

WOUND DRESSINGS DURING CANCER RADIOTHERAPY:

A SURVEY OF CANADIAN PRACTICE

By

Siby Elizabeth J Thomas

B.S.N., S.N.D.T. Women's University, Mumbai, 1999

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Dr. Sheryl Reimer-Kirkham, PhD.; Thesis Supervisor

Dr. Rosemary Kohr, PhD.; Second Reader

Dr. Rick Sawatzky, PhD.; Third Reader

TRINITY WESTERN UNIVERSITY

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There is a better way for everything. Find it.

- Thomas Edison.

Executive Summary

Patients who undergo radiotherapy typically experience changes to the skin in the area where the treatment is administered. Some discussions exist whether radiating through wound dressings will cause a boost effect to patients with cancer. The purpose of the thesis is to describe the current evidence and practice through literature review and a national environmental scan with the aim of developing the foundation for further research. After Research Ethics Boards approvals, one nurse per 34 Radiation Oncology Centres in Canada was contacted. Current practice survey data were collected from 18 Centres. Telephone interviews were conducted with four nurse participants to understand the context of nursing practice environment. Data analysis was done using descriptive statistics for the survey data and thematic analysis for the interviews. The integrative results of the study were reviewed with five inter-professional experts. The study results are used to make recommendations for research, practice, leadership and policy.

Keywords: Wound management, radiotherapy, clinical decision-making, inter-professional practice, person-centred nursing.

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Disclaimer: I have no relationship with any of the wound care product manufacturing companies.

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Chapter One: Introduction and Background

Although wounds are common among patients with cancer undergoing radiotherapy, there are inconsistencies in the management of these wounds, particularly during daily radiation treatments. This inconsistency is the focus of this nursing research study. In some cases, patients undergoing radiotherapy may have pre-existing wounds in the treatment area, while for others wounds are generated by the radiation therapy itself. Skin changes are unavoidable side-effects of radiotherapy (Perez, Medina, Perez, & Garcia, 2011). Radiation induced dermatitis is one of the most common side effects of external beam radiotherapy (Harris et al., 2012). The National Cancer Institutes' common toxicity criteria reveal that this radiation induced dermatitis, also referred to as radiation skin reactions, may vary from faint erythema or dry desquamation (NCI 1) to moderate to brisk erythema (NCI 2) to moist desquamation (NCI 3) to ulcerating dermatitis (NCI 4) (National Cancer Institute, 1999). Radiation to a site can delay wound healing, which relates to overall patient wellbeing, and is thus an integral component of nursing care. Radiodermatitis has the potential to impact an individual's quality of life as patients may suffer from changes in body image; physical discomfort such as pain and itching; difficulty with activities of daily living such as wearing clothes, movement of a limb or ambulation; and sleep impairment (McQuestion, 2006). Management of cancerous wounds and radiation dermatitis (wound greater than NCI 2) include the use of both topical agents and dressings. Currently, standard practice at the local Radiation Oncology Centre where I work involves the removal of wound dressings prior to daily fractionated radiotherapy. In my own practice as an oncology radiation nurse, many patients report the daily removal of dressings as painful and traumatic. I have noted that, on the patient's request, very thin dressings such as Mepitel® have been left in place with the approval of the radiation oncologist.

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According to White (2005), “Pain and trauma associated with dressing removal is of major concern to patients” (p. 108). Moreover, it is not clear if removing the dressing alters the wound bed and affects the healing process, and whether the radiation dose changes when delivered through a dressing. Thus, clinical inquiry in the management of radiation induced dermatitis and wound care during radiotherapy among patients with cancer is needed. This project aims to describe the relevant evidence and current practice in this regard at different Radiation Oncology Centres in Canada. A scoping review of literature is valuable in finding relevant evidence to answer existing clinical questions (Melnyk & Fineout-Overholt, 2011). As part of ongoing quality improvement measures, it is timely to reexamine the current practices, which will be accomplished with a national environmental scan in this project.

Underpinning Assumptions

Because of the lack of a standardized clinical practice guideline in this regard, my passion for the project lies in the intended benefits to the care for patients with cancer who are receiving radiotherapy. The context of clinical practice and inter-professional relations will affect the decisions made by nurses. Based on Dawes et al.’s series of questions (as cited by Pearson, Field, & Jordan, 2007, p. 126 & 127), a situation analysis has assisted in the development of broad assumptions that shape the project. These include:

- 1) Science: Focus on evidence-based knowledge with excellence as a system standard.
- 2) Safety: Develop accountable health-systems that will prevent or reduce error which is the bottom-line, overall intention for the study.
- 3) Value: New innovative techniques to prevent waste of resources (time and money).
- 4) Cooperation: Interdisciplinary co-ordination of care as data collection may require collaboration with Radiation Therapists (RT).

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- 5) Anticipation: Develop proactive efforts to restore and maintain health with possible policy change.

These underpinning assumptions assist in establishing the feasibility of the project, developing the research purpose, design and methodology to answer the clinical inquiry.

Project Description

Problem statement. As explained earlier, the effects of radiating through dressings are not well understood. The radiation technique being considered here is external beam radiotherapy that includes photon or electron beam x-rays. In my observation, many different practices exist based on empirical, physical or anecdotal evidence. Further, as modern wound care products are expensive, it is possible that the more cost efficient practice of radiating through dressings is also the ‘best practice’. There is not only a need for studies to evaluate modern wound care products in the context of radiotherapy skin reactions, but also for innovative techniques “to improve the neglected area of radiotherapy side effects” (Faithfull, 2008, p. 343).

If practices can be standardized, the overall benefit will be for both patients and to the Radiation Oncology Centres and their staff. In order to develop a focused research question, I used the PICOT tool by Melnyk and Fineout-Overholt (2011). Accordingly, in the PICOT format where P (Population), I (Issue), C (Comparison): none, O (outcome): none, T (time), the clinical question is framed as, “What is the current (T) evidence regarding the practice of nurses (P) in Canada in relation to radiating through dressings (I) among patients with cancer?”

Research literature related to wound care primarily focuses on wound assessment and treatment options resulting in practical tools for providing evidence-based care (Kohr, 2007). However, an understanding of the nurse’s experience of dealing with wounds is valuable to

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explore the meaning of nursing “actions that profoundly impact wound healing and the patient’s quality of life” (Kohr, 2007, p.14). The nurse is at the point of care, following through after daily radiotherapy with appropriate skin care and dressings. Therefore, in order to understand the context of nursing clinical practice, the project focuses on current evidence and practice and how nurses perceive their role in clinical decision-making and inter-professional relationships in the area of radiation oncology wound care.

Project purpose. The purpose of the thesis is to describe the current evidence and practice in relation to wound dressings during cancer radiotherapy with the aim of developing the foundation for best practice and further research. Research questions giving specific direction to the project are:

- 1) What is the existing evidence regarding radiating through dressings?
- 2) What is the current practice in Cancer Agencies with regards to wound dressing during radiotherapy across Canada?
- 3) How do nurses perceive their role in clinical decision-making and inter-professional relationships in this matter?

Project method. A mixed method design was implemented for the thesis. It comprised of a sequential design beginning with a literature review (Phase I) and a national environmental scan conducted via an online survey (Phase II), followed by semi-structured qualitative telephone interviews (Phase III) with four nurses to understand the phenomena of clinical decision-making and inter-professional relationships in more depth. The target population was the 42 Radiation Oncology Centres in Canada. One Radiation Therapy Nurse (RTN) per centre was invited to participate in the online survey.

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Data analysis was done using descriptive statistics for the survey data and thematic analysis for the semi-structured telephone interviews. The summarized results of the study were presented to an expert group in the field of radiation oncology and wound management (Phase IV) for feedback and consensus for future research and best practice.

Significance of study. This study contributes to minimizing pain and suffering for patients receiving oncology radiotherapy. As part of preventive skin care during radiotherapy, there is now a quest to find skin care products that not only prevent radiation dermatitis, but also may be left in place during irradiation. Further, recent changes in clinical inventory have led to recall of few wound care products with introduction of new ones at the local Radiation Oncology Centre, where I am working. In the context of wound care management during radiotherapy, this research project is of much relevance and addresses commonly used wound care products. The significance of the study is summarized as follows:

- 1) Understanding how to enhance patient experience and quality of life.
- 2) Furthering Nursing's contribution to the field of radiation oncology knowledge.
- 3) Compiling national cross sectional data on the specific aspect of patient care.
- 4) Recommending implications of the study in practice, leadership, policy and research.

Definitions

The following definitions are important to this study:

External beam radiotherapy. External Beam Radiotherapy is the most common delivery system for radiation (Newton, Hickey, & Marrs, 2009; McQuestion, 2007). A linear accelerator machine generates ionizing radiation by accelerating electrons along a tube and the total dose of radiation required is divided into equal daily fractions, usually administered once a day, five days per week until the total dose is reached (Newton et al., 2009). Patients receiving

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external beam therapy are not radioactive. Modern planning techniques and “methods of delivery such as conformal and Intensity Modulated Radiation Therapy (IMRT) have resulted in smaller volumes of normal tissue being treated”, [however] “the requirement for multiple beams tangential to the skin and high doses can result in increased skin reactions” (Faithfull, 2008, p.343).

Bolus. Great care is taken during radiotherapy to ensure an even 'homogenous' dose distribution is obtained throughout the treatment field and “it is usual practice to remove all the dressings to avoid the potential build up dose effect that leaving products in place may have” (Hollinworth & Mann, 2010, p.63). Though one of the primary reasons that a dressing is removed prior to radiotherapy is the concern of a bolus effect, bolus is also used in some radiation treatments. According to Behrend (2010),

Bolus is a tissue-equivalent material that is put directly on the patient’s skin to even the irregular contours and to create a flat surface that normalizes the radiation z beam. The use of a bolus differs from the application of a bolus layer, which is sufficiently thick to provide adequate dose buildup over the skin surface. A bolus layer is often referred to as buildup bolus. When higher-energy beams are used, bolus application on the skin surface eliminates the skin sparing advantage.

Radiation dermatitis and skin assessment. Radiation dermatitis, also called radiodermatitis is defined as “an acute or chronic inflammation of the skin caused by exposure to ionizing radiation as in cancer radiation therapy” (Mosby’s 2009, p. 1571). Symptoms as described earlier may appear 2- 3weeks into treatment and subside 2-3 weeks after the completion of radiotherapy (Faithfull, 2008, p. 344). Skin assessment is the practice of estimating the “general characteristics of the skin including the color, integrity, temperature,

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texture and turgor” (Dest, 2010, p.141). Skin assessment is not only fundamental but essential “in recognizing the right approach to nursing care” for “preventing further damage and mediating skin problems” (Faithfull, p. 345). Several clinical documentation tools such as the United States National Cancer Institute and the Radiation Therapy Oncology Group (RTOG) criteria are used to assess radiation skin reactions (McQuestion, 2010, p.124).

Cancerous or fungating wounds. Malignant cutaneous disease or malignant fungating wound is defined by the BCCA (2001) as,

a cancerous lesion involving the skin, which is open and may be draining; may be the result of a primary cancer or metastasis to the skin from a local tumor or from a tumor in a distant site and may take the form of a cavity, an open area on the surface of the skin, skin nodules or a nodular growth extending from the surface of the skin. (Cochran & Jakubek, 2010, p.77)

The aims of managing fungating wounds are to “control tumour growth, prevent and halt surface bleeding and where possible, repair skin integrity” (Krishnaswamy, 2008, p. 494).

Wound management. Wound management is part of radiation therapy management that is one of the “interventions from the Nursing Interventions Classification (NIC) defined as assisting the patient to understand and minimize side effects of radiation treatments” (Mosby’s Dictionary, 2009, p.1572). NIC is the continuum of activities that nurses perform on behalf of patients including independent and collaborative interventions as well as both direct and indirect care. NIC interventions are thereby considered inclusive of the ‘clinical decision-making’ of the nurse to decide and document the nursing diagnoses, planned outcomes, interventions implemented and outcomes achieved (Mosby’s p. 1303). Due to the plethora of wound care

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products, nurses must make wound management decisions based on the nature and type of wound and the response to treatment (Krishnaswamy, 2008, p. 489).

Clinical decision-making. Standing (2005) states, “Clinical decision-making is a complex process involving observation, information processing , critical thinking, evaluating evidence, applying relevant knowledge, problem solving skills, reflection and clinical judgment to select the best course of action which optimizes a patient’s health and minimizes any potential harm” (as cited in Standing, 2010, p.7). This definition in essence addresses the drive towards evidence-based practice or ‘best practice’. Clinical decision support tools such as ‘clinical decision rules’ are intended to help nurses and other health care professionals to organize information, guide their assessments and apply appropriate interventions (Polit & Beck, 2012, p.32). By standardizing aspects of patient assessments and prescribing specific evidence-based actions, health care professionals can minimize clinical uncertainty and reduce variations in inter-professional practice.

Inter-professional practice. According to the Canadian Inter-profession Health Collaborative (2010), inter-professional collaboration is, “A partnership between a team of health providers and a client in a participatory, collaborative and coordinated approach to shared decision-making around health and social issues” (p.11). ‘Inter’ is a prefix denoting “between, among, in the midst of; mutual, reciprocal; together” (McCallin, 2001, p.428). Thereby, inter-professional practice may be defined as a team of professionals from different disciplines who work together for a common objective.

Best practice. According to the contemporary definition of Evidence Based Practice (EBP) by Sackett, Strauss, Richardson, Rosenberg, and Haynes (2000), EBP is the “integration of the best research evidence with clinical expertise and patient values” (p. 1). Best practice is

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the implementation of “clinical or best practice guidelines that are systematically developed statements based on best evidence that assist clinicians to make decisions about appropriate” patient care (Pearson, Field, & Jordon, 2007, p.143). The kinds of evidence that support ‘best practice’ are summarized in relevant systematic reviews, research studies and clinical practice guidelines. Thus, best practice in the environmental and organizational context of radiation oncology encompasses the decisions on clinical practice by assimilating the best available research evidence with practitioner expertise and other resources with the specific needs, values and preferences of patients with cancer undergoing radiotherapy (Spring & Hitchcock, 2009).

Background to the Study

The role of the oncology nurse evolved significantly during the latter part of the 20th century as technology has advanced and cancer care has shifted increasingly to ambulatory care settings that are often affiliated with regional cancer treatment centres or large hospitals. It is estimated that 80-90% of care given to patients with cancer is delivered in the ambulatory setting (Buchsel & Yarbrow, 2005). Existing roles of the ambulatory oncology nurse involve but are not limited to: clinical nursing in symptom management; patient education; advocacy; clinical trials; triage; telephone care and community referral. With this breadth of clinical practice, nursing care is pivotal in the smooth functioning of ambulatory centres. Across Canada, there are currently 42 Radiation Oncology Centres (Canadian Association of Radiation Oncology, 2011).

A Radiation Oncology Centre is an outpatient ambulatory setting; often affiliated to a larger hospital. Ambulatory radiation oncology treatment centres contain precision-based treatment equipment as well as dedicated patient support systems. One Radiation Therapy Nurse (RTN) is recommended per centre for up to 300 patients treated annually (Inter-society Council for Radiation Oncology, cited by Khan, 2010, p. 376). Radiation Oncology Centres exemplify

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the essence of collaborative teamwork (Buchsel & Yarbrow, 2005). The multidisciplinary team includes radiation oncologists, physicists, dosimetrists, radiation therapists, radiation oncology nurses and supportive staff. This research study is at the juncture between nursing and radiation therapy professionals, in the aspect of wound care during radiotherapy.

In 2013, an estimated 187,600 new cases of cancer, as well as an estimated 81,700 new cases of non-melanoma skin cancers (basal and squamous), are expected to be diagnosed in Canada; increases in the number of new cancer cases are mainly due to a growing aging population (Canadian Cancer Society, 2013). Complex cancer treatment decisions are based on the pathology, the patient's preference and the latest evidence based guidelines. Depending upon the type and stage of disease, treatments may be used in a number of different ways. The stage and the extent of disease at initial presentation, is the largest determinant of outcomes in cancer and is a major determinant of the choice of treatments. Treatment is often multi-modal so that individual patients may be recommended to consider surgery, radiation and chemotherapy. In some cases, there may be different treatments of approximate equal efficacy. Patient choice will therefore play a larger role in determining the pattern of treatments received. Treatment may be offered with the curative intent, or at least a significant prolongation of life, or may be offered in a palliative way to alleviate symptoms, when the chance of cure is rare (British Columbia Regional Cancer Report, 2011). Treatment may also be prophylactic to treat high risk areas to prevent the progression of cancer and palliative radiation treatments are given to manage symptoms associated with malignant disease (Halperin, Perez, & Brady, 2008). Approximately 60% of patients with cancer receive radiation therapy at some point during their cancer trajectory (Newton, Hickey, & Marrs, 2009).

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Context of radiotherapy as a treatment modality. Radiation therapy is a local treatment for cancer with the use of high-energy particles or x-rays, which possess sufficient energy to create ionizing radiation by ejecting electrons from their orbit. The effects of radiation occur because of physical, chemical and biochemical factors. Physical factors consist of the energy of the radiation that is able to eject electrons, creating instability; chemical reactions occur because ionization creates powerful oxidizing and reducing agents, known as free radicals, in cellular field. The target of radiation effect is cellular deoxyribonucleic acid (DNA). Radiation results in biochemical damage of the chemical bonds which loosely hold DNA together. Double-strand breaks in DNA are the most important effect of radiation on cells (Newton, Hickey, & Marrs, 2009).

Therapeutic ionizing radiation used to treat malignancies includes electromagnetic radiation and particulate radiation. Sources of electromagnetic radiation include x-rays (photons) which are generated from an electrical machine or gamma rays emitted from the nucleus of a radioactive source such as cobalt. Particulate radiation comprises of alpha particles, neutrons and protons that are rarely used for clinical treatment and electrons, which are generally used to treat superficial malignancies (Khan, 2003; Moore-Higgs, 2007).

Radiation treatments are prescribed in units of measurement known as GY (Gray) or cGY (centiGray) with one GY equaling 100 cGY. Programmed cell death is facilitated by radiation. Radiation effect most often takes place at the time that the cell tries to divide. Cells are most susceptible to radiation damage during the G2 and M phase of cell cycle and least sensitive during the S-phase. Cells with a higher mitotic index are more sensitive to radiation damage. Normal cells have a better ability to recuperate and restore from radiation damage unlike the cancer cells therefore, the radiobiological basis for the use of dose fractionation in standard

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radiation therapy has been summarized in the four “Rs” i.e., Reoxygenation, Redistribution, Repair and Repopulation (Halperin, Perez & Brady, 2008; Newton, Hickey & Marrs, 2009).

Treatment can be directed locally or regionally for various purposes. Irradiation is an effective modality in the treatment of many patients with cancer and can be used as the primary treatment for certain cancers such as early laryngeal lesions and prostate cancer (Moore-Higgs, 2007). Combined modality is chemotherapy administered before (neoadjuvant), after (adjuvant), and concurrently with surgery or radiation therapy. Chemotherapy is used as a radio sensitizer in neoadjuvant, adjuvant or concurrent treatment to enhance the effects of radiation therapy. The choice of treatment is dependent on the therapeutic objective (i.e., neoadjuvant, adjuvant, prophylaxis, control or palliation) (Moore-Higgs, 2007). Although chemo radiotherapy improves local-regional tumor control and enhances disease free survival, there will likely be an increase in certain toxicities (Vogel, 2007). It is noted that approximately 95% of people develop skin reactions to some extent during or shortly after radiotherapy (Porock, Nikoletti, & Kristjanson, 1999). In order to examine skin changes due to radiation, it is important to review the anatomy, physiology and the manner in which healthy skin regenerates.

The skin and radiation therapy. The human skin is the largest organ in the body and is responsible for several functions. The skin acts as a barrier to prevent fluid loss and is the first line of defense against trauma, bacteria, toxins and ultraviolet radiation (Nouri, 2008; Sparks, 2007). The skin is also a sensory organ which contains nerve endings that sense touch, pressure, heat, cold and vibration. The skin is involved in immune function, contributes to thermoregulation and is a site of transport for oxygen, carbon dioxide, nitrogen and topically applied medications and creams (Nouri, 2008). It is composed of three primary layers; the epidermis, dermis and hypodermis.

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The epidermis is the outermost superficial layer of skin. It includes the outer cornified layer and the deeper basal layer that is constantly being renewed in response to the normal shedding of the cornified layer through a balanced production of new cells from the basal layer. The basal layer of the epidermis encompasses germinal or stem cells that divide and differentiate into mature skin cells. About 10% of basal cells undergo mitosis each day as outer cells of the cornified layer are shed; they are substituted by newly differentiated cells from the basal layer. This normal course comprises of both the proliferation and differentiation or maturation of skin cells to entirely replace epidermal layer approximately every four weeks (McQuestion, 2011; Sparks, 2007).

The dermis underlying the epidermis is the thickest part of the skin (1-3mm). The dermis contains the support structures including blood vessels, nerves, glands and hair follicles (Sparks, 2007). The dermis is responsible for the nutrition of the epidermis via a dense network of arterial and venous capillaries and some larger vessels (Nouri, 2008). The dermis provides the skin with its elasticity and strength; it also plays a role in thermoregulation, sensory perception and defense against injury and disease. The epidermis and the dermis rest on the hypodermis that is the fatty subcutaneous layer which provides insulation for the body (Nouri, 2008; Sparks, 2007).

The pathophysiology of radiation induced dermatitis is a sequence of radiation injury and resulting inflammatory response that can occur at both the entrance and exit site of the irradiation (Hymes, Strom, & Fife, 2006). Ionizing radiation damages the mitotic capability of stem cells within the basal layer preventing the process of repopulation and weakening the integrity of the skin (Hymes, Strom, & Fife). The skin is very sensitive to radiotherapy with basal layer damage occurring, when the cumulative dose reaches 20 Gy and it becomes more noticeable by week two

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or three of treatment (Korinko & Yurick, 1997). The patient may experience dryness, pruritus, or flaking of the skin, or dry desquamation (Maddocks-Jennings, Wilkinson, & Shillington, 2005). The recommended management of cutaneous side effects is to “avoid trauma, protect skin with creams and lotions as prescribed” (Newton et al., 2009, p. 141).

At doses of 30-40 Gy, extra capillary cell injury occurs with increased capillary blood flow, hyperemia, and edema. When severe, there is epilation leading to moist desquamation that can occur at doses 45 to 60 Gy (McQuestion, 2011). With moist desquamation, the dermis is exposed; the treatment field is moist, tender and red with oozing and leaking of serous fluid. These reactions may also be accompanied by light or heavy exudate and rarely progresses to ulceration, with discomfort ranging from mild irritation to severe pain (Porock & Kristjanson, 1999; Sparks, 2007).

Factors affecting the degree of skin reaction include both patient related factors and treatment related factors. Individual or patient related factors include their usual skin care routine, presence of skin folds, concurrent chemotherapy, immunotherapy or targeted therapies, associated medical conditions or comorbidities such as diabetes or renal failure, older age compromised nutritional status, chronic sun exposure, higher body mass index, smoking and environmental conditions (Macmillan et al., 2007; Maddocks-Jennings, Wilkinson, & Shillington, 2005; McQuestion, 2011). Treatment related factors for skin reactions include volume of tissue irradiated, the treatment technique, radiotherapy with a bolus, the type of radiation and energy, the site of radiation field and the dose, time and fractionation parameters (Macmillan et al., 2007; Porock, Nikoletti, & Kristjanson, 1999). Re-epithelialization occurs after two to four weeks of treatment completion (Sparks, 2007).

