previously discovered with the intranet and internet searches of this environmental scan. The email of inquiry with key stakeholders did not result in any additional resources for this practicum but many of the key stakeholders supported the need for this project related to cancer care in NL and were interested in the practicum project.

Implications for the Practicum

The educational materials, guidelines, and assessment tools related to mouth care and OM in patients receiving chemotherapy identified in this environmental scan will be used to develop an educational resource on OM for patients receiving chemotherapy in NL. While there were many valuable resources to this practicum found in this environmental scan, there were no online modules or education sessions for patients or HCPs on mouth care or OM in patients receiving chemotherapy identified. The information discovered in this environmental scan can be adapted to develop an online and paper educational resource for patients receiving chemotherapy in NL.

Consultations with Key Stakeholders

The consultations of this practicum were conducted at the HSC in NL in the oncology and hematology program. 4NA is the acute care, inpatient hematology and oncology unit for NL. The key stakeholders consulted included all staff nurses (Registered Nurses only) on 4NA at the HSC, the two patient care facilitators on 4NA, the clinical educator for the medicine program at the HSC, the clinical educator for the cancer care program at the HSC, the Nurse Practitioner for

inpatient hematology, the general practitioner for hematology, the clinical pharmacist for hematology, and the nurse coordinator for the NL Stem Cell Therapy Program. This sample was chosen due to the high level of expertise of these HCPs on the topic of interest, as well as their awareness of current practices and resources available relevant to this practicum.

Two questionnaires were used for consultations: one for key stakeholders who are not staff nurses and another for staff nurses of 4NA. Many of the questions were the same between the two questionnaires, the differences in the questionnaires were due to the different roles and responsibilities of staff nurses compared to the other key stakeholders consulted. The level of expertise was also more variable in the group of staff nurses compared to the other key stakeholders. Key stakeholders were informed of the questionnaire by an inquiry email and were also provided with paper copies for convenience. Key stakeholders were informed of a locked submission box in the patient care facilitators' office on 4NA and the date the questionnaires were being collected. The emails of inquiry provided background information on the practicum, the purpose of the email of inquiry and stated ethical considerations for the key stakeholders, including staff nurses. Participants were asked not to include their names on the questionnaire to protect confidentiality, and completing a questionnaire assumed implied consent for use in this practicum.

There were six completed questionnaires of the eight questionnaires sent to key stakeholders, excluding staff nurses. There were sixteen completed questionnaires, and forty-two questionnaires were distributed to staff nurses of 4NA. All questionnaires were collected via the locked collection box in the patient care facilitators' office on 4NA; no completed questionnaires were received via email from the key stakeholders or staff nurses. Responses were anonymous; therefore, it could not be identified which of the key stakeholders that were consulted did

participate. Data collected in the questionnaires was organized using tables and grouping of common findings in Microsoft Word. Data analysis was completed using descriptive statistics, including totals and percentages. Descriptive responses were thematically analyzed to better understand how common specific responses or themes were, and totals and percentages were also used. A comparison of responses for similar questions between the two questionnaires was conducted. The findings and implications of the consultations to this practicum will be discussed in the following sections of this report.

Findings

In the questionnaires, 100% of key stakeholders, including staff nurses, reported that mouth care and OM education are important for patients receiving chemotherapy. Furthermore, 80% of key stakeholders and 62.5% of staff nurses believed that patients receiving chemotherapy on 4NA are not adequately educated on mouth care and OM when receiving chemotherapy. Staff nurses were asked to identify barriers to patient education on 4NA related to mouth care and OM: 75% reported lack of time, 56.3% responded lack of resources, 37.5% responded lack of knowledge, 6.3% reported non-compliance of the patient with education, and 6.3% identified language barriers. Of the staff nurses consulted, 62.5% reported feeling extremely comfortable, 31.3% reported feeling somewhat comfortable, and 6.3% reported feeling uncomfortable providing education on mouth care and OM to patients receiving chemotherapy. Interestingly, 100% of key stakeholders and 87.5% of staff nurses responded that there is a need for additional educational resources on mouth care and OM for patients receiving chemotherapy. The key stakeholders were asked who they believed was most responsible for providing education on mouth care and OM to patients receiving chemotherapy: 66.7% responded that the Registered Nurse, Medical Doctor, Nurse Practitioner, prescriber for chemotherapy, and pharmacist were all

responsible for providing patient education; 16.6% said the prescribing physician and pharmacist; and 16.6% said the prescribing physician and Registered Nurse.

When educating patients receiving chemotherapy on mouth care and OM, verbal education was the most common educational resource used by key stakeholders, including staff nurses. Of the key stakeholders who participated, 100% use verbal education, 40% use the printed pamphlet on 4NA and 20% use the printed booklet for patient education on mouth care and OM and for staff nurses, 75% use verbal education, 50% use the printed booklet on 4NA, 43.8% use printed pamphlets, and 31.3% use information from the BC Cancer Agency website.

The most common prevention strategy key stakeholders and staff nurses identified was normal saline mouth rinses. Key stakeholders identified normal saline mouth rinses (100%), routine mouth care (50%) and daily nursing assessment (33.3%) as the top three interventions for OM prevention in patients receiving chemotherapy, and staff nurses identified normal saline mouth rinses (73%), use of soft toothbrush (33.3%) and patient education before chemotherapy (33.3%) as the top three interventions used to prevent OM in patients receiving chemotherapy. Key stakeholders and staff nurses identified magic mouthwash as the most common intervention for treating OM in patients receiving chemotherapy. Key stakeholders identified magic mouthwash (100%), analgesics and opioids (66.6%) and steroids (33.3%) as the top three interventions for OM treatment in patients receiving chemotherapy and staff nurses identified magic mouthwash (78.6%), normal saline mouthrinses (28.6%) and analgesics and opioids (21.4%) as the top three interventions used to treat OM in patients receiving chemotherapy.

Key stakeholders and staff nurses were also asked if they believed there was a need for resource development on mouth care and OM and content that should be included in an educational resource on mouth care and OM for patients receiving chemotherapy. 100% of key

stakeholders consulted, and 87.5% of staff nurses consulted, responded that there is a need for additional educational resources on mouth care and OM for patients receiving chemotherapy. To gain insight into content in resource development for this practicum, the key stakeholders and staff nurses were also asked to identify three important pieces of information to include in an educational resource on mouth care and OM for patients receiving chemotherapy. Based on the results, 66.6% of key stakeholders responded that instruction on mouth care, as well as prevention strategies for OM, were top priority to include in a patient educational resource, and 78.6% of staff nurses responded that the importance of frequent mouth care was the top priority to include in a patient educational resource. Key stakeholders also identified the importance of instructions on completing an oral assessment (50%), treatment options for OM (33.3%) and general explanation of OM (16.6%) as important pieces of information to include in an education resource on mouth care and OM for patients receiving chemotherapy. Moreover, staff nurses identified the importance of information on normal saline and other medicated mouth rinses (57.1%), prevention strategies (50%), and instructions on complete mouth assessment (35.7%) as important pieces of information to include in an education resource on mouth care and OM for patients receiving chemotherapy.

Implications for the Practicum

The data collected on the beliefs and attitudes of key stakeholders and staff nurses identified participants' beliefs that patients should be educated on mouth care and OM when receiving chemotherapy. It also identified that patients receiving chemotherapy do not appear to be adequately educated on mouth care and OM as per key stakeholders which supports this practicum in developing an educational resource on mouth care and OM for patients receiving chemotherapy. Staff nurses identified lack of time, resources, and knowledge as the most

common barriers to patient education on mouth care and OM for those receiving chemotherapy. This has implications for resource development in consideration of a resource that is quick to use, accessible, and contains all required information. This resource will be available electronically and on paper for easy access and distribution. This resource will also include all the necessary information to adequately educate patients receiving chemotherapy on mouth care and OM. The content of the educational resource will be based on the information found in the literature search, environmental scan, and consultations for this practicum project. Key stakeholders also identified that the responsibility of patient education on mouth care and OM for patients receiving chemotherapy does not lie with one HCP, therefore this resource can be accessed and used by all HCP to gain knowledge and as support for patient education.

Furthermore, verbal information and printed information were the most common forms of education provided to patients; therefore, the development of a resource which can be printed and used to guide verbal education is supported. Common prevention and treatment interventions for OM were also identified and should be included in the development of educational resources. Some prevention interventions for OM, as identified in the questionnaires by key stakeholders and staff nurses to include in the educational resource to be developed, include an explanation of the importance of normal saline mouth rinses, instructions for mouth care, and instructions for mouth assessment. Some treatment interventions for OM, as identified in the questionnaires completed by key stakeholders and staff nurses to include in the educational resource to be developed, include an explanation of medicated mouthwashes such as magic mouthwash, the use of pain medication, and continuation of mouth care practices. The most common information identified by key stakeholders and staff nurses to include in the resource are instructions on completing mouth care and oral assessment, prevention and treatment strategies for OM, the

importance of normal saline mouth rinses, and the use of other medicated mouth rinses. The consultations with key stakeholders and staff nurses yielded significant information for consideration and application to developing an educational resource on mouth care and OM for patients receiving chemotherapy.

Summary of Resource

As part of this practicum in Nursing 6661, an educational resource on mouth care and OM for patients receiving chemotherapy in NL was developed. The resource was developed based on the findings of the data collection methods described and Orem's SCDNT as a theoretical framework. It includes a patient resource manual and patient pamphlet which can be found in Appendix D: *Educational Resource* of this report.

A patient resource manual was developed using Word. A table of contents is located after the cover page of the manual so that patients can see the topics covered in the manual and find them quickly with the allocated page number based on their individual needs. The topics chosen for this manual were based on the most common information in the environmental scan and suggested content noted by key stakeholders during consultations in this practicum. Most of the resource manual is descriptive. The topics included in the resource manual include chemotherapy and oral health, OM, stages of OM, mouth care, prevention of OM, oral assessment, treatment of OM, complications related to OM, as well as nutrition and OM. There are some images to help patients understand the content described. A copy of the patient pamphlet developed in this course is included in the resource manual, which patients can remove and use as a more compact resource. The resource manual also consists of a page for notes and questions that patients can use to make notes on their assessment findings, symptoms, or questions for an HCP. The

resource manual also includes a list of additional resources, references for the resource and photograph acknowledgements.

A patient pamphlet was developed using a template for a business brochure on Word. Critical information from the patient resource manual was used in the patient pamphlet. The purpose of the patient pamphlet is for quick reference and a more compact resource for patients with key information and a list of additional resources if required. The patient pamphlet includes a description of the impact of chemotherapy on oral health, description of mouth care basics, a definition of OM, instructions for mouth assessment, tips for prevention and treatment of OM, a list of complications of OM, and a list of additional resources for patients.

The information presented in this educational resource will be available online and on paper for accessibility to HCPs and patients. The educational resource will provide information for patients receiving chemotherapy so they can be knowledgeable and active in preventing, identifying, and treating OM.

Theoretical Framework

Orem's SCDNT was identified as the theoretical framework for this practicum. This theory has resonated with me throughout the Master of Science in Nursing Program. I strongly believe in empowering patients in self-care to optimize resources, including nursing care, in a highly strained healthcare system. I have examined this theoretical framework in various healthcare settings through my assignments in the Master of Science in Nursing Program, and I found this theory to be applicable and appropriate for the clinical issue of OM in patients receiving chemotherapy. Many of the ideas and concepts related to OM in patients receiving chemotherapy discussed in the components of this practicum were connected to the

underpinnings of Orem's SCDNT.

Self-care is the ability of an individual, family, group, or community to promote health, prevent disease, maintain health and cope with illness and disability with or without the support of an HCP (Hartweg & Metcalfe, 2022). Self-care suggests that individuals use their resources, including personal attributes such as knowledge, skills, attitudes, determination, courage, and optimism, to improve poor health (El-Nemer et al., 2015). Orem's SCDNT looks to empower patients and their families to care for themselves and to clarify the role of nurses in situations where self-care or care from others is not possible (Hartweg & Metcalfe, 2022). Orem's SCDNT facilitates a functional partnership between the nurse and patient to ensure the patient's needs are met while maintaining optimal involvement from the patient (Hartweg & Metcalfe, 2022). This aligns with the goal of this practicum to develop an educational resource for patients receiving chemotherapy on mouth care and OM to prevent OM as this resource will be used to increase patient knowledge and empower patients to be active in maintaining their oral health, providing their mouth care as well as self-assessments for early identification of OM which may require intervention from an HCP. This resource will allow patients to self-manage their side effects and know when to seek assistance from an HCP. The studies previously discussed by El-Nemer et al. (2015) and Dodd and Miaskowski (2000) used self-care-focused educational interventions, which resulted in favourable outcomes and reduced occurrence of OM, as previously discussed. It is imperative for patients and their families to have the essential information, skills and support to carry out effective self-care symptom management (Dodd & Miaskowski, 2000).

Of important note, promoting self-care is a strategy that can be used to address the financial pressures on the healthcare system and inadequacies of health coverage (Hartweg & Metcalfe, 2022). This applies to the current economic strain of the healthcare system and the

evidence from the literature presented in the literature review of this practicum of the financial burden which can occur because of the development of OM in patients receiving chemotherapy. Self-care aims to encourage prophylactic measures to prevent OM and early identification of OM to avoid the impacts previously discussed for the patient and healthcare system, which aligns with the goal of this practicum in developing an educational resource on OM for patients receiving chemotherapy in NL.

Discussion of Advanced Nursing Practice (ANP) Competencies

The Canadian Nursing Association (CNA) has defined nursing competencies for ANP to enable nurses to enhance their skills and knowledge in various settings (CNA, 2019). Throughout this practicum, I have developed my advanced nursing competencies. The most relevant ANP competencies to this practicum are education, leadership, consultations and collaboration.

The APN competency of education was demonstrated in this practicum by developing an educational resource on mouth care and OM. Patient education was identified as an appropriate intervention to address this clinical issue amongst patients receiving chemotherapy, and a need for such resources was demonstrated in the environmental scan and consultations conducted as part of this practicum. Further to this, the resources developed in this practicum will be used to support nurses and other HCPs in providing education on mouth care and OM to patients receiving chemotherapy. Completing the Master of Science in Nursing Program with this practicum project demonstrates my commitment to continuing education, which supports the APN competency of education as APNs must be dedicated to the professional advancements and educations of HCPs, students, clients, and their families (CNA, 2019). Furthermore, the CNA (2019) recognizes that nurses have the educational skills to share new knowledge, develop

educational programs, identify HCPs' learning needs, and create learning opportunities as completed in this practicum.

The APN leadership competency was demonstrated in this practicum by identifying and exploring the clinical issue of OM in patients receiving chemotherapy and the need for educational resources. APNs are organizational leaders who aim to bring about positive change and explore ways to enhance healthcare practices (CNA, 2019). Developing an educational resource to address the clinical issue of OM in patients receiving chemotherapy involves being an agent for change by exploring ways to improve patient care and outcomes with consultations of colleagues in my practice area as completed in this practicum. In this practicum, my leadership skills were demonstrated through my communication with key stakeholders, critical evaluation of information obtained through the three data collection methods, and project development.

Finally, the APN competency of consultation and collaboration was incorporated in this practicum, with consultations with key stakeholders as a data collection method for this project. Consultations with key stakeholders supported the need for this practicum and influenced the content of the resources developed in this practicum. Communication and collaboration with other HCPs and key stakeholders are essential to ANP competency (CNA, 2019). Further consultation and collaboration with key stakeholders and other nurses will occur in the future with implementing and evaluating the educational resources developed in this practicum.

Next Steps

Due to time constraints, implementation and evaluation of the educational resource developed in this practicum was not completed. A plan for implementing and evaluating the resource is presented in this section of this report.

Plan for Implementation

Two components are recommended for implementing the educational resource developed in this practicum: making HCPs aware of the resource and disseminating the resource to patients.

To make HCPs aware of this educational resource, short information sessions can be offered via Webex or Teams. This could be facilitated by a clinical educator or the educator of the cancer care program. Several short sessions, approximately 20 minutes per session, could be offered to accommodate the busy schedules of HCPs to be able to attend a session. The sessions would introduce the educational resource and instruct HCPs on where to locate the resource and implement the resource in practice. Since the resource is available electronically through the intranet and internet, the person facilitating the education session can distribute the resource via email, direct HCPs where to find the resource, and go through the resource directly on the Webex or Teams meeting by sharing their screen for attendees to see the resource while it is being discussed. These sessions also allow time for questions and discussion about the resource and its content by HCPs before dissemination.

