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In this issue

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Editorial
The *AJCN* aims to provide a forum where debate and the exchange of views can take place. We welcome papers on contemporary professional policy or practice issues of concern and interest to cancer nurses.

Notes for contributors
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Our mission

The CNSA is committed to achieving and promoting excellence in cancer care through the professional contribution of nurses.

To achieve our mission of promoting excellence in cancer care, the CNSA will act as a resource to cancer nurses around Australia, no matter what their geographical location or area of practice.
The CNSA will be the link between cancer nurses in Australia, the consumers of cancer nursing services and other health professionals involved in cancer care.

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The Australian Journal of Cancer Nursing

Editorial

Radiation oncology nursing

Mei Krishnasamy PhD., MSc., DipN., B.A., RGN.

In this edition of the journal, we feature a series of papers that focus on patient needs and problems experienced while receiving radiotherapy as part of their cancer treatment. These papers demonstrate the capacity of nursing to contribute to ongoing developments in the field of radiation oncology. Over 50% of people receiving radiotherapy report anxiety before starting treatment and about 40% remain anxious by the end of treatment[1]. Radiotherapy-related side effects such as fatigue, skin reactions and nausea can be highly prevalent and distressing[2,3]. Expert nursing care is fundamental to achieving optimal patient outcomes.

In a comprehensive review of 'The experience of receiving radiation therapy', Pauline Rose demonstrates the importance of excellent nursing care to the physical and psychosocial well-being of patients. The great potential for nurses to contribute to patient comfort and capacity to self-manage to better tolerate often lengthy radiation therapy is made clear, despite an acknowledgement of the paucity of robust evidence to inform radiation oncology nursing practice. Rose's paper highlights the need for nurses to understand the basics of radiobiology within the context of multimodality therapy, in order to provide care tailored to individual needs.

Sharron Carson reports on a national survey undertaken to explore nursing advice regarding 'Use of deodorant in breast cancer patients undergoing radiation treatment'. Recognition of the variation between skin-care practices recommended for women undergoing external beam radiation (EBRT), led Carson to undertake a national nursing survey, against which to develop a randomised controlled trial to inform best practice. Interestingly, the survey indicated that the majority of nurses who participated in the study were already acting according to best-available evidence, endorsing the use of aluminium-free deodorants for women undergoing EBRT for breast cancer.

Pauline Tanner and colleagues address a highly topical and contentious area of radiation oncology practice: 'Prevention of vaginal stenosis after treatment for gynaecological cancer'. Tanner *et al.*'s audit of the implementation of a clinical pathway, to enhance understanding of vaginal stenosis and to promote increased use of vaginal dilators, provides encouraging evidence of the capacity of nursing interventions to prevent or ameliorate debilitating side effects of cancer treatment.

A recognition of the physical and psychosocial impact of acute radiation-induced toxicities led Sarah Everitt and her colleagues to develop and pilot test an acute toxicity scoring tool, to screen for and inform evidence-based management of radiation-induced toxicities. Everitt *et al.* describe how the screening tool has promoted systematic grading of key toxicities by multidisciplinary practitioners and how, as a result, communication of information about patient needs and problems has been enhanced across departments within their organisation.

Papers presented in this edition of the *AJCN* demonstrate the expertise and skills required of radiation oncology nurses. The development of a minimum data set to capture and report nurse-sensitive patient outcomes for radiation oncology nurses across Australia is urgently needed to inform staffing ratios, competence and skill requirements and to inform advanced and specialist nursing roles within radiation oncology units.