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The goal of radiation therapy in the case of malignant wounds is to reduce the tumour size. As the tumor becomes smaller, radiation dermatitis may develop on the surrounding tissue. The principles of moist wound healing should be applied from the beginning of radiotherapy to promote patient comfort and create an optimal wound environment in the open lesion and in any radiation skin reaction in the nearby area (BCCA, 2012). Skin care practices for malignant or fungating, exudating wound include cleansing, debridement, controlling bleeding and odor, protecting the wound from further damage and controlling pain. Metronidazole 0.8% gel and charcoal dressings may be applied to the wound to reduce odor (Sparks, 2007). The focus of this research study is to examine whether radiating through dressings is a standardized wound care practice during radiotherapy at different Radiation Oncology Centres in Canada and to understand the context of nursing work environment in the area of clinical decision-making and inter-professional practice, particularly in the area of wound management.

Outline of Thesis

This thesis includes six chapters. The quest to identify which dressings may be left in place during radiation leads into the next chapter, which reports on literature review (Phase I) of the study. Chapter Two describes the literature review undertaken to glean existing knowledge in relation to radiating through wound dressings and an analysis of current gaps in the research literature. In the third chapter, the research design, conceptual framework, methodology and related procedures of the study are described. In addition, a description of the sampling, data collection and analysis approach as well as considerations of ethical and research quality elements of the study are presented. Chapter Four includes quantitative findings of the national environmental scan survey (Phase II), which are supplemented by qualitative description and followed by a thematic explanation of the semi-structured telephone interviews (Phase III).

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Finally, the fourth chapter describes the consensus-building process with expert consultations (Phase IV). The fifth chapter provides a discussion of the mixed method study findings in relation to the research questions, expert consults and the extant literature. It also explains the overall limitations of the study. Chapter Six provides conclusions of the thesis, recommendations arising from the study and suggestions for related future research, leadership, practice and policy. The thesis concludes with a reference list and appendices.

Chapter Two: Literature Review

Introduction

The primary purpose of the literature review (Phase 1) is to answer the research question, recognize gaps in the literature relating to the problem, suggest how the gaps might be filled and identify appropriate methods of data collection (Burns & Grove, 1997; Coughlan, Cronin, & Ryan, 2007). The literature review for this project primarily examined the existing evidence regarding radiating through dressings. The study design, methodology, measurable outcomes, data collection instruments, and data analysis plans for each of the studies were critically examined in order to inform this research project. However, due to limited research in the area of interest, additional materials were included in order to contextualize the subject. It is noteworthy that there continues to be a paucity of well-designed studies evaluating the effectiveness of interventions for the prevention and management of radiodermatitis (McQuestion, 2011).

Search and Retrieval Strategy for Review of Published and Grey Literature

Scholarly articles and grey literature were retrieved through computer assisted advanced searches of Cumulative Index of Nursing and Allied Health Literature (CINAHL), eBook Academic collection, MEDLINE, E-Journals, Cochrane library, PUBMED, Advanced Google search (domain .au &.ca), Google, Cancer literature, Biomedical Reference Collection and ERIC databases. The scoping literature review focused primarily on studies dealing with wound dressings during radiotherapy. However, due to the nature of the clinical question, some work in the area of skin care investigations and protocols were also considered. Further, review of the bibliographies of relevant studies led to the acquisition of a few more applicable studies.

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Inclusion criteria for the literature search were: (a) the source is written in English; (b) the source reports primary research, relevant textbooks and systematic literature review articles relevant to this project; (c) a focus on “during radiotherapy” to determine relevant articles.

I used the following separate themes with keywords to guide the online searches and finally combined them with the Boolean operator “AND”:

1) *Intervention*: Bandages* OR "Wound care products" OR Mepitel® OR "Mepilex® Lite" OR dressings OR "Hydrocolloid dressings" OR “soft silicone” OR “wound dressing*” OR “silicone dressings” OR “hydrogel dressings”.

2) *Treatment modality/ cause*: Radiotherapy* OR "Radiation Dosage*" OR "during cancer radiotherapy" OR "radiation treatment" OR dosimetry.

3) *Wounds*: "Radiation dermatitis" OR "moist desquamation” OR “Skin reactions” OR “cancerous wounds” OR “Fungating wounds” OR “Malignant wounds”.

The inclusion criteria for scholarly articles were those written in English language, primary research or review articles related to dressings *during* radiation treatments and clinical practice guidelines from the year 1995 to current. Inclusion criteria for grey or unpublished literature are all possible relevant material in English language from conference publications and abstracts, symposium presentation, dissertations, clinical trials, government reports, technical reports and product reviews with a critical approach regarding any conflict of interest from the year 2008 to current. Throughout the subsequent researching and writing of this study, I continued to search reference lists and retrieve relevant literature.

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Literature Review (Phase I)

The computer assisted search revealed a handful of Canadian studies addressing the area of interest. The rationale for seeking Canadian studies is the quest to find relevant evidence particularly within the national context to address the research question regarding common practice. The literature search was expanded to capture international studies.

The extraction questions for the literature review were:

- What is the existing evidence regarding radiating through dressings?
- Which dressings can be left in place on wounds of patients with cancer during radiation treatments?

The literature review is organized by the following topics: patient experience, current practice in Canada and overview of wound management. Due to limited relevant articles the method of analysis for the literature review was exploring topical applications and wound dressings during radiotherapy and not meta-analysis or meta-synthesis. The concepts of clinical decision-making and inter-professional practice are explored in the literature within the context of wound management in radiation oncology. Significance of the study also lies in understanding the patient's experience when dressings are removed or left in place during radiotherapy.

Patient Experience. The experiences of the patient living with wounds, whether acute such as radiation dermatitis or chronic as in malignant wounds have been explored by phenomenological studies. As our society continues to age, chronic wounds are becoming more common and complex, demanding a planned and methodical approach to wound caring (Woo, Orsted, & Gjodsbol, 2009). Considering the prevalence of chronic wounds, comparatively little research has been conducted about an individual's chronic wound experience (Beitz & Goldberg, 2005; Kohr, 2007). Chronic wound pain is described as "distressing and influences the patient's ability to function" (Reddy, Kohr, Queen, Keast, & Sibbald, 2003, p. 2). Quality of life

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indicators such as changes in body image and activities of daily living make the patient's experiences a vital part of nursing care. Wound-care management is a collaborative effort because chronic wounds may impose lifestyle changes and lead to severe physical consequences (Slachta, 2012). An understanding of the patient's experiences and psychological effects during radiation oncology wound management would be beneficial in planning care. In the context of chronic wounds, Sibbald, Woo, and Ayello (2008) emphasize, "Clinicians need to remember that wound healing is not always the primary outcome" [and] "consider other wound related outcomes such as: reduced pain reduced bacterial load, reduced dressing changes or an improved quality of life" (p. 34). In addition, Kohr (2007) explored the nurse's experience of dressing changes and suggests that both qualitative and quantitative approaches facilitate the understanding of experiences in the complex world of human health (p. 19). The focus and scope of this inquiry is on the context of nursing practice in wound management during radiotherapy.

Current practice in Canada. A telephone survey by Bolderston (2003) regarding skin care recommendations among 26 radiotherapy departments across Canada revealed that the management of moist desquamation in most centres appeared to be the realm of the radiation oncologist, as a prescription is usually required. The survey demonstrated that most centres were unable to give a single management approach as recommendations for moist desquamation were dependent on the preferences of the treating oncologist. According to the survey, "the most common way of managing moist desquamation was Flamazine \diamond (Silver Sulphadiazine) followed by hydrocortisone cream and various dressings" [and] "this area showed the most diversity in management with many agents and methods being recommended by individual centres" (p. 5).

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A systematic review and practice guideline by Bolderston et al. (2006) and the Supportive Care Guidelines Group of Cancer Care Ontario (2006) on the prevention and management of acute skin reactions related to radiation therapy concluded that there is a dearth of strong evidence regarding the management of radiation induced moist desquamation and therefore recommendations on the best management of radiation dermatitis cannot be made. The review thus far, provides brief information on current practice in Canada. In order to acquire the full picture, it is valuable to examine approaches to wound management.

Overview of wound management. Wound management involves the use of topical agents and dressings. While primary dressings come in direct contact with the wound bed, secondary dressings cover or hold primary dressings in place (Perry & Potter, 2010, p. 1000). Wound dressings are beneficial as they preserve a moist environment that enhances re-epithelialization, allow enzymes in the wound fluid to lyse necrotic tissue, and permit inflammatory cells to phagocytize necrotic debris and bacteria. In addition to preserving a moist environment for wound healing, dressings cover the wound and shield the area from external contamination and infection; prevent soiling of clothing and prevent further irritation, friction or shearing (Mendelsohn, Divino, Reis, & Kerstein, 2002). The relevant wound care products in the context of radiation oncology include hydrocolloids, hydrogels, alginates and foam dressings. Hydrocolloids are described as semi occlusive adhesive dressings composed of elastometric adhesive and gelling agents; whereas hydrogel are glycerin or water based dressings that are designed to hydrate a wound (Perry & Potter, p.1002). On the contrary, alginates are highly absorbent nonwoven material that forms a gel when exposed to wound drainage; while foam dressings have absorbent, non-adherent, polyurethane pad that is used to protect wounds and maintain a moist healing environment (Perry & Potter, p. 1003).

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Wounds heal best in a moist environment because it facilitates healing, prevents wound tissue from drying and minimizes the adherence to healing tissue (Bolton, 2007, p. 23).

Principles of moist wound healing are based on Winters' (1962, 1965) theory that cell epithelialization needs moisture. Moisture retentive dressings act like the skin and preserve a physiological environment promoting adequate moisture, temperature, pH, blood supply, and pathogen control (Rolstad & Ovington, 2007). Factors to consider when choosing a dressing include 1) the purpose of the dressing and 2) ease of application and removal (Thomas, 2003). Cioffi (2002) theorizes that efficient nursing care is dependent upon good choice of alternatives involved in clinical decision-making, which in turn is based on precise judgments. Thompson and Dowding (2002) define judgment as the "assessment of alternatives" (p. 15). The Wound, Ostomy and Continence Nurses Society (WOCN) support the use of clean technique as opposed to sterile procedure for the management of chronic wounds (Perry & Potter, p. 1004). Nurses provide patient care by using clinical judgment which is part of the decision-making process. The overview impels a query directed to nurses' perceived role in clinical decision-making in radiation oncology wound management which is addressed in the methodology portion of the study. It is worthwhile to further review wound care during radiotherapy.

Wounds and radiotherapy. Hollinworth and Mann (2010) argue that while removing dressings during daily radiotherapy is not ideal for preserving optimum wound temperature and promoting wound healing, further research is needed to appraise and provide subsequent conclusions about irradiating through dressings. The authors suggest:

Further consideration could be given to leaving the product in place and the radiotherapy dose recalculated on an individual patient basis. For patients with fungating lesions, it is accepted practice to irradiate with the dressing in place, but the presence of the dressing

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on the wound is taken into account during the initial radiotherapy planning stage.

(Hollinworth & Mann, 2010, p. 63)

A relevant systematic review is from the Cochrane library by Adderley and Smith (2011) who reviewed the evidence from two trials (n=63) regarding the effects of topical agents and dressings on quality of life and symptoms that affect quality of life in people with fungating wounds. Based on the fact that “the emphasis of care of patients with fungating wounds is the palliation of distressing symptoms, such as copious exudate, malodor and pain” [the review acknowledged that] “it is difficult to carry out trials in palliative care settings, due to the ethical challenges of recruiting patients who are approaching the end-stage of their lives” (p. 10). The systematic review did not include studies where wound dressings were left in place during radiation treatments. However, these authors’ conclusion that there is insufficient evidence to direct practice with regard to improving quality of life or managing other wound symptoms associated with fungating wounds further makes a case for the importance of my study.

Dressings and radiotherapy. The choice of dressing depends on the amount of exudate while facilitating a moist wound environment to minimize the risk of pain and bleeding, during dressing change. While a plethora of antimicrobial products are accessible, dressings with silver are one of the most popular selections among topical agents (Sibbald, Woo, & Ayello, 2008). It must be noted that as an efficient antimicrobial agent silver needs to have moisture for ionization; however dressings with silver are not suitable for non-healing wounds. Sibbald, Woo, and Ayello suggest, “Clinicians need to be aware of the mechanism of moisture balance in the dressing to match appropriate characteristics with the clinical features of the wound bed” (p. 32). Hydrogels and hydrocolloids are useful for low exudating wounds and help with the preservation of the surrounding skin; whereas dressing such as foams, alginates and hydro fibers

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are recommended for excessive drainage and are more acceptable to patients as they are less bulky than other absorbent dressings such as abdominal pads (Cochran & Jakubek, 2010). However, the dressing must be removed before daily treatment, and this removal may cause more desquamation and pain (Sparks, 2007). In addition, the use of non-adherent absorbent dressings and hydrocolloid dressings share a common problem in that both types of dressing require daily removal before each fraction of radiation therapy and removal might cause more damage to the skin integrity because of their different level of adherence (Mak et. al., 2005). Removing wound dressings prior to daily radiation treatments can thus alter the wound bed or healing process. Hydrocolloid dressings may melt and leak gel, if left in place during radiation (Mak et al.). It is not clear if radiating through other non-adherent absorbent dressings will cause a boost effect or harm to patients with cancer.

A number of clinical trials have investigated agents that create or preserve a moist wound healing environment. A clinical update and literature review by McQuestion (2006, 2011) report that though a number of authors have cited the use of dressings in the management of moist desquamation, few studies exist evaluating the effects of hydrocolloids, semipermeable dressings or hydrogels in the management of radiation skin reactions. See Appendix A and B.

Moisture retentive dressings. Hom, Adams, Koreis, and Maisel (1999) presented an article on choosing the optimal wound dressing for irradiated soft tissue wounds. Although general principles of wound care management apply, the authors recommend that adhesives should be used sparingly to prevent epithelial injury and that the type of dressing chosen should correspond to wound characteristics. Six moisture retentive dressing categories (i.e., gauze, transparent film, foam, hydrocolloid, calcium alginate, and hydrogel dressings) are addressed.

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Additionally, their indications, guidelines for use and effectiveness, along with cost considerations are discussed.

A review of evidence by Kumar, Juresic, Barton, and Shafiq (2010) suggests that recommendations on general wound care management such as moist dressing may not be appropriate based on a trial by Macmillan et al. (2007). The randomized controlled trial (n= 357) evaluated the effect of a hydrogel (Intrasite®) versus a dry dressing (Tricotex®) in the management of radiation induced moist desquamation. Of the 100 patients who developed moist desquamation, the study concluded that hydrogel dressings do not expedite healing. The principal finding was that the study found no evidence to support the routine use of hydrogel dressings in patients with moist desquamation after radiotherapy. According to Kumar et al. (2010), “It should be noted that skin toxicity unlike a burn wound, occurs due to damage done repeatedly and not via an instantaneous injury, and therefore it may not be appropriate to directly relate burn wound management guidelines to radiotherapy skin reactions” (p. 276). The authors conducted a pattern of care survey in New Zealand on recommendations given to patients to manage skin toxicity that demonstrated variability in skin care practices based on protocols derived from both literature and anecdotal evidence.

Dosimetric measurement. Each patient undergoing radiotherapy requires careful treatment planning. Clinical evaluation, therapeutic plan, imaging, simulation, and isodose planning are all part of the treatment planning process (Khan, 2007, p.3). Medical dosimetry is the calculation of absorbed dose and optimization of dose delivery in radiation therapy that is often performed by a medical dosimetrist. In order to plan the delivery of radiation therapy, the radiation produced by the sources is usually characterized and dose profiles are measured by medical physicists. Khan wrote, “The radiation oncologist, who has the ultimate responsibility

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for the care of the patient, heads the treatment planning team” (p. 7). According to the author, it is implied that the Radiation Therapy Nurse (RTN) is part of the clinical team, but not directly part of the treatment planning process. An examination of quality practice environment by Girouard (2004) defines *process* as “Methods in which health care is provided; provider behaviors; includes technical and inter-personal elements” (p. 500). This directs one to further explore the perceived role of the radiation therapy nurse in an inter-professional practice context such as radiation oncology, which is addressed in the subsequent part of this study. The following articles are relevant to this study because they highlight the tests done to precisely estimate the effect of radiating through dressings.

Thilmann et al. (1996) used thermo luminescent dosimetry to quantify the increase in surface dose from a silicone coated polyamide wound dressing (Mepitel®, Silk acetate (Cuticerin*), Hydrocolloid (Varihesive®, extra thin) and Ca-Na-alginate (Kaltostat®). The investigation led to the conclusion that wound dressings could be used during electron beam irradiations with no significant change to skin dose; however only very thin dressings could be used during high energy photon irradiations. Other relevant findings are summarized as follows:

- 1) Non-adhesive silk acetate wound dressings are recommended for moist desquamation as they help to protect the damaged skin, aid healing and do not cause skin to feel more irritated;
- 2) Silicon-coated polyamide dressing has the disadvantage that it is often removed inadvertently, but the relative dose increase caused is lower;
- 3) Alginate wound dressings can be used for heavily oozing wounds. The wound dressing’s absorbent material and the wound secretion form a film which, depending on the stage of the secretion of the wound, can be up to 2 mm. thick;
- 4) With electron therapy, the dose increase through a wound dressing is small (3-7%). Any of the wound dressings can be

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left on the skin during electron irradiation, but its thickness should be taken into account when calculating the actual applied dose; 5) With photons, the dose increases depending on the thickness of its tissue as noted with the polyamide and silk acetate dressings that had equal increase in skin dose however; a slightly higher skin dose was measured for the hydrocolloid wound dressing; and 6) For ulcerating tumor, all non-adhesive wound dressings whose clinical aptitude for the treatment of ulcerating tumors have been proven can be used regardless of their dosimetric characteristic. Wound dressings can be left on the skin without increasing the risk of an aggravated skin reaction. This has to be taken into account while calculating the actual applied dose. (Thilman et al., 1996, p. 183)

Other scholars have varied in their views regarding radiating through dressings.

Mendelsohn, Divino, Reis, and Kerstein (2002) posit, “The ability to irradiate through thicker dressings without creating a possible, but unverified, bolus effect remains to be explored” (p. 219). In a dosimetry study, Butson, Cheung, Yu, and Metcalfe (2002) measured skin dose variations produced by a silicon-based protective dressing, Mepitel®, by using thermo luminescent dosimeters, parallel plate ionization chambers and Gafchromic film. Increases in skin dose produced by the silicon dressing ranges were reported. According to the authors, the effective thickness of the dressing was calculated to be 0.5 mm. water equivalence (p. 151).

Mac Nally and Woodings (2012) conducted a study (see Literature review: Appendix A) using Allevyn◇ average (dry and wet), Mepilex® border (dry and wet), Mepilex® lite (dry and wet), duoderm® dry and fixomull® (dry and wet). The study led to the conclusion that the state of the dressing must be examined prior to patient treatment, particularly in the case of exudating wounds (p. 249). According to the study, for electron beams there were no clinically significant effects at the surface; whereas for photon beams the presence of a dressing caused a clinically

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significant increase in dose at surface. However for most dressings, there were no clinically significant effects measured at depth for both photon and electron beams energies.

The studies reflect an opinion that thin dressings (up to 2 mm.) may be left in place during radiotherapy. While this may be the case, there is variability in the types of dressings that were investigated. Overall, the suggestion that the condition of the dressing must be examined prior to irradiation leads one to further consider the most favorable wound dressings for irradiation.

Moisture-vapor-permeable dressings. In a literature review by Naylor and Mallett (2001), semi-permeable film dressings were recommended for moist desquamation in clinical papers by Blackmar (1997), Dunne-Daly (1995), and Gallagher (1995) on the basis that the film can be left in place during radiotherapy treatment and reduces discomfort. The clinical trial by Adamietz et al. (1995) in which Mepitel® a non-adherent dressing was evaluated in 21 patients revealed that though the dressing caused an increase in the radiation dose to the skin, it did not result in increased skin reaction. Accordingly, Naylor and Mallett (2001) recommended that semi-permeable film dressings may be applied to areas of low or no exudate and left in place during treatment as they will reduce pain and can be easily removed.

Adamietz et al. (1995) demonstrated the effect of self-adhesive silicone coated polyamide net dressing (Mepitel®) on irradiated human skin. A small sample size of 21 patients' tolerance of dressing strips was good and there were no reactions to the adherent dressing net by non-irradiated skin. According to the authors, no additional skin irritation due to the tested material was observed in the irradiated region and the ulcers covered by silicone-coated dressings re-epithelialized quickly during radiotherapy. Further, there was no injury to new epithelium

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during changes of dressing. Thereby, the authors concluded that the dressing could be used for skin protection during irradiation (p. 281).

White and Morris (2009) summarized the published clinical literature including randomized clinical trials and case studies relating to the use of Mepitel® in different types of wounds. According to White and Morris, “The mechanical protection of irradiated skin is essential but conventional dressings may irritate treated skin and enhance skin reactions to radiation” (p. 63). Cost-effectiveness of Mepitel® is analyzed and it is reported that overall expenditure may be cut in some cases by about half despite the higher initial purchase cost; as treatment with Mepitel® may result in use of fewer dressings and dressing changes, with less time required for the dressing change compared to traditional dressings (White & Morris). The article was supported by a grant from the manufacturer and therefore researcher bias cannot be completely excluded.

MacBride et al. (2008) presented a series of case studies with the aim to evaluate patients’ comfort with using Mepilex® Lite in the management of brisk erythema or moist desquamation during radiotherapy treatment. The generalizability of the study findings is limited by the small number of patients (n=20) and the fact that there was no control group (MacBride et al.). Though dressings were removed during radiotherapy, this project was informed by the patients’ quality of life indicators such as pain, itching, burning, sleep disturbance and the level of comfort experienced while wearing and removing the dressing, that were recorded on a symptom diary card. It was recommended that a patch test might be appropriate before the dressing is applied over a large area and that highly exudating wounds may require a more absorbent dressing such as Mepilex® or an alginate or foam (p. E13).

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Diggelmann et al. (2010) performed the first systematic inpatient controlled clinical trial using Mepilex® Lite dressings for the management of radiation-induced erythema in breast cancer patients treated with radiation therapy. In order to verify dose build-up or bolus effect, a series of measurements in a white water phantom were conducted to determine the effect of Mepilex® Lite dressings on the actual dose received. According to the authors Mepilex® Lite dressings have no effect on skin temperature; the dressings cause a very small bolus effect of 0.5 mm. and decrease the extent of radiation induced erythema. However, for the sake of consistency all dressings were removed prior to treatment. The end point of the trial was dry desquamation and skin assessments or measurements for the study were stopped at that point and therefore the effects of Mepilex® Lite dressing over the full scale of skin reaction is unclear. This study provides relevant findings, but does not address the topic for this thesis as the clinical effect when Mepilex® Lite dressing might be left in place on patients during the radiation treatment has not been presented.

Perez, Medina, Perez, and Garcia (2011) conducted an observational study (n=20) to validate the efficacy of a radiodermatitis management protocol using Mepilex® Lite. Though the study concluded that using Mepilex® Lite significantly reduced the discomfort arising from radiodermatitis, shortened wound healing times and improved patient's quality of life, it is unclear if the dressings were left in place during radiation. Limitations of the study include a non-comparative design and a small sample size.