The educational resource developed in this practicum will be available on the NL Health Services website as well as on the intranet for accessibility to patients as well as HCPs. This resource can be printed from online. It would also be recommended that paper copies of the educational resource be available on 4NA, at the cancer centres and in any other practice area where applicable. Having the resource available in multiple locations will increase accessibility and use of this resource. Patient should be provided with these resources upon diagnosis with initial chemotherapy teaching so that best practices can be implemented with the start of chemotherapy. Patients will have this information for the duration of their treatment. It would

also be recommended that HCPs follow up on patients' mouth care practices and any concerns with each follow-up appointment throughout treatment.

Plan for Evaluation

The educational resource could be evaluated in several different ways. The first evaluation method could be a review of the resource by HCPs, such as the key stakeholders who completed consultations for this practicum, with feedback on the resource's content. A second evaluation method could be a pre and post-implementation questionnaire for HCPs and/or patients. This would assess one's knowledge pre and post-educational resource implementation. A third evaluation method for this resource could be a review of documentation on the patient's health record for mouth care practices, the occurrence of OM, and knowledge changes demonstrated through patient action to seek medical attention. A review of documentation pre and post-implementation would demonstrate changes related to resource implementation. Such evaluations would also be beneficial in assessing the impact of the resource and noting any modifications that could be made to the resource for better patient outcomes.

The last two evaluation methods described could be used for future research to add to the literature and research on the impact of patient education as an intervention to address the clinical issue of OM in patients receiving chemotherapy. An interventional study with or without a control group could be used to evaluate the impact of this educational resource on patient outcomes. Findings of such inquiries could result in modifications which could be made to improve this resource. Furthermore, receiving patient feedback through a descriptive inquiry on this educational resource could have a significant impact on this resource with patient influence for their experiences. Patient-led interventions are significant as such resources directly impact the patient experience.

Conclusion

In completing Nursing 6661, the goals and objectives for this practicum established in Nursing 6660 have been met. An integrative literature review, environmental scan, and consultations with key stakeholders were conducted for data collection. Using the information retrieved with these three data collection methods and Orem's SCDNT as a theoretical framework, an educational resource on mouth care and OM for patients receiving chemotherapy in NL was developed. The program consists of a resource manual and patient pamphlet, which can be used to increase patient's knowledge of mouth care and OM to improve patient outcomes related to oral health and chemotherapy. The need for this project was supported by the literature review, environmental scan, and consultations with key stakeholders completed in this practicum. The ANP competencies of education, leadership, collaboration, and consultation as per the CNA (2019) were incorporated into the development of this practicum and educational resource developed. Future collaboration with key stakeholders, other HCPs, and patients will be imperative in implementing and evaluation this educational resource.

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Appendix A Integrative Literature Review

Practicum Literature Review

The Development of an Educational Resource on Mouth Care and Oral Mucositis for Patients Receiving Chemotherapy in Newfoundland and Labrador

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In recent years, remarkable progress in the treatment of cancer has been made and the prognosis for patients diagnosed with cancer has significantly improved (Yuce & Yurtsever, 2019). In Canada, the predicted five-year survival rate for all cancers combined was 64% in 2017, up from 55% in the early 1990s and 25% in the 1940s (Ellison & Saint-Jacques, 2023). The clinical significance of improved prognosis of patients diagnosed with cancer related to the impact of adverse effects of cancer therapy for the patient has caused significant problems for healthcare providers (HCPs), including increased healthcare needs for the patient and costs to the healthcare system (Yuce & Yurtsever, 2019; Mercadante et al., 2015). The main side effects of chemotherapy are due to the lack of selectivity of the chemotherapy drugs for cancer cells (El-Nemer et al., 2015; Mollaoğlu & Erdoğan, 2014; Ottaviani et al., 2023). Chemotherapy induces not only damage to the cancer cells but also the healthy cells characterized by high proliferation, such as the epithelial cells of the oral mucosa and the gastrointestinal system (El-Nemer et al., 2015; Mollaoğlu & Erdoğan, 2014; Ottaviani et al., 2023). Oral mucositis (OM) is one side effect of chemotherapy which implies an inflammation of the oral mucosa and affects up to 40% of patients treated with standard chemotherapy (Chen, 2008; Ottaviani et al., 2023; Yuce & Yurtsever, 2019). Symptoms of OM generally manifest within three to five days after chemotherapy administration (Yuce & Yurtsever, 2019). Symptoms of OM usually peak in intensity seven to fourteen days after chemotherapy administration and can take two to three weeks for full recovery from OM (Yuce & Yurtsever, 2019). OM can have many implications for the patient and healthcare system including reduced oral intake, increased risk for infection, increased healthcare needs, interruption to chemotherapy, and increased healthcare costs (Mercadante et al., 2015; Borbasi, 2002; Kanagalingam et al., 2018; Ruescher et al., 1998; Heimdahl et al., 1989; Elting et al., 2003; Goldberg et al., 2004). With chemotherapy

predominantly administered in the outpatient setting, almost all patient self-care activities related to the prevention and treatment of symptoms need to be managed at home without direct supervision by an HCP (Dodd & Miaskowski, 2000). For patients to manage side effects or symptoms of chemotherapy, such as OM, they require comprehensive information on the specifics of their disease, treatment, associated symptoms, and symptom management (Dodd & Miaskowski, 2000).

The literature review aims to explore the clinical issue of OM in patients receiving chemotherapy and to investigate the use and outcomes of implementing patient education on OM to address this clinical issue. Educational resources for patients receiving chemotherapy on mouth care and OM intend to empower patients to engage in self-care practices related to oral health to improve outcomes and prevent OM. Gaps in the literature will be identified and implications of the literature review in relation to the practicum will be discussed. The theoretical framework of Orem's Self-Care Deficit Nursing Theory (SCDNT) will be discussed in the literature review as a guide for this practicum project. This literature review will support patient education on OM as an effective intervention to address the clinical issue of OM in patients receiving chemotherapy.

Methods of Literature Review

A literature search was performed using three databases: Google Scholar, CINAHL Plus, and PubMed. Grey literature was also searched using Google Scholar and the Memorial University of Newfoundland library database. Boolean operators and truncation of search terms using the advanced search option were utilized in the CINAHL Plus and PubMed databases. This advanced search method allowed for a more comprehensive, refined search of the literature using specific fields for searches, a combination of search terms, and a comparison of the number of

results for different searches. Initially, literature findings were restricted to studies published in the past five years and were broadened to the past ten years using similar search terms. Broadening the time constraints on the search identified additional literature related to this topic and demonstrated development in the literature over time while also keeping the literature recent. Reference lists for the articles found in this search were also reviewed for any additional relevant literature for this literature review. The search terms for this literature review included *nursing, nurse, education, mouth care, oral hygiene, oral mucositis, chemotherapy, side effect, knowledge, self-care, Orem's self-care deficit nursing theory, and oncology*. Articles were reviewed for applicability to this report and practicum. Articles involving the pediatric population and patients receiving concurrent head and neck radiation were omitted from this review. Only studies published in English were included in this review. There were seventeen studies found in this literature search that were used in this review: six qualitative studies and eleven quantitative studies. The quantitative studies included in this literature review were critically appraised using the Public Health Agency of Canada's (PHAC, 2014) Critical Appraisal Toolkit (CAT). The Lincoln and Guba (1985) criteria for trustworthiness and the Joanna Briggs Institute (JBI) CAT, as described by Lockwood et al. (2015), were used for the critical appraisal of the qualitative research studies included in this literature review. Details of the publications are included in the literature summary tables found in Appendix A: *Literature Summary Table,* and the associated studies will have the first author's name in **bold** font.

Literature Review

OM is a significant side effect for patients receiving chemotherapy (Borbasi et al., 2002; Chen, 2008; Kanagalingam et al., 2018; Lalla et al., 2008; Mercadante et al., 2015; Ottaviani et al., 2023; Goldberg et al., 2004; Staudenmaier et al., 2018; **Yuce** & Yurtsever, 2019). This

literature review aims to explore the occurrence, impact, contributing factors, and existing interventions surrounding mouth care and OM in patients receiving chemotherapy as supported in the literature. This literature review will focus on patient education as an intervention to address OM in patients receiving chemotherapy. Interventions related to patient education aim to reduce the occurrence and associated negative implications of OM in patients receiving chemotherapy by providing information to patients to prevent, identify, and treat promptly. The effectiveness of patient education in addressing OM in patients receiving chemotherapy will be discussed, as well as its impact on rates of OM, severity of OM, self-care practices for mouth care, and patient quality of life as supported in the literature.

Background Information

Occurrence

Seven studies found in the literature explore the incidence and prevalence of OM in patients receiving chemotherapy (Mercadante et al., 2015; Ottaviani et al., 2023; Allana et al., 2024; Staudenmaier et al., 2018; Chen, 2008; Goldberg et al., 2004; Salvador, 2005). There was one observational study (Mercadante et al., 2015), two quantitative descriptive studies (Allana et al., 2024; Goldberg et al., 2004) and three qualitative descriptive studies (Ottaviani et al., 2023; Staudenmaier et al., 2018; Chen, 2008; Salvador, 2005). The studies by Allana et al. (2024) and Goldberg et al. (2004) are cross-sectional studies (CSS), which have a weak study design. All the quantitative studies were of medium quality based on the PHAC (2014) CAT. All the qualitative studies were of medium trustworthiness except for the study by Chen (2008) which was of low trustworthiness based on the JBI criteria (Lockwood et al., 2015).

Three of the studies were conducted at multiple centers (Mercadante et al., 2015; Ottaviani et al., 2023; Allana et al., 2024); two of the studies were conducted in Italy (Mercadante et al., 2015; Ottaviani et al., 2023) and one in Pakistan (Allana et al., 2024). The study by Mercadante et al. (2015) involved 669 participants with advanced-stage cancer, the study by Ottaviani et al. (2023) involved 194 participants with a diagnosis of any solid tumour, and the study by Allana et al. (2024) involved 160 women with breast cancer. All three studies aimed to determine the prevalence and characteristics of oral symptoms related to chemotherapy treatment in cancer patients (Allana et al., 2024; Mercadante et al., 2015; Ottaviani et al., 2023). Four studies were conducted at single sites in Germany (Staudenmaier et al., 2018), the United States (Goldberg et al., 2004), Australia (Chen, 2008) and Canada (Salvador, 2005). The study by Staudenmaier et al. (2018) involved 45 participants, Chen (2008) involved 57 participants, Goldberg et al. (2004) involved 514 participants, and Salvador (2005) involved 140 participants. Two studies involved all patients with cancer actively receiving chemotherapy at the study sites (Chen, 2008; Goldberg et al., 2004), and two studies involved patients receiving stem cell transplant (Staudenmaier et al., 2018; Salvador, 2005). Staudenmaier et al. (2018) and Salvador (2005) aimed to determine the frequency and impact of OM in patients receiving hematopoietic stem cell transplantation. Goldberg et al. (2004) aimed to identify the rates of OM as well as patient perceptions of OM, and Chen (2008) aimed to understand better the experiences and perceptions of patients with cancer who developed OM related to chemotherapy.

The seven studies outlined reported high incidence of OM in patients receiving chemotherapy (Mercadante et al., 2015; Ottaviani et al., 2023; Allana et al., 2024; Staudenmaier et al., 2018; Chen, 2008; Goldberg et al., 2004; Salvador, 2005). The World Health Organization grading tool for OM was used in the studies by Mercadante et al. (2015), Staudenmaier et al.

(2018) and Allana et al. (2024). The Terminology Criteria for Adverse Events version 4.0 was also used in the study by Mercadante et al. (2015). In the studies by Ottaviani et al. (2023), Goldberg et al. (2004), and Chen (2008), participants completed questionnaires to report occurrence of OM. Salvador (2005) conducted 140 chart reviews to determine frequency and impact of OM. The following percentages of participants experienced OM in each study: 22.3% (Mercadante et al., 2015), 15.5% (Ottaviani et al., 2023), 58% (Staudenmaier et al., 2018), 75.4% (Chen, 2008), 32% (Goldberg et al., 2004), 55% (Allana et al., 2024) and 90% (Salvador, 2005). Although some percentages are lower, the findings represent the presence of OM in patients receiving chemotherapy. The following percentage of participants experienced moderate to severe OM in each study: 44% (Staudenmaier et al., 2018), 25% (Goldberg et al., 2004), and 53.57% (Salvador, 2005). Ottaviani et al. (2023) considered their findings to underestimate the actual occurrence of OM, compared to other findings in the literature, due to the lack of clinical assessment and solely patient self-reporting symptoms of OM. Findings may be underreported because patients need to be made aware of symptoms of OM and assessment findings so the incidence of OM will be appropriately reported and identified (Ottaviani et al., 2023). As shown, OM occurs in patients receiving chemotherapy, sometimes at high rates with severe symptoms. The occurrence of OM in patients receiving chemotherapy can be impacted by various factors, as described in the following section of this report.

Impact

Several studies found in this literature search examine the impact of OM on patients receiving chemotherapy as well as on the healthcare system (Mercadante et al., 2015; Borbasi et al., 2002; Kanagalingam et al., 2018; Ruescher et al., 1998; Heimdahl et al., 1989; Elting et al., 2003; Goldberg et al., 2004). The impacts of OM in patients receiving chemotherapy include

reduced oral intake, increased risk for infection, increased need for medical intervention, interruption to chemotherapy, and increased healthcare cost.

Reduced Oral Intake. Three studies which explore reduced oral intake due to the presence of OM in patients receiving chemotherapy (Borbasi et al., 2002; Mercadante et al., 2015; Kanagalingam et al., 2018). The study by Mercadante et al. (2015) was previously described in this paper. Borbasi et al. (2002) conducted a qualitative descriptive study of medium trustworthiness and Kanagalingam et al. (2018) conducted a study using qualitative and quantitative components of medium credibility and quality. The study by Borbasi et al. (2002) was conducted at one teaching hospital in Australia with six patients receiving stem cell transplants, and the study by Kanagalingam et al. (2018) was conducted in seven countries in Asia with 175 patients receiving chemotherapy for various types of cancer. Borbasi et al. (2002) and Kanagalingam et al. (2018) conducted interviews to explore patients' experiences with OM. Kanagalingam et al. (2018) also conducted a questionnaire further to explore patients' perspectives on OM and its impact. There was no integration of methods in the study by Kanagalingam et al. (2018), therefore it is not a mixed methods study although there are quantitative and qualitative components.

All three studies found that OM reduced oral intake in patients receiving chemotherapy (Borbasi et al., 2002; Mercadante et al., 2015; Kanagalingam et al., 2018). Further to this, patients equated eating with recovery, therefore this became a major concern and source of distress for the patient when oral intake was reduced related to OM (Borbasi et al., 2002; Kanagalingam et al., 2018). In the study by Kanagalingam et al. (2018), 67% of patients experiencing OM reported that it caused difficulty with eating, and 32% reported difficulty with drinking. Similarly, in the study previously described by Mercadante et al. (2015), of the

participants reporting OM, 33.6% reported mucositis partially preventing nutrition or hydration, 21.5% reported that mucositis severely limited nutrition or hydration, and 6% reported that mucositis completely prevented nutrition or hydration. Patients receiving chemotherapy lamented their inability to enjoy life through the simple pleasure of food and drink. They reported that eating, an ordinary act taken for granted, became a severe problem due to OM (Borbasi et al., 2002). Patients reported having "to concentrate on the mechanical act of eating, especially swallowing" and "needing to retrain oneself to eat" (Borbasi et al., 2002). Reduced oral intake related to the development of OM in patients receiving chemotherapy is a significant concern due to the risk of inadequate nutrition and hydration as well as psychological distress for the patient (Borbasi et al., 2002; Mercadante et al., 2015; Kanagalingam et al., 2018). As shown, OM causes reduced oral intake in patients receiving chemotherapy, which can have many implications for the patient.