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The Australian Journal of Cancer Nursing

Utilising evidence to inform acute toxicity scoring for patients receiving radiation therapy for lung cancer

Sarah Everitt • PhD *
Research Radiation Therapist, Radiation Therapy Services, Peter MacCallum Cancer Centre
Locked Bag, 1 A'Beckett Street, VIC 8006
sarah.everitt@petermac.org

Mei Krishnasamy • PhD., MSc., DipN., B.A., RGN.
Director, Cancer Nursing Practice and Research
Peter MacCallum Cancer Centre, Locked Bag, 1 A'Beckett Street, VIC 8006

Mary Duffy • Grad Dip Nursing Cancer and Pall Care
Nurse Coordinator: Lung Service
Peter MacCallum Cancer Centre, Locked Bag, 1 A'Beckett Street, VIC 8006

Sara Briffa • BAppSci (Med Rad: RT)
Radiation Therapist, Radiation Therapy Services
Peter MacCallum Cancer Centre, Locked Bag, 1 A'Beckett Street, VIC 8006

* Corresponding author

Abstract

Prompt screening and assessment of acute radiation-induced toxicities are central to the delivery of high-quality, patient-centered care. This paper describes the development and implementation of an acute toxicity scoring tool (the screening tool) for use in a multidisciplinary setting. The screening tool was developed to: 1) promote systematic screening and timely identification of radiation-induced toxicities; and 2) enhance professional awareness of evidence-based interventions for radiation-induced toxicities experienced by patients diagnosed with lung cancer. A six-item scoring tool was developed, based on the best available evidence, expert multidisciplinary input and a training needs analysis to ensure the relevance of the content and acceptability of the format of the screening tool. The screening tool was piloted by members of the lung multidisciplinary team and consumers prior to its implementation in practice. The screening tool includes screening criteria, a grading scale and interventions based on each of the key toxicities. Ongoing evaluation indicates that the screening tool promotes systematic grading of key toxicities by multidisciplinary practitioners. Furthermore, practitioners are provided with the knowledge necessary to promote patient self-care in response to acute radiation-induced toxicities and are prompted to make appropriate and timely referrals for toxicity interventions.

Introduction

Lung cancer remains the leading cause of cancer death in Australia[1]. For the majority of patients diagnosed with this disease, the overall prognostic outcome remains poor, with 80% dying within a year and only 5% living for five years[2]. Maximising quality of life for patients with lung cancer is a considerable challenge. Patients commonly present with complex symptoms including cough, breathing changes or chest pain, which may have been present for months prior to diagnosis[3]. Post-diagnostic quality of life data demonstrate marked and persistent decline in health status. Fatigue, breathlessness, weight loss and deterioration in physical and role functioning are consistently reported as the most prevalent and bothersome disease-related problems[4,5]. Depression is persistent in over a quarter of all patients diagnosed with lung cancer, especially those with more severe symptoms or functional limitations[6]. Pain, decline in physical function and the development of a depressive disorder are predictive factors of suicidal ideation in patients with unresectable disease[7]. This demonstrates both the importance of prompt identification of disease and treatment-related problems, and timely initiation of effective interventions.

The objectives of radiation therapy (RT) in lung cancer management span curative and palliative intent. Irrespective of the aims of treatment, a primary goal of RT is to minimise toxicities to adjacent radiosensitive organs. Patients receiving radical and high-dose palliative treatment for lung cancer commonly experience considerable acute, radiation-induced toxicities, including oesophagitis, fatigue, nausea and skin reactions[8,9]. However, for the majority of these problems there is limited evidence to guide management and, as such, care received may be suboptimal or inconsistent.

Screening for and monitoring of radiation-induced toxicities is important for the assessment of biological effects on an individual, to set therapeutic limits for cancer treatment and to identify areas of need for patients and families[10]. Early identification and response to treatment-related toxicities may also reduce severity and distress associated with the disease and its treatment[11]. The development and implementation of systematic screening tools are recognised as an important step in promoting timely assessment of a patient's status. They also act as a means to ensuring that appropriate treatment decisions are

made based on an individual patient's needs. This is particularly important in the ambulatory care setting, where large numbers of patients are treated on a daily basis in increasingly busy radiotherapy units, and are, therefore, potentially at risk of being missed by practitioners, even when they may have considerable unmet needs[10].