A recent presentation by Bennett et al. (2013) at the Radiation Therapy conference (March 1-2, 2013) reported the effect of Mepilex® Lite dressings in comparison to aqueous cream on the full range of skin reactions in 74 breast cancer patients post mastectomy. According to the authors, Mepilex® Lite dressings reduce all aspects of radiation induced skin

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reactions. “Compared with aqueous cream, Mepilex® Lite dressings reduced the overall severity of skin reaction by 41% ($p < 0.001$), the incidence of moist desquamation from 19% to 15%, the average moist desquamation score from 0.37 to 0.18 ($p = 0.043$) and the total moist desquamation time for all areas combined by 28% from 25 to 18 weeks” (Bennett, p. 46). However, it is not clear if the dressings were left in place during the radiation therapy.

In an associated small trial ($n=10$) by Paterson (2012) the Mepilex® Lite dressings were removed during treatment because they may have obscured treatment positioning tattoos in some patients. The aim of this trial was to investigate whether Mepilex® Lite dressings are superior to standard care in reducing the extent of radiation dermatitis in patients with breast cancer post mastectomy. Modified Radiation-Induced Skin Reaction Assessment Scale (RISRAS) was used to assess the treatment area with the inclusion of a patient component that rated discomfort, itchiness, burning and effect on daily life. There was a small, statistically significant improvement in the average erythema rating under the Mepilex® Lite dressing. The study concluded that the dressing was found to promote comfort and reduce subjective symptoms of acute radiodermatitis. The conclusions of this small-scale study need to be tested with a larger study with greater power.

Chan, Larsen, and Chan (2012) reexamined the evidence in radiation dermatitis management literature by appraising previous systematic reviews. According to Chan et al., “Four reviews examined the use of dressings” and “concluded that there is limited evidence from investigations of the efficacy of dressings” (p. e 360). Kedge (2009) recommended that there may be advantages to using moisture-vapor-permeable dressings, however further research is necessary. Salvo et al. (2010) described that hydrogel dressing was not beneficial for radiation dermatitis as it had a significantly longer healing time than dry dressing. In a comparison

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between hydrogel dressing and gentian violet in the management of moist desquamation, wound size, and wound pain were significantly lower with gentian violet (Bolderston et al., 2006; Salvo et al., 2010). However, there is no evidence supporting the use of gentian violet in terms of healing time, pain, and comfort; and there are safety and patient comfort concerns associated with its use (Kedge). Silver-leaf Nylon dressings were reported to be superior to silver sulfadiazine cream in reducing skin reactions and pain (Kourkourakis, Kelekis, Kouvaris et al., 2010; Salvo et al.). It is noteworthy that based on the common knowledge that silver is a metal, wound care products with metallic properties are removed prior to radiation. I have not yet found any literature evidence to support this practice.

Burch, Parker, Vann, and Arazie (1997) investigated the effect of deodorants, powders, and creams when applied in the treatment area prior to radiation treatments. The study investigated if an interaction occurs between the radiation and metallic elements such as aluminum, magnesium or zinc found in deodorants and powders. Another rationale for the study was the common belief that the product applied to the skin acts as a bolus. A Markus-type parallel plate ionization chamber in a polystyrene phantom was used to measure surface doses for normal application of the products for a small and large field size. They compared a set of samples representing normal application thickness with a set of samples of extremely thick application. The authors reported that no large increase in surface dose was detected with a normal application of the products and possible increase in skin reaction may occur owing to chemical irritants in the applied products (p. 447). Additionally, there were no differences between metallic and nonmetallic deodorant or powder products in relation to the assumption of boost effect. Though no patient trials were conducted, the authors claim that if the patient is not sensitive or allergic to the product applied, skin reactions should not increase if products are

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worn during treatment using high-energy x-rays. Accordingly the authors concluded that there is no significant bolus effect or increased surface dose with normal application of deodorants, creams or powders (p.450). In a similar recent investigation by Morley, Cashell, Sperduti, McQuestion, and Chow (2013) to determine the thickness of skin product necessary to produce clinically meaningful dose increase to the skin and provide recommendations for evidence-based patient instructions, the authors recommend that there are no dosimetric reasons to restrict the use of water-based moisturizer or silicon-based barrier cream, considering that a typical application of product would be only 0.3 mm. (p. 1 & 7).

Niazi et al. (2012) conducted a phase III randomized trial to compare the efficacy of Silver Clear Nylon Dressing (SCND) with that of standard skincare in patients with lower gastrointestinal cancer. A total of 42 patients with the rectal or anal cancer were randomized to either SCND or standard skincare group. All patients randomized to SCND wore the dressing from day one of radiation therapy except during radiotherapy. All patients in the control arm used sulfadiazine cream at the time of development of grade 1 skin dermatitis per institutional standard. Patients were advised to wash the cream off at least four hours prior to radiation therapy. The authors conclude that SCND is effective in reducing radiation-induced dermatitis in patients with lower gastrointestinal cancer treated with combined chemotherapy and radiation treatment.

Summary of Literature Review

In summary, it is noted that the quest to determine which dressings can be left in place has been explored by authors for a period of over 18 years. Based on the current state of knowledge and synthesis of evidence regarding radiating through dressings, it appears that a few

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wound care products such as Mepitel® and Mepilex® Lite may be left in place during radiotherapy.

- Mepitel® has a soft silicone wound contact layer and maybe left in place for up to 14¹ days depending on the condition of the wound which reduces the need for frequent primary dressing changes. The porous structure allows exudate to pass into an outer absorbent dressing. The manufacturers report atraumatic dressing changes and minimized risk of maceration (Molnlycke Health Care Mepitel®).
- Mepilex® Lite is a thin self-adhering, absorbent, soft silicone dressing designed for the management of non to low exudating wounds. The dressing has three layers:
(1) A soft silicone wound contact layer; (2) A thin, flexible pad of polyurethane foam; and (3) An outer film which is vapour permeable and waterproof (Molnlycke Health Care Mepilex® Lite).

Overall, there is little written about the concept of interest (see Appendix A & B).

Review of the literature from the last two decades revealed that the available evidence varies greatly in methodology and clinical outcomes measured. Clinical trials regarding radiating through dressings are few and only Adamietz et al. (1995) report leaving dressings in place during radiotherapy, as noted in Appendix B. Most wound care protocols are based on historical or anecdotal evidence. Few interventions applied in clinical practice for the management of radiotherapy related wounds are supported by research-based evidence; more often they are guided by clinical experience and knowledge that a particular intervention will cause no harm, expert opinion and consensus (McQuestion, 2010). It is noteworthy that the literature suggests that there might be variability in wound care practices both nationally and internationally. For

¹ The manufacturers' instructions on their website state 14 days; there is some indication that this is being extended to 21 days (R.Kohr, personal communication, September 22, 2013).

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this very reason, consideration of patient experience in wound management and nurse's perceived role in clinical decision-making is important. Significant variances in practice occur within inter-professional teams and across organizations (Bolderston, 2003). Hughes (2009) posits, "Realizing a collaborative environment requires that professionals recognize their interdependence and value the contributions of other disciplines" (p. 59). In light of the literature review, further exploration of nurses' perceived role in inter-professional relationships is pertinent. The literature review of both published and grey literature reveals that more clinical research must be done to establish evidence-based wound care regimens during radiotherapy.

Conclusion

Radiating through dressings during cancer radiotherapy is an area that is yet to be well researched. Addressing the need to use a standard skin assessment tool will be essential in order to compare the results of different studies. It is noteworthy that though radiating through dressings might be an innovative treatment technique, qualitative findings or patients' narrative records might be most beneficial in understanding their experience while receiving treatment. There is a lack of both qualitative research and quantitative clinical trials in this regard.

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Chapter Three: Research Design, Methodology and Procedures

In this chapter, the research question, conceptual framework, methodology, sampling and recruitment strategy, data collection procedures and instruments along with the ethical considerations of the study are presented. The scientific quality (i.e., validity and reliability) and limitations are also discussed. Based on the literature review and inconsistencies in current practice at the local Radiation Oncology Centre where I am working, it is meaningful to gather a national picture regarding wound management during cancer radiotherapy.

Purpose and Research Questions

The purpose of the thesis is to describe current evidence and practice in relation to wound dressings during cancer radiotherapy with the aim of developing the foundation for best practice and further research. This purpose was achieved through a mixed method approach that incorporated a literature review, along with a national environmental scan involving a short online survey followed by semi-structured interviews with nurses and consensus-building with key stakeholders.

In mixed methods studies, the research questions are the motivating force behind the scope of the inquiry (Polit & Beck, 2012). The overarching goal of each of the following two mixed methods research questions requires a different type of data and approach. The research questions giving specific direction to Phase II: Environmental scan survey and Phase III: Qualitative telephone interviews of the project are:

- What is the current practice in Cancer Agencies with regards to wound dressing during radiotherapy across Canada?
- How do nurses perceive their role in clinical decision-making and inter-professional relationships in this matter?

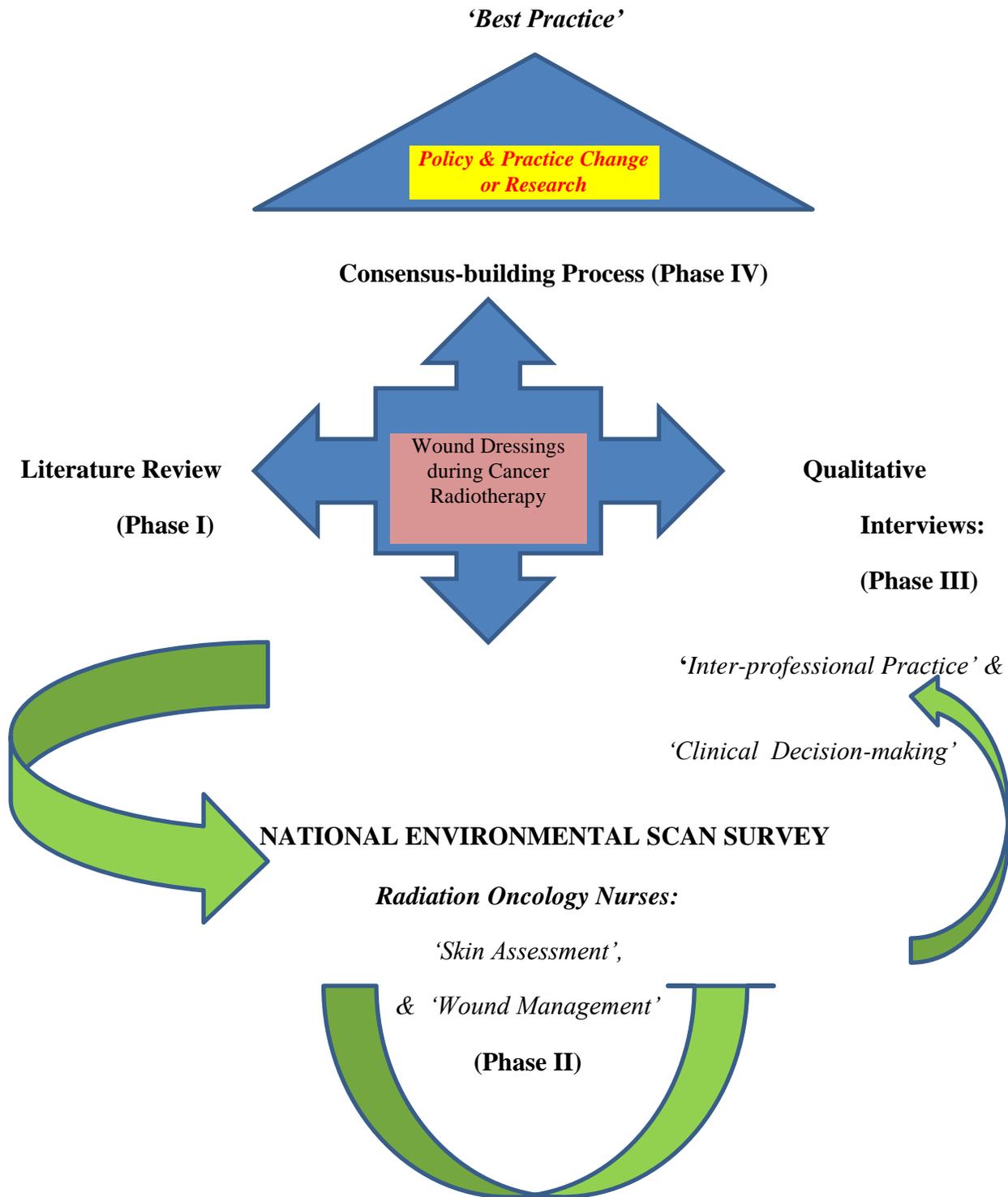


Figure 3.1: Project Schematic Model

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Conceptual Framework

The visual representation of the project's schematic model (Figure 3.1) is foundational to the entire research process. The schematic model introduced the sequential relationships between different phases of the project. The concepts of skin assessment, wound management, clinical decision-making and inter-professional practice guided the scope and focus of all four phases of this project. Each phase is instrumental in highlighting different aspects of wound care and together helps to comprehend the whole. An effort was made at every stage of the research process to understand the practice and perspectives of nurses in radiation oncology, particularly in the area of both, radiation-induced dermatitis and malignant wound care management during radiotherapy.

Methodology

A mixed method design was planned for the thesis. It comprised of a sequential design of four phases:

- Phase I focused on a literature review and was presented in detail in Chapter Two;
- Phase II included an environmental scan with the scope of an online national survey of present practices with nurses across 42 Canadian Radiation Oncology Centres;
- Phase III comprised of semi-structured telephone interviews with four nurses. A qualitative descriptive design was planned for this phase of the inquiry, so that the participants could describe their experiences in the provision of wound care in oncology during radiotherapy;
- Phase IV, the final phase of the study, involved a consensus-building process in which experts from the field of radiation oncology and wound management were

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consulted to review study findings and results to obtain feedback and consensus for recommendations.

Phase II: Environmental Scan.

The national environmental scan of Radiation Oncology Centres may be defined as the procurement and analysis of self-report data regarding the individual centres practice in relation to wound management during cancer radiotherapy to understand national trends that serve to inform the research project's current and future plans (Aguilar, 1967).

The steps of the national environmental scan survey were as follows:

- 1) Development of a clinical practice survey;
- 2) Pilot the clinical practice survey;
- 3) Research Ethics Boards (REBs) approvals;
- 4) Introduce the electronic national environmental scan survey;
- 5) Weekly email reminder.

Each step will be described in detail in the subsequent sections.

1) Development of a clinical practice survey (See Appendix D for environmental scan survey). The survey was developed based on the preliminary literature review and the project's conceptual framework presented in schematic model: Figure 3.1. Two primary objectives of the tailored survey design were (a) to reduce nonresponse and (b) to reduce or avoid measurement error (Dillman, 2007). The average response rates in web-based survey are less than 50% (Polit & Beck, 2012, p. 305). The weekly friendly reminders were intended to increase response to the environmental scan survey. A minimum number of 15 nurse respondents were expected for the environmental scan. Dillman describes measurement error as, "The result of poor question wording or questions being presented in such a way that inaccurate or uninterpretable answers

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are obtained” (p. 11). Further, “because the visual presentation of the survey questions influence how people answer them”, the survey was designed using separate screen for each section with careful attention to “all the components of the question together” (Dillman, Smyth, & Christian, 2009, p. 95). There were a total of seven pages (or screens) with 14 items. The first screen of the online survey included the invitation with instructions, and the second page presented the informed consent (See Appendix C). The questions were organized and arranged into five different sections addressed on separate pages. The “save page” feature of the survey was intended to enable the participants to save their responses, return to where they left off and complete the survey at their convenience. It was expected to take approximately ten minutes to complete the survey. Navigating through the questionnaire was facilitated by the “back” and “next” icon on the bottom of each page.

Dillman, Smyth, & Christian (2009) posit, “Survey questions are made up of multiple parts that must work together in concert to produce high-quality data about the topic of interest” (p. 77). The respondent friendly questions briefly sought demographic information such as Province, role or position, academic background and years of experience in oncology. The drop-down menu feature from FluidSurveys™ was used for the demographic section. The next set of questions focused on common skin assessment tools that are used in daily practice for the management of dermatitis. The closed-ended questions ask for information regarding wound care practices and clinical decision-making. The aim of the set of questions under “clinical decision-making” was to identify wound care guidelines used in practice. The subsequent answer categories offered multiple choice responses for the respondent to pick the most appropriate answer. The aim of the set of questions under the “management of open wounds” section was to associate the most commonly used wound care products for both radiation

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induced and fungating wounds. The answer categories are arranged in order of potential choices with the option to check all that apply as limiting choices could mean that respondents “will not be able to provide the answer they want to provide” (Dillman, 2007, p. 47). Explanations were requested for areas that required further exploration or a specific answer that is not provided in the choices. Adequate space was provided for respondents to completely answer the question (Dillman, Smyth, & Christian, 2009, p. 115). The final section requested contact information from participants willing to be contacted over the phone for a 20-30 minute interview to understand their perceived role in clinical decision-making and inter-professional practice.

2) Pilot the clinical practice survey. The survey was piloted at FVCC with (a) two experienced nurses i.e., a RTN and an Education Resource Nurse who initially performed the online FluidSurveys™ and later provided suggestions as a group. Individual feedback was also obtained from (b) a radiation therapy professional practice leader and (c) a radiation oncologist. The preliminary findings from the FluidSurveys™ report were used to receive feedback and make necessary alterations to the format. Several changes were made to the survey after the pilot, particularly in its visual design and presentation to make the survey easier to follow. The survey pilot met the expectation to test the online survey’s content validity prior to the actual national environmental scan. Pilot data was not included in the final data analysis.

3) REB approvals were received from TWU and BCCA in June, 2013. The BCCA approval deemed the project as minimal risk. Amendment was approved for contacting those Radiation Oncology Centres that were not in the preliminary list via the phone for the purpose of procuring potential nurse participants’ e-mail addresses.

4) Introductory e-mail to inform participants of the national environmental scan survey with consent and online FluidSurveys™ link. These were done in two separate sets. The first

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group of individuals was from the available contact list and the second set was generated by contacting remaining Radiation Oncology Centres over the phone.

5) Weekly email reminder for three weeks to each group and advising those who have responded to kindly excuse the prompt.

Sampling and recruitment strategy for environmental scan. The “target population” was the 42 English Radiation Oncology Centres in Canada with the aim of one nurse respondent from each centre as the “representative sample” (Polit & Beck, 2012, p. 274). The inclusion and exclusion criteria are as follows:

Inclusion criteria: To be present in this study, one nurse participant who works in a Canadian Radiation Oncology Centre and speaks English was invited.

Exclusion criteria: Nurses who are not part of the Radiation Oncology Department as the focus of the study was in wound care during radiotherapy.

Accordingly, the projected sample size was 42 nurses from across Canada (See Table 3.1). An initial list of “purposive sample” contacts had been developed as they “are judged to be particularly knowledgeable about the issue under study” (Polit & Beck, 2012, p. 279). As a radiation oncology nurse, I was privy to a contact list of nurses at these Canadian centres. The list comprised of Education Resource Nurses or Nurse Leaders at ambulatory Radiation Oncology Centres. However, on comparing this list with the Radiation Oncology Centres from the Canadian Association of Radiation Oncology (CARO) centre contact list, only 31 centres were represented. The Radiation Oncology Centres that did not have contact names on the preliminary list were contacted via the phone to obtain contact names. At this point, centres that sent responses in French were eliminated from the target sample (given English as inclusion criteria). Three centres (out of the missing 11 centres) provided contact information in English

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and a second set of e-mails was sent to these three using the same protocol and timeline as for the first set of contacts. One contact replied, “*Not participating*”. Thereby, the resulting target sample size was set to be one nurse from each of the 33 centres (n=33). See Table 3.1 that illustrates the resulting target sample size from the initial projected sample size. No incentives was provided before or after the survey was completed because it is presumed that the participants are nursing professionals who wish to advance the role of radiation therapy nursing in oncology.

Table 3.1

<i>Environmental Scan Sample Size</i>	
Projected sample size	42
E-mail invite sent to : 1 st group	31
2 nd group	3
“Not participating” reply	1
Unable to contact directly	2
French speaking centres :Quebec	6
Resulting target sample size (n)	33

The recruitment procedure involved an introductory email that was sent to a total of 34 participants individually via the researcher’s employee e-mail. The contents of the e-mail provided information about the project that was sent to nurse participants, at each Radiation Oncology Centre. This initial contact helped to introduce the study and provide a link to the online survey deployed via FluidSurveys™ that was active for a total period of three and half weeks, enabling both the groups to complete the survey in three weeks. The individual links were a strategy developed after the survey pilot that helped to limit one response per participant, thereby minimizing multiple incomplete responses per participant. One organizational e-mail

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was rejected; therefore the researcher's personal email was used as an alternate source to communicate. Two weekly reminders were sent to all the potential participants. The online survey was used to recruit nurse participants willing to also be contacted over the phone for an interview.

Data collection procedures and instruments (Phase II). Data were collected using the environmental scan survey. The single mode national survey was administered electronically. Only one response was requested from each centre. Out of the 34 e-mail invites sent with the tailored survey design, 18 FluidSurveys™ responses were received (n=18), of which 16 were complete and two were incomplete. All available data was included in the analysis.

E-mail replies were received from five participants directing the researcher to other appropriate participants. Two centres reported via e-mail that two staff got together to respond collectively regarding the centres practice. These two e-mail responses assured the researcher of the date planned by the participant to respond to the survey. The e-mail responses were encouraging to the researcher. It conveyed not only the interest of participants across the country but also the relevance of the topic under study.

The survey consisted of 14 items which were closed-ended questions with a mix of multiple-choice answers and dichotomous responses. Demographics of the nurse participants such as role or position and years of experience in radiation oncology along with their Province and academic background are reported. The environmental scan survey is presented in Appendix D. The sections i.e., 'current practice', 'skin assessment', 'clinical decision-making', and 'management of open wounds' form part of the environmental scan survey. The concepts of 'skin assessment' and 'management of open wounds' were operationalized with the collection of factual data. The open text response details were obtained for the other specific answers, apart

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from the answer choices provided. Survey follow up section requested consent for participating in telephone interview, which is the next phase of the project.

Data analysis (Phase II). A mixed method synthesis was planned for the data analysis of the FluidSurveys™ and the qualitative telephone interviews. All available information was considered together as the data types are mutually informing. The data analysis features from the FluidSurveys™ service were used to create a report with appropriate tables, charts and graphs. Basic descriptive statistics were used to organize, describe and explore data using graphs and numerical summaries. The most important finding in the “current practice analysis” was to explain whether there is consistency or inconsistency in relation to radiating through dressings. The open text response details were examined for similarities or differences in the "other" specific answers, apart from the answer choices provided. Since missing data such as “don’t know” answer can result in biased results, the extent of the problem was analyzed by examining frequency distributions on each of the questions in the survey with the option of “don’t know” answer (Polit & Beck, 2012). The extent of missing data was reported and the problem was addressed at that point, depending on the degree to which the issue affected the central analysis.

Phase III: Qualitative Telephone Interviews.