Increased Risk for Infection. Three studies found in this literature review that specifically examine the increased risk for infection in patients with OM (Ruescher et al., 1998; Heimdahl et al., 1989; Elting et al., 2003). It is important to note that several of the studies found in this literature review and described in other sections of this paper refer to the increased risk of infection in patients with OM (Ottaviani et al., 2023; Lalla et al., 2008; Goldberg et al., 2004), but do not specifically investigate this. Impairment of the oral mucosa with OM in patients receiving chemotherapy increases the risk for oral infections with possible systemic dissemination (Ottaviani et al., 2023; Lalla et al., 2008; Goldberg et al., 2004). It is estimated that up to 75% of all life-threatening septicemia in immunosuppressed oncology patients originate from the oral cavity (Goldberg et al., 2004). Stem cell transplant patients with OM are two to three times more likely to develop bacteremia as the oral cavity is a frequent site of

infection due to toxic reactions in the mucous membranes caused by the chemotherapy, predisposing the oral mucosa to local and systemic infection that can be life-threatening due to myelosuppression after receiving chemotherapy (Goldberg et al., 2004; Heimdahl et al., 1989; Ruescher et al., 1998).

Three studies found which explore the increased risk of infection in the presence of OM in patients receiving chemotherapy (Ruescher et al., 1998; Heimdahl et al., 1989; Elting et al., 2003). Ruescher et al. (1998) conducted a case-control study of low quality with 69 participants from two university hospitals in the United States, Heimdahl et al. (1989) conducted an observational study of low quality with 181 participants from one hospital in Sweden, and Elting et al. (2003) conducted a multi-center cohort study of medium quality involving 599 patients in the United States. The studies by Ruescher et al. (1998) and Heimdahl et al. (1989) involved patients undergoing stem cell transplants, and the study by Elting et al. (2003) involved patients with a solid tumour cancer undergoing chemotherapy. All three studies aimed to explore the association between OM and the occurrence of infection (Ruescher et al., 1998; Heimdahl et al., 1989; Elting et al., 2003).

In their studies, Ruescher et al. (1998) and Elting et al. (2003) conducted chart reviews for data collection. Ruescher et al. (1998) identified 45 patients with negative blood cultures as a control group and 24 patients with positive blood cultures to use as the intervention group. The participants in the study by Heimdahl et al. (1989) were assessed by an oral surgeon two times per week to determine the condition of their oral mucosa and test for microorganisms. An association between OM and the presence of microorganisms in the oral cavity and bacteremia was demonstrated in all three studies (Ruescher et al., 1998; Heimdahl et al., 1989; Elting et al., 2003).

Ruescher et al. (1998) and Elting et al. (2003) found a significant difference between the occurrence of OM with ulceration between the study and control groups. In the study by Ruescher et al. (1998), 62% of the study group had mucositis with ulceration while only 36% of the control group had mucositis with ulceration ($p < 0.05$) and Elting et al. (2003) found that 73% of patients with OM developed an infection while only 36% of patients without OM developed an infection ($p<0.0001$). Heimdahl et al. (1989) found that septicemia in 41% of patients originated from the oral mucosa. In the study by Elting et al. (2003), antibiotics, antifungals, and antivirals were used in 36%, 10% and 6% of patients without OM, respectively, compared to 68%, 45% and 34% of patients with OM. As supported by the literature, an increased risk for infection with the development of OM is a major concern for patients receiving chemotherapy.

Increased Need for Medical Intervention and Interruption to Chemotherapy. As seen with the impact of increased risk for infection with OM previously discussed, many studies found in the literature referred to the increased need for medical intervention and risk for interruption to chemotherapy with the development of OM, but few studies directly examined this. Severe OM, especially with the development of infection, can lead to hospitalization and extended hospital length of stay, as well as an increased need for medical intervention with medication, total parenteral nutrition, secondary morbidity, and mortality (Mercadante et al., 2015; Ottaviani et al., 2023; Staudenmaier et al., 2018). Two studies previously discussed by Ruescher et al. (1998) and Elting et al. (2003) demonstrate increased length of stay with the development of OM. Moreover, three studies previously discussed by Mercadante et al. (2015), Goldberg et al. (2004) and Elting et al. (2003) demonstrate the increased need for medical intervention with the development of OM, and two studies previously discussed by

Kanagalingam et al. (2018) and Elting et al. (2003) demonstrate the concern for interruption to chemotherapy with the development of OM.

An increased length of hospital stay related to OM was explored in the studies previously discussed by Ruescher et al. (1998) and Elting et al. (2003). A significant difference was found in the length of stay in the hospital between patients who did and did not develop OM (Ruescher et al., 1998). Patients in the control group who had OM had an average length of stay of 34 days compared to an average length of stay of 29 days in patients who did not develop OM ($p < 0.05$) in the study by Ruescher et al. (1998). Similarly in the study group, patients who had OM had an average length of stay of 40 days compared to an average length of stay of 34 days in patients who did not develop OM ($p < 0.050$) (Ruescher et al., 1998). In the study by Elting et al. (2003), the average length of stay in the hospital was four days in patients without OM and six days in patients with OM. The development of OM increases the length of hospital stay for patients receiving chemotherapy, which is further increased with the development of OM with infection (Ruescher et al., 1998; Elting et al., 2003).

Increased need for medical intervention with OM was demonstrated in the three studies previously discussed by Mercadante et al. (2015), Goldberg et al. (2004), and Elting et al. (2003). In the study by Mercadante et al. (2015), 53.4% of patients with OM required alternative route for drug and nutrition administration, including parenteral hydration and nutrition, and in the study by Elting et al. (2003) total parenteral nutrition was not required in patients without OM but was required in 10% of patients with OM. The need for increased medical intervention and alternate route for drug administration for patients experiencing OM was also demonstrated in the study previously discussed by Goldberg et al. (2004) as one of the participants described needing morphine before eating, which would be taken as an oral medication at times but also an

injection when required. These three studies support the need for increased medical intervention with the development of OM in patients receiving chemotherapy (Mercadante et al., 2015; Goldberg et al., 2004; Elting et al., 2003).

The studies previously discussed by Kanagalingam et al. (2018) and Elting et al. (2003) explore the interruption of chemotherapy with the development of OM is explored. The top concern for oncologists identified for the development of OM in patients receiving chemotherapy was the need for delay or reduction in treatment with chemotherapy for the patient (Kanagalingam et al., 2018). Oral problems related to chemotherapy can lead to dose reduction or discontinuation of chemotherapy, often associated with complications related to patient disease and patients' reduced survival rates (Kanagalingam et al., 2018). Elting et al. (2003) found that dose reduction for the next cycle occurred in 11% of cases without OM and 25% of cases with OM, further to this delay in the timing of the next cycle occurred in 9% of cases without OM and 11% of cases with mucositis. As shown, the development of OM can delay or interrupt chemotherapy administration, impacting patient response to treatment and survival (Kanagalingam et al., 2018; Elting et al., 2003). As supported in the literature, the development of OM increases the patient's need for medical intervention. It poses a risk for interruption, dose adjustments or delay of chemotherapy for patients with cancer.

Increased Healthcare Cost. It is evident that with the associated complications of reduced oral intake, increased risk for infection, increased need for medical intervention, and interruption to chemotherapy related to the development of OM in patients receiving chemotherapy, that healthcare costs can be significantly increased with the development of OM. Two studies previously discussed by Elting et al. (2003) and Goldberg et al. (2004) examined the change in healthcare costs associated with the development of OM. The average cost of

hospitalization per cycle of chemotherapy would be $3893 without the development of OM compared to $6277 per cycle with the development of OM (Elting et al., 2003). Goldberg et al. (2004) found that the length of stay and total transplantation costs for patients who develop severe OM are significantly increased from $28,000 to $42,000. It is important to note that location can dramatically impact healthcare cost. These numbers do not reflect costs to the patient in all cases due to insurances and funding programs patients may avail of, but they remain significant for the healthcare system.

As shown in the literature, the development of OM in patients receiving chemotherapy has many implications for the patient and healthcare system, such as reduced oral intake, increased risk of infection, increased need for medical intervention, interruption to chemotherapy, and increased healthcare costs.

Contributing Factors

Several studies found in the literature examine the contributing factors of OM in patients receiving chemotherapy (Mercadante et al., 2015; Ottaviani et al., 2023; Goldberg et al., 2004; Allana et al., 2024; Chen, 2008; Borbasi et al., 2002; Salvador, 2005; Wilberg et al., 2014; Kanagalingam et al., 2018). The contributing factors of OM in patients receiving chemotherapy, as supported in the literature to be discussed in this paper, include chemotherapy and disease, demographic characteristics, oral care, and lack of knowledge.

Chemotherapy and Disease. The pathogenesis of OM caused by the chemotherapy drugs themselves is the greatest contributing factor to OM in patients receiving chemotherapy (Lalla et al., 2008; Ottaviani et al., 2023). Chemotherapy induces cellular damage resulting in the death of the basal epithelial cells of the gastrointestinal system, including the oral mucosa

(Lalla et al., 2008). The generation of free radicals by chemotherapy also exerts a role in mucosal injury through cell damage as free radicals stimulate inflammatory processes, worsening conditions of the oral mucosa (Lalla et al., 2008). Some chemotherapy agents have a greater risk of causing OM than others. Moreover, an increased number of cycles of chemotherapy can have a cumulative effect and increase the patient's risk for OM (Lalla et al., 2008; Ottaviani et al., 2023). In their studies, Salvador (2005) and Wilberg et al. (2014) demonstrate the effect of different chemotherapy agents on the development of OM. The study by Salvador (2005) was previously discussed in this paper. Wilberg et al. (2014) conducted a multicenter analytical CSS of low quality with 155 participants in Norway to assess the prevalence and intensity of acute oral problems in outpatients receiving chemotherapy for various cancer types. Wilberg et al. (2014) conducted semi-structured interviews and completed oral assessments. Both studies found that different chemotherapy drugs cause different rates and severity of OM (Salvador, 2005; Wilberg et al., 2014). In the Salvador (2005) study, 43.4% of patients who received stem cell conditioning with just melphalan developed OM, whereas 76.74% of the patients who received stem cell conditioning with melphalan and etoposide experienced OM.

Similarly, in the study by Wilberg et al. (2014), 25% of the patients who received the chemotherapy protocol FLOX developed OM, whereas 8% of patients who received Taxane chemotherapy protocols developed OM. Patients with metastatic disease, as well as certain types of cancer, such as head and neck cancers treated with chemotherapy and radiotherapy, also increase a patient's risk for developing OM when receiving chemotherapy (Ottaviani et al., 2023). Being knowledgeable of the pathogenesis of OM and the risk of OM associated with certain chemotherapy drugs can help patients and HCPs identify the risk for the development of OM and implement appropriate prophylactic interventions. As supported in the literature,

chemotherapy itself and the specific cancer type patients have affected the patient's risk for developing OM.

Demographic Factors. The degree and extent of OM in patients receiving chemotherapy has also been shown to be impacted by factors such as patient age, gender, BMI and education. In the studies previously discussed, Ottaviani et al. (2023) and Goldberg et al. (2004) found that younger age was a slight protective factor for the development of OM in patients receiving chemotherapy (OR 0.95, $p = 0.000$) but Salvador (2005) and Chen (2008) found that there was no statistically significant association between age and the development of OM in patients receiving chemotherapy. In the studies previously discussed by Ottaviani et al. (2023), Allana et al. (2024), and Goldberg et al. (2004), females were shown to have a higher incidence of OM than males, but Salvador (2005) found there was no statistically significant association between one's sex and the development of OM. Further research is warranted to investigate the association between one's sex and the development of OM. Salvador (2005) also found a marginally significant association between the occurrence of OM and higher BMI in patients receiving chemotherapy ($p=0.0764$). As shown in the study previously discussed by Allana et al. (2024), a low level of education is shown to have implications for the development of OM in patients receiving chemotherapy (0.52, 95% CI 0.31-0.88). While there is conflicting evidence on the risks associated with demographic factors such as age, gender, BMI and education in the development of OM in patients receiving chemotherapy, such factors are important considerations in the prevention and treatment of OM in patients receiving chemotherapy. Such findings may also have implications for future studies on the contributing factors of OM in patients receiving chemotherapy.

Oral Care. Three studies previously described demonstrate the impact of oral hygiene practices on the development of OM in patients receiving chemotherapy (Borbasi et al., 2002; Allana et al., 2024; Salvador, 2005). One of the five themes identified as central to the patient's experience with OM in the study by Borbasi et al. (2002) was the prioritization of oral care and ongoing patient assessment. Patients who prioritized oral care and were knowledgeable of the importance of oral care had better outcomes than patients who did not (Borbasi et al., 2002; Allana et al., 2024; Salvador, 2005). Allana et al. (2024) and Salvador (2005) determined that mouth care practices are significantly associated with the development of OM in patients receiving chemotherapy. In the study by Allana et al. (2024), the prevalence of OM in patients whom the frequency of oral hygiene measures was practiced occasionally increased by 2.26 (95% CI 1.06-4.86) compared to patients who completed oral care at least twice a day and only 41.67% of patients who used primary prevention of OM developed OM compared to 62.5% ($p=0.0144$) of patients who used secondary prevention measures (Salvador, 2005). Oral hygiene practices have significantly affected the development and severity of OM in patients receiving chemotherapy (Borbasi et al., 2002; Allana et al., 2024; Salvador, 2005). Based on the findings, patients should be educated on the importance of oral hygiene practices and provided with instruction on oral care and assessment.

Lack of Knowledge. Three studies previously described demonstrate the lack of patient knowledge contributing to OM in patients receiving chemotherapy (Mercadante et al., 2015; Wilberg et al., 2014; Ottaviani et al., 2023). More than two-thirds of participants in the study by Mercadante et al. (2015), 73% of participants in the study by Wilberg et al. (2014) and 20% of participants in the study by Ottaviani et al. (2023) reported not receiving information on the oral sequelae associated with chemotherapy. Further, in the study previously discussed by

Kanagalingam et al. (2018), oncologists only initiated prophylactic interventions for OM in 45% of patients receiving chemotherapy. Salvador (2005) provides context for the significance of improving patient knowledge and patient education, as oral care practices increased by 1.59 (95% CI 0.37-1.79) with patient education by a nurse or physician in patients receiving chemotherapy. The lack of patient knowledge of OM is a significant issue, as supported in the literature. Patients can only prevent, identify or treat OM if provided with adequate information.

As supported by the presented background information in this literature review on OM in patients receiving chemotherapy, OM is a prevalent clinical issue in patients receiving chemotherapy with many concerning impacts for the patient and healthcare system. Knowledge of the contributing factors of OM in patients receiving chemotherapy as supported in the literature can be used to address this clinical issue with the implementation of patient-focused interventions that address contributing factors such as identification of patient risk, consideration of risk and protective factors individual to the person, and increase patient knowledge and oral care practices through education. This information supports the need for interventions to address the clinical issue of OM in patients receiving chemotherapy.

Interventions

Three studies were found in the literature investigating the use of patient education to address the clinical issue of OM in patients receiving chemotherapy (**Yuce** & Yurtsever, 2019; **El-Nemer** et al., 2015; **Mollauglu** & Ergogan, 2014). Yuce and Yurtsever (2019) conducted a randomized controlled trial (RCT) of high quality, and El-Nemer et al. (2015) and Mollauglu and Ergogan (2014) conducted uncontrolled before and after studies, a weak study design of medium quality. Yuce and Yurtsever (2019) aimed to determine the effect of patient education on OM on patients' quality of life. El-Nemer et al. (2015) and Mollaoğlu and Erdoğan (2014) aimed to

evaluate the utilization of a self-care educational program for addressing chemotherapy induced physical side effects, including OM, and to examine the impact of planned patient education to patients receiving chemotherapy on symptom control, respectfully.

The studies by Yuce and Yurtsever (2019) and Mollaoğlu and Erdoğan (2014) were conducted at single sites in Turkey with 30 participants and 120 participants, respectively. The study by El-Nemer et al. (2015) was conducted at multicenter outpatient oncology clinics in Egypt with 80 participants. These studies being conducted in Turkey and Egypt can affect the generalizability of the study findings to this practicum. Participants in the studies by Yuce and Yurtsever (2019) and Mollaoğlu and Erdoğan (2014) were receiving chemotherapy for various types of cancer, and the participants in the study by El-Nemer et al. (2015) were receiving chemotherapy for breast cancer. Participants in all three studies were assigned to the intervention and control groups evenly. In all three studies, the intervention group received an educational program by trained facilitators, and the control group received routine care (El-Nemer et al., 2015; Mollaoğlu and Erdoğan, 2014; Yuce & Yurtsever, 2019).

In the study by Yuce and Yurtsever (2019), a patient education booklet that researchers prepared was provided to participants along with verbal education during the first cycle of chemotherapy. The patient education in the study by Mollaoğlu and Erdoğan (2014) was personalized to each patient's needs with input from HCPs and family members. Three education sessions with printed information on side effects and symptom management were provided to participants in the study by Mollaoğlu and Erdoğan (2014). In the study by El-Nemer et al. (2015), the education program involved two 30-minute information sessions delivered during the first cycle of chemotherapy: one information session focused on the side effects of focus, and the second focused on self-care strategies to address side effects.