Care provision at Peter MacCallum Cancer Centre

At Peter MacCallum Cancer Centre (PeterMac) collaboration and a multidisciplinary approach are the focus of patient care. PeterMac, a comprehensive cancer centre comprising one central and five satellite centres, offers a diverse range of specialist care including RT. The framework for care delivery is centred around a clinical services model, based on 11 of the main tumour types. This model facilitates the delivery of multidisciplinary patient care and operates as a driver of innovation, integrated research initiatives and education. The multidisciplinary team (MDT) in each service consists of radiation and medical oncologists, surgeons, radiation therapists, nurses, dieticians, social workers, physiotherapists, occupational therapists and other allied health professionals. In addition to these professions, medical residents, registrars, interns and students rotate through each service.

Each year the lung clinical service reviews approximately 350 patients with newly diagnosed lung cancer. The majority of patients encounter most members of the MDT within their first week of treatment. Evidence indicates that patients and family members of people newly diagnosed with cancer report considerable unmet informational needs, often as a result of inconsistent information provided by differing members of the health care team[12]. At PeterMac, one of the challenges faced by the MDT in achieving optimal care was overcoming communication barriers across the organisation to ensure that patients were receiving consistent, evidence-based self-care information informed by a standardised approach to assessing and recording RT-related toxicities. Realisation that toxicity data for patients undergoing RT for lung cancer at PeterMac were filed in numerous locations accessible only to varying combinations of team members, led to the development of an evidence-based, multidisciplinary, acute toxicity scoring tool. Further emphasising the need to develop practice in this area were data from a retrospective analysis of medical records across the organisation that revealed an absence of objective scoring criteria for grading toxicities experienced by patients with lung cancer.

The project

The aims of this initiative were to develop an evidence-based screening tool to guide the supportive care management of patients receiving RT for lung cancer. The core project team included two radiation therapists, the lung unit nurse coordinator and a nursing research fellow. Throughout the developmental process the project team forged collaborative links with key stakeholders to ensure the applicability of the screening tool in the clinical setting. Key stakeholders included:

- The multidisciplinary lung clinical service.
- The radiation therapy patient care committee.
- The radiation therapy service.
- Patients receiving radical or high-dose palliative RT for lung cancer.
- Patients' families and carers.

The instrument, to be utilised by all members of the MDT, was developed to record and communicate the incidence and severity of radiation-induced toxicities, and the effectiveness of interventions chosen to manage them. In addition, the instrument was intended to improve the quality of care provided to patients by ensuring information regarding symptoms and self-care interventions was documented and disseminated to patients and their carers in a consistent and streamlined manner.

This paper sets out to describe the development and implementation of the tool, to report preliminary evaluation data, and outline areas for future expansion.

Methods

Preparing the ground: a training needs analysis

A training needs analysis, approved by the local Expedited (Ethics) Review Committee was undertaken with all radiation therapists, nurses and allied health staff within the lung clinical service. The needs analysis was undertaken to map the existing knowledge base with regard to the identification and management of acute toxicities anticipated when patients receive radical and high-dose palliative thoracic RT. The needs analysis facilitated an analysis of current practice, referral pathways and the confidence and satisfaction of staff in communicating information about toxicities and their management with patients and other members of the MDT. Obtaining this information enabled the project team to tailor educational workshops and learning materials regarding key radiation-induced toxicities to meet knowledge deficits identified by staff through the needs analysis.

The development of the screening tool

In response to data gathered through the needs analysis exercise and from stakeholder feedback, the screening tool was designed to include four main elements:

- Guidelines to inform the grading of each toxicity.
- A scoring system to prospectively record (screen) the presence or absence of key toxicities.

- Reference to evidence-based information or best-available evidence to inform self-care strategies appropriate to each toxicity.
- Information to guide appropriate referral within the MDT.

Toxicities and assessment: Key acute toxicities identified with regimes delivered at our centre include dysphagia and oesophagitis, nausea, vomiting, skin reactions and fatigue[13]. These toxicities are included in the tool and are also documented on the standardised consent form utilised for thoracic RT at our centre. Probing questions are included in the tool to establish the presence and severity of each toxicity (Figure 1).