As this was an “opportunity to triangulate data sources”, four consenting nurse respondents with different roles and from separate provinces were contacted out of the six participants willing to be interviewed (Polit & Beck, 2012, p. 626). I selected these four participants (n=4) using a “convenience sampling” strategy based on practical issues such as accessibility and scheduling interviews across various time zones (Polit & Beck, p. 516). Two survey participants had explained, “Not possible to assure dedicated time;” and “Sorry, probably not the best person to ask. Although I am involved in education in the radiation department, I do

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not provide direct patient care”. The interviews were arranged via email and telephone. The sequential design of the project and the semi-structured telephone interview data helped to supplement the small quantitative data by providing more in-depth perspectives.

Data collection (Phase III). The semi-structured telephone interviews with four consenting participants served to collect supplementary data regarding the concepts ‘clinical decision-making’ and ‘inter-professional’ practice. Data were collected over a period of four weeks. The interviews were arranged via telephone and e-mail. Each interview lasted 20 to 30 minutes. For “focused or semi-structured interviews, researchers prepare a written topic guide” in advance (Polit & Beck, 2012, p. 537). See Appendix E: Interview guide. The questions are arranged in logical sequence, from general to specific with suggestions for prompts “to elicit more detailed information” (Polit & Beck, p. 537). The open-ended questions and prompts are geared to deeper description of the context of nursing practice environment in the specific area of ‘clinical decision-making’ and ‘inter-professional practice’ in the area of radiation oncology wound management. The list of interview questions with prompts that had been initially developed was revised after the first two semi-structured interviews and these are listed in Appendix E. The revision included two additional prompts that were helpful in understanding the context of nursing practice environment in the area of wound management in radiation oncology.

The interviews were recorded using a digital recording device and transcribed verbatim by this writer with the use of voice recognition software. Qualitative researchers need to devote time and energy in analyzing and documenting their own presuppositions, biases and ongoing emotions (Polit & Beck, 2012). After each interview, reflexive field notes were written to summarize the interview.

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Data analysis of qualitative interviews (Phase III). Each telephone interview was transcribed verbatim by this writer to ensure accuracy. Polit and Beck (2012) posit, “Qualitative analysis begins with data organization” (p. 558). I developed broad categories based on the interview guide and carefully coded data from each of the interviews under the categories. Themes often emerge from within categories of data, but may also be seen intertwined across them (Polit & Beck, p. 562). The thematic analytic process involved the identification of both commonalities and natural differences across the participants.

My supervisor, Dr. Reimer-Kirkham, reviewed coding of the first two transcripts for accuracy and was involved in consultations around the emerging themes and patterns that evolved from the data. Dr. Kohr, second reader on my supervisory committee, was also involved at key points in the analysis process through discussions around emerging findings. As mentioned earlier, during the data analysis member-checking was used to contact the participants to validate that “the themes accurately represent the perspectives of the participants” (Polit & Beck, 2012, p. 563). In the final stage, the various themes were inter-related to provide an overall structure regarding the context of nursing practice environment in radiation oncology, particularly in the area of wound management.

Phase IV: Consensus-building Process

In order to ensure relevance and acceptability, consultation with a spectrum of clinical experts was initiated through the consensus-building process. An executive summary of findings (See Appendix F: Executive Summary for Consensus-building) from all the previous phases were presented to six experts. Five (n = 5) of the six expert consultants selected for the consensus-building process and invited to provide feedback to the executive summary,

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responded over a period of 10 days. Depending on the expert consultants' preference, three responses were obtained via e-mail and one response was discussed over the phone.

The expert consultants in the field of radiation oncology and wound management included an Advanced Practice Nurse, a Nursing Professional Practice Leader (PPL), a Wound and Ostomy Nurse, a Radiation Oncologist, and a Radiation Therapy PPL. The interpretation of findings, any relevant guidelines and the relation to available evidence from literature were re-examined. Further, the thematic analysis and the context of radiation oncology nursing practice environment, particularly in the area of wound management were discussed. The experts' feedback was analyzed, incorporated in Chapter Five and acknowledged with permission.

Ethical Considerations

The national environmental scan was conducted after the Research Ethics Board approval from TWU and BCCA. Consent was voluntary. There were no known or anticipated risks from participating in the survey. The electronic survey was administered through FluidSurveys™, a Canadian-based secure online survey system. Anonymity was maintained through the anonymous FluidSurveys™ service. Please refer to Appendix C: Informed consent form. The electronic data with no personal identifiers will be stored in a password protected computer for a period of five years. Each telephone interview was audiotaped via a digital voice recorder and transcribed verbatim by this writer. All transcripts were given a code number and identifiable material excluded to maximize confidentiality. The participant is identified by a pseudonym that appears on the transcribed data and on any computer data. Transcribed data and data recordings were kept in a locked filing cabinet for the duration of the study. Once the study has been completed, written up and approved, all paper material containing data will be shredded. Access to the transcribed data was limited to my thesis committee, but the committee did not have

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access to any of the audio data recordings. The expert consultants who participated in Phase IV agreed to have their names disclosed.

Scientific Quality: Validity and Reliability

The survey was piloted at FVCC in an attempt to test for clarity such as short, specific questions with simple words, thereby avoiding vague, objectionable, biased and hypothetical questions (Dillman, 2007, p. 51). The survey pilot helped to make the necessary changes and thus enhanced the content validity prior to the actual administration of the online survey. All available data were used in the analysis.

The environmental scan survey and the telephone interviews involve “space triangulation” by “collecting data on the same phenomenon in multiple sites, to test for cross-site consistency” (Polit & Beck, 2012, p. 590). With this objective, only one RTN participant per centre was surveyed in order to eliminate potential variability within the Radiation Oncology Centres. A reflexive journal was maintained that helped me to analyze how my own values, beliefs and assumptions might influence the interpretation of data. Member-checking is an important technique for validating the credibility of the qualitative data (Polit & Beck). This process of member check with three participants included asking additional questions to elaborate or clarify previous comments.

Proposed criteria for integrity of the mixed method study are based on inference quality and inference transferability (Polit & Beck, 2012, p. 629). The integrative framework for inference quality by Teddlie and Tashakkori (2009), cited by Polit and Beck (p. 626) is instrumental in achieving the expected standards for the integrative thesis. Presenting the results to an expert group for feedback was another planned strategy to increase rigour. The final narrative report aimed to offer recommendations for replication or extension of current practices

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to guide policy and practice change or future research. Therefore, the thesis was done rigorously.

Conclusion

This study was designed to capture the foundational information and understand the context of wound management during cancer radiotherapy. The sequential separate phases served as methods for gathering both objective and subjective data regarding the topic. Ethical review and amendments were done in a timely manner. The researcher employed the use of reflexive technique throughout the data collections and analysis process to augment validity and reliability of the study findings and the interpretation of those findings. Limitations of this study (discussed in more detail in Chapter Five) included a small sample size and single mode survey. For this reason, the semi-structured qualitative interviews were designed to supplement and contextualize the survey results, and the Phase IV expert consultations were initiated to build consensus.

Chapter Four: Findings

Introduction

In this chapter, the findings from the national environment scan survey, semi-structured telephone interviews, along with summary of Phase IV confirmation of findings are presented. The sample is described using descriptive statistics. Polit and Beck (2012) posit, “A major advantage of web-based surveys is that the data are directly amenable to analysis” (p. 312). Additionally, in order to contextualize the findings, direct quotes from the open text responses and telephone interviews are presented. Overall, this chapter presents an integrated analysis of the different phases of the study.

Description of Survey Sample

Response rates are summarized in the below table 4.1 by reporting details and frequency statistic. As explained earlier and noted in Table 4.1 below, of the 34 e-mail invites, 18 FluidSurveys™ responses (n=18) were received, of which 16 were complete and two were incomplete. The two incomplete responses had the demographic section completed and one of the respondents had part of section two ‘current practice’ filled out. All available data from the responses were included in the analysis. The response rate calculated based on the complete responses is 47%.

Table 4.1

<i>Recruitment Results</i>	
Survey invites sent	34
Total responses	18
Complete responses	16
Incomplete responses	2
Average time taken to complete the survey	8 minutes 57seconds
Response rate	47%

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Demographic characteristics. The results of the environmental scan survey are organized as per the sections from the electronic survey (See Appendix D for the Environmental Scan Survey). A comparison with qualitative findings is also discussed here. Qualitative data from the semi-structured telephone interview are used to supplement findings (See Appendix E for Interview Guide). The distribution of respondents, their Provinces, educational background, nursing role or position and years of experience in radiation oncology are presented in Table 4.2.

Table 4.2*Demographic Distribution of Radiation Oncology Nurse Respondents*

Provinces (Total= 6)	Alberta	BC	New Brunswick	Ontario	Saskatchewan	Quebec
Responses						
Complete (16)	1	6	1	5	1	2
Incomplete (2)	-	-	-	2	-	-
Academic Background						
Diploma(3)	1	1	-	1	-	-
Degree(9)	-	4	1	2	1	1
Graduate(6)	-	1	-	4	-	1
PhD	-	-	-	-	-	-
Nursing Role or Position						
Staff(7)	1	3	-	1	1	1
Educator(6)	-	1	-	4	-	1
Leader(4)	-	2	-	2	-	-
Other(1)	-	-	1	-	-	-
Years of experience						
0-2 (1)	-	1	-	-	-	-
3-5 (6)	-	2	-	3	1	-
6-10	-	-	-	-	-	-
More than 10 (11)	1	3	1	4	-	2

An examination of regional distribution of people across Canada based on 2012 statistics shows that, “the majority (86%) of people in Canada lived in Ontario, Quebec, British Columbia, and Alberta” (Indicators of Well-Being in Canada, 2013). The statistic is significant in relation

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to the study as these larger, more populous provinces are relatively well represented on the survey as evident from Table 4.2 and Table 4.3.

The demographics section included the drop down menu feature from FluidSurveys™ and sought information on Province, role or position, academic background and years of experience in oncology. They are individually represented in the following four Tables and Figures.

Table 4.3

Province

Response	Percentage	Count
Alberta	6%	1
British Columbia	33%	6
Manitoba	0%	0
Nova Scotia	0%	0
New Brunswick	6%	1
Ontario	39%	7
Prince Edward Island	0%	0
Saskatchewan	6%	1
Newfoundland and Labrador	0%	0
Quebec	11%	2
Total Responses		18

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It is noteworthy that a participant from each of the six Radiation Oncology Centres from British Columbia (33%) completed the survey. Though seven responses were received from Ontario (39%), only five were complete. Two responses from Quebec (11%) is also remarkable as six French speaking centres from Quebec were excluded from the survey. Four participants were selectively contacted from Québec, Ontario, Saskatchewan and British Columbia for the semi-structured telephone interview.

Table 4.4

Role or Position

Response	Chart	Percentage	Count
Nurse Educator		33%	6
Nurse Leader		22%	4
Staff Nurse		39%	7
Other		6%	1
Total Responses			18

The other response for nursing role or position was clarified to be an oncology resource nurse. It is noteworthy that three domains of nursing practice; clinical, education and leadership were represented in the national environmental scan. The telephone interview participants included two staff nurses, one nurse educator and one nurse leader. The aim of person triangulation among the participants selected for the telephone interview was to validate data through multiple perspectives on the topic under study (Polit & Beck, 2012).

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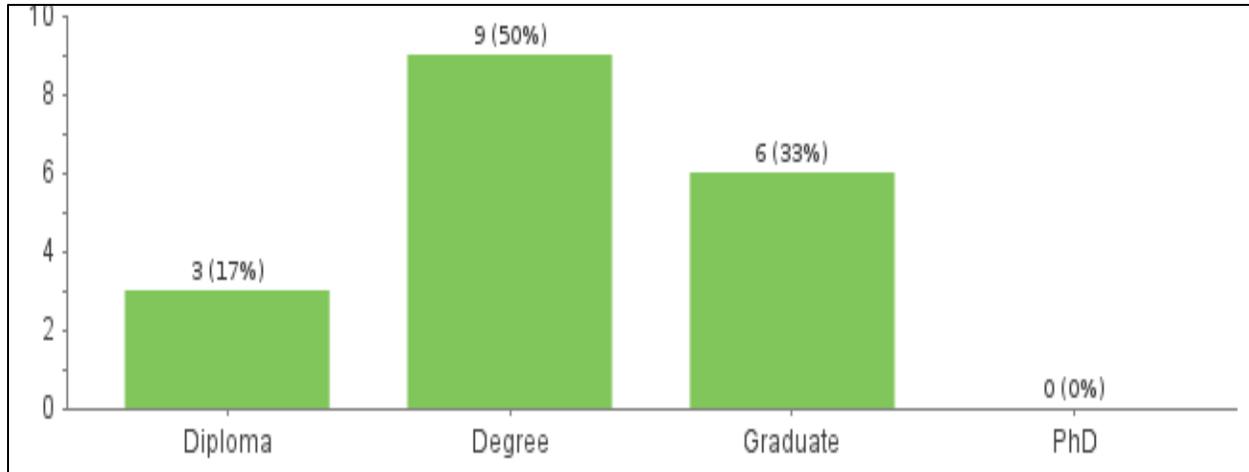


Figure 4.1: Academic Background

The column chart (Figure 4.1) shows that most of the oncology nurse respondents (50%) had a degree in nursing. The academic background of the four telephone interview participants included two with undergraduate nursing degree and two MSN graduates.

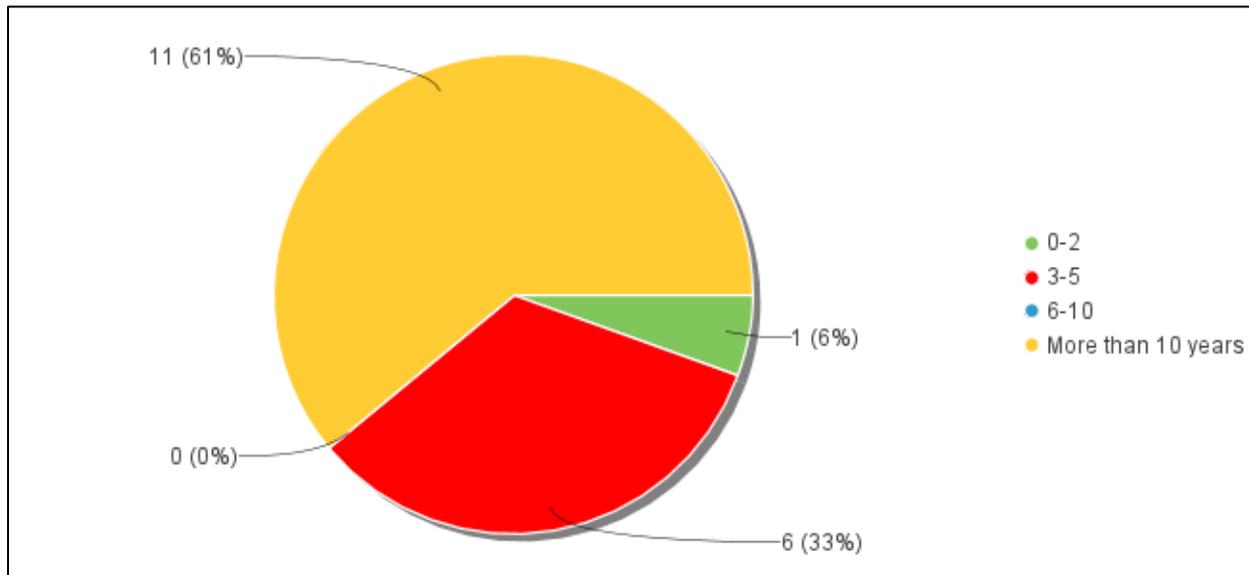


Figure 4.2: Years of Experience in Radiation Oncology

The pie chart (Figure 4.2) represents years of nursing experience in radiation oncology. It appeared that most (61%) of the participants have more than 10 years of experience in radiation oncology. However, during a semi structured telephone interview, one of the participants who

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reported more than 10 years' experience clarified: *"I'm trying to clarify about my years, in working in a total oncology environment. I have only been full-time in this position for a year but for oncology, I have been over 10 years in other acute care facility, so not as a concentrated amount. As a concentrated amount, it's only been one year"*.

Review of demographic data reported by the participants' revealed heterogeneity in the sample description particularly in the major provinces represented and participants' roles or positions. While four provinces were not represented and two of the participants from Ontario did not complete the survey, the demographic information helped to reveal the geographical distribution and specific details about the participants' nursing careers in radiation oncology. Over 50% of the participants had a Nursing degree and more than 10 years of experience in radiation oncology, presumably reflecting staffing retention in radiation oncology clinical settings.

Phase II Survey Findings

Report of current practice. The first set of questions following the demographic section on the survey focused on common skin assessment tools used in daily practice for the management of dermatitis, frequency of assessments and whether radiating through dressings is a standard practice.

Skin assessment tool for radiation dermatitis. Table 4.5 illustrates that most (71%) of the Radiation Oncology Centres in Canada used the NCI Common Toxicity Criteria assessment tool for radiation dermatitis. In addition, Radiation Therapy Oncology Group (RTOG) criterion was also widely used (41%). "Check all that applies" was an option provided and on examination of responses four respondents picked two of the answer choices. Though similar, both the tools reflect only the observable physical assessment and do not take into account of the

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subjective features of skin damage such as pain or discomfort. One of the other responses in the detailed text box indicated that they use the BC Cancer agency skin assessment tool in practice, which is an adapted version of NCI Common Toxicity Criteria assessment tool.

Table 4.5***Skin Assessment Tool for Radiation Dermatitis***

Response	Chart	Percentage	Count
Radiation Therapy Oncology Group (RTOG) criteria		41%	7
National Cancer Institute (NCI) Common Toxicity Criteria		71%	12
Radiation Induced Skin Reaction Assessment Scale (RISRAS)		0%	0
Other		12%	2
Don't know		0%	0
Total Responses			17

The most commonly used assessment and clinical documentation tool as described by McQuestion (2010) identifies, “The RTOG scoring criteria for radiation skin reactions measures the intensity of a reaction using an ordinal scale from 0 to 4, ranging from no change through degrees of skin desquamation to ulceration and necrosis”, whereas the revised NCI Common Toxicity Criteria for Adverse Events (CTCAE, 2009) in its fourth version “documents grades of radiation dermatitis using an ordinal scale from 1 to 5, ranging from faint erythema or dry desquamation through higher degrees of erythema and desquamation to necrosis or ulceration and death” (p. 125).

Frequency of wound assessment. The pie chart (Figure 4.3) shows that wound is assessed as needed (41%) at seven centres, daily (29%) at five centres, and weekly (29%) at other five centres. The ‘as needed’ criteria might include patient preference, or condition of the

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dressings and wound as assessed by the team. A bar chart comparison of this with the reported consistency in nursing practice regarding the use of skin assessments and wound dressing changes during radiotherapy is depicted later on, in Figure 4.13.

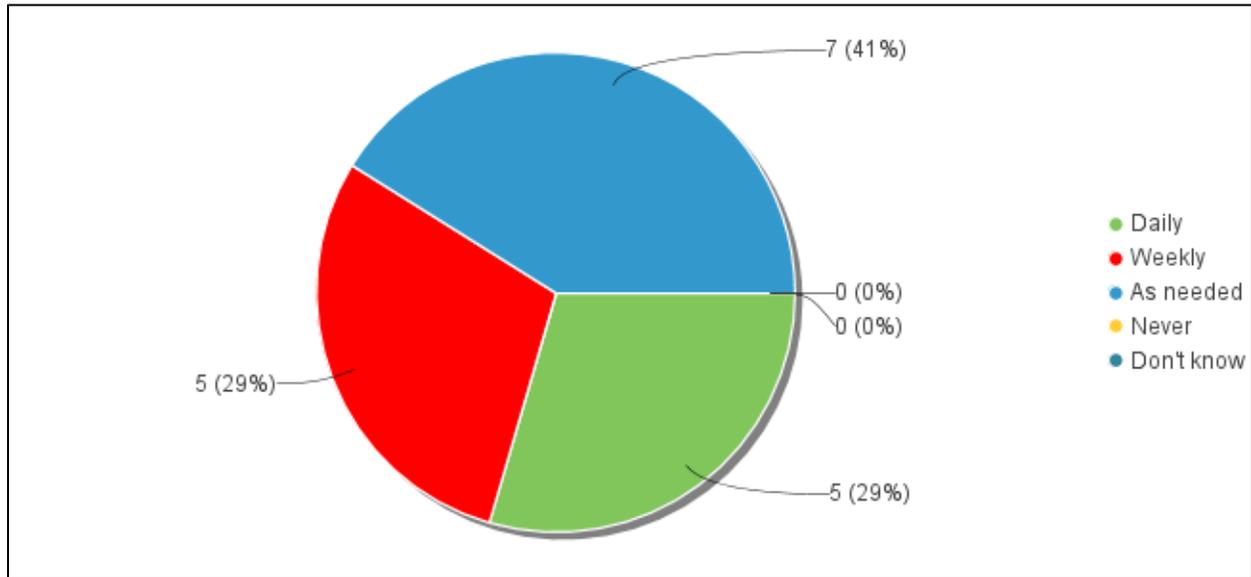


Figure 4.3: Frequency of Wound Assessment

Table 4.6
Dressing Removal Prior to Radiotherapy

Response	Chart	Percentage	Count
Yes, always because		50%	8
Sometimes, Explain under what conditions		50%	8
Never		0%	0
Total Responses			16

Dressing removal prior to radiotherapy. Table 4.6 reveals that wound dressings are always removed prior to radiation treatments at 50% of the centres, while they are sometimes left in place at 50% of the centres that participated in the environmental scan survey. The rationale

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provided for always removing dressings prior to radiation treatment are, “*except when dressing is used as a bolus*”; “*bolus effect however if dressing quite small they treat through it*”; “*done on treatment unit - sometimes left on with palliative patients*” and “*we need to assess the stage of the wound*”. Therefore, the reasons for removal of dressings prior to radiotherapy were the purpose of the treatment and or clinical assessment of both the wound and dressing condition. This is an important and expected result, based on the literature review and practice at the local Radiation Oncology Centre, where I am working.

The conditions when wound dressings are left in place are explained in the open text responses as “*depends on radiation therapists preference and if dressing will interfere with treatment*”; “*depends upon the treatment plan and the oncologist*”; “*removed when bolus is possible*”; “*if dressing too bulky that it may interfere with treatment*”; “*tangential beams; if the dressing is lifting; thickness or concerns related to bolus dosing*” and “*depending on the type of energy used for radiation---some dressings can be maintained*”. One of the interview participants informed:

It would be the physician who decides about removing the dressing but honestly I have been here 16 years, I can't even think of maybe five times that we haven't removed the dressings, we always remove the dressing. (P#1)

Based on patient preference or prognostic factors, it was reported that dressings are sometimes left on with palliative patients. One of the telephone interview participants shared:

I think like a lot of people under the misconception if you need to remove dressings because you don't want a bolus effect or you don't want to change or cause a problem. So we're willing to learn all about the radiation patients and we are working with our physicist and a bio physicist to learn a little more about really thicknesses and really what will make an impact, a difference and a change. So we're going to probably right at this recent times start to make the changeover for some of our dressings that will stay on and that are the lighter type dressings that don't have a lot of absorbency, that don't have a lot of wet or increase in thickness to what's on against the skin area and then we will make more of a change and put out more education for the staff and everything. (P#4)

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This participant highlighted the presumption of a bolus effect regardless of the type or condition of dressing that leads to removal prior to radiotherapy and also described a policy change about leaving dressings on during radiotherapy that is underway at their centre (discussed in more detail later).