Participants also received printed information discussed in the information sessions in a booklet (El-Nemer et al., 2015). A 45-minute information session with a revision of the information shared in the first two sessions was delivered to intervention group participants during the second cycle of chemotherapy (El-Nemer et al., 2015). This session also provided participants time to discuss their experiences of the first cycle of chemotherapy and ask questions (El-Nemer et al., 2015).

The data collection tools used in the study by Yuce and Yurtsever (2019) included the Oral Assessment Guide and the European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire (EORTC QLQ)-C30 Version 3.0. These data collection tools were applied to both the intervention and control groups on the first day for baseline data collection (Yuce & Yurtsever, 2019). The oral mucosa of participants in both groups was assessed again on the fifth, tenth, fifteenth and twenty-first day of chemotherapy and the EORTC QLQ-C30 Version 3.0 was conducted again on the fifteenth and twenty-first day of chemotherapy (Yuce & Yurtsever, 2019). Mollaoğlu and Erdoğan (2014) used two data collection tools: the Patient Information Form and the Chemotherapy Symptom Assessment Scale. The patient information form was completed before the first cycle of chemotherapy, and the chemotherapy symptom assessment scale was completed ten days after the initiation of cycle three of chemotherapy (Mollaoğlu & Erdoğan, 2014). In the study by El-Nemer et al. (2015), three tools were used for data collection: an interview questionnaire sheet for sociodemographic data collection, a modified memorial symptoms assessment scale and the Modified Self-Care Diary Scale. Data collection was completed for the control group from January to June 2013 and for the intervention group from June 2013 to September 2013 (El-Nemer et al., 2015). Data was

collected during the first and sixth cycles of chemotherapy for both the control and intervention groups (El-Nemer et al., 2015).

In addition to the three studies described by Dodd and Miaskowski (2000) describe in their article, the PRO-SELF Program content, testing, and refinement are used in RCTs. The PRO-SELF Program involves information sessions, printed information booklets, specific self-care skill training, and nurse coaching involving telephone calls with a nurse about the side effects of chemotherapy, such as nausea, vomiting, mucositis and infection (Dodd & Miaskowski, 2000). This program was designed to focus on information sharing, skill training, and support for patients with cancer receiving chemotherapy with self-managing side effects (Dodd & Miaskowski, 2000). This program was initially developed and tested in a RCT with 127 participants who were actively receiving chemotherapy (Dodd & Miaskowski, 2000). There were no statistically significant findings from this study. Still, participants reported that focusing on so many side effects in one program to be overwhelming, therefore the researchers decided to develop PRO-SELF Programs focusing on single side effects such as the PRO-SELF Mouth Aware Program and the PRO-SELF Program for Pain Control (Dodd & Miaskowski, 2000). Unfortunately, this literature review could not include the RCT related to the PRO-SELF Mouth Aware Program. Still, the description provided in the article by Dodd and Miaskowski (2000) is relevant to this literature review. The PRO-SELF Mouth Aware Program was delivered as soon as the patients started chemotherapy, as the risk for OM begins with the initiation of chemotherapy and involved instruction and printed information on principles of good oral hygiene and performing oral assessment and interpretation of findings (Dodd & Miaskowski, 2000). The program also included teaching, supervision and evaluation of mouth care practices to ensure patients were proficient in the required skills for self-care (Dodd & Miaskowski, 2000).

The nurses involved in the direct care of patients receiving chemotherapy were also trained in the program to support patients in the program (Dodd & Miaskowski, 2000).

The literature explores patient education as an intervention used to address OM in patients receiving chemotherapy. These studies provide the basis for future research to investigate quantitative and qualitative analyses of higher quality and credibility on the use of patient education to address OM in patients receiving chemotherapy. As no studies found with a more local context of NL, Canada, or the United States, this could be a setting for future research on OM in patients receiving chemotherapy for better generalizability of findings to this practicum.

Outcomes

As supported in the literature, three outcomes associated with the implementation of patient education on OM for patients receiving chemotherapy are reduced occurrence and severity of OM, improved self-care practices and improved quality of life (**Yuce** & Yurtsever, 2019; **El-Nemer** et al., 2015; **Mollauglu** & Ergogan, 2014; Dodd & Miaskowski, 2000).

Occurrence and Severity of Oral Mucositis

Four of the studies previously described demonstrate how patient education on OM reduces the occurrence and severity of OM in patients receiving chemotherapy (Dodd & Miaskowski, 2000; El-Nemer et al., 2015; Mollaoğlu & Erdoğan, 2014; Yuce & Yurtsever, 2019). In these four studies previously discussed, rates and severity of OM decreased with the implementation of patient education on OM for patients receiving chemotherapy (Dodd & Miaskowski, 2000; El-Nemer et al., 2015; Mollaoğlu & Erdoğan, 2014; Yuce & Yurtsever, 2019). In the study by Yuce and Yurtsever (2019) the occurrence of OM was reported on days

one, five, ten, fifteen and twenty-one of chemotherapy based on assessment findings using the Oral Assessment Guide. The number of participants with OM on days one, five, ten, fifteen and twenty-one of chemotherapy for the control group was zero, nineteen, twenty-four, twenty-four, and twenty-four and for the intervention group, zero, six, twelve, ten and five ($p<0.001$) (Yuce & Yurtsever, 2019). In the study by Mollaoğlu and Erdoğan (2014), the number of participants reporting sore mouth in the control group was twenty-seven of sixty participants and nine of the sixty participants in the intervention group ($p=0.001$). Similarly, in the study by Dodd and Miaskowski (2000), the PRO SELF Mouth Aware Program reduced the incidence of OM from 44% to 26%. The severity of OM was also shown to improve with the implementation of education on OM in the studies by Mollaoğlu and Erdoğan (2014) and El-Nemer et al. (2015). In the study by Mollaoğlu and Erdoğan (2014), the median rank for the severity of oral symptoms was 2.0 for the control group and 1.0 for the intervention group ($p=0.763$). In the study by El-Nemer et al. (2015), the mean rank for the severity of OM and mouth sores for the control group was 43.54 and for the intervention group was 37.46 ($p=0.21$). Further, the mean rank of the effect of mouth sores for the patients in the control group was 44.35 and the intervention group 36.65 ($p=0.12$) in the study by El-Nemer et al. (2015). As shown in the studies discussed, the occurrence and severity of OM are significantly reduced with implementing patient education on mouth care and OM for patients receiving chemotherapy. This supports patient education as a strategy to address OM in patients receiving chemotherapy.

Improved Self-Care Practices

In two studies previously described, self-care practices improved with implementation of patient education on OM for patients receiving chemotherapy (El-Nemer et al., 2015; Yuce & Yurtsever, 2019). The education interventions in the two studies were based on promoting self-

care and its implications for patient outcomes related to physical side effects and OM (Yuce & Yurtsever, 2019; El-Nemer et al., 2015). Yuce and Yurtsever (2019) determined that a self-care education program effectively alleviates the physical side effects of chemotherapy. El-Nemer et al. (2015) found that self-care practices regarding the oral mucosa were significantly improved with the self-care intervention of their study. El-Nemer et al. (2015) found that self-care practices such as self-examination, lip moisturizer, keeping mouth moist, avoiding mouthwash with alcohol and increasing fluid intake significantly improved with the implementation of a self-care educational program ($p<0.05$). The use of self-care strategies for mouth care and management of mouth sores increased from 0% in the control group to 75% in the intervention group ($p<0.005$) (El-Nemer et al., 2015). As previously shown, oral care is essential in preventing and treating OM in patients receiving chemotherapy. Self-care practices are important to maintain proper oral care, therefore patient education to promote self-care is an appropriate intervention supported in the literature to address the clinical issue of OM in patients receiving chemotherapy. Future research should focus on promoting self-care by patients through patient education on mouth care and OM to prevent OM in patients receiving chemotherapy.

Improved Quality of Life

Two studies previously discussed demonstrated improved quality of life with the implementation of patient education on OM for patients receiving chemotherapy (Yuce & Yurtsever, 2019; Mollaoğlu & Erdoğan, 2014). Yuce and Yurtsever (2019) assessed patient-reported quality of life on days one, fifteen and twenty-one of chemotherapy. Mollaoğlu and Erdoğan (2014) compared patient anxiety related to oral health between the control and intervention groups. Yuce and Yurtsever (2019) found that the mean quality of life based on functional score were 81.09, 60.10 and 68.46 for the control group and 79.41, 67.30 and 79.68

($p=0.017$) for the intervention group on days one, fifteen and twenty-one of chemotherapy. Mollaoğlu and Erdoğan (2014) found that patient education reduced anxiety in participants, as 91.7% of the control group reported experiencing anxiety related to oral health, and only 48.3% of participants in the intervention group reported experiencing anxiety related to oral health ($p<0.001$). Further to this, Mollaoğlu and Erdoğan (2014) found that nurse education and patient symptom control by nurses in patients undergoing chemotherapy positively impact the patient's quality of life. The two studies demonstrate oral health's impact on a patient's quality of life and well-being, which can be addressed through patient education on OM. Many of the studies found in the literature refer to patient's quality of life in reference to OM (Borbasi et al., 2002; Elting et al., 2003; Wilberg et al., 2014; Mollaogli & Erdogan, 2014; Mercadante et al., 2015; Kanagalingam et al., 2018; Dodd & Miaskowski, 2000; Yuce & Yurtsever, 2019). As previously discussed, Borbasi et al. (2002) found that patients equated eating with recovery, therefore this became a major concern and source of distress for the patient when oral intake was reduced related to OM (Borbasi et al., 2002; Kanagalingam et al., 2018). Patients reported "anxiety at mealtimes that swallowed food would not go down" (Borbasi et al., 2002). Patient education on OM has been shown to significantly reduce OM occurrence (Dodd & Miaskowski, 2000; El-Nemer et al., 2015; Mollaoğlu & Erdoğan, 2014; Yuce & Yurtsever, 2019), and therefore allow patients to maintain oral intake and prevent distress related to reduced oral intake. Literature specific to OM in relation to quality of life and its impact on individuals is sparse (Borbasi et al., 2002). This indicates a need for further investigation and research on the association of OM and quality of life for patients receiving chemotherapy and how patient education can be used to improve patient's quality of life in relation to OM.

The occurrence and severity of OM, self-care practices and quality of life were improved with the implementation of patient education on OM in patients receiving chemotherapy as supported in the literature. In conducting this literature search, gaps in the literature and suggestions for future research were identified to strengthen the literature on OM in patients receiving chemotherapy and patient education to address this clinical issue.

Gaps in the Literature

Several gaps in the literature related to OM in patients receiving chemotherapy that were identified in this literature review. Although many articles and studies were found in the literature that support the various parts of this review, no studies conducted in NL; only one study was conducted in Canada, and two studies that were conducted in the United States. Provincial and national statistics, data and research findings related to OM in patients receiving chemotherapy would be significant in comparing more local findings with findings in other countries related to the occurrence and interventions to address the clinical issue of OM. Such information would also be significant in monitoring trends of OM and related impacts and contributing factors to OM in patients receiving chemotherapy. The poor representation of NL and Canada in the literature also impacts the generalizability of the findings to the patient population of this practicum. The studies conducted in the United States are generalizable to NL and Canada.

Further, this literature search identified no high-quality or trustworthy studies. Future research should consider methods that increase the quality and trustworthiness of the studies related to OM in patients receiving chemotherapy. Also noteworthy is that many of the research studies found and used in this review were published more than ten years ago. This may indicate

the need for new studies on OM in patients receiving chemotherapy in addition to a more local context of NL, Canada and the United States.

As this literature search identified few research articles related to patient education on OM for patients receiving chemotherapy, future research should focus on conducting studies of strong design and high quality to investigate further the impact of patient education on OM for patients receiving chemotherapy. More qualitative research on patients' individual experiences of the effects of patient education on mouth care and OM when receiving chemotherapy would be beneficial in investigating various factors that influence patients' educational needs and education received.

There were also recommendations made by researchers mentioned in this literature review as areas requiring further investigation with recommendations for future research. Mercadante et al. (2015) identified an increased need for clinical focus and priority on oral care for advanced cancer patients in all settings. They suggested that a better understanding of the impact of oral discomfort among patients with cancer is a significant care issue, especially for nursing staff (Mercadante et al., 2015). Ottaviani et al. (2023) suggests future research assesses the effect of self-reporting oral problems on clinical outcomes and the efficacy of early detection of adverse events related to anticancer therapies. Assessment tools should be taught to patients for self-care and assessment in identifying OM for early intervention (Chen, 2008).

While the information presented in this literature review creates a solid basis for this practicum, several gaps related to OM in patients receiving chemotherapy warrant further investigation and research.

Orem's Self-Care Deficit Nursing Theory

Orem's SCDNT will be used as a theoretical framework for this practicum based on the findings of this literature review and the practicum's the goal and objectives as highlighted in the practicum proposal. Self-care is the ability of an individual, family, group, or community to promote health, prevent disease, maintain health and cope with illness and disability with or without the support of an HCP (Hartweg & Metcalfe, 2022). Self-care suggests that individuals use their resources, including personal attributes such as knowledge, skills, attitudes, determination, courage, and optimism, to improve poor health (El-Nemer et al., 2015). Orem's SCDNT looks to empower patients and their families to care for themselves and to clarify the role of nurses in situations where self-care or care from others is not possible (Hartweg & Metcalfe, 2022). Orem's SCDNT facilitates a functional partnership between the nurse and patient to ensure the patient's needs are met while maintaining optimal involvement from the patient (Hartweg & Metcalfe, 2022). This aligns with the goal of this practicum to develop an educational resource for patients receiving chemotherapy on mouth care and OM to prevent OM as this resource will be used to increase patient knowledge and empower patients to be active in maintaining their oral health, providing their mouth care as well as self-assessments for early identification of OM which may require intervention from an HCP. This resource will allow patients to self-manage their side effects and know when to seek assistance from an HCP. The studies previously discussed by **El-Nemer** et al. (2015) and Dodd and Miaskowski (2000) used self-care-focused educational interventions, which resulted in favourable outcomes and reduced occurrence of OM as previously discussed. It is imperative for patients and their families to have the essential information, skills and support to carry out effective self-care symptom management (Dodd & Miaskowski, 2000).

Of important note, promoting self-care is a strategy that can be used to address the financial pressures on the healthcare system and inadequacies of health coverage (Hartweg & Metcalfe, 2022). This applies to the current economic strain of the healthcare system and the evidence from the literature presented in this literature review of the economic burden that can occur because of the development of OM in patients receiving chemotherapy. Self-care aims to encourage prophylactic measures to prevent OM and early identification of OM to avoid the impacts previously discussed for the patient and healthcare system, which aligns with the goal of this practicum in developing an educational resource on OM for patients receiving chemotherapy in NL.

Implications for Practicum

This literature review resulted in various articles and research studies which support the significance of the clinical issue of OM in patients receiving chemotherapy. Interventions related to patient education on OM with improved patient outcomes to address the clinical issue of OM in patients receiving chemotherapy are supported in the literature. The findings presented in this literature review support the goal and objectives of this practicum previously identified in the practicum proposal for this project, as well as the advanced nursing competencies of leadership and education. Identification of Orem's SCDNT as a theoretical framework for this practicum and planning resource development came from the literature support demonstrated in this literature review.

This practicum aims to develop an online and printed educational resource on mouth care and OM for patients receiving chemotherapy in NL to prevent complications related to oral health in oncology patients receiving chemotherapy. The following objectives for this practicum were met with completion of this literature review:

1. Complete a literature review of the effectiveness of patient education on mouth care to prevent OM in patients receiving chemotherapy.
2. Demonstrate application of advanced nursing practice competencies of consultation, collaboration, leadership, and education throughout the practicum project.
3. Explore Orem's SCDNT about educational resource development on OM for patients receiving chemotherapy as supported in the literature.

The advanced nursing competencies of leadership and education were met with identifying and exploring the clinical problem of OM in patients receiving chemotherapy and gathering information for resource development as a quality improvement project. This involves exploring ways to improve patient care and outcomes as supported in the literature and as applicable to nursing practice. This literature review will be the foundation by which an educational resource will be developed to be used by patients and HCPs to facilitate learning of mouth care and OM in patients receiving chemotherapy.