Guidelines and grading system: Each toxicity (with the exception of fatigue), is graded according to the National Cancer Institute Common Terminology Criteria Adverse Events v3.0 (NCI CTCAE)[14]. This validated scale, used for toxicity assessment in international clinical trials, was familiar to the MDT and easily adapted into daily clinical practice. Following a review of the literature, the National Comprehensive Cancer Network (NCCN) scale was adapted to score the incidence, severity and bother/distress caused by fatigue[15]. An example of the screening probe and grading system utilised for oesophagitis is illustrated in Figure 1.

Interventions: Interventions are defined and documented for every toxicity (Figure 1). The project team determined recommended interventions based on best-available evidence together with referral pathways for specialist consultations. The referral pathways were reviewed by members of the lung service to ensure accuracy and relevance. In accordance with the screening guidelines, toxicity interventions are presented and reinforced to patients in a consistent and timely manner. Patients attending PeterMac receive a detailed explanation of all possible toxicities prior to consenting to treatment by a radiation oncologist. With the introduction of the screening tool, patients have tailored information that addresses key toxicities and is reinforced at regular time points.

Toxicity grading: A scoring template was designed to record toxicity grades at regular time points throughout the treatment trajectory (Figure 2). A baseline assessment is established at the RT planning simulation appointment prior to the commencement of treatment. It is at this time that introductory treatment information is given to each patient, according to routine practice at our centre. Screening is then carried out at recommended intervals throughout the course of therapy, and at three follow-up occasions following the completion of treatment. The assessor's initials and discipline are incorporated into the scale to ensure all stakeholders are aware of who has conducted the assessment. As the scoring tool is reliant on objective observations, an additional section is provided to record supplementary patient or professional data relating to toxicities and their interventions.

Figure 2 shows an example of the acute toxicity scoring

Figure 1. An example of oesophagitis screening.

Oesophagitis

What foods were eaten in the past 24 hours? Quantity? Ease of managing food intake? Any sensations associated with eating?

0	1	2	3	4
None	Asymptomatic: able to eat regular diet.	Symptomatic: altered eating/swallowing; IV fluids indicated <24 hours.	Symptomatic and severely altered eating and swallowing: IV fluids; tube feeding or TPN indicated ≥24 hours.	Life-threatening consequences.

Intervention – Grade 1

- Suggest a soft, moist, bland diet. If unable to tolerate progress to puréed food.
- Add extra nourishment to food and eat small, frequent meals.
- Encourage adequate fluid intake to prevent dehydration.
- Eat and drink slowly and consume foods that are best tolerated by personal experience.
- Avoid smoking and alcohol consumption.