In summary, this section of the survey results showed that there is inconsistency in practice regarding radiating through wound dressings across Canada with 50% of centres who always remove and 50% who sometimes remove dressings prior to radiotherapy. The findings revealed that dressings are not left in place at all times at any of the centres. An analysis of the explanations provided disclosed that dressings are generally removed for the dosimetric reasons such as to prevent a bolus effect, however if dressings are thin, they may be radiated through. Physical factors for dressing removal comprised being too bulky or lifting, whereas other factors might include “organization policy” or standard practice, prognostic factors or patient preference (A. Hughes, personal communication, August 29, 2013). Current practices are referred to as “institutional and traditional practices” (A. Bolderston, personal communication, August 22, 2013).

Clinical decision-making. This section of the survey aimed to find out the nature of clinical decision-making and to identify wound care guidelines that might be used in practice for when to remove or radiate through dressings. It was requested that, if possible, the respondents share an electronic copy of such record for reference. An open text response box was available to explain any other response.

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Decision-making to remove or radiate through dressings. Table 4.7 shows that while five participants (31%) reported that the radiation oncologist makes the decision to remove or radiate through dressings, another five participants (31%) informed that the multidisciplinary team made the decisions. However, another three participants (19%) reported that the radiation therapist makes the decision while two others (12%) conveyed don't know. The detail for the other response (6%) stated, "We never do XRT through a dressing". The descriptive statistics revealed that there is variation in this aspect of the survey results because it is unclear as to whose decision it is. However, it is noteworthy that the registered nurse is not the sole decision maker in this aspect of patient care.

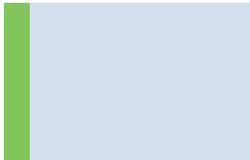
Table 4.7**Decision-making to Remove or Radiate Through Dressings**

Response	Chart	Percentage	Count
Radiation Oncologist		31%	5
Radiation Therapist		19%	3
Registered Nurse		0%	0
Team decision		31%	5
Other, please explain		6%	1
Don't know		12%	2
Total Responses			16

Policy document. In general, it appears that most centres (71%) did not have a reference document for when to remove a dressing during radiotherapy. Although, one response reported the presence of a local policy, Clinical Practice Guideline or Best Practice Guideline, none was forwarded to me. It was noted that of the 16 complete responses, two responses were missing in this section (See Table 4.8).

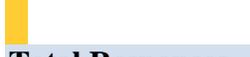
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Table 4.8***Policy Document***

Response	Chart	Percentage	Count
Yes, Please explain (Please share policy or guideline by kindly attaching an electronic copy to my email, if possible)		7%	1
We have a local policy		21%	3
No		71%	10
Total Responses			14

Consistency in nursing practice. Table 4.9 shows that 50% of the participants reported ‘very consistent’ nursing practice, whereas 31% of the participants stated ‘somewhat consistent’ practices. 12% of the participants reported ‘not consistent’ and 6% responded ‘don’t know’. In general, participants informed consistent practice regarding the use of skin assessments and wound dressing changes during radiotherapy.

Table 4.9***Consistency in Nursing Practice***

Response	Chart	Percentage	Count
Very consistent		50%	8
Somewhat consistent		31%	5
Not consistent		12%	2
Don't know		6%	1
Total Responses			16

A comparison bar chart in Figure 4.4 below, of the questions, “How often is a patient's wound assessed” with “How consistent is nursing practice regarding the use of skin assessments

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and wound dressing changes during radiotherapy?” shows that three participants who reported daily skin assessments and wound dressing changes during radiotherapy also reported their practice as being ‘very consistent. It is noteworthy that four respondents who answered ‘as needed’ also reported their practice as being ‘very consistent’. Three participants who reported weekly frequency also responded that their practice was ‘somewhat consistent’. Three participants who reported weekly frequency also responded that their practice was ‘somewhat consistent’. Three participants who reported weekly frequency also responded that their practice was ‘somewhat consistent’. Though the chart illustrates a different perspective and perhaps contradicts the assumption that ‘as needed’ assessments (41%) might not be ‘very consistent’, for the most part the respondents reported consistency (81%) in nursing wound care practices.

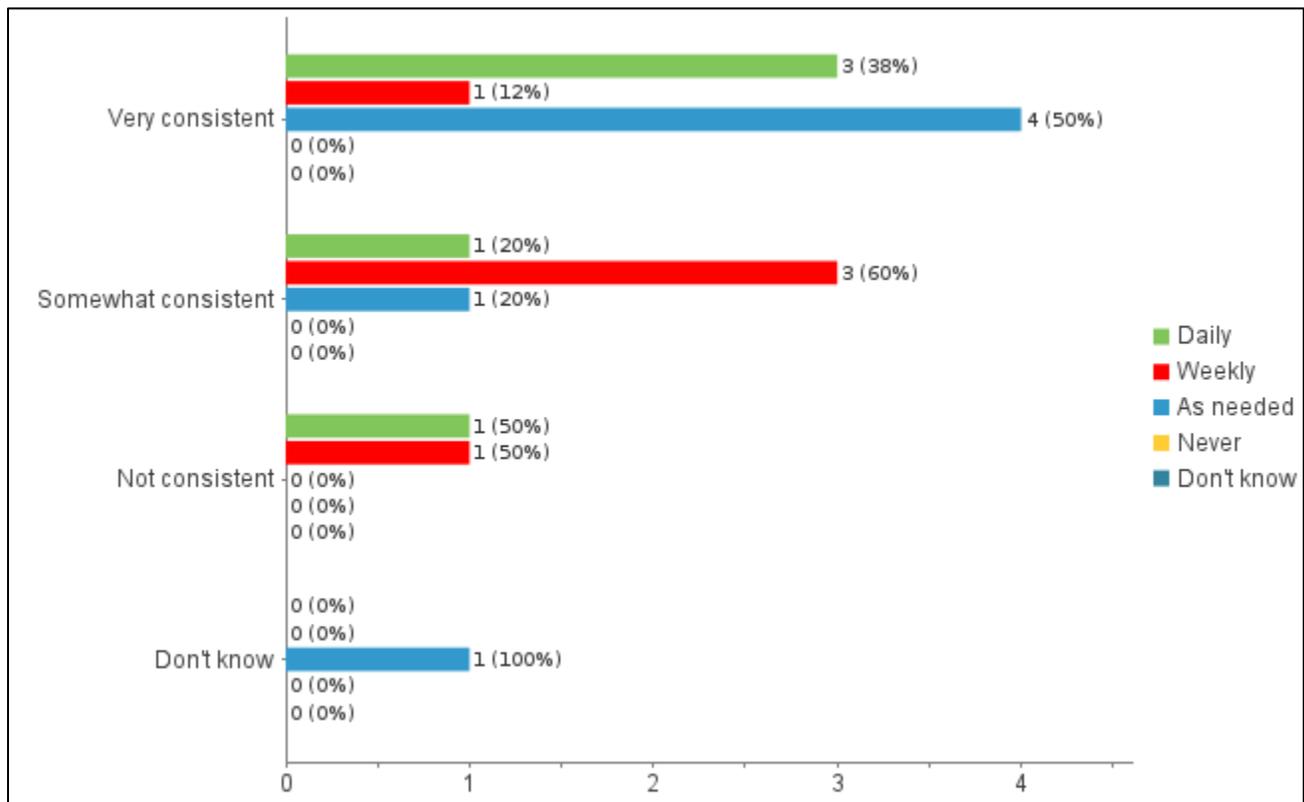


Figure 4.4: Comparative Bar Chart

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Summary of findings from the section on clinical decision-making demonstrate that the decision to remove or radiate through dressing is generally made by the Radiation Oncologist (31%) or by the team (31%). It is noteworthy that 71% of the centres do not have a reference document for when to remove dressings prior to radiotherapy. Additionally, the participants presented a general perception of consistency in skin assessments and wound dressing changes. It is noteworthy that the term consistency appeared to have been interpreted based on personal practices rather than standardized institutional policy.

Management of open wounds. This section aimed to identify topical treatments and wound care management of radiation dermatitis and malignant wounds at different centres across Canada. The rationales for this set of questions were to identify the most commonly used treatments and wound care products. “Check all that applies” was an option provided in this entire section.

Topical treatments used in moist desquamation radiation dermatitis. Table 4.10 shows that, the most common way of managing moist desquamation is antimicrobials such as silver sulfadiazine (69%). This is consistent with the finding from a similar survey examining skin care recommendations during radiotherapy by Bolderston in 2003. Non-adherent, thin dressings such as Mepitel® (38%), Adaptic® (31%) or Mepilex® Lite (31%) appeared to be used on radiation dermatitis at different centres in Canada. The open text responses revealed that other wound care products such as Jelonet*, InterDry® Ag, Telfa™ dressings, topical applications such as Triad™, hydrogel, Eosin aqueous, Glaxal* base cream, Critic-Aid® and antibiotic ointments were also used.

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Table 4.10***Topical Treatments used in Moist Desquamation Radiation Dermatitis***

Response	Chart	Percentage	Count
Saline compresses		81%	13
Mepitel®		38%	6
Adaptic®		31%	5
Antimicrobials such as Silver Sulfadiazine		69%	11
Mepilex® Lite		31%	5
Non adherent pads		62%	10
Gauze		31%	5
Surgifix®		6%	1
Other, please specify...		31%	5
Total Responses			16

Topical treatments for malignant wounds receiving radiotherapy. Results of survey questions 4.10 and 4.11 revealed that saline compresses and gauze were widely used for both the radiation dermatitis and malignant wounds. In addition, Table 4.11 showed the use of hydrogels (69%), antimicrobial agent such as metronidazole (62%) and wound care products such as Mepilex® Border (81%) across Canada. The open text responses stated that other wound care products such as Aquacel®, Aquacel®Ag, Restore®, Triad™, Biatain®, abdominal pads for outer absorbant dressing, MEDIHONEY® and hydrocolloid protective sheets in between treatments were also used.

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Table 4.11***Topical Treatments for Malignant Wounds Receiving Radiotherapy***

Response	Chart	Percentage	Count
Wound cleansing/ irrigation with saline solution or sterile water		94%	15
Hydrogels: Intrasite* gel		69%	11
Ointment based antimicrobial agents such as Metronidazole		62%	10
Alginate sheet such as NU-DERM ®		12%	2
Kaltostat®		38%	6
Silvercel® Non-Adherent		31%	5
Actisorb®		31%	5
Carboflex™		25%	4
Mepore®		31%	5
Mepilex® Border		81%	13
Allevyn◇		38%	6
Gauze		44%	7
Other, please specify...		19%	3
	Total Responses		16

One telephone interview participant explained:

So when they have an infected or necrotic base and we're trying to debride or clean or reduce odor, MEDIHONEY® is extremely effective in those cases and lot of non-healable wounds”, and “Hydrochloride protective sheets, We'll use those sometimes for our radiation patients over weekends when they're having radiation toxicity and we want to clean up their neck, reduce friction, reduce dressing changes, help autolytically clean up the area. (P#4)

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In summary, it is evident that the management of malignant wounds was different from the management of radiation dermatitis. The most commonly used products were preferably non-adherent and helped to control bleeding, exudate, and odor.

Distribution of responses and missing data. Since missing data such as “don’t know” answer can result in biased results, the extent of the problem was analyzed by examining frequency distributions on each of the questions in the survey with the option of “don’t know” answer (Polit & Beck, 2012). The extent of missing data is reported and the degree to which the issue affected the central analysis was examined. “Don’t know” option was provided for the following questions and a total of three responses received were noted, as below.

Table 4.12

Distribution of Missing Data Responses

Questions where “Don’t know” was a response option	Number of “Don’t know” response
Which skin assessment tool do you use for radiation dermatitis?	0
How often is a patient's wound assessed?	1
Who makes the decision to remove or radiate through dressings?	2
How consistent is nursing practice regarding the use of skin assessments and wound dressing changes during radiotherapy?	0

The above Table 4.12 shows that there are three “don’t know” responses. As described earlier the two incomplete survey responses had only demographic and part of ‘current practice’ section answered. Since all available data were used in the analysis, these respondents had missing data for most of the survey questions.

It is also noteworthy that only 14 responses were received for the question, “Do you use a local policy, Clinical Practice Guideline or Best Practice Guideline for when to remove a dressing during radiotherapy? If possible, share the document electronically?”. Two responses

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were missing from the completed surveys. This missing data may be the result of an institutional policy on information management that restricts the sharing of organizational documents. Polit and Beck (2012) suggests, “In interpreting results, the risk for various biases should be assessed and factored into conclusions” (p. 476). Based on the survey results, it may be concluded that the extent of the missing and “don’t know” responses in the complete responses are limited and therefore the extent of the problem in relation to reporting bias is minimal.

Phase III Interview Findings

Qualitative interview sample. The qualitative sample is a subsample of the larger online survey sample (n=4). Table 4.13 provides demographic information of the four nurse participants from Phase III of the study. Even though the sub-sample was small, all the participants were from different provinces and represented various levels of nursing practice, namely, staff nurse, nurse educator and nurse leader. Their academic background and years of experience in radiation oncology also varied with two of the participants with degree and 3-5 years of experience while the other two were MSN graduates with more than 10 years of experience in radiation oncology.

Table 4.13

Demographic Table of Qualitative Interview Participants

Participant	Province	Role or Position	Academic Background	Years of experience in Radiation Oncology
1	Quebec	Nurse Educator	Graduate	More than 10
2	British Columbia	Staff Nurse	Baccalaureate	3-5
3	Saskatchewan	Staff Nurse	Baccalaureate	3-5
4	Ontario	Nurse Leader	Graduate	More than 10

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Findings from the qualitative telephone interviews. The findings from the four semi-structured telephone interviews (n=4) presented an informative account of the nurse participants' views and experiences in clinical decision-making and inter-professional practice in wound management. The best qualitative research focuses on meaning and understanding by seeking to identify what people do know, for example, "how they maintain their health and what the underlying rationality of their behavior is" (Green & Thorogood, 2009, p. 65). The implications for patient care were considered throughout the process.

Analysis of the interview data revealed three broad categories that are presented as themes, under an overarching theme. The major themes emerged as a result of data analysis "to discover repetitive patterns in their context" (Polit & Beck, 2012, p. 565). The overarching theme of "*Integration and Patient-centred care*" suggested the complexity of nursing role in the area of wound management during radiotherapy. The three themes were: *The context of wound care practices in radiotherapy; Nurses' perceived role in clinical decision-making and Nurses' perceived role in inter-professional relationships.*

The overarching theme of *Integration and Patient-centred care* was reflected throughout the three subthemes. Radiation Therapy Nurses (RTNs) used integration as a key attribute in their practice, especially in the provision of patient-centred care during radiation oncology wound management. Integration of nursing skills and knowledge, available resources, institutional policy and procedures is vital in the context of nursing practice, clinical decision-making and inter-professional relationships. The salient aspects of integration and patient-centred care were the essence of collaborative practice among team members in wound care management during radiotherapy.

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Theme One: The context of wound care practices in radiotherapy. This theme reflected the environment in which radiation oncology nurses practice. Each participant was from a different Radiation Oncology Center from various provinces across Canada. Their position or roles were quite different; however there were commonalities in their practice environment. A first subtheme, *Hierarchy in the model of care*, was noted as a participant reflected on wound care:

Leadership! without a doubt, ...yeah we take the lead role for sure... we seem to work in such a fluid, we seem to be on the same page, but if I were to have a different opinion, I probably wouldn't I wouldn't question it, I probably would let's say some don't want to give someone Flamazine◇, I wouldn't challenge them. (P#3)

In this excerpt, two different perspectives are being expressed. While the nurse worked in a fluid, non-hierarchical manner, she also would not challenge a different opinion. In a study by Whitworth (2008) accommodation followed by avoidance are the two most preferred styles of conflict management among female registered nurses. It is noteworthy that authority for individual patient care tended to be attributed to the Radiation Oncologist as a participant explained, *"We can't do things based on our judgment, it has to be a combined effort from everyone as well and the final decision is always the oncologist"* (P#2). In the context, reference to Khan's (2007) statement that the radiation oncologist heads the treatment planning team is helpful to explain the process.

Another sub theme, *Communication* with electronic documentation was common to all participants' work environment. The electronic virtual communication exemplified the essence of inter-professional practice in Radiation Oncology Centres in Canada. One of the participants explained:

All of our documentation is done electronically, so it's quick access for someone to follow up with what the other has done. So I think that's... huge improvement for us as

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we are able to see and communicate better. So it's just a matter of I think it's also developing a trust in each other's competencies. (P#1)

Yet another sub-theme, *Resource management*, was discussed as a factor in the provision of wound care as participants revealed information about wound care products, “*Mepilex® or Mepilex® Lite is not available in the hospital, it's more costly to the patients, it's not necessarily available*” (P#1). This excerpt refers to newer wound care products that are introduced in the clinical setting for patient care that may be expensive, particularly when changed on a daily basis. RTNs may encounter choices of similar wound care products from different manufacturers that might explain variations in product utilization across the centres in Canada, based on availability. The following quote reflected this variance based on availability of wound care products:

Before there was silver nitrate, silver stuff, but we haven't been using it because, it is so expensive. But patients love the Mepilex®. It's about \$26 a sheet, so we give it out sparingly and patients will buy it. (P#3)

Participants reflected on sub-theme, *Patient education* as an integral part of wound care management. Patients are taught self-care and their support system, such as family may be involved in wound care. In addition referral to community nursing resources is made, as needed. One participant shared:

If there is someone who is well enough, who has support services at home, who has a supportive spouse, son, daughter or anybody like that, we do teach them how to do the dressing on their own. For people who are younger or even older, some people have the preference of saying, I prefer to do the dressing myself than going to the clinic and waiting for half an hour for that nurse. As long as we have evaluated that yes they are competent, yes they will follow the protocol, they will do the dressing appropriately, they know to do it every day, we do the teaching of how to do the dressing, what to look for, signs of infection, when to call us. (P#1)

Fostering self-care in radiation induced dermatitis and wound management is part of the RTNs role. A participant described:

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Usually patients are advised and taught, how to take care of their own skin, and we teach them that that say they have ended up with moist desquamation, we teach them how to do saline soaks and apply the Flamazine and keep open to air. So we do all that for the patient to be able to manage themselves. (P#3)

In this section, findings have been presented regarding Theme One: *The context of wound care practices in radiotherapy*. Four sub-themes of *Hierarchy in model of care*, *Communication*, *Resource management* and *Education* were discussed. While all of these aspects work together for patient-centred care, these factors might influence variations in wound care practices based on individual patient needs during radiotherapy.

Theme Two: Nurses' perceived role in clinical decision-making. This theme highlighted the various nursing roles in radiation oncology wound care. The semi-structured telephone interviews revealed that RTNs participate in clinical research, apply relevant knowledge and use innovative techniques, anecdotal evidence, practice experience, in-services, expert opinions, community referrals and research-based decisions to guide their practice.

The sub-theme of *Nursing autonomy* in wound assessment and care is a key feature in the RTN's role. Trust in nursing competence is described by a participant, *"When a prescription is required for Flamazine, we do have to speak to with the physician to get it. They are quite comfortable with our assessment skills to provide that"* (P#3). Another participant referred to the unique contribution of nursing assessment.

Primary care nursing that strengthened competence in clinical assessment and judgment was apparent, as the participants explained, *"We do try for the patients to see more or less the same, one or two nurses. Everyone has the same set of eyes evaluating... the doctors are very confident in the nursing expertise"* (P#1).

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A proactive measure such as initiating a nursing policy in the clinical setting is discussed by this same participant:

We are actually in the process of finalizing a collective agreement in our hospital where we are legally covered or have the legal right to initiate. We don't prescribe the Flamazine◇ but we can say to the patient "Yes, you need to start the Flamazine◇, here is a sample you can try" or "let's put this dressing on". (P#1)

Another sub-theme was *Sources of evidence* used in clinical decision-making and to inform nursing practice. Sources of evidence were acknowledged to be based on research or information regarding technologically advanced wound care products that become available for patient care. One participant explained:

We are looking for evidence based practices, with the research that has been evolving, we look for articles, we will then look at also new products discussed with industries, what is types of their new products, what type of products should we particularly use for a patient population. (P#4)

Clinical trials investigating the effect of new skin care products in the prevention and management of radiation dermatitis were underway at different centres as a participant mentioned, "*We do have a couple of studies happening right now with different skin products*" (P#1).

Innovative practices and bridging knowledge about wound care from other areas, for example burn wound management, to individual patient needs in radiation oncology were disclosed by participants. One nurse said:

In the past couple of years any patient that we are treating to the pelvis area, for let's say Gyne or colorectal we suggest silver clear underpants ...The companies also made improvements with that now they will make patients custom-made like longer underwear so all the area of the pelvis, the groin wherever there is creases that need to be in contact with the silver clear mesh will have that. All the other areas the outer thigh, the outer buttocks or any areas that does not need to have contact will be in a different like a nylon underpant. So this is a change that we have recently in the past two years, started encouraging patients to use during treatments. (P #1)

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Bridging knowledge from different types of wound and its management assisted in innovative wound care practices among patients undergoing radiotherapy described by a participant as follows, *“Brava protective sheets, they are through Coloplast. They are actually for Peristomal patients’ complications but we found them quite effective for radiation patients”* (P#4).

Anecdotal evidence and patients’ preferences were also used in clinical decision-making, as communicated by one participant:

We try to be as evidence-based as possible. Sometimes patients will come and say “I didn’t like that dressing I need something else, something different”. In that case, of course we are going to make adjustments based on the patient’s comfort. (P#1)

Patients’ positive feedback regarding their own comfort relating to pain and ease of dressing removal helped to guide the RTNs choice of dressings, as explained by one nurse:

Well, I find that with great success we use Mepilex®, if a wound for example..., some head and neck patients. You know they can be very painful, their moist desquamation, we use Mepilex®. So what we will use is saline soak, Flamazine◇, and then apply the Mepilex® dressing and patients love it. It doesn’t stick, absorbs the exudate, and because the nerve endings are covered, the patient is very comfortable. They love it! (P#3)

This practice of using a saline soak diverges from how the dressing is designed to be used, but the nurse is patient-focused in describing why this practice is used. The survey findings revealed that this practice is widespread (94% of respondents reported the use of saline compresses). At my own site of practice, patients with radiation induced dermatitis describe saline soaks as *soothing*. In our particular setting, after the application of saline compresses for 10 - 15 minutes, the treatment area is allowed to air dry, a thin layer of a prescribed antimicrobial agent is applied to open or peeling areas of moist desquamation and the area is covered by a dressing of choice depending upon the amount of exudate.

A related sub-theme regarding RTNs’ perception of their role in clinical decision-making is that of *Networking*. Connecting with other members of organizations, such as the Canadian

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Association of Nurses in Oncology-Radiation Therapy Special Interest Group (CANO-RT SIG), was common to two participants as they disclosed, *“It’s quite interesting to hear other opinions, research that’s just happening... it’s a great access to education, access to another resource”* (P#2).

Networking helped to share information and perspectives, motivate one another and forums such as CANO-RT SIG served as a specialized professional body to build the evolving role of RTN in radiation oncology. A participant explained:

I’ve spoken to some colleagues in different centers within ... Canada, try to compare what is their skincare protocol, what are they doing, how, what studies are they doing and sharing information... being part of the CANO special interest group has also helped because we are networking across Canada. (P#1)

In summary, *Theme Two: Nurse’s perceived role in clinical decision-making* is presented with three sub-themes including *Nursing autonomy*, *Sources of evidence* and *Networking*. Although clinical judgment and decision-making are integral to the RTN role, complexity is also evident from the sub-themes. A key element informing clinical decision-making was keeping the patient at the centre of the process. Yet, while trust in nursing competence and wound care based on patient needs was evident, there was variability in how evidence is actually implemented in practice. As reflected in the next theme regarding inter-professional relationships, there are constraints on nurses that account for some of this variability.