HCPs are essential in advising patients of the possible occurrence of oral problems related to chemotherapy, providing information on prevention as well as management of symptoms that may occur during chemotherapy (Dodd & Miaskowski, 2000; **Mollaoğlu** & Erdoğan, 2014; Ottaviani et al., 2023; **Yuce** & Yurtsever, 2019). Nurses are essential in advising patients and providing information on OM and ways to prevent and alleviate mucositis (**El-Nemer** et al., 2015). Teaching patients about their chemotherapy treatment reduces fear, increases self-confidence, improves compliance, reduces complications and enhances their participation in self-care (El-Nemer et al., 2015).

Conclusion

OM is a significant clinical issue, as shown by its prevalence and impact on the patient and healthcare system, as supported in the literature. Educational resource development on OM for patients receiving chemotherapy is an intervention supported in the literature to address this clinical issue, however, further high-quality research with robust study designs is warranted based on the low number of studies found for this literature review. The incidence of OM in patients receiving chemotherapy decreased significantly, and the quality of life and patient self-care practices were shown to significantly improved with the implementation of patient education on OM for patients receiving chemotherapy. This literature review provided a strong rationale for developing of this practicum based on the practicum goal and objectives, and the advanced nursing practice competencies of this practicum. In conclusion, patient education on OM for patients receiving chemotherapy is an effective strategy to address the clinical issue of OM in patients receiving chemotherapy.

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Literature Summary Table

Study/Design	Methods	Key Results	Comments
El-Nemer et al. (2015) UCBA <u>Aim:</u> To evaluate the utilization of a self-care educational program for alleviating chemotherapy induced physical side effects (OM and oral sores included)	N = 80 - Mastectomized women - Breast cancer - Receiving adjuvant CT for the first time - 20-60 years of age - Able to read and write Egypt, Mansoura University Hospital Oncology Centre <u>CG:</u> - N = 40 - Usual care <u>IG:</u> - N = 40 - Self-care educational program <u>Data Collection:</u> - Sociodemographic sheet - Modified Memorial CT Symptoms Assessment Scale - Modified self-care diary scale - January – June 2013 for CG - June – September 2013 for IG - During first and sixth cycle of CT - <u>Outcomes</u>: - Severity of oral sores - Effect of oral sores - Use of self-care strategies (mouth care)	**Severity of mouth sores (mean rank)** - <u>CG</u>: 43.54 - <u>IG</u>: 37.46 - p=0.21 **Effect of mouth sores (mean rank)** - <u>CG</u>: 44.35 - <u>IG</u>: 36.65 - p=0.12 **Use of self-care strategies for mouth sores care (% distribution)** - <u>CG</u>: 0 - <u>IG</u>: 75 - p<0.005	<u>Strength of Design</u>: **Weak** <u>Quality</u>: **Medium** <u>Issues</u>: - recruitment and sampling strategies not identified, risk for selection bias - single site - CG participants first assessed, then intervention applied to a new group of participants and IG assessment complete

	Analysis: - SPSS 15.0 software for data entry and statistical analysis - Mean and SD - Descriptive statistics for qualitative variables - Chi-square analysis - Mann Whitney Test - P<0.05		
Mollaoğlu & Erdoğan (2014) UCBA Aim: To examine the effect of planned patient education to patients receiving chemotherapy on symptom control (including oral problems)	N = 120 - Receiving CT for the first time between April 2010 and February 2011 - > 18 years of age - Able to communicate and give consent - randomization Turkey, inpatient and outpatient at Ericyes University Mehmet Kemal Dedeman Oncology Hospital CG: - N = 60 - Usual care IG: - N = 60 - Personalized, planned education program for each participant based on their needs - Prior to the first, second and third CT cycles Data Collection: - Patient information form - CT symptom assessment scale	**Frequency of sore mouth (N)** - CG: 27 - IG: 9 - p=0.001 **Severity of oral symptoms (median)** - CG: 2.0 - IG: 1.0 - p=0.763	Strength of Design: **Weak** Quality: **Medium** Issues: - single site and recruitment strategy - not random sampling - CG participants first assessed, then intervention applied to a new group of participants and IG assessment complete - Recommended assessing symptoms after each education

	- Patient information form completed at first cycle, CT symptoms assessment scale complete 10 days after third cycle of CT <u>Outcomes</u>: - Frequency of sore mouth - Severity of oral symptoms <u>Analysis</u>: - SPSS 16.0 software for data entry and statistical analysis - Mean and SD - Frequency and percentages - Fisher exact chi square - Chi-square analysis - Mann Whitney U Test - Wilcoxon paired two samples test - P<0.05, CI 95%		session not just after all three sessions
Yuce & Yurtsever (2019) RCT <u>Aim:</u> To determine the effect of education for cancer patients receiving CT for prevention of OM on the QOL	N = 60 - > 18 years old - Receiving CT for the first time - No previous education on OM - Similar smoking status, presence/absence of dental problems, CT protocol - Able to read and write - Randomization to CG or IG Turkey, CT outpatient units of two university hospitals and a public hospital <u>CG:</u> - N = 30 - Usual care	**Occurrence of OM (n)** <u>CG</u>: - day 1: 0 - day 5: 19 - day 10: 24 - day 15: 24 - day 21: 24 <u>IG</u>: - day 1: 0 - day 5: 6 - day 10: 12 - day 15: 10 - day 21: 5 p<0.001	<u>Strength of Design</u>: **Strong** <u>Quality</u>: **Medium** <u>Issues</u>: - recruitment and sampling strategies not identified, risk for selection bias - self-reported that no previous education on OM, risk for

	IG: - N = 30 - Oral education on prevention of OM by trained personnel - Patient Education Booklet Data Collection: - Oral assessment guide on days 1, 5, 10, 15 and 21 of CT - EORTC QLQ-C30 Version 3.0 assessed on day 1, 15 and 21 of CT Outcomes: - Occurrence of OM - QOL Analysis: - Chi-square analysis - Mann-Whitney U test - Number, percentage, mean, SD - P<0.001	**QOL (mean of functional score with SD)** CG: - day 1: 81.09 (SD 17.76) - day 15: 60.10 (SD 18.14) - day 21: 68.46 (SD 18.01) IG: - day 1: 79.41 (SD 15.78) - day 15: 67.3 (SD 13.18) - day 21: 79.68 (SD 12.68) p=0.017	misclassification and information bias

Legend: Adverse Event (AE), Confidence Interval (CI), Chemotherapy (CT), Control Group (CG), European Organisation for Research and Treatment of Cancer Quality of Life Group Assessment (EORTC QLQ-C30), Florida Cancer Specialists (FCS), Intervention Group (IG), Oral Mucositis (OM), Quality of Life (QOL), Randomized Controlled Trial (RCT), Standard Deviation (SD), Uncontrolled Before and After (UCBA)

Appendix B Environmental Scan Report

Environmental Scan Report

The Development of an Educational Resource on Mouth Care and Oral Mucositis for Patients Receiving Chemotherapy in Newfoundland and Labrador

Madisan Martin (201417425)

N6660

Memorial University of Newfoundland

In recent years, remarkable progress in the treatment of cancer has been made and the prognosis for patients diagnosed with cancer has significantly improved (Yuce & Yurtsever, 2019). In Canada, the predicted five-year survival rate for all cancers combined was 64% in 2017, this is up from 55% in the early 1990s and 25% in the 1940s (Ellison & Saint-Jacques, 2023). The clinical significance of improved prognosis of patients diagnosed with cancer-related to the impact of adverse effects of cancer therapy for the patient has caused significant problems for healthcare providers (HCPs) such as increased healthcare needs for the patient and costs to the healthcare system (Yuce & Yurtsever, 2019; Mercadante et al., 2015). The main side effects of chemotherapy are due to the lack of selectivity of the chemotherapy drugs for cancer cells (El-Nemer et al., 2015; Mollaoğlu & Erdoğan, 2014; Ottaviani et al., 2023). Chemotherapy induces not only damage to the cancer cells but also the healthy cells characterized by high proliferation such as the epithelial cells of the oral mucosa and the rest of the gastrointestinal system (El-Nemer et al., 2015; Mollaoğlu & Erdoğan, 2014; Ottaviani et al., 2023). Oral mucositis (OM) is one side effect of chemotherapy which implies an inflammation of the oral mucosa and affects up to 40% of patients treated with standard chemotherapy (Chen, 2008; Ottaviani et al., 2023; Yuce & Yurtsever, 2019). Symptoms of OM generally manifest within three to five days after chemotherapy administration (Yuce & Yurtsever, 2019). Symptoms of OM usually peak in intensity seven to fourteen days after chemotherapy administration (Yuce & Yurtsever, 2019). If OM is cared for properly with minimal complications, symptoms can be recovered in up to two to three weeks following chemotherapy administration (Yuce & Yurtsever, 2019). OM can have many implications for the patient and healthcare system including reduced oral intake, increased risk for infection, increased healthcare needs, interruption to chemotherapy, and increase healthcare costs (Mercadante et al., 2015; Bernhardson, 2003; Kanagalingam et al., 2018;

Ruescher et al., 1998; Heimdahl et al., 1989; Elting et al., 2003; Goldberg et al., 2004). With chemotherapy predominantly administered in the outpatient setting, almost all patient self-care activities related to prevention and the treatment of symptoms are needed to be managed at home without direct supervision by an HCP (Dodd & Miaskowski, 2000). To manage side effects or symptoms of chemotherapy, the patient requires comprehensive information on the specifics of their disease, treatment, associated symptoms, and symptom management (Dodd & Miaskowski, 2000).

This practicum project aims to address the clinical problem of OM in patients receiving chemotherapy in Newfoundland and Labrador (NL) by developing an educational resource on mouth care and OM for patients receiving chemotherapy. This environmental scan aims to identify existing knowledge from internal and external databases on mouth care and OM in patients receiving chemotherapy and gain insight into the management of OM and mouth care-related side effects in patients receiving chemotherapy in NL and other parts of Canada. The information obtained through this environmental scan will be used in this practicum project to guide resource development and adapt the existing knowledge for developing an educational resource on mouth care and OM for patients receiving chemotherapy in NL.

Objectives for the Environmental Scan

The environmental scan was performed to identify existing knowledge from internal and external databases and gain insight into the management of OM in patients receiving chemotherapy in NL and in other settings in Canada. The objectives of this environmental scan include:

1. Identify the clinical resources available on mouth care and OM in patients receiving

chemotherapy in NL.

2. Identify the clinical resources available on mouth care and OM in patients receiving chemotherapy across Canada, focusing on the British Columbia (BC) Cancer Agency and the Leukemia and Lymphoma Society of Canada (LLSC).
3. Consult with key stakeholders on resources available and used in NL on mouth care and OM for patients receiving chemotherapy.
4. Analyze and summarize the data collected to inform the development of an educational resource on mouth care and OM for patients receiving chemotherapy in NL.

Methods

Three sources were used for data collection for this environmental scan. There was a local intranet search with NL Health Services, an internet search, and consultation with key stakeholders, conducted. The internet search involved searching for information from the BC Cancer Agency and LLSC. Each search aimed to identify relevant informational resources, policies, guidelines, and assessment tools related to mouth care and OM in patients receiving chemotherapy. Data management and analysis of the information found in this environmental scan will be discussed in this section of the paper.

Data Collection

This section of the paper will discuss the three sources used to collect data for this environmental scan, as previously identified.

Local Intranet Search

To identify existing local and provincial knowledge related to mouth care and OM in patients receiving chemotherapy, the local intranet, including the learning management system

for employees, for NL Health Services was searched for educational resources, policies, guidelines, and assessment tools related to mouth care and OM in patients receiving chemotherapy. The intranet is an online, internal database for employees with access to policies, forms, reporting systems, clinical tools, and resources within the health authority. The learning management system is the primary healthcare training portal for recording education and completing required education modules for employees of NL Health Services.

Internet Search

In addition to searching the intranet for local resources related to this practicum, informational resources related to mouth care and OM in patients receiving chemotherapy were explored nationally through the LLSC and the BC Cancer Agency. These two organizations were chosen as many of the current practices and resources for cancer care in NL are based on the guidelines, policies, and resources from these two organizations in Canada. General searches of oral/mouth care and mucositis searches were performed on the websites of the LLSC and the BC Cancer Agency to find relevant resources for this practicum.

Email of Inquiry to Key Stakeholders

The third data collection method used in this environmental scan was an email of inquiry to key stakeholders in the oncology and hematology program in NL. The email of inquiry sent to key stakeholders is included in Appendix A: *Email of Inquiry for Key Stakeholders* of this paper. This email was sent to the patient care facilitator on 4NA, the clinical educator for the medicine program at the Health Science Centre, the clinical educator for the cancer care program of NL, the nurse coordinator for the NL Stem Cell Therapy Program and the Nurse Practitioner for inpatient hematology. The purpose of this email of inquiry was to identify any additional sources

of information or resources that may not have been considered or found in this environmental scan with the local intranet and internet searches.

Data Management and Analysis

The data collected was grouped into the educational materials, policies, guidelines, and assessment tools. This allowed related material from different sources to be compared and analyzed for relevance and applicability to the practicum. It also allowed for identifying the strengths and limitations of the different resources identified.

Ethical Considerations

Ethical approval for this practicum is not required per the Health Research Ethics Authority screening tool attached in Appendix B: *Health Research Ethics Approval Screening Tool* of this paper. This project is considered a quality improvement initiative. Some other ethical considerations for this practicum project include disclosure of practicum context and intent and verbal consent from the unit manager to conduct this practicum project and contact key stakeholders. Verbal consent was obtained from the manager of 4NA. Key stakeholders contacted will be sent the email of inquiry included in Appendix A of this paper. The purpose of this practicum and the inquiry will be communicated in the email with the recognition that response is voluntary, and that response means implied consent for the purpose of this practicum. Direct responses will not be presented in the practicum but can be used to guide information and resource searching as part of the environmental scan. There is no patient involvement or use of patient information in this practicum, therefore, considerations around confidentiality and data security considerations are not required.

Results

Educational Materials

There were no online modules or education sessions for patients or HCPs on OM or mouth care in patients receiving chemotherapy identified through the three data sources used in this environmental scan. There were three online information booklets on managing side effects related to mouth care and OM (LLSC, n.d.-a, LLSC, n.d.-b, LLSC., n.d-c.) as well as two patient information documents (BC Cancer Agency, 2003; BC Cancer Agency, 2020). Only one resource, a paper pamphlet on mouth care, was found in the search for educational materials available by NL Health Services for patients and HCPs.

Policies and Guidelines

This environmental scan identified three guidelines for mouth care and OM in chemotherapy patients: one by NL Health Services (2002), two by the BC Cancer Agency by mouth care in patients receiving chemotherapy by NL Health Services (2022), and two guidelines by BC Cancer Agency on symptom management guidelines for OM (BC Canada Agency, 2014) and mucositis nutritional guidelines for symptom management (BC Cancer Agency, 2005). However, no policies related to mouth care or OM in patients receiving chemotherapy were found in this environmental scan.

Assessment Tools

This environmental scan identified two assessment tools for OM: one used by NL Health Services on 4NA, as outlined in the Eastern Health (2022) guidelines, and another by the BC Cancer Agency (2018). The assessment tool used in the Eastern Health (2022) guidelines is adapted from the World Health Organization (1979).

Email of Inquiry to Key Stakeholders

The resources related to this practicum that key stakeholders identified in their responses to the email of inquiry in Appendix A of this paper were previously discovered through intranet and internet searches of this environmental scan. Although the email of inquiry with key stakeholders did not result in any additional resources for this practicum, many of the key stakeholders commented on the need for this project related to cancer care in NL and expressed interest in the practicum project.

Implications for the Development of an Educational Resource

The educational materials, guidelines, and assessment tools related to mouth care and OM in patients receiving chemotherapy identified in this environmental scan will be used to develop an educational resource on OM for patients receiving chemotherapy. While there were many valuable resources to this practicum found in this environmental scan, there were no online modules or education sessions for patients or HCPs on mouth care or OM in patients receiving chemotherapy identified. The literature review for this practicum supports the development of an educational resource on mouth care and OM for patients receiving chemotherapy. The information discovered in this environmental scan can be adapted to develop an educational resource for patients receiving chemotherapy in NL.

Conclusion

This environmental scan for this practicum project identifies significant resources, including educational materials, guidelines, and assessment tools, on mouth care and OM in patients receiving chemotherapy. This information will be significant in developing an educational resource on mouth care and OM for patients receiving chemotherapy in NL. This environmental scan supports a lack of educational resources in NL and significant resources

from the BC Cancer Agency and the LLSC, which can be adapted to develop an educational resource on mouth care and OM for patients receiving chemotherapy in NL.