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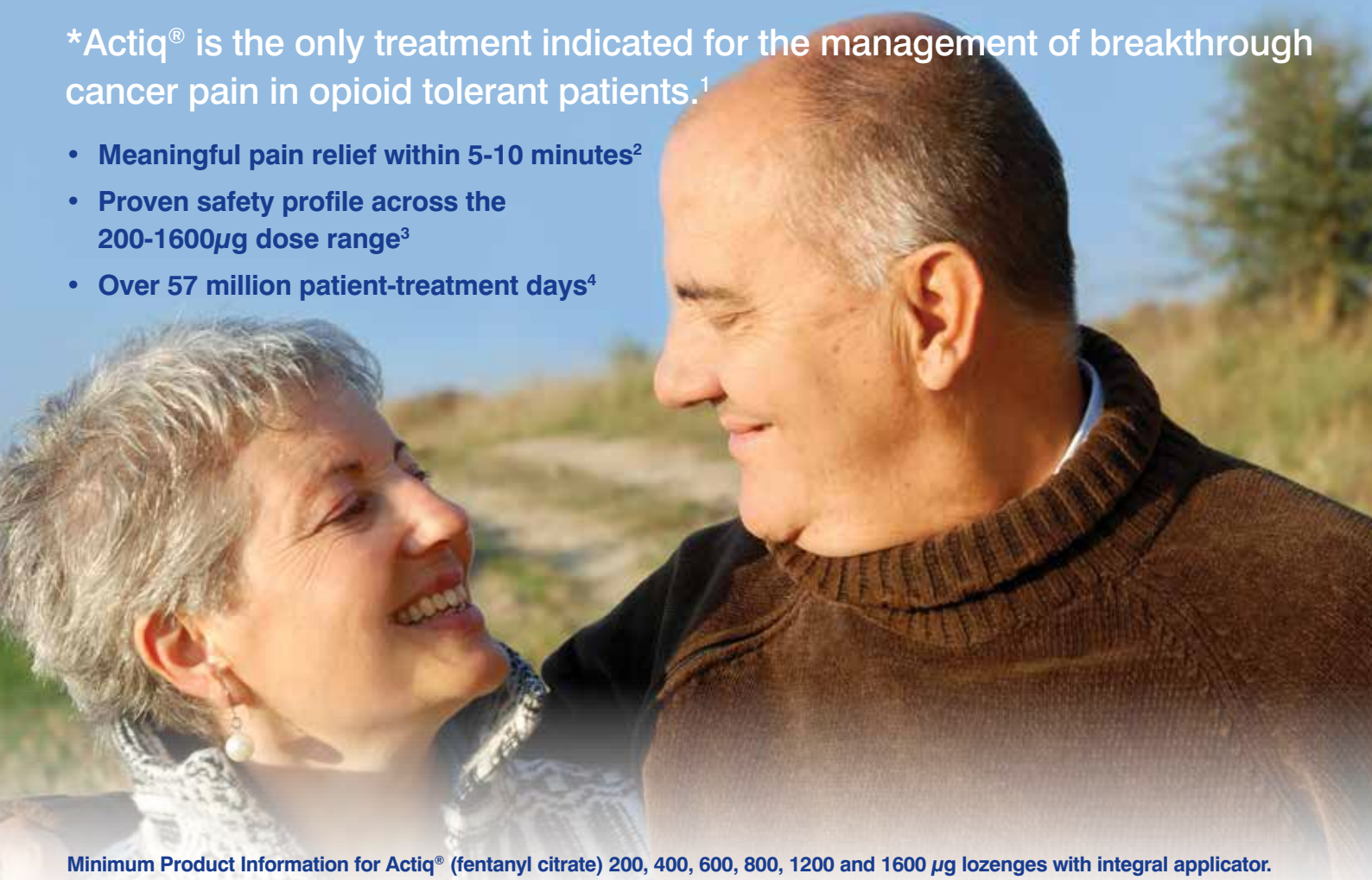

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template, with only select treatment fractions shown (across the top row). Numbers in the columns indicate the grade of the toxicity scored, with the exception of weight, which is documented in kilograms. The assessor's initials and discipline are documented on the bottom two rows.

Clinical implementation

Evidence available to inform successful practice change implementation guided the introduction of the scoring tool into daily practice[16,17]. Initially, this involved identifying champions to lead the project in each of the relevant clinical areas across the organisation, including each of the 12 RT treatment units across the five PeterMac sites. The project team aimed to establish an institutional commitment to the scoring tool and used numerous communication methods to inform stakeholders of the aims and objectives of the initiative. These were flexible and persistent, including MDT meetings, one-on-one discussions and online communication. Meetings were conducted by the project team at each site, in individual departments and via video-conference. Multidisciplinary educational sessions and learning materials were developed to meet the needs identified by the needs analysis. Throughout the introductory and implementation phases, regular contact was maintained with all stakeholders to actively seek feedback to encourage use of the tool.

Results

Use of the tool and processes involved with its implementation was evaluated for the first 100 patients who received treatment. Of these, the median number of times the screening tool was completed was 6 (range, 1-15). Radiation oncology nurses most commonly documenting toxicities with the screening tool (median 5, range 0–9), followed by radiation therapists (median 5, range 0–4) and radiation oncologists (median 1, range 0–3). Data supporting the frequency these disciplines refer to the tool are not available; however, anecdotal feedback from staff includes:

> "... consistent, simple and more comprehensive".

> "It (the screening tool) enables me to give accurate info to the patient and improve the patient care provided".

The screening tool aims to support patients on their journey throughout the organisation and their course of treatment. Anecdotal feedback from patients indicates that the screening tool initiative is achieving this aim:

> "The information is consistently reinforced to me by all of my carers, which helps me to understand how my side effects are managed".