Theme Three: Nurses’ perceived role in inter-professional relationships. This theme related to nurse participants’ descriptions regarding their role in inter-professional relationships, and has already been referenced in the preceding two themes. Participants were invited to describe how inter-professional relationships may affect collaborative practice. All participants articulated the sub-theme of “Teamwork” as implemented through team meetings,

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interdisciplinary co-ordination, patient allocation and patient flow in the ambulatory care setting.

The sub-theme of *Teamwork* is explained as RTNs are resourceful with clinical expertise in the area of skin care and wound management:

For us it's kind of automatic where I shouldn't say automatic but it really is more that we've developed strong relationships between the team, whether it's technologists, whether it's doctors or if the dosimetrist has a question about someone's skin, they'll come to us. (P#1)

Another participant summarized the inter-professional relationship as teamwork, *"I think they perceive it as being part of the team in making a decision for the best outcome of the patient"*

(P#2). Yet another participant described the inter-professional relationship as collaborative communication:

I find everyone's very team oriented. Everyone has and understands and co-ordinate their area of what we need to do and how we need to promote advocacy for the patient. Whether it's collaborating with other colleagues, whether it's collaborating with the patient it's all towards patient centered care. So we all work very well together. Everyone has a voice. Everyone makes decisions. Everyone will give input depending on the patient's needs. (P#4)

In these quotes, patient-centred care—determining what is best for the patient—is in large part what the team coalesces around. Wound care was further portrayed to have an interdisciplinary approach, involving the different members of the team as participants' shared collective decision-making:

If there was a query or something that, if I really didn't know, something that was out of the ordinary, I'd pick up the phone ...the wound clinic... so I would consult them and then I would bring that information back to the team, primarily the radiation oncologist, run it by him or her and then inform the whole team and then we embark on that and take it that way. (P# 3)

Although nurses might make primary assessments and recommendations based on institutional policy, they typically consulted with the radiation oncologist. A participant explained the inter-professional work:

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I make recommendations through orders, medical directives and then for areas where it is needed for further expansion of the care, then I would collaborate with the physician and have physician order as well. It has to be with physician order. (P#4)

Another RTN participant depicted consistent inter-professional interactions in the clinical setting to plan individual patient care:

Nursing is the one who does the primary assessment and make some clinical judgments and you know we have opinion from the oncologist, 9/10 it's kind of a combined effort from nursing and oncologist to decide what's best treatment for skin care. (P#2)

Another sub-theme is *Patient advocacy* in relation to wound management. Reinhard, Grossman, and Piren (2004) aptly describe client-focused advocacy as the participatory process of enhancing client autonomy and assisting clients in voicing their values by involving clients in co authorship of their health narrative (p.283). Participants emphasized their role as patient advocates in their cancer trajectory as illustrated in the following comment of one participant, “*We practice primary nursing so we are very advocative for the patient*” (P#1).

A reflection of a patient’s current status and its influence on wound care management is suggested by the participant, “*Compliance from the patient, as well as if there are other factors like co-morbidities or level of understanding*” (P#2). Referral to necessary care and resources available for the patient undergoing radiotherapy might become part of the Radiation Therapy Nurses’ role while providing wound care, as explained by this participant:

So if I am seeing them and I see that maybe they are having a psychosocial issue, or they're not having nutrition, you call in all those colleagues that need to help that person through their aspect of care. (P#3)

A participant described wound care as being holistic. The participant provided insight on the patient factors and interdisciplinary approach in wound management. The focus on patient care as a whole was explained with this in-depth description:

There's multiple facets that you have to address; we look at whole patient. We don't look at just one aspect of that patient, so even if I'm seeing a patient for wound care

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management, I am looking at every other factor that is going into the care... So there's never just one issue happening with them... When it comes to wound care management it's the wound assessment, it's looking at the patient's overall health, looking at if they're having subsequent chemotherapy. What's happening with their labs, general health, nutrition? It depends on type of wound, it is as well. Are we assessing what type of wound so we have to know the cause, is it healable, non-healable, are we in maintenance mode because of different underlying factors that are happening. Is it a non-healable palliative type wound? ... we really have to look at fully at the whole patient before we make any decisions regarding the wound, and then with the wound, It's a full thorough wound assessment before we make any determination of what kind of dressings we will be using. (P#4)

Again, this nurse is describing how clinical decision-making and inter-professional collaboration revolves around individualizing care for best patient outcomes, not only in wound management but in what is best overall for the patient.

Another sub-theme is *Practice change initiatives*. A nursing policy change was described earlier under clinical decision-making and its sub-theme, Nursing Autonomy. Another participant described an inter-professional policy change in relation to radiating through dressings and the objectives were explained:

Improve patient care, improve outcomes, reduce the amount of dressing changes, improve comfort, be cost effective... We're really looking at that right now is what dressings really need to be removed, what dressings could stay on. So we're in the process of doing a bit of change in practice so we're just been meeting the committee to make a change overall. (P#4)

Theme Three: Nurses' perceived role in inter-professional relationships is summarized in the sub-themes *Teamwork*, *Patient advocacy* and *Practice change initiatives*. The flexible relationships for best patient care and outcomes illustrated collaborative practice. The focused area of inter-professional care delivery was seen as a vital aspect of the patient experience in the ambulatory setting. While advocating for patients' preferences, RTNs as valuable members of the multidisciplinary team co-ordinated patient allocation and patient flow in the ambulatory care setting. Additionally, successful initiation of practice changes in the clinical area strengthened

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the evolving role of the RTN. Perhaps, these inter-professional relationships will continue to make radiation oncology a sustainable workplace for specialized nursing practice and improved patient outcomes.

Summary of Integrated Findings

In this section, an integration of findings from phases II and III is presented. Analysis of current practice as reported in the national environmental scan survey showed that there is inconsistency in practice, particularly in relation to radiating through dressings. None of the participants responded to the survey request to share standardized reference documents, such as a Clinical Practice Guidelines in relation to radiating through wound dressings. The absence of such standardized documents might explain some of the variations in whether or not to radiate through dressings. While there was inconsistency in regard to radiating through dressings, the survey results also revealed that there is generally consistency in the topical treatments used for radiation induced skin reactions and malignant wounds during radiotherapy across Radiation Oncology Centres in Canada.

The thematic analysis of the semi-structured telephone interviews describes the context of nursing practice environment in wound care management as one that utilizes the integration of clinical decision-making and inter-professional relationships to guide collaborative, patient-centered practice. The complexity of the nursing role in radiation oncology wound management is exhibited by these overarching themes of *Integration* and *Patient-centred care*. It is noteworthy that a few centres have resources such as a radiation oncology nurse consultant, a clinical resource nurse and experts in wound and ostomy care. While one of the participants shared that their centre is looking at changing practices in regards to removal of dressings prior to daily radiotherapy, it appears to be a local practice change that is in process. When complete

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and available, the document from this centre might be a resource for future directions of this project. These findings were presented to the expert consultants in Phase IV in an executive summary (See Appendix F) for their input.

Phase IV: Consensus-Building for Recommendations

In situations such as the current study where there is a lack of evidence—whether generated empirically or synthesized from the literature—and where best practice is yet to be established, clinical expertise and professional opinion play a critically important role in health care decision-making (Pearson, Field, & Jordan, 2007, p. 105). A final phase of consensus-building with clinical experts was initiated “to be inclusive of multiple disciplines and perspectives” [and] “ensure that evidence includes science based knowledge as well as practitioner based wisdom” (Weeks et al., 2013, p. e.290). Radiating through dressings may be an innovative practice and it is hoped that the thesis will serve as foundation for a national standard. Toward this end, five experts were consulted in Phase IV.

An executive summary based on the mixed method analysis of data gathered from previous phases was presented to experts in the area of oncology radiotherapy and wound care management (See Appendix F). Table 4.14 represents information regarding the panel of experts who participated in Phase IV of the study. Four of the five agreed to be named.

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Table 4.14*Phase IV: Panel of Expert Consultants*

Name	Position	Agency
A. Hughes	Nursing PPL*	BCCA
A. Bolderston	Radiation Therapy PPL*	BCCA
**	Radiation Oncologist	**
M. McQuestion	CNS***	Princess Margaret Cancer Centre
S. Chadwick	Advanced Practice Nurse	Princess Margaret Cancer Centre
	CNS***	Princess Margaret Cancer Centre
	Medical Oncology Wound & Ostomy	

Note. PPL*: Professional Practice Leader

** : Anonymous

CNS*** : Clinical Nurse Specialist

There were five guiding questions for input for recommendations to enable development of collaborative guidelines for inter-professional best practice. The guiding questions are listed in Appendix F. The experts reiterated the need and benefits of addressing this aspect of patient care (personal communication, August 22-30, 2013). Consensus on future research priorities, along with strategies for safety, effectiveness in wound management and an action plan to acknowledge patients as experts concerning their own health and experiences living with cancer, was achieved (Weeks et al., 2013). Feedback obtained from the experts is used to further supplement the analysis of the findings from the previous phases and to propose recommendations. Their responses are integrated into Chapter Five discussion. Therefore, the goal of “best practice” as directed by the conceptual framework and project schematic model was initiated.

Conclusion

The findings of the study reveal that there is considerable variability between centres in relation to radiating through wound dressings during radiotherapy. The analysis suggests that

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evidence-based standardization of wound care practices, particularly in the area of radiating through dressings during cancer radiotherapy requires further research. The next chapter will discuss the implications of the findings of this study in relation to the foci of current practices across Canada regarding radiating through wound dressings during cancer radiotherapy. The synthesis of findings from all phases of the project is discussed in more detail in Chapter Five.

Chapter Five: Discussion

Introduction

In this chapter, salient findings of the research study are discussed, highlighting the relevance of the findings in respect to existing nursing knowledge and practice. “The combined findings suggest richly textured and comprehensive datasets” from the different phases of this study (Polit & Beck, 2012, p. 626). The key pieces of evidence are synthesized, also discussed in relation to the guiding research questions, existing knowledge along with expert consultations and current knowledge.

Synthesis of Evidence

The mixed methods employed for the study were literature review, national environmental scan via an online survey and qualitative telephone interviews, and a final consensus – building consultation phase. The guiding research questions of the study were:

- 1) What is the existing evidence regarding radiating through dressings?
- 2) What is the current practice in Canadian Radiation Oncology Cancer Agencies with regards to wound dressings during radiotherapy? and
- 3) How do nurses perceive their role in clinical decision-making and inter-professional relationships in this matter?

In this chapter these questions provide the organizing structure for the synthesis and discussion of the study findings. Synthesized findings from the national environmental scan survey and telephone interviews pointed to the importance of a patient-centred approach as core to any evidence-informed guidelines regarding wound management.

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Question #1: Existing evidence regarding radiating through dressings. The current literature reviewed served as a backdrop against which current practice findings were compared. The literature review included peer-reviewed published articles, books and grey literature and revealed that limited evidence regarding the benefits and or potential harms of radiating through dressings during radiotherapy is available. Existing evidence suggests that it may be safe to radiate through thin dressings such as Mepitel® (Adamietz et al., 1995; Butson, Cheung, Yu, & Metcalfe, 2002; Naylor & Mallett, 2001; Thilman et al., 1996) and Mepilex® Lite in relation to the potential radiation induced skin reactions and relatively less boost effect (Diggelmann et al., 2010; Mac Nally & Woodings, 2012). It is noteworthy that only Adamietz et al. and Diggelmann et al. have published clinical trials. Two studies (laboratory-based, not with human subjects) reported that while any of the wound dressings can be left on the skin during electron irradiation, with photons the dose increase depends on the thickness of the dressing (Mac Nally & Woodings; Thilman et al.). The same study (Thilman et al.) reported that in the case of ulcerating tumors or fungating wounds, all non-adhesive wound dressings whose clinical aptitude for the treatment of ulcerating tumors have been proven, can be used regardless of their dosimetric characteristics. In all cases, the thickness of the dressing must be taken into account when calculating the actual applied dose of radiation (Hollinworth & Mann, 2010; Thilman et al.).

Although the available literature speaks to dressing type and procedure, few studies have addressed removal of dressings for radiation therapy, the area of focus I address in the thesis. When the quality of the overall evidence is graded on a three-point scale whether good, fair and poor, the literature review reveals that evidence is poor; assessed as *level three* because “evidence is insufficient to assess the effects on health outcomes because of limited number or

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power of studies, important flaws in the design of conduct, gaps in the chain of evidence or lack of information on important health outcomes” (Pearson, Field, & Jordan, 2007, p. 108).

Appendices A and B reveal that only two clinical trials were retrieved. Adamietz et al. (1995) had Mepitel® dressings left in place on patients with cancer (n=21) during radiotherapy. Even though Diggelmann et al. (2010) discuss that the bolus effect is low and that Mepilex® Lite may be left in place, in the actual study some patients had their dressings positioned on top of reference marks and therefore for the sake of consistency, all dressings were removed prior to treatment (p. 977). No relevant Randomized Controlled Trials (RCTs) that are considered the ‘gold standard’ in evidence of effectiveness were retrieved. Important health outcomes for patient care that include quality of life indicators such as pain, itching, comfort, sleep patterns, activities of daily living and wound healing are not addressed in the retrieved relevant studies.

In situations when empirical evidence is missing or inconsistent, expert opinion is another type of best available evidence on a topic such as radiating through dressings (Pearson, Field, & Jordan, 2007). Accordingly, a question posed to experts was, “Can you comment on the assumption that removing wound dressings prior to daily radiation treatment is best practice?” The general opinion was removing dressings is not best practice in relation to wound management. Expert M. McQuestion explained further:

I would suggest that automatic removal of dressings prior to treatment is not best practice, particularly in situations where the dressing is thin (what constitutes “thin”, i.e., < 5 mm., < 3 mm.) adheres well to the skin / wound without gaps or the dressing is not fluid filled (in that case changing the dressing but keeping one in place would be preferred), patient factors (malignant wounds, pain associated with removal, cost of supplies to the patient, etc.) and treatment factors. (personal communication, August 30, 2013).

Existing evidence regarding radiating through dressings suggests that thin dressings (up to 2 mm.) may be left in place during radiotherapy without significant bolus effect. While this may

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be the case, there is variability in the types of dressings that were investigated. Overall, the suggestion is to examine the condition of the dressing prior to irradiation. A radiation oncologist commented that one cannot make a simple statement that removing wound dressings is best practice or not, because there are different types of wounds and different types of dressings (personal communication, August 25, 2013). It was also recommended to define different wound scenario namely radiation dermatitis and malignant wounds, provide rationale for pros and cons of dressing removal, develop draft guidelines and seek feedback from multiple disciplines for further research and practice. It is noteworthy that an assumption of bolus effect related to the thickness and consistency of dressings has and continues to guide practice.

In summary, there is little evidence in relation to deciding if radiating through dressings is best practice. More research needs to address specific wound care products that might be left in place during radiation without causing a significant boost effect or harm to patient. Also helpful would be the development of an expert consensus-developed decision-making algorithm. In the context of clinical inquiry, examining current practice is crucial in gathering any other existing evidence.

Question # 2: Current practice in cancer agencies across Canada. All phases of the study addressed the question regarding current wound care practices in Radiation Oncology Centres across Canada. As explained in Chapter Four, the national environmental scan survey results reveal that dressing use is similar for radiation induced skin reactions and malignant wounds during radiotherapy. Though dressings are sometimes left in place during radiotherapy, in fact radiating through wound dressings is not yet standardized anywhere.

Inconsistency in practice. In this study, findings revealed that practices in relation to radiating through dressings varied considerably across centres in Canada. While dressings are

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always removed in some centres, they are left in place for palliative patients at other centres.

The qualitative data suggests that there is inconsistency in whether to remove or radiate through wound dressings because 1) it is standard practice to never radiate through dressings; 2) because it is beyond their scope or field of practice as other team members are the decision makers; 3) individual patient's co-morbidities or preference; 4) goals of care i.e., curative or radical and palliative or supportive; and 5) a possible change in practice is in process at one of the centres. Thin dressings are sometimes left in place at a few centres based on patient preference or team decision as learnt from one of the qualitative interviews, experience at the local Radiation Oncology Centre, where I am working and as suggested in the literature.

A comparison of the questions, "How often is a patient's wound assessed" to "How consistent is nursing practice regarding the use of skin assessments and wound dressing changes during radiotherapy?" showed that four respondents who answered 'as needed' also reported their practice as being 'very consistent'. Though the comparison illustrated a different perspective and perhaps contradicts the assumption that 'as needed' assessments (41%) might not be 'very consistent', for the most part the respondents reported consistency (81%) in nursing wound care practices. This apparent contradiction could speak to the perceived difference between how often the wound is assessed, the role of the nurse in decision-making in patient specific wound care practices and the broader context of clinical decision-making, particularly around wound management. Without a tested scale to measure consistency in practice, a firm conclusion cannot be made, based on this study.

Nonetheless, the term "consistency" in wound care practices seems to be interpreted on individual perspectives rather than standardized practices. In other words, nurses may view their own professional practice as consistent, even though there may be variation from nurse to

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nurse. Therefore, a question posed to expert consultants was, “How can consistency in wound assessment and dressing management be facilitated?” A Radiation Oncologist responded, “*Team discussion and have discussion based on sound physics and radiation principles*” (personal communication, August 25, 2013).

Other factors such as resource management (e.g., dressing availability and cost) also influence wound care practices during radiotherapy. Common barriers to change, such as the use of new wound care products encompass organizational, structural and systemic limitations that may include accountability gaps in the mode of resource allocation (Pearson, Field, & Jordan, 2007, p. 121). Expert A. Hughes explained,

When an area of clinical care is under researched, we rely on foundational information such as the principles of moist healing and this is open (and vulnerable) to a very broad interpretation. Organizational practices should be clearly articulated and grounded in available evidence or theory. Education (as always) is key and employees should be adequately supported to practice in a manner conducive to good patient care (having knowledge of available products and their use and a clear understanding of practice expectations are examples). Opportunities for education and discussions with nurse leaders when observed practice does not conform to best or evidence based practice are essential. (personal communication, August 29, 2013)

Expert M. McQuestion also reiterated similar recommendations in this regard:

Consistency can be improved by ensuring that education is provided, monitoring and supporting nurses' practice during a change process. Developing criteria for the type and frequency of assessment and building it into electronic (or paper) documentation systems improves adherence to a standard. (personal communication, August 30, 2013)

In summary, there is inconsistency in practice in relation to radiating through dressings across Canada with no standard policy regarding when to remove or radiate through dressings.

Developing specific guidelines will assist in delivering standardized practices. It is applicable to have educational events, workshops or in-services related to new wound care products based on clear guidelines. Communication between the inter-professional team is also crucial for members to be *on the same page* with the implementation of knowledge into practice. Often,

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information is received from wound care product manufacturers that might also influence practice. However, the implementation of a standardized policy will assist in the provision of individualized patient care.

Integration and patient-centred care. The overarching theme of ‘integration and patient-centered care’ is a key attribute that Radiation Therapy Nurses use in their practice, especially in the area of wound care management in radiation oncology. The perception of comprehensiveness overlaps with the image of integration (Kodner & Spreeuwenberg, 2002). Integration of nursing skills and specialized knowledge of radiation oncology, available resources for wound care, institutional policy and procedures are vital in the context of nursing practice. The art of integration is essential in clinical decision-making, inter-professional relationships and in the delivery of enhanced client experience. All organizations are to an extent, hierarchical structures consisting of distinct, yet interconnected constituents that are intended to play complementary roles in order to accomplish their joined tasks (Pfeffer, 1982). The salient aspect of integration and patient-centred care were the essence of collaborative practice among inter-professional team members in wound care management during radiotherapy.

Question #3: The context of professional practice. All phases of the study focused on understanding the context of nursing practice environment in Canada. Nurses’ perceived roles in clinical decision-making and inter-professional practice were particularly explored in the context of wound management of patients with cancer during radiotherapy.

Complexity in clinical decision-making. The perception of complexity in nursing role and clinical judgment in the area of wound management during radiotherapy was evident from all sources of data. Most centres (71%) did not have a reference document such as local policy,

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Clinical Practice Guideline or Best Practice Guideline for when to remove a dressing during radiotherapy. A question posed to experts was, “How can the practice of removing or radiating through dressings be effectively evaluated? What evidence is needed to develop a practice guideline?”

Expert A. Hughes emphasized the impact of evidence on practice as she responded, “*I believe that we are a long way from having sufficient evidence to develop an evidence based practice guideline. However, further research in this area could support (or not) some of the existing perceptions of best practice*” (personal communication, August 30, 2013). A Radiation Oncologist posited, “*One has to define the types of wound (radiation dermatitis versus malignant wound), type of thickness of dressing, and intent of therapy (radical/curative versus palliative)*” (personal communication, August 25, 2013). Expert M. McQuestion explained in relation to evaluating the practice and evidence needed in developing a Clinical Practice Guideline:

It is challenging but consideration should be given to level I evidence and availability of methodologically sound RCT studies, but other methods can be considered. Should it be a “Clinical Practice Guideline” where level I evidence is preferred, or would it be best to develop a Clinical Guide that encompasses other levels of evidence, consensus building and decision-making to develop a standard of practice in light of existing evidence... Build provincial or national consensus for what criteria will be used for evaluating the evidence. (personal communication, August 30, 2013)

The suggestion to develop a clinical guide is a valid point for consideration. The current evidence from this thesis would suggest that further research is required, in addition to gathering expert consensus. Evidence must be stronger than what the current state of knowledge has revealed. Nonetheless, until a sufficient body of evidence is developed through replicated empirical studies, expert consensus in this regard is invaluable. It is noteworthy that three

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consultants' recommended further research, starting with the measurement of bolus effect when dressings are left in place, by collaborating with the physics department.

Inter-professional relationships. During the qualitative interviews, nurse participants were invited to describe how inter-professional relationships may affect collaborative practice. All participants articulated teamwork through team meetings, interdisciplinary co-ordination, patient allocation and patient flow in the ambulatory care setting. Participants described their role as patient advocates in their cancer trajectory. One participant in particular described wound care as being holistic by addressing the whole person and their needs. Wound care was described to have an interdisciplinary approach, involving different members of the team and thereby *integrating* all available resources for best outcomes.

Though the descriptive data show that it is unclear as to whose decision it is to remove or radiate through dressings, it is noted that the registered nurse is not the sole decision maker in this aspect of patient care. Nurses value the direction provided by the interdisciplinary team. One finding in this study was the hierarchy in the model of care that was particularly gleaned from the interviews with staff nurses, referred to as “subordinated role” (A. Hughes, personal communication, August 29, 2013). The perception of a subordinate role may impact RTNs clinical decision-making. However, Advanced Practice Nurses (APN) in the study tended to present clinical decision-making as more of a collaborative process. Nurse scholars note that because the treatment complexity of patients undergoing radiotherapy has changed, the evolving role of Advanced Practice Nurses varies from performing consultations, managing symptoms, to following patients for recurrence and late side effects and participating in research (Haas, 2010). The expanded role of the APN offers considerable potential to radiotherapy nursing for

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increased autonomy in clinical practice and the design of much-needed quality improvement projects.