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Appendix A

Email of Inquiry for Key Stakeholders

May 26th, 2024

To whom it may concern,

I am completing the Master of Science in Nursing Program at Memorial University. I am required to complete a practicum project to complete this program. The title of my practicum project is *The Development of an Educational Resource on Mouth Care for Patients Receiving Chemotherapy in Newfoundland and Labrador*. I am conducting an environmental scan to determine what resources and information already exists in Newfoundland and Labrador as well as through BC Cancer Agency and the Leukemia and Lymphoma Society of Canada. I am emailing inquiring of any existing resources which you believe would be applicable to this practicum project. Any guidance on existing resources related to mouth care and oral mucositis in patients receiving chemotherapy would be greatly appreciated.

Thank you,

Madisan Martin

Appendix B

Health Research Ethics Authority (HREA) Screening Tool

Student Name: Madisan Martin

Title of Practicum Project: The development of an educational resource on mouth care for patients receiving chemotherapy in Newfoundland and Labrador

Date Checklist Completed: May 25th, 2024

This project is exempt from Health Research Ethics Board approval because it matches item number 3 from the list below.

1. Research that relies exclusively on publicly available information when the information is legally accessible to the public and appropriately protected by law; or the information is publicly accessible and there is no reasonable expectation of privacy.
1. Research involving naturalistic observation in public places (where it does not involve any intervention staged by the researcher, or direct interaction with the individual or groups; individuals or groups targeted for observation have no reasonable expectation of privacy; and any dissemination of research results does not allow identification of specific individuals).
2. Quality assurance and quality improvement studies, program evaluation activities, performance reviews, and testing within normal educational requirements if there is no research question involved (used exclusively for assessment, management or improvement purposes).
3. Research based on review of published/publicly reported literature.
4. Research exclusively involving secondary use of anonymous information or anonymous human biological materials, so long as the process of data linkage or recording or dissemination of results does not generate identifiable information.
5. Research based solely on the researcher's personal reflections and self-observation (e.g. auto-ethnography).
6. Case reports.
7. Creative practice activities (where an artist makes or interprets a work or works of art).

For more information please visit the Health Research Ethics Authority (HREA) at https://rpresources.mun.ca/triage/is-your-project-exempt-from-review/

Appendix C Consultations Report

Consultations Report

The Development of an Educational Resource on Mouth Care and Oral Mucositis for Patients Receiving Chemotherapy in Newfoundland and Labrador

Madisan Martin (201417425)

N6660

Memorial University of Newfoundland

In recent years, remarkable progress in the treatment of cancer has been made, and the prognosis for patients diagnosed with cancer has significantly improved (Yuce & Yurtsever, 2019). In Canada, the predicted five-year survival rate for all cancers combined was 64% in 2017, up from 55% in the early 1990s to 25% in the 1940s (Ellison & Saint-Jacques, 2023). The clinical significance of improved prognosis of patients diagnosed with cancer related to the impact of adverse effects of cancer therapy for the patient has caused significant problems for healthcare providers (HCPs) such as increased healthcare needs for the patient and costs to the healthcare system (Yuce & Yurtsever, 2019; Mercadante et al., 2015). The main side effects of chemotherapy are due to the lack of selectivity of the chemotherapy drugs for cancer cells (El-Nemer et al., 2015; Mollaoğlu & Erdoğan, 2014; Ottaviani et al., 2023). Chemotherapy induces not only damage to the cancer cells but also the healthy cells characterized by high proliferation such as the epithelial cells of the oral mucosa and the rest of the gastrointestinal system (El-Nemer et al., 2015; Mollaoğlu & Erdoğan, 2014; Ottaviani et al., 2023). Oral mucositis (OM) is one side effect of chemotherapy which implies inflammation of the oral mucosa, and affects up to 40% of patients treated with standard chemotherapy (Chen, 2008; Ottaviani et al., 2023; Yuce & Yurtsever, 2019). Symptoms of OM generally manifest within three to five days after chemotherapy administration (Yuce & Yurtsever, 2019). Symptoms of OM usually peak in intensity seven to fourteen days after chemotherapy administration (Yuce & Yurtsever, 2019). If OM is cared for properly with minimal complications, symptoms can be recovered in up to two to three weeks following chemotherapy administration (Yuce & Yurtsever, 2019). OM can have many implications for the patient and healthcare system including reduced oral intake, increased risk for infection, increased healthcare needs, interruption to chemotherapy and increased healthcare costs (Mercadante et al., 2015; Bernhardson, 2003; Kanagalingam et al., 2018;

Ruescher et al., 1998; Heimdahl et al., 1989; Elting et al., 2003; Goldberg et al., 2004). With chemotherapy predominantly administered in the outpatient setting, almost all patient self-care activities related to the prevention and treatment of symptoms need to be managed at home without direct supervision by an HCP (Dodd & Miaskowski, 2000). To manage side effects or symptoms of chemotherapy, the patient requires comprehensive information on the specifics of their disease, treatment, associated symptoms, and symptom management (Dodd & Miaskowski, 2000).

This practicum project aims to address the clinical problem of OM in patients receiving chemotherapy in Newfoundland and Labrador (NL) by developing an educational resource on mouth care and OM in patients receiving chemotherapy. In this practicum, the purpose of consultations with key stakeholders, including staff nurses, is to gather information on beliefs and attitudes, current practices, and educational resource development related to mouth care and OM in patients receiving chemotherapy.

Goal and Objectives of the Consultations

The goal of consultations in this practicum with key stakeholders including staff nurses in the hematology and oncology program at the Health Science Center (HSC), was to gain knowledge on attitudes and beliefs, current practices and educational resource development related to mouth care and OM in patients receiving chemotherapy. Consultations aimed to identify the need for resource development and content for the educational resource to be developed in this practicum as per key stakeholders, including staff nurses. The objectives of the consultations for this practicum included:

1. To gather information on current attitudes and beliefs of key stakeholders related to

mouth care and OM in patients receiving chemotherapy used in NL.

2. To gather information on current educational resources and practices of key stakeholders including staff nurses related to mouth care and OM in patients receiving chemotherapy in NL.
3. To gather information on patient educational needs related to mouth care and OM during chemotherapy as per key stakeholders to inform educational resource content to be developed in this practicum.
4. To identify barriers to patient education related to mouth care and OM in patients receiving chemotherapy.
5. To obtain feedback from staff nurses on current resources, the need for resource development, and resource content on mouth care and OM in patients receiving chemotherapy in NL.

Setting and Sample

The consultations included in this report were conducted at the HSC in NL in the oncology and hematology program. 4NA is the acute care, inpatient hematology and oncology unit for NL. The key stakeholders consulted included all staff nurses on 4NA at the HSC, the two patient care facilitators on 4NA, the clinical educator for the medicine program at the HSC, the clinical educator for the cancer care program at the HSC, the Nurse Practitioner for inpatient hematology, the general practitioner for hematology, the clinical pharmacist for hematology, and the nurse coordinator for the NL Stem Cell Therapy Program. This sample was chosen due to the high level of expertise of these HCPs on the topic of interest, as well as their awareness of current practices and resources available relevant to this practicum.

Data Collection

There were two questionnaires used for consultations: one for key stakeholders who are not staff nurses as shown in Appendix A: *Email of Inquiry and Questionnaire for Key Stakeholders (Excluding Staff Nurses),* and another for staff nurses on 4NA, as shown in Appendix B: *Email of Inquiry and Questionnaire for Staff Nurses*. Many of the questions were the same between the two questionnaires, there was a question on the questionnaire for key stakeholders asking who they believed to be responsible for patient education that was not posed to staff nurses. Questions on experience and comfort with delivering education were posed to the staff nurses, but they were not asked of the other key stakeholders. These differences were due to the staff nurses' different roles and responsibilities compared to the other key stakeholders. The level of expertise was also more variable in the group of staff nurses compared to the other key stakeholders.

Key stakeholders and staff nurses were informed of the questionnaire by an email of inquiry, as shown in the Appendices. Each email included the appropriate questionnaire so that participants could complete the questionnaire via email or complete a paper form. The questionnaires included in the emails were also printed and delivered to the key stakeholders for convenience. Paper copies of the questionnaire for staff nurses were placed in the classroom on 4NA, and staff nurses were made aware of this via email. Key stakeholders and staff nurses were informed of a locked submission container in the patient care facilitators' office on 4NA. The emails of inquiry provided background information on the practicum, the purpose of the email of inquiry and stated ethical considerations for the key stakeholders, including staff nurses. Participants were asked not to include their names on the questionnaire to protect confidentiality, and completing a questionnaire assumed implied consent for use in this practicum. Emails of inquiry and questionnaires were distributed on July 8th, 2024, and completed questionnaires were

collected from the locked collection box in the patient care facilitators office on July 11th, 2024, as communicated with key stakeholders and staff nurses in the email of inquiry.

Data Management and Analysis

The results of the completed questionnaires are included in Appendix C: *Results of Questionnaire for Key Stakeholders (Excluding Staff Nurses)* and Appendix D: *Results of Questionnaire for Staff Nurses* of this paper. Data collected in the questionnaires was organized using tables and grouping of common findings in Microsoft Word. Data analysis was completed using descriptive statistics including totals and percentages. Descriptive responses were grouped for data analysis of how common specific responses or themes were, and totals and percentages were also used. A comparison of responses for similar questions between the questionnaire for key stakeholders and the questionnaire for staff nurses was conducted. The findings of the consultations will be discussed in the following section of this paper.

Results

Eight emails of inquiry with questionnaires as shown in Appendix A: *Email of Inquiry and Questionnaire for Key Stakeholders (Excluding Staff Nurses)* distributed to key stakeholders excluding staff nurses. Six completed questionnaires were collected via the collection box in the patient care facilitators' office on 4NA. There were forty-two emails of inquiry with questionnaires, as shown in Appendix B: *Email of Inquiry and Questionnaire for Staff Nurses* distributed to staff nurses on 4NA. Sixteen completed questionnaires were collected via the collection box in the patient care facilitators' office on 4NA. There were no responses with completed questionnaires received via email for the key stakeholders or staff nurses. Participants were asked not to include their names on the completed questionnaires, therefore, it is unknown

which key stakeholders and staff nurses responded to the questionnaires. The results of the completed questionnaires are included in Appendix C: *Results of Questionnaire for Key Stakeholders (Excluding Staff Nurses)* and Appendix D: *Results of Questionnaire for Staff Nurses* of this paper. Background information on participants as available, beliefs and attitudes, current practices, and resource development information obtained from the questionnaires in the consultations for this practicum will be presented in this section of the paper.

Background Information on Participants

The key stakeholders consulted in the consultations for this practicum are outlined above. Only background information was collected on the staff nurses, not the other key stakeholders. The key stakeholders are believed to be experts in this area based on their positions. All key stakeholders are knowledgeable in chemotherapy, have prescribing abilities for chemotherapy or have completed the chemotherapy certification course. In the questionnaire for staff nurses, staff nurses were asked their years of experience on 4NA and chemotherapy certification status. Of the staff nurses who responded, 25% of participants have worked on 4NA for less than one year, 25% have worked on 4NA for one to five years, 12.5% have worked on 4NA for six to ten years, and 37.5% have worked on 4NA for more than ten years. Furthermore, 62.5% of staff nurses who participated in the questionnaire reported having the chemotherapy certification course. This information provides insight into the level of expertise and experience of staff nurses who participated in the consultations for this practicum.

Beliefs and Attitudes

In the questionnaires, 100% of key stakeholders, including staff nurses, responded that they believe education on mouth care and OM is important for patients receiving chemotherapy.

Furthermore, based on the results, 80% of key stakeholders and 62.5% of staff nurses believed that patients receiving chemotherapy on 4NA are not adequately educated on mouth care and OM when receiving chemotherapy. Staff nurses were asked to identify barriers to patient education on 4NA related to mouth care and OM: 75% reported lack of time, 56.3% responded lack of resources, 37.5% responded lack of knowledge, 6.3% reported non-compliance of the patient with education, and 6.3% identified language barriers. Of the staff nurses consulted, 62.5% reported feeling extremely comfortable, 31.3% reported feeling somewhat comfortable, and 6.3% reported feeling uncomfortable providing education on mouth care and OM to patients receiving chemotherapy. In the questionnaires, 100% of key stakeholders and 87.5% of staff nurses consulted, responded that there is a need for additional educational resources on mouth care and OM for patients receiving chemotherapy. The key stakeholders were asked who they believed was most responsible for providing education on mouth care and OM to patients receiving chemotherapy: 66.7% responded that the Registered Nurse, Medical Doctor, Nurse Practitioner, prescriber for chemotherapy, and pharmacist were all responsible for providing patient education; 16.6% said the prescribing physician and pharmacist; and 16.6% said the prescribing physician and Registered Nurse. Collecting data on the beliefs and attitudes of key stakeholders and staff nurses related to mouth care and OM is significant as it identifies support for this practicum, helps determine if there is a need to focus intervention on changing beliefs and attitudes to address the clinical issue of OM, and identifies considerations for resource development such as creating time conscious resources to address the identified barrier to patient education of lack of time.

Implications for the Practicum

The data collected on the beliefs and attitudes of key stakeholders and staff nurses

consulted as part of this practicum identified participants' beliefs that patients should be educated on mouth care and OM when receiving chemotherapy. It also identified that patients receiving chemotherapy do not appear to be adequately educated on mouth care and OM. Staff nurses identified lack of time, resources, and knowledge as the most common barriers to patient education on mouth care and OM for those receiving chemotherapy. This has implications for resource development in consideration of a resource that is quick to use, accessible, and contains all required information. This resource will be available electronically and on paper to be easily accessible and distributed. This resource should also contain all the information to adequately educate patients receiving chemotherapy on mouth care and OM, as the content will be based on the information found in the literature search, environmental scan and consultations of this practicum project. Key stakeholders also identified that the responsibility of patient education on mouth care and OM for patients receiving chemotherapy does not lie with one HCP, therefore this resource can be accessed and used by all HCP to gain knowledge and as support for patient education. This information has implications for resource development and supports the development of an educational resource on mouth care and OM for patients and HCPs in this practicum to address the clinical issue of OM in patients receiving chemotherapy.

Current Practices

When educating patients receiving chemotherapy on mouth care and OM, verbal education was the most common educational resource used by key stakeholders and staff nurses. Of the key stakeholders who participated, 100% use verbal education, 40% use the printed pamphlet on 4NA and 20% use the printed booklet for patient education on mouth care and OM and for staff nurses, 75% use verbal education, 50% use the printed booklet on 4NA, 43.8% use printed pamphlets, and 31.3% use information from the BC Cancer Agency website.

The key stakeholders and staff nurses were also asked about current prevention and treatment interventions used for OM in the questionnaires. The most common prevention strategy key stakeholders and staff nurses identified was normal saline mouth rinses. Key stakeholders identified normal saline mouth rinses (100%), routine mouth care (50%) and daily nursing assessment (33.3%) as the top three interventions for OM prevention in patients receiving chemotherapy, and staff nurses identified normal saline mouth rinses (73%), use of soft toothbrush (33.3%) and patient education before chemotherapy (33.3%) as the top three interventions used to prevent OM in patients receiving chemotherapy. Key stakeholders and staff nurses identified the use of magic mouthwash as the most common intervention for treating OM in patients receiving chemotherapy. Key stakeholders identified magic mouthwash (100%), analgesics and opioids (66.6%) and steroids (33.3%) as the top three interventions for OM treatment in patients receiving chemotherapy and staff nurses identified magic mouthwash (78.6%), normal saline mouthrinses (28.6%) and analgesics and opioids (21.4%) as the top three interventions used to treat OM in patients receiving chemotherapy. Collecting data on current practices of key stakeholders and staff nurses related to mouth care and OM in patients receiving chemotherapy is significant as it identifies resources already used and information to consider for content in the resource to be developed in this practicum.