> "I have faith in my carers ... they are aware of side effects I am experiencing and I am not required to repeat information in each department".

At the first review of the screening tool, 12 months after its initial introduction, two new areas of assessment were added. The first is a performance status score, which is graded according to the Eastern Cooperative Oncology Group (ECOG) criteria, to provide an overall indication of a patient's condition[18]. Following input from the practice development nurse Quit counsellor, smoking status was also included into the screening tool. The opportunity for practitioners to support patients to quit smoking or remain quit during treatment was presented by the use of the screening tool and smoking status is graded according to evidence-based guidelines[19].

Figure 2. The acute toxicity scoring template.

	Sim+	1	7	8	12	17	21	29	30	F/UP+
Introductory teaching	✓	✓								
Dysphagia/ oesophagitis	0	0	0	0	1	1	1	2	2	2
Nausea	0	0	1	1	0	0	0	0	0	0
Vomiting	0	0	1	0	0	0	0	0	0	0
Skin integrity	0	0	0	0	1	1	1	2	2	2
Weight (kg)	71	71	70	70	69	69	69	68	68	67
Fatigue	8	8	6	6	4	3	6	6	6	5
Assessor initials	HP	MS	LM	BE	MD	GY	GS	DB	HP	BE
Assessor's discipline*	N	RT	MO	D	N	RT	RT	RO	N	RO

+ Sim = planning simulation (baseline); F/UP = follow-up appointment.

*N = nurse; RT = radiation therapist; MO = medical oncologist; N= nutritionist; RO = radiation oncologist.

Discussion

Implementation of a screening tool into routine clinical practice for patients undergoing thoracic RT at PeterMac has demonstrated benefits for all stakeholders. Analysis of the completeness of data entry and professional sign-off of the screening tools for the first 100 patients indicates RT-induced toxicities have been detected and documented in a systematic manner at treatment reviews and post-treatment appointments.

Reflections

Challenges of implementing the screening tool across a large, multi-site organisation have been experienced. Evidence indicates that screening and assessment data should be documented in patient records in a section that is easy to access by all health care providers[17].Although implementation of the screening tool has enhanced communication, there remains room for improvement. An electronic system accessible by the whole organisation, for example, radiotherapy and chemotherapy, is not yet utilised within our centre. Consequently, there is still potential to further enhance communication between departments. Continuity in the use of the screening tool by staff not directly aligned with the lung service (for example, members of the allied health team who work across several tumour streams) was challenging as these clinicians did not have the opportunity to benefit from the preparatory education sessions. Our experience indicates the importance of including evidence-based guidelines within the screening tool to reinforce consistency around screening and the provision of self-care information within a large department where multidisciplinary, non-medical staff provide care for patients from various clinical services on a routine basis.

The expansion and adaptation of the screening tool to other clinical units within the organisation has commenced, with tools now being utilised in the urology and gastrointestinal clinical services while others are being developed for the breast and head and neck clinics. A retrospective analysis of completed tools within the lung service is currently being undertaken to examine the relationship between toxicities experienced by patients and treatment they received. This will provide valuable information for enhancing our service in the future. We are also utilising the screening tools completed for 180 patients to retrospectively review the incidence and severity of key radiation-induced toxicities and radiation dose administered to these sites.

In the future, our team plans to develop the screening tool into patient-appropriate language. This will enable patients to score the toxicities they are experiencing and discuss these with practitioners. The utility of such an instrument to enhance communication between staff and patients when patients are away from the hospital warrants evaluation. Future opportunities will also exist to investigate the correlation between toxicity grading by health care providers and patients themselves.

Conclusion

If interventions employed to minimise the impact of radiation-induced toxicities on the quality of lives of patients with cancer are to be effective, comprehensive screening and assessment is essential. Ensuring that problems are documented and communicated efficiently to relevant members of the MDT maximises the potential to introduce self-care and professional interventions as soon as possible. Furthermore, this ensures that data is recorded to note the type of interventions employed, and to evaluate their efficacy in reducing the severity and distress of problems experienced by patients. The screening tool enables standardised scoring of radiation-induced toxicities by all members of the MDT. This results in prompt and appropriate referral for intervention for symptom control and optimal care of patients receiving treatment for lung cancer.