A respondent to the semi-structured qualitative interviews equated inter-professional practice with holistic care and highlighted the ‘permeable inter-professional boundaries’ that exist in the clinical setting (Cameron, 2011). For example, often in the ambulatory setting educational resources provided to patients may be interchangeably used by nursing, radiation therapy, oncologist and nutrition. Exploring the concept of ‘inter-professional practice’ using nursing care as a frame of reference raises questions, such as:

- 1) How do nurses ‘individualize’ care when working from standardized procedures?
- 2) How do nurses hold their voice in an inter-professional work setting?
- 3) What is the experience of the patient in all of this? and
- 4) How is a patient preference handled if they do not want dressing removed?

Thus, exploring the role of nurses in inter-professional practice inevitably takes us to how nurses promote patient-centred care, an overarching theme evident in the data. Toward this end, the subsequent section discusses this theme.

Person-centred nursing framework. A framework of care adapted from McCance, McCormack, and Dewing (2011) is helpful in providing some explanations to the emerging questions that explore person-centredness in radiation wound management practice. McCance, McCormack, and Dewing present the Person- Centred Nursing (PCN) framework developed by McCance and McCormack (2010) that includes four constructs: engagement, having sympathetic presence, sharing decision-making and providing holistic care. The PCN framework is explained:

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Prerequisites focus on the attributes of the nurses and include: being professionally competent, having developed interpersonal skills, being committed to the job, being able to demonstrate clarity of beliefs and values, and knowing self. *The care environment* focuses on the context in which care is delivered and includes: appropriate skill mix, systems that facilitate shared decision-making, effective staff relationships, organisational systems that are supportive, the sharing of power, the potential for innovation and risk taking, and the physical environment. *Person-centred processes* focus on delivering care through a range of activities and include: working with patient's beliefs and values. To overcome this gap between the concept and the reality of person-centred care we have developed the Person-Centred Nursing Framework... *engagement, having sympathetic presence, sharing decision-making, and providing holistic care*. Outcomes, the central component of the Framework, are the results of effective, person-centred nursing and include: satisfaction with care, involvement in care, feeling of well-being, and creating a therapeutic environment. (Online document)

Based on the PCN framework, the three domains of influence for nursing in relation to this study's findings are discussed separately in the following three sub-sections: 'Prerequisites', 'The care environment' and 'Person-centred processes'.

Prerequisites. Ongoing *education* and clinical in-services are valuable tools for competence among radiation therapy nurses involved in patient care. As described earlier, A. Hughes pointed out the importance of "education" for nurses regarding wound care (personal communication, August 29, 2013). M. McQuestion would agree with this: "Since products change frequently, it is important for nurses to understand the categories of products rather than individual product company names" (personal communication, August 30, 2013).

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Three of the interview and expert consult participants were members of a group of Radiation Therapy Nurses *networking* across Canada through ‘virtual community’ such as the Canadian Association of Nurses in Oncology (CANO) Radiation Therapy Special Interest Group (RT-SIG) in order to pursue mutual interests or goals. The CANO-RT SIG Position Statement, “The majority of patients now are treated in the outpatient setting resulting in an ongoing need for direct patient care, close monitoring, and teaching of self-management strategies” (Canadian Association of Nurses in Oncology, 2013). Such networking depicts having a passion for the job. The forum is a resource for nurses who have a passion for their role and wish to advance the scope of the radiation oncology nurse.

Another prerequisite is *self-knowledge*. Bean and Holcombe (1993) theorize, “The development of specialized fields within oncology nursing with divergent activities and relationships allow for the accommodation of different personality characteristics, thereby increasing role satisfaction and effectiveness” (p. 479). The national environmental scan survey revealed that 61% respondents had more than 10 years of experience in oncology. Reflecting on staffing retention and findings from the qualitative interviews in relation to nursing autonomy, clinical decision-making and hierarchy in model of care takes one back into the context of nursing work environment and inter-professional practice, the focus of the next section.

Care environments. Work environments that are structurally empowering with a commitment to shared governance enhance mutual respect, communication, trust, information sharing and inclusive clinical decision-making, which in turn empowers nurses to *hold their voice* in an inter-professional work setting (Moore & Hutchison, 2007, p. 565). The findings from the qualitative interview suggested that in the clinical setting staff nurses did not hold their voices, while APNs typically did. It is possible that if RTNs had or exercised *more voice*, then

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1) patient voices would be further represented as nurses advocate for them; 2) more quality improvement projects would be initiated as nurses identify practice needs; 3) there would be increased nursing autonomy leading to enhanced job satisfaction; and 4) the role of the RTN would evolve as an *essential* member in treatment planning, as well. In order to employ and maintain the culture of shared governance, the attributes of inter-professional collaboration, continuous support and education are necessary. In the realm of wound management in radiation oncology, standardizing practices would help to validate and evaluate ‘best practice’. Expert M. McQuestion suggests:

I have read that changing practice and moving evidence into practice can take 17 years. We need strategies to address personal perceptions and responses to the evidence to support the uptake of evidence and for nurses to be at the tables when decisions are being made by purchasing about which products are brought into an organization, so the evidence can be used rather than decisions based solely on cost. (personal communication, August 30, 2013)

This excerpt indicates the process involved in health care systems resource allocation that might not have all the stakeholders involved in decision-making. Eventually, the drivers of resource management (radiation therapy nurses in this study) are required to decide best practice. A connection between both the resource allocation and resource management is imperative to the *care processes and environment*.

The effect of power hierarchies in the inter-professional context versus the need for collaboration is nuanced with promoting power equality among professionals which in turn is crucial to including the client in the health care process (Marshall, Medves, Docherty, & Paterson, 2011, p. 453). These authors reiterate that resistance to collaboration should be resolved through research, education and leadership because use of collaboration may change the way professionals and patients consider the health care encounter (p. 453). Careau, Vincent,

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and Swaine (2011) present an apt description of inter-professional collaboration as “at the extremity of a continuum of collaborative practice implicating multiple stakeholders (professionals, clients, relatives, community partners, etc.) and is characterized by interdependence between these individuals to develop a cohesive care plan that meets clients’ needs” (p. 300). In essence, “*an infrastructure which provides the foundation for safe and effective patient care is required*” (A. Hughes, personal communication, August 29, 2013). Returning to the underpinning assumptions of this study, namely, science, safety, value, co-operation, and anticipation, it is crucial that an inter-professional collaborative approach drives the focus towards the goal of ‘best practice’. Guideline-driven care may be efficient in simplifying the transferal of tasks between different types of staff while maintaining quality (Sibbald, Shen, & McBride, 2004). This initiative towards quality improvement also directs us to another important perspective, that of the patient.

Person-centred processes. Patients are experts in describing their own experience regarding the spectrum of care received. Armstrong and Armstrong (2008) suggest that we must also ask, “How will citizens, who contribute to all health-care services, directly and indirectly, have their voices heard in the design of healthcare services?” (p. 137). Perhaps, patients are subject to decisions made by the team and might lose their own voice in health care decision-making. Advanced infrastructural changes such as implementing electronic health records in itself is not patient-centred care unless it reinforces the client-clinician relationship, supports communication, “helps patients know more about their health status and facilitates their involvement in their own care” (Epstein & Street, 2011, p. 101). The electronic documentation program called “ARIA” in my own practice is an exemplar way of communicating across the multidisciplinary team. While patient preference such as Advance Care Planning is initiated, it is

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in the process of being adapted and integrated into the electronic document in a separate document called the Goals of Care form within the Provincial Health Services Authority. The form is already in use at Alberta Health Services (Advance care planning goals of care, n.d.). The Medical Orders Scope of Treatment (MOST) form used by other health authorities in BC is integrated into ARIA for now, with the approval of the Most Responsible Physician.

Similarly, resources like the Registered Nurses Association of Ontario (RNAO) nursing Best Practice Guidelines (BPGs) on wound care management such as venous leg ulcers or pressure ulcers may be integrated into the existing BCCA (2012) document, “Care of radiation skin reactions” to also include patient preference for when one does not wish to have a dressing removed during radiotherapy. Kodner and Spreuwenberg (2002) propose a patient-oriented definition of ‘integration’ based on their analysis. According to these authors, “Integration is a coherent set of methods and models on the funding, administrative, organisational, service delivery and clinical levels designed to create connectivity, alignment and collaboration within and between the cure and care sectors” (p. 3). The patient-oriented definition essentially articulates the overarching theme of ‘integration and patient centred care’ with the context of health care delivery systems. Expert M. McQuestion further suggested:

The voices of patients living with malignant wounds need to be heard to further understand their experiences. Qualitative research should address areas of importance to patients (reduction in pain, impression or impact of time to heal, impact of frequent or daily dressing changes during treatment of dressings left on during treatment, cost to patient (distress and financial) that may not be captured or valued in quantitative research. (personal communication, August 30, 2013)

The significance of patient experiences and advantages of using both quantitative and qualitative approaches in future research, particularly in the context of wound management during radiotherapy, is gleaned from the expert opinion.

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Patient preference is handled on a case by case basis in consultation with the team, if they do not want the dressing removed during radiotherapy (A. Bolderston, personal communication, August 22, 2013). The perception of holistic care provided by nurses by integrating the whole person's needs versus a focused area of treatment care provided by the radiation therapist was a perspective gleaned from the consensus-building process. "*Nursing practice requires us to focus on the individual not just problem and whether or not the same or similar approach to practice is taken up by the Radiation Therapist group*" (A. Hughes, personal communication, August 29th, 2013).

In summary, in this chapter the research questions were answered by using the findings from the literature review, national environmental scan survey and qualitative interviews as a frame of reference for discussion with expert consultants during the consensus-building process. The PCN framework provides a resourceful and dynamic tool for operationalizing patient-centred care in the context of wound management in radiation oncology. The framework's dimensions of *Prerequisites*, *The care environment* and *Person-centred processes* are mutually enhancing elements for best patient outcomes.

Limitations and Strengths

Overall limitations followed by the strengths of the study are reported here. I acknowledge the inherent bias in this study derived from researcher as instrument with a worldview constructed along improvising practices in the face of limited resources and my own background as a Radiation Therapy Nurse. The researcher as instrument may be considered as both a strength and a limitation. Limitations of the literature review are the lack of inclusion of patient's opinions, as outlined in Appendix A. Though ideal dressings are suggested, there is a

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lack of either qualitative and quantitative data or randomized controlled trials in the area of radiating through wound dressings.

The small sample size (n=18), lack of rating scale questions and instruments does not allow the use of statistical procedures such as multivariate analysis. The survey was only available in English; possible translation to French might have assisted in inclusion of six French speaking centres. However, I am not proficient to interview in French and therefore would require translation and interpretation assistance. Further, missing data with no response and “don’t know” challenges the generalizability of the findings. Perhaps, efforts in bimodal administration methods of the survey i.e., electronic and telephone might have compensated for inadequacies in the electronic mode on its own (Dillman, Smyth, & Christian, 2009). Lack of “face to face” follow up made it unable to determine if each question was understood in the manner intended and if the responses were accurate. Field notes during the telephone interview were not able to account for the participant’s body language or non-verbal behavior. Possible use of Skype or other video chat methods might have been beneficial in counteracting the limitation. Further, since only one participant per centre was surveyed, it was not possible to quantify potential variability within the Radiation Oncology Centres. Limitations of the national environmental scan survey include not knowing who completed the survey as they were completed anonymously. Therefore, it is unclear if the responses are individual views or departmental policies.

Perhaps, a quest to understand the patient’s perspectives with wound care during radiotherapy might have also benefited the study. However, considering the topic and scope of the research, only clinical staff was invited to participate. The small sample size of 18 responses

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with only 16 complete responses, missing data and “don’t know” responses in the survey introduces a certain level of bias and challenge the generalizability of this study.

As explained in Chapter Four regarding minimal reporting bias, these limitations in Phase II of the study were counteracted with the strengths of Phase III and Phase IV, such as selecting respondents from four different major provinces for the semi-structured telephone interview followed by the expert consults with an inter-professional team in the consensus-building process. Additionally, the characteristics of the pan Canadian study nurse participants from the environmental scan survey (Phase II) reflected diversity in role or position, academic background, province and years of experience in radiation oncology. The telephone interview nurse participants (Phase III) had different professional roles; while the experts in Phase IV were an inter-professional group of Registered Nurses, Radiation Oncologist and Radiation Therapist. Follow up with participants who provided their contact information via email and telephone helped to confirm findings. Phase III nurse participants pointed out how individual patient perspectives were considered in wound management, however this would need to be validated by actual patients in future research.

Conclusion

In this chapter, the evolving role of the RTN is examined and analyzed in context of wound management during radiotherapy. The intricacies of *integration* and *patient-centered care* are explained in view of complexities involved in clinical decision-making and inter-professional practice in the clinical setting. Current wound care practices are summarized and it is suggested that future research be undertaken to evaluate the effects of radiating through dressings and develop Clinical Practice Guidelines. As has been explained in this chapter, the Person-Centred Nursing Framework is a practical instrument that illuminates the path to ‘best

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practice. Collaborative practice through shared governance is illustrated to strengthen the voice of the RTN, to confidently express the unique attributes of nursing, by realizing leadership at all levels of nursing practice whilst providing holistic care. The final chapter will outline conclusions drawn from the study and recommendations to be considered by researchers and inter-professional team members in the area of radiation oncology.

Chapter Six: Conclusion and Recommendations

Introduction

This study aimed to capture the current wound care practices during radiotherapy as described by Radiation Therapy Nurses (RTN) from different Radiation Oncology Centres in Canada. It also aimed to understand the perception of nurses regarding their role in clinical decision-making and inter-professional practice in oncology wound management during radiation treatments. A total of 18 centres participated in the national environmental scan survey, followed by four semi-structured phone interviews and consultations with five experts in the final consensus-building process. This chapter summarizes the conclusions derived from the findings of the study, provides recommendations for practice and inter-professional research to be inclusive of patients' perspectives.

Conclusions

This Canadian study provides an initial image of radiation therapy nursing wound care practices, including an examination of which dressings may be left in place during daily fractionated radiotherapy. Several conclusions can be made from the study.

- 1) There is inconsistency in practice in relation to radiating through dressings during radiotherapy. Although the literature suggests that thin dressings may be left in place during radiation treatment, it is not the standard practice.
- 2) The main reasons for not radiating through dressing are (i) it is standard practice to never radiate through dressings; (ii) because it is beyond the Radiation Therapy Nurses' scope or field of practice as other team members are the decision makers; (iii) because of the individual patient's co-morbidities or preference; (iv) goals of

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care namely, curative or palliative; (v) it is not clear if it is best practice.

Therefore, it is important to incorporate goals of care, patient preference and contextual factors into 'best practices'.

- 3) Although nurses reported a perception of consistency in wound care practices at their centre, more likely was consistency in individual practice rather than standardized institutional practice. This conclusion is based on the survey finding that most centres (71%) do not have a reference document such as local policy, Clinical Practice Guideline or Best Practice Guideline for when to remove a dressing during radiotherapy.
- 4) Clinical decision-making and inter-professional relationships are key elements for collaborative practice in the ambulatory setting. Nurses' clinical judgment is a valued aspect of inter-professional collaborative practice in clinical decision-making for wound management in radiation oncology.
- 5) Radiation Therapy Nurses approach a broad interpretation of Evidence Based Practice to include empirical evidence, patient preference, clinical experience and expert opinion.
- 6) Evidence-based standardization of wound care practices, particularly in the area of radiating through dressings during cancer radiotherapy requires further research.
- 7) Finally, insights from the study point to the relevance of the Person-Centred Nursing Framework for practice, empowerment through shared governance and continuous education requirement for consistency in wound management.

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Recommendations

There are implications for practice and leadership, as well as recommendations for future research and policy development, derived from the study in the evolving area of Radiation Therapy Nursing. Findings from the literature review (Phase I), the national environmental scan survey (Phase II) and qualitative interviews (Phase III) served as a frame of reference for discussion with expert consults during the final consensus-building process (Phase IV).

Implications for practice. There is scant research literature and insufficient evidence to direct practice towards radiating through wound dressings during cancer radiotherapy as it is not clear if the technique is indeed safe or efficient practice. However, in all cases, ‘best practice’ must take into account patient preference, contextual factors and the goals of care (i.e., curative, palliative or supportive). Toward this end, clinical practice tools that elicit patient preference should be integrated into the care of patients. Nursing BPGs by the RNAO recommend practice settings to adapt and tailor wound management guidelines (for example; foot ulcers for people with diabetes, venous leg ulcers and pressure ulcers) in formats that would be user friendly and apply the implementation strategies for local uptake.

Emerging from the study analysis and from the expert consultations are nursing practice implications such as the need for continuing education and in-services in wound management for Radiation Therapy Nurses. Knowledge transfer to clinical staff will result in consistency in wound management during any change processes, such as the introduction of new wound care products.

Shared clinical decision-making through team meetings empowers nurses in the provision of patient care in a highly inter-professional work setting such as the ambulatory Radiation Oncology Centre. This study suggested that reporting patient status with use of a standardized skin assessment tool for radiation dermatitis promotes collaboration with the entire team via the

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electronic documentation. The involvement of Radiation Therapy Nurses in the treatment planning team will assist in individualized wound care management and practices for patients receiving radiotherapy.

Implications for leadership. Adoption of the Person-Centred Nursing Framework (McCormack & McCance, 2010) may strengthen inter-professional relationships in the clinical setting and lead to decisions that are more responsive to the specifics of an individual patient's situation. Collaborative team dynamics from the study findings imply that “more effort needs to be taken in ensuring appropriate, evidence-based care is provided to patients across the continuum of care, in a collaborative approach to wound care” management (RNAO, 2007). Implementing the Patient-Centred Nursing Framework to guide the resource allocation process has the potential to transform the health care delivery system. Here nurses need to view themselves as leaders. Instead of letting others make decisions for us, every RTN must stand up for the cause, bridge a gap, continue to learn, network with others, and do what needs to be done to advance the our professional role toward *the preferred future we want* (Grossman & Valiga, 2009). The three domains of influence for nursing: *Prerequisites; The care environment* and *Person-centred processes* will be supportive in achieving best patient outcomes in the management of a chronic disease such as cancer.

Implications for research. The directions for future endeavors of this study was a debate among the expert consultants in regards to clinical guidelines based on existing evidence versus further research. Among the five experts consulted, general consensus was achieved for future research and evidence based practice. One of the five experts suggested the drafting of clinical guidelines to determine best practice; additionally two experts recommended building provincial or national consensus for what criteria will be used for evaluating the evidence. (S. Chadwick,

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personal communication, August 30, 2013; M. McQuestion, personal communication, August 30, 2013). The following implications for research are presented in a sequence; however patient care goals must be factored into prioritizing these recommendations. Based on analysis of findings and expert-consensus, recommendations for future research are:

- 1) Identify the composition and properties of available and most frequently utilized wound care products in radiation induced dermatitis and malignant wounds reported in the national environmental scan survey.
- 2) Collaborate with Physics Department to test the hypothesis, measure in a phantom lab setting the bolus effect, when dressings are left in place in order to “*understand the physics of it*” (A. Bolderston, personal communication, August 22, 2013).
- 3) Conduct a cost analysis of wound dressings when they are removed on a daily basis.
- 4) Design research that includes both quantitative and qualitative approaches (M. McQuestion, personal communication, August 30, 2013; Polit & Beck, 2012). Clinical research such as a Randomized Controlled Trial (RCT) with patient tumor groups or treatment site-specific groups to determine best evidence is needed. However, considering the practical difficulty in conducting RCTs due to complexity of the patient population with co-morbidities, concomitant therapy, prognostic factors etc., a well-designed clinical case study that is not randomized, but with large power and appropriate inclusion and exclusion criteria may be effective in studying effects of wound dressings.
- 5) A phenomenological approach could further be used “to create an environment that is open to change” (Kohr, 2007, p.19). For example, cancer type or site-specific group discussions could in turn lead to efficient implementation of nursing practice guidelines.

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Implications for policy. In view of the inter-professional aspect involved in Radiation Oncology wound management, the development of a Clinical Practice Guideline would be most beneficial. The scope of nursing practice in the possible standardization of an innovative practice such as radiating through wound dressings will need to be addressed in order to support and evaluate best practice. In developing or adapting care standards, policy makers should ensure that the resulting care standards are relevant to local stakeholders including the patients, staff, managers, and healthcare facility; based on clear evidence, reliable so that different practitioners will be able to interpret and apply them in the same way, valid, flexible and reviewable (Pearson, Field, & Jordan, 2007). Additionally, in order to use clinical guidelines to assess practice, they need to be developed into quantitative criteria or indicators that are measurable and observable quantitative statements that may be used to measure quality of care relating to only the specific area of practice (Pearson, Field, & Jordan, p. 143). The development of an algorithm based on expert consensus regarding wound care products to be used consistently would be helpful in guiding practice in radiation oncology. All of these necessitate inter-professional communication between the radiation oncologists, nursing and radiation therapy departments to standardize care and develop site-specific guidelines.

Summary

In this thesis, I have presented an overview of current evidence and practice regarding radiating through wound dressings both in literature and across Canada. Specific methods employed in the study included a national environmental scan survey, qualitative interviews and expert-consensus. In the quest for identifying ‘best practice’, the methodology was geared towards assimilating research evidence, experience in wound management and expertise in the field of radiation oncology. The findings and related discussion bear implications in practice,

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leadership, research and policy. The study revealed inconsistent practices in relation to radiating through wound dressings during cancer radiotherapy across Canada. Some evidence exists that radiating through dressings may be acceptable under certain conditions. The study indicates that patient preference, contextual factors and the goals of care direct clinical decision-making and collaborative inter-professional practice. Radiation Therapy Nurses are at the frontline of these direct patient care decisions. Finding our voice in organizational factors whilst working in inter-professional teams can pave the way to better patient outcomes during a difficult time for them.

Commit to the Lord whatever you do,

And He will establish your plans.

(Proverbs 16:3, New International Version)

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APPENDIX A: Dosimetric Measurements Investigating the Effects of Radiating Through Various Wound Dressings

Reference	Purpose	Variables		Results	Comments	
		Dependent	Independent			Characteristics of Wound Dressings
1)Mac Nally, C., & Woodings,S. (2012) Changes to dose at surface and shifts of dose distribution at depth through dry and wet wound dressings for photon and electron beam radiotherapy. <i>Australian College of Physical Scientists and Engineers in Medicine.</i>	Quantifying the increase of dose on the skin and the change of dose coverage at depth through different wound dressings.	Increase of skin dose and shift of dose at depth	-Type of wound dressing used. -Thickness of wound dressing used -Beam Type and quality use	Allevyn◇ non-adhesive, Allevyn◇ Ag (dry and wet); Allevyn◇ Gentle Border & Allevyn◇ Gentle, Mepilex® Border (dry and wet), Mepilex® Lite (dry and wet), Convatec Duoderm® (dry) & BSN Fixomull® stretch (dry and wet)	No clinically significant effects at surface for electron beam energies and at depth with photon or electron beam energies. For photon beams, the presence of a dressing caused clinically significant effects at the surface.	The effects measured become exaggerated when dressings are wet. Assess dressings with exudating wounds prior to treatment.
2) Butson, M. J., Cheung, T., Yu, K. N. P., & Metcalfe, P. (2002). Measurement of skin dose variations produced by a silicon-based protective dressing in radiotherapy. <i>Physics in Medicine and Biology.</i>	Investigate variations in skin dose caused by a silicon-based burn dressing used in radiotherapy during treatment	Skin dose variations	Size of Mepitel® dressing	Mepitel® 5cmx5 cm to 40cmx 40 cm	Increases in skin dose produced by Mepitel® range from 14% for 5 cm x 5cm field at surface to 4 % of the maximum for a 40 cm x 40cm field at 1 mm depth with a definite variation in delivered dose due to the mesh pattern of the silicon dressing. Effective thickness of the dressing was calculated to be 0.5 mm water equivalence.	No clinical trials reported though they began in 2002.