Implications for the Practicum

The data collected on current practices of key stakeholders and staff nurses identifies important considerations and information for resource development. Verbal and printed information were the most common forms of education provided to patients therefore development of a resource which can be printed and used to guide verbal education is supported. Common prevention and treatment interventions for OM were also identified and should be

included in the development of educational resources. Some prevention interventions for OM identified in the questionnaires by key stakeholders and staff nurses to include in the educational resource to be developed, including an explanation of the importance of normal saline mouth rinses, instructions for mouth care, and instructions for mouth assessment. Some treatment interventions for OM as identified in the questionnaires completed by key stakeholders and staff nurses to include in the educational resource to be developed, include an explanation of medicated mouthwashes such as magic mouthwash, the use of pain medication, and continuation of mouth care practices. The information collected in this part of the consultations will be significant in the content of the resources to be developed in this practicum.

Resource Development

Key stakeholders and staff nurses were also asked if they believed there is a need for resource development on mouth care and OM, and content that should be included in an educational resource on mouth care and OM for patients receiving chemotherapy. In the questionnaires, 100% of key stakeholders consulted and 87.5% of staff nurses consulted, responded that there is a need for additional educational resources on mouth care and OM for patients receiving chemotherapy. To gain insight into content in resource development for this practicum, the key stakeholders and staff nurses were also asked to identify three important pieces of information to include in an educational resource on mouth care and OM for patients receiving chemotherapy. Based on the results, 66.6% of key stakeholders responded that instruction on mouth care, as well as prevention strategies for OM, were top priority to include in a patient educational resource, 78.6% of staff nurses responded that the importance of frequent mouth care was the top priority to include in a patient educational resource. Key stakeholders also identified the importance of instructions on complete mouth assessment (50%), treatment

options for OM (33.3%) and general explanation of OM (16.6%) as important pieces of information to include in an education resource on mouth care and OM for patients receiving chemotherapy.

Moreover, staff nurses identified the importance of information on normal saline and other medicated mouth rinses (57.1%), prevention strategies (50%), and instructions on complete mouth assessment (35.7%) as important pieces of information to include in an education resource on mouth care and OM for patients receiving chemotherapy. Collecting data related to resource development from key stakeholders and staff nurses related to mouth care and OM in patients receiving chemotherapy is significant. It identifies the need for resource development and key information to include in the resource to be developed in this practicum.

Implications for the Practicum

The data collected related to resource development from key stakeholders and staff nurses identifies important information to include in the educational resource for this practicum. The most common information identified by key stakeholders and staff nurses to include in the resource are instructions on completing mouth care and oral assessment, prevention and treatment strategies for OM, the importance of normal saline mouth rinses, and other medicated mouth rinses. As shown in Appendix C: *Results of Questionnaire for Key Stakeholders (Excluding Staff Nurses)* and Appendix D: *Results of Questionnaire for Staff Nurses* of this paper, there were eleven and five different pieces of information identified to include in the development of an educational resource on mouth care and OM by key stakeholders and staff nurses respectively to be considered for resource development. The consultations with key stakeholders and staff nurses yielded significant information for consideration and application to developing an educational resource on mouth care and OM for patients receiving chemotherapy.

Ethical Considerations

Ethical approval for this practicum is not required, as shown in Appendix E: *Health Research Ethics Authority Screening Tool* for this consultation report. This project is considered a quality improvement initiative. Some other ethical considerations for this practicum that were not previously mentioned in this paper include disclosure of practicum context and intent to the unit managers of 4NA. Verbal consent was obtained from the managers of 4NA to conduct this practicum project and to contact key stakeholders in this consultation. There is no patient involvement or use of patient information in this practicum therefore considerations around confidentiality and data security are not required.

Conclusion

OM in patients receiving chemotherapy is a significant clinical issue due to its occurrence and impact on the patient and healthcare system. In the consultations for this practicum, patient education on mouth care and OM for patients receiving chemotherapy was identified as being important by key stakeholders, including staff nurses, but it was also reported that patients receiving chemotherapy needed to be more adequately educated on mouth care and OM. One barrier to patient education identified was lack of resources. Key stakeholders, including staff nurses, identified the need for more educational resources on mouth care and OM for patients receiving chemotherapy. In the consultations for this practicum, information was collected on prevention and treatment interventions for OM. Key pieces of information were identified to include in developing an educational resource on mouth care and OM for patients receiving chemotherapy, as identified by key stakeholders and staff nurses. In conclusion, the consultation of key stakeholders and staff nurses in the hematology and oncology program at the HSC

resulted in significant data supporting this practicum and the development of an educational resource on mouth care and OM for patients receiving chemotherapy in NL.

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Appendix A

Email of Inquiry and Questionnaire for Key Stakeholders (Excluding Staff Nurses)

July 8th, 2024

To whom it may concern,

I am completing the Master of Science in Nursing Program at Memorial University Faculty of Nursing. I am required to complete a practicum project to complete this program. The title of my practicum project is *The Development of an Educational Resource on Mouth Care and Oral Mucositis for Patients Receiving Chemotherapy in Newfoundland and Labrador*. I hope to develop an online and paper resource for patients as well as health care providers on mouth care and oral mucositis in patients receiving chemotherapy. I am conducting consultations to determine what resources and information already exist in Newfoundland and Labrador and to inquire on the need for new educational resources and resource content, on mouth care and oral mucositis for patients receiving chemotherapy. I have attached a questionnaire to seek information pertinent to this consultation. I invite you to complete this questionnaire or use it to guide a response to this email. Your response will not be included directly in the practicum but will be used to guide resource development.

Participation is voluntary. You do not have to complete all questions of the questionnaire and can withdraw your participation at any time. All information provided is confidential, and your name will not appear in any report of this practicum. Data collected will only be accessible to myself, Madisan Martin. There are no known or anticipated risks to you as a participant.

If you choose to complete the questionnaire, you can email it back to me or place it in a sealed envelope and in the designated collection box in the patient care facilitator's office on 4NA by **Thursday July 11th, 2024.**

Your feedback would be greatly appreciated. Thank you for your time.

Madisan Martin BNRN

Master of Science in Nursing Graduate Student

Faculty of Nursing, Memorial University of Newfoundland

Key Stakeholder Questionnaire

1. Do you believe education on mouth care and oral mucositis is important for patients receiving chemotherapy?
    a. Yes
    b. No

2. Do you believe patients receiving chemotherapy on 4NA are adequately educated on mouth care and oral mucositis when receiving chemotherapy?
    a. Yes
    b. No

3. Who do you believe is primarily responsible for providing education on mouth care and oral mucositis to patients receiving chemotherapy?
    a. Registered Nurse
    b. Physician/Nurse Practitioner
    c. Prescriber of Chemotherapy (Hematologist/Oncologist)
    d. Pharmacist
    e. All the above
    f. Other (please specify): _____

4. What educational resources do you provide to patients receiving chemotherapy on mouth care and oral mucositis? (select all that apply)
    a. Website links or printed information from websites
        i. If you provide information from websites, which organization's websites does the information come from? _____
    b. Printed information booklets on unit
    c. Printed pamphlets on unit
    d. Verbal education
    e. Other (please specify): _____

5. Do you believe there is a need for additional educational resources on mouth care and oral mucositis for patients receiving chemotherapy in Newfoundland and Labrador?
    a. Yes
    b. No

6. What interventions are used to prevent oral mucositis in patients receiving chemotherapy?

    _____

    _____

    _____

7. What interventions are used to treat oral mucositis in patients receiving chemotherapy?

   _____
   _____
   _____

8. In the development of an educational resource on mouth care and oral mucositis in patients receiving chemotherapy, what would be three important pieces of information to include?

   1) _____
   2) _____
   3) _____

If there is any further information or recommendations that you would like to include to contribute to this practicum project, please include them below.

_____
_____
_____
_____
_____
_____
_____
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_____

Appendix B

Email of Inquiry and Questionnaire for Staff Nurses

July 8th, 2024

Dear nursing staff of 4NA,

I am completing my practicum project for the Master of Science in Nursing Program at Memorial University Faculty of Nursing and am emailing to invite you to participate in a questionnaire to contribute to this project. The goal of this practicum is to develop an educational resource on mouth care and oral mucositis for patients receiving chemotherapy in Newfoundland and Labrador. The goal of this consultation is to gain knowledge of current resources and practices related to patient education and mouth care, and to gain input on the needs for resource development as well as content to be considered for resource development.

Participation is voluntary. Your participation will include completion of a questionnaire which may take five to ten minutes to complete. You can withdraw your participation at any time. All information provided is confidential, and your name will not appear in any report of this practicum. Data collected will only be accessible to myself, Madisan Martin. There are no known or anticipated risks to you as a participant.

I have attached the questionnaire to this email and have also placed paper copies in the classroom on 4NA. Once you have completed the questionnaire, you can email it to me or place it in a sealed envelope and in the designated collection box in the patient care facilitator's office on 4NA by **Thursday, July 11th, 2024.**

Thank you for your consideration to participate,

Madisan Martin BNRN

Master of Science in Nursing Graduate Student

Faculty of Nursing, Memorial University of Newfoundland

Staff Nurse Questionnaire

Instructions:

- Please provide the response that is most relevant to you.
- You may answer written questions in point form or paragraph form.
- Please do not include your name on this questionnaire.
- It is not necessary to answer all questions to submit the questionnaire.
- Once complete, place the questionnaire in an envelope and then in the collection box in the patient care facilitator's office on 4NA.

1. How long have you worked on 4NA?
    a. 0-1 year
    b. 1-5 years
    c. 6-10 years
    d. 10-15 years
    e. > 15 years

2. Have you completed the chemotherapy certification course?
    a. Yes
    b. No, but I am interested in completing the course
    c. No

3. How comfortable do you feel providing education to patients receiving chemotherapy on mouth care and oral mucositis?
    a. Extremely comfortable
    b. Somewhat comfortable
    c. Neutral
    d. Uncomfortable
    e. Extremely uncomfortable

4. Do you believe education on mouth care and oral mucositis is important for patients receiving chemotherapy?
    a. Yes
    b. No

5. Do you believe patients receiving chemotherapy are adequately educated on mouth care and oral mucositis when receiving chemotherapy?
    a. Yes
    b. No

6. What educational resources do you provide to patients receiving chemotherapy on mouth care and oral mucositis? (select all that apply)
    a. Website links or printed information from websites
        i. If you provide information from websites, which organization's websites does the information come from? _____
    b. Printed information booklets on unit
    c. Printed pamphlets on unit
    d. Verbal education
    e. Other (please specify): _____

7. Do you believe there is a need for additional educational resources on mouth care and oral mucositis for patients receiving chemotherapy?
    a. Yes
    b. No

8. What are barriers to patient education that you experience on 4NA related to mouth care and oral mucositis in patients receiving chemotherapy? (select all that apply)
    a. Lack of resources
    b. Lack of knowledge
    c. Lack of time
    d. Other (please specify): _____

9. In your experience, what interventions are used to prevent oral mucositis in patients receiving chemotherapy?

    _____
    _____
    _____

10. In your experience, what interventions are used to treat oral mucositis in patients receiving chemotherapy?

    _____
    _____
    _____

11. In the development of an educational resource on mouth care and oral mucositis in patients receiving chemotherapy, what would be three important pieces of information to include?

    i. _____
    ii. _____
    iii. _____

Appendix C

Results of Questionnaire for Key Stakeholders (Excluding Staff Nurses)

Question Responses (n)	Yes n (%)	N n (%)
Do you believe education on mouth care and oral mucositis is important for patients receiving chemotherapy? (n=6)	6 (100)	0
Do you believe patients receiving chemotherapy on 4NA are adequately educated on mouth care and oral mucositis when receiving chemotherapy? (n=5)	1 (20)	4 (80)
Do you believe there is a need for additional educational resources on mouth care and oral mucositis for patients receiving chemotherapy in Newfoundland and Labrador? (n=6)	6 (100)	0

Question Responses (n participants)	RN n (%)	MD/ NP n (%)	Prescriber n (%)	Pharmacist n (%)	All the Above n (%)
Who do you believe is primarily responsible for providing education on mouth care and oral mucositis to patients receiving chemotherapy? (n=6) *participants chose multiple responses (n=11 responses)	2 (33.3)	1 (16.7)	2 (33.3)	2 (33.3)	4 (66.7)
Legend: RN = Registered Nurse, MD = Medical Doctors, NP = Nurse Practitioner					

Question Responses (n participants)	Websites n (%)	Printed Booklets n (%)	Printed Pamphlet n (%)	Verbal n (%)
What educational resources do you provide to patients receiving chemotherapy on mouth care and oral mucositis? (select all that apply) (n=5) *participants chose multiple responses (n=8 responses)	0	1 (20)	2 (40)	5 (100)

What interventions are used to prevent oral mucositis in patients receiving chemotherapy? (n=6) *Participants gave multiple responses (n=15 responses)	
Common Themes/Responses	Number of participants (%)
Normal Saline Mouth Rinses	6 (100)
Routine Mouth Care	3 (50)
Daily Nursing Assessment	2 (33.3)
Soft Toothbrush	1 (16.6)
Club Roda Rinses	1 (16.6)
Cryotherapy	1 (16.6)
Magic Mouthwash (medicated mouthwash)	1 (16.6)

What interventions are used to treat oral mucositis in patients receiving chemotherapy? (n=6) *Participants gave multiple responses (n=20 responses)	
Common Themes/Responses	Number of participants (%)
Magic Mouthwash (medicated mouthwash)	6 (100)
Analgesics/Opioids	4 (66.6)
Steroids	2 (33.3)
Antiviral/Antifungal	2 (33.3)
Frequent Mouth Care	2 (33.3)
Change in Diet	1 (16.6)
IV Hydration	1 (16.6)
Change Oral Medications to Intravenous	1 (16.6)
Normal Saline Mouth Rinses	1 (16.6)

In the development of an educational resource on mouth care and oral mucositis in patients receiving chemotherapy, what would be three important pieces of information to include? (n=6) *Participants gave multiple responses (n=14 responses)	
Common Themes/Responses	Number of participants (%)
Instruction on Mouth Care	4 (66.6)
Prevention Strategies	4 (66.6)
Assessment	3 (50)
Treatment	2 (33.3)
Explanation of OM	1 (16.6)

Appendix D

Results of Questionnaire for Staff Nurses

Question Responses (n)	Yes n (%)	N n (%)
Having you completed the chemotherapy certification course? (n=16)	10 (62.5)	6 (37.5)
Do you believe education on mouth care and oral mucositis is important for patients receiving chemotherapy? (n=16)	16 (100)	0
Do you believe patients receiving chemotherapy on 4NA are adequately educated on mouth care and oral mucositis when receiving chemotherapy? (n=16)	6 (37.5)	10 (62.5)
Do you believe there is a need for additional educational resources on mouth care and oral mucositis for patients receiving chemotherapy? (n=16)	14 (87.5)	2 (12.5)

Question Responses (n participants)	0-1 Years n (%)	1-5 years n (%)	6-10 years n (%)	10-15 years n (%)	> 16 years n (%)
How long have you worked on 4NA? (n=16)	4 (25)	4 (25)	2 (12.5)	3 (18.8)	3 (18.8)

Question Responses (n participants)	Extremely n (%)	Somewhat n (%)	Uncomfortable n (%)
How comfortable do you feel providing education to patients receiving chemotherapy on mouth care and oral mucositis? (n=16)	10 (62.5)	5 (31.3)	1 (6.3)

Question Responses (n participants)	Websites n (%)	Printed Booklets n (%)	Printed Pamphlet n (%)	Verbal n (%)
What educational resources do you provide to patients receiving chemotherapy on mouth care and oral mucositis? (select all that apply) (n=16)	BC Cancer Agency 5 (31.3)	8 (50)	7 (43.8)	12 (75)

*participants chose multiple responses (n=32 responses)				

Question Responses (n participants)	**Lack of Resources n (%)**	**Lack of Knowledge n (%)**	**Lack of Time n (%)**	**Other Barrier n (%)**
What are barriers to patient education that you experience on 4NA related to mouth care and oral mucositis and patient teaching? (select all that apply) (n=16) *participants chose multiple responses (n=29 responses)	9 (56.3)	6 (37.5)	12 (75)	Non-compliance 1 (6.3) Language Barrier 1 (6.3)

What interventions are used to prevent oral mucositis in patients receiving chemotherapy? (n=15) *Participants gave multiple responses (n=39 responses)	
Common Themes/Responses	Number of participants (%)
Normal Saline Mouth Rinses	11 (73)
Soft Toothbrush	5 (33.3)
Education Before Chemotherapy	5 (33.3)
Routine Mouth Assessment	4 (26.6)
Frequent Mouth Care	3 (20)
Magic Mouthwash (medicated mouthwash)	2 (13.3)
Prophylactic Fluconazole	2 (13.3)
Cryotherapy	2 (13.3)
Avoid Food and Drink that Irritates the Oral Mucosa	2 (13.3)
Reporting Signs of oral mucositis	1 (6.7)
Biotene Dry Mouth Gel	1 (6.7)
Avoid Alcohol and Smoking	1 (6.7)

What interventions are used to treat oral mucositis in patients receiving chemotherapy? (n=14) *Participants gave multiple responses (n= 29 responses)	
Common Themes/Responses	Number of participants (%)
Magic Mouthwash (medicated mouthwash)	12 (85.7)
Normal Saline Mouth Rinse	4 (28.6)
Analgesics/Opioids	3 (21.4)
Antiviral/Antifungal	3 (21.4)
Soft Foods	2 (14.3)
Changing Oral Medications to Intravenous	2 (14.3)
Sucralfate	1 (6.7)
Steroid Mouth Rinse	1 (6.7)
Ice Chips	1 (6.7)

In the development of an educational resource on mouth care and oral mucositis in patients receiving chemotherapy, what would be three important pieces of information to include? (n=14) *Participants gave multiple responses (n= 48 responses)	
Common Themes/Responses	Number of participants (%)
Importance of Frequent Mouth Care	11 (78.6)
Normal Saline and Other Mouth Rinses	8 (57.1)
Prevention	7 (50)
How to Perform Mouth Assessment	5 (35.7)
Hydration (Oral and Intravenous)	4 (28.6)
Early Signs of oral mucositis/Early Intervention	3 (21.4)
Nutrition/ Food and Drink to Avoid	3 (21.4)
Treatment	3 (21.4)
Use of Soft Toothbrush	2 (14.3)
Pain Management	1 (7.1)
Support from the Literature	1 (7.1)

Appendix E

Health Research Ethics Authority (HREA) Screening Tool

Student Name: Madisan Martin

Title of Practicum Project: The Development of an Educational Resource on Mouth Care for Patients Receiving Chemotherapy in Newfoundland and Labrador

Date Checklist Completed: June 19th, 2024

This project is exempt from Health Research Ethics Board approval because it matches item number 3 from the list below.

8. Research that relies exclusively on publicly available information when the information is legally accessible to the public and appropriately protected by law; or the information is publicly accessible and there is no reasonable expectation of privacy.
9. Research involving naturalistic observation in public places (where it does not involve any intervention staged by the researcher, or direct interaction with the individual or groups; individuals or groups targeted for observation have no reasonable expectation of privacy; and any dissemination of research results does not allow identification of specific individuals).
10. Quality assurance and quality improvement studies, program evaluation activities, performance reviews, and testing within normal educational requirements if there is no research question involved (used exclusively for assessment, management or improvement purposes).
11. Research based on review of published/publicly reported literature.
12. Research exclusively involving secondary use of anonymous information or anonymous human biological materials, so long as the process of data linkage or recording or dissemination of results does not generate identifiable information.
13. Research based solely on the researcher's personal reflections and self-observation (e.g. auto-ethnography).
14. Case reports.
15. Creative practice activities (where an artist makes or interprets a work or works of art).

For more information, please visit the Health Research Ethics Authority (HREA) at https://rpresources.mun.ca/triage/is-your-project-exempt-from-review/

Appendix D Educational Resource

Patient Resource Manual

Chemotherapy, Mouth Care and Oral Mucositis

A resource manual on mouth care and
oral mucositis for patients receiving chemotherapy

This resource manual is created by © Madisan Martin BNRN

in partial fulfillment of the Master of Science in Nursing Program at

Memorial University School of Nursing

2024

Table of Contents

Chemotherapy and Oral Health

Chemotherapy causes damage to the lining of the oral cavity (oral mucosa) and gastrointestinal system. Oral mucositis is one side effect of chemotherapy which implies an inflammation to the oral mucosa and affects up to 40% of patients treated with standard chemotherapy.

Some chemotherapy agents have a greater risk for causing such damage to the oral mucosa than other chemotherapy agents. An increased number of cycles of chemotherapy can have a cumulative effect and increase the risk of damage to the oral mucosa in patients receiving chemotherapy.

Mouth care is the best strategy to prevent oral mucositis, and the complications related to side effects of chemotherapy on the oral mucosa. Regular mouth care should be initiated with the start of chemotherapy.

The purpose of this patient resource manual is to provide information on oral health, mouth care and oral mucositis in patients receiving chemotherapy. This manual can empower patients receiving chemotherapy to be knowledgeable about oral health and chemotherapy and to practice proper oral care to optimize oral health while receiving chemotherapy.

Oral Mucositis

WHAT IS ORAL MUCOSITIS?

Oral mucositis is an acute inflammation to the lining of the oral cavity or throat characterized by redness, swelling, and ulceration of the oral mucosa. Oral mucositis is a progressive side effect of chemotherapy which requires early intervention once it occurs.

Oral mucositis can cause pain or discomfort, and interfere with oral intake, swallowing and speech. Oral mucositis may also lead to infection.

Stages of Oral Mucositis

The World Health Organization Grading System for Oral Mucositis

Grade	Description
0	No mucositis present
1	Irritation to the oral mucosa with pain, no overt ulcerations With or without redness Able to eat a normal diet
2	Sores/ulcers evident to oral mucosa Redness present Patient still able to swallow solid food
3	Extreme redness and ulceration Patient experiences extreme sensitivity when swallowing solid food Liquid diet necessary
4	Patient unable to swallow Total parenteral nutrition or tube feeding necessary

Mouth Care and Prevention of Oral Mucositis

Regular mouth care is key to preventing oral mucositis and mouth care practices should be initiated with the start of chemotherapy.

***Mouth Care Guidelines for Patients <u>Without</u> Oral Mucositis*:**

FREQUENCY

- Mouth care should be performed at least every four hours while awake using one of the mouth rinses listed below

MOUTH RINSES

- Saltwater/Normal Saline (dissolve 1 tsp of salt in 4c of hot water, allow to cool)
- Baking Soda Rinse (dissolve ½ tsp of baking soda in 2c of water)
- Salt and Soda Rinse (dissolve ½ tsp of salt and baking soda in 4 cups of water)

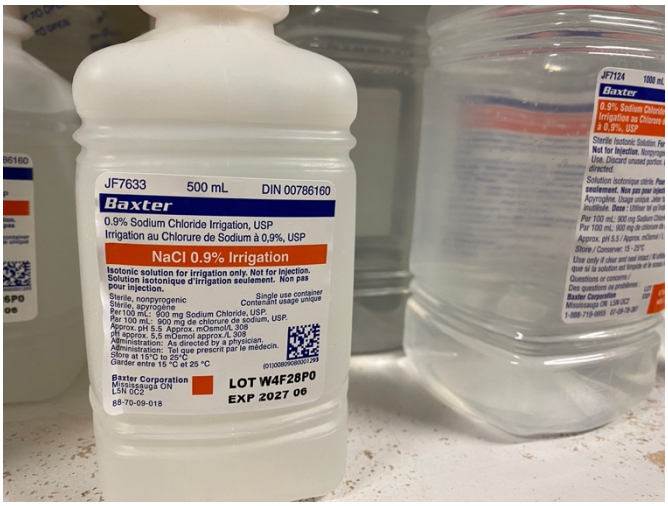


Figure 1 Normal Saline Mouthrinse

BRUSHING

- Brush teeth with a soft toothbrush after eating and as needed

FLOSS

- Gently floss once a day with unwaxed dental floss
  - Do not floss if pain or bleeding occur
  - Do not floss if platelet count is less than 50 or advised by your healthcare provider
  - Do not floss if it was not a routine practice prior to treatment

DENTURES

- If dentures are worn, remove and clean after meals
- Remove dentures and soak at night

LIP CARE

- Use petroleum jelly to keep lips moist

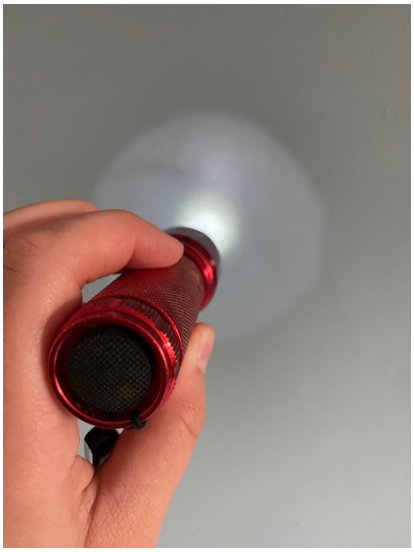
ORAL ASSESSMENT

- Perform oral assessment at least once a day

Oral Assessment

FREQUENCY

- Assess lips, inside of mouth and throat using a flashlight at least once a day



WHAT TO LOOK FOR?

- Monitor for dryness, redness, ulceration, cracks, bleeding gums or white patches on tongue and inside mouth.
- Monitor pain, ability to eat and drink, taste changes, changes with ability to speak, ability to wear dentures, and interference with normal daily activities

PRESENCE OF ORAL MUCOSITIS

- Report any signs or symptoms of oral mucositis to your healthcare provider immediately and initiate *Mouth Care Guidelines for Patients with Oral Mucositis*
- Continue regular daily assessments and make note of changes in assessment findings

Treatment of Oral Mucositis

***Mouth Care Guidelines for Patients <u>with</u> Oral Mucositis*:**

FREQUENCY

- Mouth care should be performed at least every four hours using one of the mouth rinses previously listed
- Wake during the night for mouth care

BRUSHING

- Brush teeth with a sponge toothbrush after eating and as needed

Figure 2 Sponge Oral Toothettes for Mouth Care

FLOSS

- Gently floss once a day with unwaxed dental floss
  - Do not floss if pain or bleeding occur
  - Do not floss if platelet count is less than 50 or advised by your healthcare provider
  - Do not floss if it was not a routine practice prior to treatment

DENTURES

- Avoid and minimize the use of dentures
- If dentures are worn, remove and clean after meals
- Remove dentures and soak at night

LIP CARE

- Use petroleum jelly to keep lips moist
- Monitor for broken skin, bleeding or signs of infection

ORAL ASSESSMENT

- Perform oral assessment at least once a day as previously described

TREATMENT

- May involve admission to hospital
- Regular mouth care practices
- Medication for pain or discomfort
- Medicated mouthrinses:
    - Lidocaine Viscous 2%
    - Magic Mouthwash (BMX Formulation)
    - Morphine Liquid
- Modification of regular diet to more liquids and soft foods as tolerated
- Intravenous nutrition or nutrition by feeding tube may be required in severe cases

Complications Related to Oral Mucositis

It is important to report any complications related to oral mucositis to your healthcare provider. Some common complications of oral mucositis experienced by patients receiving chemotherapy include abnormal dry mouth, bleeding, infection, pain, and reduced oral intake.

ABNORMAL DRY MOUTH

- Abnormal dryness in the mouth characterized by decrease and/or thickening of saliva may occur with oral mucositis
- It can be acute (short term) or chronic (long-lasting) in nature
- It can impact the ability to eat, drink, speak and breathe
- It is important to follow mouth care recommendations for oral mucositis
- The use of cool humidifier or vaporizer may help with dry mouth
- Ensure adequate fluid intake (2-3L daily)
- Moisturizing mouthwashes (Biotin) are available and may be helpful in addition to regular mouth care

BLEEDING

- Occasional bleeding may occur in the presence of oral mucositis
- Rinse mouth with ice water and apply pressure to site(s) of bleeding with clean gauze dipped in ice water or a partially frozen wet gauze
- If persistent or severe bleeding occurs and will not stop within two minutes, seek medical intervention immediately

INFECTION

- Alterations to the oral mucosa increases the risk of infection
- Infections may be bacterial, viral and fungal
- Monitor for signs and symptoms of infection (redness, swelling, fever) and report to healthcare provider immediately
    - *Bacterial infections* are characterized by inflamed oral mucosa, pain, ulceration, fever
    - *Viral infections* (such as Herpes Simplex Virus) and characterized by small, raised vesicles filled with clear fluid on the lips or oral mucosa
    - *Fungal infections* (such as Candida or Thrush) are characterized by inflammation and a white coating on the tongue or oral mucosa

PAIN

- Oral pain can occur with oral mucositis
- Oral pain can be a barrier to mouth care, which can make oral mucositis worse
- Oral pain management is essential to prevent further complications such as reduced oral intake, malnutrition, and dehydration
- Pain medications and medicated oral mouth rinses can be prescribed for oral pain management
- Taking pain medications before mealtimes can improve oral intake to prevent further complications

REDUCED ORAL INTAKE

- Reduced oral intake in the presence of oral mucositis is usually related to oral discomfort or pain
- Reduced oral intake increases the risk of malnutrition and dehydration
- Providing mouth care before and after meals can improve oral intake
- Sometimes pain medication is required prior to mealtimes to improve oral intake
- Modify your diet as appropriate.
    - Liquids and soft foods may be easier to consume opposed to hard solid foods in the presence of oral mucositis
- Avoid salty and spicy foods

Nutrition and Oral Mucositis

Maintaining adequate oral food and liquid intake is essential to prevent further complications when receiving chemotherapy. Oral mucositis may reduce oral intake due to pain and discomfort from oral mucositis. Modification to your diet may be necessary in the presence of oral mucositis. Soft solids and liquids are usually easier for people with oral mucositis. Your health care provider may also complete a **dietician** consult to support your nutritional needs. In severe cases of oral mucositis, intravenous nutrition or nutrition through a feeding tube may be necessary.

Some things to avoid when experiencing oral mucositis include:

- Very hot or cold foods and drinks
- Salty and spicy foods
- High acidity drinks such as juice and soda
- Hard and crunchy foods

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Patient Pamphlet

Additional Resources

Refer to *the Patient Resource Manual: Chemotherapy, Mouth Care and Oral Mucositis* for more detailed information and a list of additional resources on mouth care and oral mucositis in patients receiving chemotherapy.

Photo Acknowledgement

A woman with cancer is seen outside, Tongpatong, n.d., https://stock.adobe.com/ca/images/a-woman-with-cancer-is-seen-outside/630037769?prev_url=detail

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MOUTH CARE AND ORAL MUCOSITIS

An information pamphlet for patients receiving chemotherapy

Chemotherapy and Oral Health

Chemotherapy causes damage to the lining of the oral cavity (oral mucosa) making your mouth, tongue, lips and throat sore. Good mouth care is key to preventing this and future complications.

Mouth Care Basics

Perform mouth care using one of the following mouthrinses at least every four hours when awake:

- Normal Saline (Salt water)
- Baking Soda
- Salt and Soda Rinse

Brush your mouth after eating with a soft toothbrush. Use petroleum jelly to keep lips moist.

Floss your teeth daily with unwaxed floss unless bleeding occurs, or your doctor advises you not to.

Remove and clean dentures after meals. Remove dentures and soak at night.

Mouth care should be initiated with the start of all cancer treatment, including chemotherapy

Oral Mucositis

Oral mucositis is an acute inflammation to the lining of the oral mucosa or throat characterized by redness, swelling, and ulceration of the oral mucosa. Oral mucositis affects up to 40% of patients treated with standard chemotherapy.

Oral mucositis can cause pain or discomfort, and interfere with oral intake, swallowing and speech.

Mouth Assessment

Perform assessment of mouth at least once a day using a flashlight.

Monitor for redness, swelling, ulceration, bleeding, dryness, and white patches on tongue. Make note of pain or discomfort and your ability to eat, drink, swallow, and speak. Report any new findings to your health care provider immediately.

Prevention of Oral Mucositis

Regular mouth care and assessment is key to preventing oral mucositis.

Report any signs of oral mucositis and complications to your health care provider immediately

Treatment of Oral Mucositis

Perform regular mouth care every four hours (wake at night)

Pain control with medications and medicated mouth rinses

Treatment of infection

Complications

- Abnormal dry mouth
- Bleeding
- Infection
- Pain
- Reduced oral intake

Notes and Questions

References

British Columbia Cancer Agency. (2014). *Symptom Management Guidelines: Oral Mucositis*. http://www.bccancer.bc.ca/nursing-site/Documents/12.%20Oral%20Mucositis.pdf

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Prevention of Oral Mucositis

Regular mouth care and assessment is key to preventing oral mucositis.

Report any signs of oral mucositis and complications to your health care provider immediately

Treatment of Oral Mucositis

Perform regular mouth care every four hours (wake at night)

Pain control with medications and medicated mouth rinses

Treatment of infection

Complications

- Abnormal dry mouth
- Bleeding
- Infection
- Pain
- Reduced oral intake