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<p>3) Thilmann, C., Adamietz, I. A., Mose, S., Saran, F., Ramm, U., & Bottcher H. D. (1996). Increase of surface dose using wound dressings during percutaneous radiotherapy with photons and electrons. <i>Radiotherapy and Oncology</i>.</p>	<p>Quantifying the increase of the dose on the skin through different wound dressings during irradiation for different beam qualities and beam energies.</p>	<p>Increase of the skin dose</p>	<p>1) Type of wound dressing 2) Type of Xray beam and 3) quality of beam</p>	<p>1) Silicone- coated polyamid net (Mepitel®) 0.5mm thick 2) Silk acetate (Cuticerin*) 0.4 mm thick (3) Hydrocolloid (Varihesive®, extra thin) 0.5mm thick (4) Ca- Na- Alginate (Kaltostat®) 2 mm thick.</p>	<p>With electron therapy, the dose increase through a wound dressing is small (3-7%). Any of the wound dressings can be left on the skin during electron irradiation, but its thickness should be taken into account when calculating the actual applied dose. With photons the dose increases depending on the thickness of its tissue. The polyamide and silk acetate dressings had equal increase in skin dose; a slightly higher skin dose was measured for the hydrocolloid wound dressing. For ulcerating tumor, all non-adhesive wound dressings whose clinical aptitude for the treatment of ulcerating tumors have been proven can be used regardless of their dosimetric characteristic. Wound dressings can be left on the skin without increasing the risk of an aggravated skin reaction. This has to be taken into account while calculating the actual applied dose.</p>	<p>Removal of lesion recommended for ulcerating tumor as a low surface dose through high dose build up is not desired. Not clear, if removal of non-adherent wound dressing was intended.</p>
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APPENDIX B: Trials Investigating the Management of Acute Radiation-Induced

Skin Reactions

Reference	Purpose Of Study	Design	Sample Size	Skin Assessment Tool	Main Conclusion	Comments
Adamietz et al. (1995)	To investigate the tolerance of irradiated skin to silicone-coated polyamide net and to estimate the adherence and ability of this material under normal radiotherapy conditions.	Prospective study with a non-comparative controlled trial.	21	Self-defined scale consisting of numerical values ranging from 0 to 5	A significant increase in radiation dose to the skin underneath the dressing was noted; however the skin reactions under the dressing were the same as uncovered skin.	Mepitel® appears to be suitable for skin protection during RT.
Diggelmann et al. (2010)	To investigate the effect of Mepilex® Lite dressings in the extent of radiation-induced erythema in patients with breast cancer.	Open-label intra-individual comparison RCT	24	Modified RISRAS	Mepilex® Lite decrease extent of erythema ($p < 0.001$). No difference in skin surface temperature.	Though the bolus effect of Mepilex® Lite was calculated to be 0.5mm, the dressings were not left in place for RT as the study endpoint was dry desquamation.

APPENDIX C: Informed Consent Form**Wound Dressings during Cancer Radiotherapy: A Survey of Canadian Practice.**

Principal Investigator: Siby Elizabeth J Thomas, RN, BSN, MSN (C)

Radiation Therapy, Fraser Valley Cancer Center,

Personal phone # 6044965829

Email address: sthomas4@bccancer.bc.ca.

Supervisor: Sheryl Reimer-Kirkham, PhD, RN

Director | Master of Science in Nursing Program

Trinity Western University | t: 604.513.2121 (3239)

Email address: Sheryl.kirkham@twu.ca

Purpose: The purpose of the thesis is to describe the current evidence and practice in relation to wound dressings during cancer radiotherapy with the aim of getting a national picture of the current state of practice regarding wound care during radiotherapy.

Procedures: One nurse participant from the 42 Radiation Oncology Centers in Canada is invited to participate in the environmental scan survey. A list of the Education Resource Nurses and Nurse Leaders was procured from a recently updated national list to send out invitations to participate in the environmental scan survey. The survey will take up to 10 minutes to complete. Participants who consent for a follow-up interview may be contacted for a confidential telephone interview for 20-30 minutes. The interview will focus on nurse's roles in clinical decision-making and inter-professional practice in regard to wound dressing during radiotherapy. The research findings are planned to be presented at professional conferences and published in an academic journal.

Potential Risks and Discomforts: There are no known or anticipated risks associated with the survey.

Potential Benefits to Participants and/or to Society: The study aims at benefits such as improved patient care and more efficient use of resources. Benefits to participants may include enhanced professional involvement in clinical decision-making.

Voluntary Participation: Your participation in this research must be completely voluntary. If you do decide to participate, you may withdraw at any time without any consequences or any explanation. If you do withdraw from the study, your data will only be used if you permit us to do so.

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Confidentiality: Your anonymity, confidentiality and the confidentiality of the data will be protected by assigning a code number to you and your survey. The master list will be kept on a password computer and will be only available to me and the thesis committee. Electronic files will be stored in a password protected computer and a secured server. All documents will be kept in a locked filing cabinet. The key code will be kept separate from the data files and will be destroyed, along with any other paper documents containing personal information, 5 years after the conclusion of this research project. Personal identifying information will only be available to the project coordinator. Research participant will not be identified by name in any reports of the completed study.

Contact for information about the study: If you have any questions or desire further information with respect to this study, you may contact Siby Thomas at 6044965829 or sthomas4@bccancer.bc.ca.

Contact for concerns about the rights of research participants: I would like to assure you that this study has been reviewed and received ethics clearance from the office of Research ethics at Trinity Western University. If you have any concerns about your rights as a research participant, you may contact Ms. Sue Funk in the Office of Research, Trinity Western University at 604-513-2142 or sue.funk@twu.ca.

Disclaimer: I have no relationship with any of the wound care product manufacturing companies.

Thank you for considering participation in this survey.

Consent: Your participation in this survey is completely voluntary and you may refuse to participate or withdraw from the study at any time.

With full knowledge of all foregoing, I agree, of my own free will, to participate in this study

By clicking "Next" you are indicating that you voluntarily consent to participate in this study and that your responses may be put in anonymous form and kept for further use after the completion of this study. Note that as this is a survey, when you submit your response (whether online, or over the phone) this action implies consent. You may print a copy of this consent form for your own records.

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APPENDIX D: Environmental Scan Survey

Instructions: There is a lack of consensus and evidence about best practice in relation to radiating through wound dressings. I am gathering a national picture of the current state of practice regarding wound care during radiotherapy. If necessary, please consult with the Radiation Therapists or a clinical expert on your site about current practice. This survey will take 10 minutes. You may leave the survey and come back to it. (Please click “Save Page” before leaving the survey. The final section requests contact information, if you are willing to participate in a confidential telephone interview for 20-30 minutes. The interview will focus on nurses’ roles in clinical decision-making and inter-professional practice in regard to wound dressings during radiotherapy.

Thank-you for your time and participation!

SECTION ONE: Demographics

1.1. Province

- a) Alberta
- b) British Columbia
- c) Manitoba
- d) Nova Scotia
- e) New Brunswick
- f) Ontario
- g) Prince Edward Island
- h) Saskatchewan
- i) Newfoundland and Labrador
- j) Quebec

1.2. Role or Position

- a. Nurse Educator
- b. Nurse Leader
- c. Staff Nurse

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- d. Other
- 1.3. Academic Background
- a. Diploma
 - b. Degree
 - c. Graduate
 - d. PhD
- 1.4. Years of experience in oncology
- a. 0-2
 - b. 3-5
 - c. 6-10
 - d. More than 10 years

SECTION TWO: Current Practice

- 2.1. Which skin assessment tool do you use for radiation dermatitis (check all that apply)
- a. Radiation Therapy Oncology Group (RTOG) criteria
 - b. National Cancer Institute (NCI) Common Toxicity Criteria
 - c. Radiation Induced Skin Reaction Assessment Scale (RISRAS)
 - d. Other: [Please specify:]]
 - e. Don't know
- 2.2. How often is a patient's wound assessed?
- a. Daily
 - b. Weekly

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3.3. How consistent is current nursing practice regarding the use of skin assessments and wound dressing changes during radiotherapy?

- a. Very consistent
- b. Somewhat consistent
- c. Not consistent
- d. Don't know

SECTION FOUR: Management of open wounds

4.1. What topical treatments do you use with open moist desquamation radiation dermatitis? (Check all that apply)

- a) Saline compresses
- b) Mepitel®
- c) Adaptic®
- d) Antimicrobials such as Silver Sulfadiazine
- e) Mepilex® Lite
- f) Non adherent pads
- g) Gauze
- h) Surgifix®
- i) Other, please specify... []

4.2. What topical treatments are used for malignant wounds receiving radiotherapy? (Check all that apply)

- a) Wound cleansing/ irrigation with saline solution or sterile water
- b) Hydrogels: Intrasite* gel
- c) Ointment based antimicrobial agents such as Metronidazole
- d) Alginate sheet such as NU-DERM ®

APPENDIX E: Interview Guide

1. I understand that you have certain years of experience in radiation oncology; can you tell me more about your own experience with wound management in radiation therapy?

Prompts:

- a. Please describe the staffing ratio and continuity in client care?
 - b. How do you document and communicate patient care? Paper vs electronic?
 - c. What kinds of referrals do you make in regards to wound care?
2. Please comment on trends in wound care products and the evolving role of the radiation oncology nurse in the area of wound management?

Prompts:

- a. How receptive was staff to any recent changes?
 - b. What happened next?
3. How do nurses in your Cancer Centre perceive their role in clinical decision-making in the area of radiation oncology wound care?

Prompts:

- a. Tell me about nurse's involvement in clinical decision-making in practice?
- b. What goes into a decision about whether to remove a dressing prior to radiation?

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- c. What types of factors come into play when making decisions about wound management?
 - d. What types or sources of evidence inform your decision?
4. How do nurses in your Cancer Centre perceive their role in relation to inter-professional relationships in the area of radiation oncology wound care?

Prompts:

- a. How do inter-professional relationships affect collaborative practice?
- b. In what ways do the patients', radiation therapists' and or radiation oncologists' preferences influence your practice?

Debriefing Questions:

Thank-you so much for your participation in the project!

- Is there anything you would like to tell me about what it was like for you to participate in this project?
- What did you gain from the experience?
- Were there any negative aspects to your participation? And if so, what were they?
- Your participation was important to the project and will benefit in wound management for patients.

APPENDIX F: Executive Summary for Consensus-building

Wound Dressings during Cancer Radiotherapy: A Survey of Canadian Practice
Siby Elizabeth J Thomas

EXECUTIVE SUMMARY

Submitted in Partial Fulfillment of Requirements for the Award of

Master of Science in Nursing

Trinity Western University

Advisor: Dr. Sheryl Reimer-Kirkham

Second Reader: Dr. Rosemary Kohr

August 18, 2013.

Executive Summary

The executive summary is a synopsis of my research project. The purpose and preliminary findings from separate phases of the study, along with the analysis and recommendations, are presented. There are 5 guiding questions on page 5 for your valuable feedback.

Introduction

Patients undergoing radiation treatment typically experience changes to the skin in the area where the treatment is administered. In some cases, patients undergoing radiotherapy may have pre-existing wounds in the treatment area, while for others; wounds are generated by the radiation therapy itself. Radiation to the site can delay wound healing, which relates to overall patient wellbeing, and is thus an integral component of nursing care. There has been some discussion in both literature and clinical settings whether radiating through wound dressings will cause a boost effect or harm to patients with cancer during radiotherapy. *The purpose of the thesis is to describe the current evidence and practice in relation to wound dressings during cancer radiotherapy.* The methods employed are a literature review and national environmental scan of existing wound care practices with the aim of developing the foundation for further research.

Preliminary Findings

Phase 1: Literature Review

The two extraction questions for the literature review were: (i) what is the existing evidence regarding radiating through dressings? and (ii) which dressings can be left in place on wounds of patients with cancer during radiation treatments? The literature review included peer-reviewed published articles, books and grey literature and revealed that, limited evidence regarding the benefits and or potential harms of radiating through dressings during radiotherapy is available.

- Existing evidence suggests that it may be safe to radiate through thin dressings such as Mepitel® (Butson, Cheung, Yu & Metcalfe, 2002; Naylor & Mallett, 2001; Thilman et.al., 1996; Adamietz et. al., 1995) and Mepilex® Lite in relation to the potential radiation induced skin reactions and relatively less boost effect (Mac Nally & Woodings, 2012; Diggelmann, Zytovicz, Tuaine, Bennet, Kelly & Herst, 2010). It is noteworthy that only Adamietz et. al. and Diggelmann et.al. have published clinical trials.
- Two studies (laboratory- based, not with human subjects) reported that while any of the wound dressings can be left on the skin during electron irradiation, with photons the dose increase depends on the thickness of the dressing (Mac Nally & Woodings, 2012; Thilman et.al., 1996).
- The same study (Thilman et.al., 1996) reported that in the case of ulcerating tumors or fungating wounds, all non-adhesive wound dressings whose clinical

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aptitude for the treatment of ulcerating tumors have been proven, can be used regardless of their dosimetric characteristics.

- In all cases, the thickness of the dressing must be taken into account when calculating the actual applied dose of radiation (Hollinworth & Mann, 2010; Thilman et.al., 1996).

Thus, although the available literature speaks to dressing type and procedure, few studies have addressed removal of dressings for radiation therapy, the area of focus I address in the thesis.

Phase II: Environmental Scan

The research questions giving specific direction to the second phase of the project were, (i) what is the current practice in Cancer Agencies with regard to wound dressing during radiotherapy across Canada? and (ii) how do nurses perceive their role in clinical decision-making and inter-professional relationships in this matter? The survey instrument developed for the environmental scan was piloted at the Fraser Valley Cancer Center to test the process and ensure validity of the contents, prior to the actual administration of the national environmental scan survey. After approval from both Trinity Western University and British Columbia Cancer Agency Research Ethics Board, one nurse per radiation oncology center was contacted for a national environmental scan of 34 radiation oncology centres in Canada. 18 nurses responded to the online survey invitation (n=18). Semi-structured telephone interviews were conducted with four nurse participants (n=4) to understand the context of nursing practice environment in radiation oncology in more depth; particularly in the area of wound management, clinical decision-making and inter-professional practice. Data analysis was done using descriptive statistics for the survey data and thematic analysis for the semi-structured interviews.

Sample: Data regarding the current practice in wound care was collected from 18 centres from the provinces of Alberta, British Columbia, New Brunswick, Ontario, Saskatchewan and Quebec. The respondents to this Pan-Canadian survey included staff nurse (39%), nurse educator (33%), nurse leader (22%) and an oncology resource nurse. Though only 16 of the 18 survey responses received were complete, all available data was used in the analysis.

Results of Survey:

- The survey results show that wound dressings are always removed prior to radiation treatments at 50% of the centres, while they are sometimes left in place at 50% of the centres. Based on these results, it is concluded that there is inconsistency in practice regarding radiating through wound dressings across Canada.
- Though the descriptive statistics show that it is unclear as to whose decision it is to remove or radiate through dressings, it is noted that the registered nurse is not the sole decision maker in this aspect of patient care.

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- Most centres (71%) do not have a reference document such as local policy, Clinical Practice Guideline or Best Practice Guideline for when to remove a dressing during radiotherapy.
- A comparison of the questions, “How often is a patient's wound assessed” Vs. “How consistent is nursing practice regarding the use of skin assessments and wound dressing changes during radiotherapy?” shows four respondents who answered ‘as needed’ also reported their practice as being ‘very consistent’. Though the comparison illustrated a different perspective and perhaps contradicts the assumption that ‘as needed’ assessments (41%) might not be ‘very consistent’; for the most part the respondents reported consistency (81%) in nursing wound care practices. This could speak to the perceived difference between how often the wound is assessed, the role of the nurse in decision- making in patient specific wound care practices and the broader context of clinical decision-making, particularly around wound management.
- The environmental scan reveals that the most common topical treatment for moist desquamation is antimicrobials such as silver sulfadiazine (69%) along with non-adherent, thin dressings such as Mepitel® (38%), Adaptic® (31%) or Mepilex® Lite (31%).
- Saline compresses and gauze are widely used for both the radiation dermatitis and malignant wounds. In addition, hydrogels (69%), antimicrobial agent such as metronidazole (62%) and wound care products such as Mepilex Border® (81%) are also used across Canada for the management of malignant wounds.
- Based on the survey results, it may be concluded that the extent of the missing and “don’t know” responses in the completed surveys (47%) are limited and therefore the extent of the problem in relation to reporting bias is minimal.

Results of Qualitative Interviews:

The findings of the semi structured telephone interview presented an informative account of the nurse participant’s views and experiences in clinical decision-making and inter professional practice.

- **Integration:** The overarching theme of ‘integration’ is a key attribute that Radiation Therapy Nurses use in their practice, especially in the area of wound care management in radiation oncology. Integration of nursing skills and knowledge, available resources, institutional policy and procedures is vital in the context of nursing practice; clinical decision-making; inter-professional relationships and client experience or preference. The salient aspect of integration is the essence of collaborative practice among team members in wound care management during radiotherapy

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- **Complexity:** The perception of complexity in nursing role and clinical judgment in the area of wound management during radiotherapy is evident from the data analysis.
- **Inconsistency in Practice:** The qualitative data suggests that there is inconsistency in whether to remove or radiate through wound dressings because (i) it is standard practice to never radiate through dressings or (ii) because it is beyond their scope or field of practice as other team members are the decision makers, or (iii) because of the individual patient's co-morbidities or preference and (iv) a possible change in practice is in process at one of the centres.
- **Inter-professional Relationships:** Participants were invited to describe how inter-professional relationships may affect collaborative practice. All participants articulated teamwork through team meetings, interdisciplinary co-ordination, patient allocation and patient flow in the ambulatory care setting. Participants described their role as patient advocates in their cancer trajectory. A participant provided an insight into wound care as being holistic. Wound care is further described to have an interdisciplinary approach, involving the different members of the team.

In summary, the findings of the literature review and environmental scan illustrate that there is considerable variability between centres in regards to radiating through wound dressings during radiotherapy. The analysis suggests that evidence-based standardization of wound care practices, particularly in the area of radiating through dressings during cancer radiotherapy, requires further research. While one of the participants shared that their centre is looking at changing practices in regards to removal of dressings prior to daily radiotherapy, it appears to be a local practice change that is in process. When their practice change is evaluated, it may well be resourceful for future directions of this project.

Phase III: Consensus-Building for Recommendations

The final phase of consensus-building with clinical experts is now being initiated. Radiating through dressings may be an innovative practice and it is hoped that the thesis will serve as foundation for a national standard. The study results will be used to make recommendations for future research. Based on preliminary analysis of findings, recommendations are:

- Identify the composition or properties of available and most frequently used wound care products.
- Collaborate with Physics Department to test and measure in a phantom lab setting the bolus effect when dressings are left in place.
- Conduct a cost analysis of dressings when dressings are removed on a daily basis.
- Clinical research such as a Randomized Controlled Trial with patient groups to evaluate best practice.

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Your Involvement:

I am grateful for your involvement as an expert consultant in the consensus-building process. Your feedback will enable development of collaborative guidelines for inter-professional best practice. I have included five guiding questions for your input. Depending on your preference, you can send me an e-mail with your responses, or we can set a time to discuss your responses over the phone.

Guiding Questions;

1. Can you comment on the assumption that removing wound dressings prior to daily radiation treatment is best practice?
2. How can the practice of removing or radiating through dressings be effectively evaluated? What evidence is needed to develop a practice guideline?
3. The term “consistency” in wound care practices seems to be interpreted on individual perspectives rather than standardized practices. How can consistency in wound assessment and dressing management be facilitated?
4. Based on the preliminary findings, what recommendations would you suggest for further research and practice?
5. How would you interpret the following spectrum of data in relation to inter-professional practice (Excerpt #1), practice change (Excerpt #2), and clinical decision-making (Excerpt #3)

EXCERPT #1: A respondent (P#4) equates inter-professional practice with holistic care.

R: How do nurses in your Cancer Care Center perceive their role in relation to inter-professional relationships in the area of radiation oncology wound care?

P#4: There's multiple facets that you have to address; we look at whole patient. We don't look at just one aspect of that patient, so even if I'm seeing a patient for wound care management, I am looking at every other factor that is going into the care... So there's never just one issue happening with them... When it comes to wound care management it's the wound assessment, it's looking at the patient's overall health, looking at if they're having subsequent chemotherapy. What's happening with their labs, their general health, nutrition? It depends on type of wound, it is as well. Are we assessing what type of wound so we have to know the cause, is it healable, non-healable, are we in maintenance mode because of different underlying factors that are happening. Is it a non-healable palliative type wound? ... we really have to look at fully at the whole patient before we make any decisions regarding the wound, and then with the wound; It's a full thorough wound assessment before we make any determination of what kind of dressings we will be using.

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EXCERPT #2: A respondent (P#1) reflects on practice change and other factors such as resource management (e.g., dressing availability and cost) that influence wound management.

R: Can you tell me more about your own experience with wound management in radiation therapy?

P#1: I know there are some practices that have been dispelled since I started in radiotherapy. Before people would be putting on baby powder and talc and now we really avoid those because now we know that it can cause fungal infections. So we have changed some of our recommendations what we tell patients to do and how to take care of their skin. In terms of dressings, there are a few things that we are doing in our department. We do use Flamazine for moist desquamation for anybody who is not allergic and we do however cover that with Adaptic and dry gauze. I know colleagues in other centers are using Mepilex or Mepilex Lite, umm but we haven't gone that route. It's not available in the hospital, it's more costly to the patients, it's not necessarily available ... We practice primary nursing so we are very advocative for the patient.

EXCERPT #3: Respondents (P#1, P#2 & P#3) articulated nursing leadership and autonomy in clinical judgment particularly in radiation oncology wound management and highlighted the permeable inter-professional boundaries that exist in the clinical setting.

R: How do nurses in your cancer center perceive their role in clinical decision making in the area radiation oncology wound care?

P#1: It would be the physician who decides about removing the dressing but honestly I have been here 16 years, I can't even think of maybe five times that we haven't removed the dressings, we always remove the dressing.

P#2: We are pretty much the frontline even though radiation therapists are mainly the front line healthcare professionals. But nursing is the one who does the primary assessment and make some clinical judgments and you know we have opinion from the oncologist, 9/10 it's kind of a combined effort from nursing and oncologist to decide what's best treatment for skin care. They are open and receptive to the nurse's opinion, so I find it's good.

P#3: Assessment, we have fair amount of liberty to decide management. umm it's so consistent, but when a prescription is required for Flamazine, we do have to speak to with the physician to get it. They are quite comfortable with our assessment skills to provide that. We follow the lead, certainly depending on the patient.

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Debriefing Question:

Thank-you so much for your participation in the project!

- I would like to acknowledge your contributions, with your permission (anonymity will be maintained if you prefer). Do you agree to be acknowledged by name and position in the thesis as an expert consultant? If so, kindly provide your name and correct title/position.
- Is there anything more that you would like to tell me about what it was like for you to participate in this project?

Your participation was important to the project and will benefit in wound management for patients.

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