Acknowledgements

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The experience of receiving radiation therapy

Pauline Rose • RN, MN (Onc), PhD
Radiation Oncology Mater Centre, (Princess Alexandra Hospital), South Brisbane, QLD 4101
Pauline.Rose@health.qld.gov.au

Abstract

Patients undergoing radiation therapy for cancer face significant challenges requiring support from the multidisciplinary team over the course of their treatment. Radiation oncology nurses are an important part of this team. This paper describes the use of radiation therapy and highlights how this treatment modality might impact on the patient throughout a course of treatment. There is particular emphasis on the physical and psychosocial domains for the patient, as well as the nurse's role in patient care. In the physical domain, this paper highlights the major responses by patients to the impact of radiotherapy on the skin and mucous membranes and the common sites of the body, where there is a cumulative radiotherapy effect on tissues. The psychosocial domain concentrates on a brief overview of sources of distress that may impact on the quality of life of the patient and their family.

Introduction

The primary objective in using radiation therapy is to deliver sufficient doses of ionising radiation to a specific area of the body to damage target DNA that eventually results in cell death[1]. Radiotherapy is a local, primary treatment for many solid tumours and an effective neoadjuvant and adjuvant treatment for others. Radiotherapy uses ionising radiation to kill cancer cells, either as external beam radiation delivered by a linear accelerator, or as brachytherapy, where a radioisotope is placed in a body tissue or cavity to produce proximal irradiation[1]. It is estimated that potentially half of all patients diagnosed with cancer may need to receive a course of radiotherapy[2]. Radiotherapy is commonly used to treat a number of malignant diseases and has many benefits, including organ preservation, survival and palliation of symptoms[1].

In Australia approximately 45% of cancer patients receive radiation therapy as part of their treatment plan; however, reports recommend that up to 50–55% of all cancer patients might benefit from a course of radiotherapy[3]. All body tissues have varying sensitivities to radiotherapy and treatment delivery systems have evolved to target the tumour for the individual patient with the intent to cause less damage and trauma to surrounding normal tissue[4]. However, many patients may have complex care needs, both physical and psychosocial, that require specialised intervention based on evidence. Importantly, the majority of patients receiving radiotherapy do so as out-patients. This has created a unique nursing environment for the planning, provision and assessment of the appropriate care for each patient and their family within this mainly ambulatory population. This care needs to occur not only during the radiotherapy, but planning for symptom relief and skin care/dressings is required during weekend breaks when the patient does not have access to the nursing staff, and into the post-treatment phase, as the radiation side effects may persist for some time.

Radiotherapy can be used alone or in combination with other treatment modalities such as surgery, chemotherapy and hormonal therapy[5]. The synergistic effect of the radiotherapy and chemotherapy may increase the impact and complexity of the side effects that patients need to manage. Patients and their families/supporters generally have limited knowledge about the effects of cancer treatments. Therefore, they need to be empowered and prepared through targeted information, education and available resources to manage the treatment side effects and maintain their health during the radiotherapy. A key component of the nurse's role, therefore, is providing supportive nursing interventions to promote the person's ability to manage the treatment-related toxicities[6]

The patient experience during the radiotherapy treatment

The first key health care event in the radiotherapy process is attending a consultation with a radiation oncologist, where the treatment decision is discussed. This decision will be based on the site and histologically-proven type, grade and stage of the tumour involved. Patients and their families may be very anxious about the diagnosis and the treatment, and how this might impact on themselves, their lives and their families. Some patients may also need to consider the practicalities of requiring transport to treatment, being accommodated away from home and requiring accommodation, or travelling long distances to treatment each day. This may be a very worrying time, especially for those who do not live close to a treatment centre[7].

Once a course of radiotherapy is decided upon the patient must proceed through a series of planning procedures before commencing the actual daily prescribed treatment. Treatment planning is the process that determines how the treatment will be delivered. This includes determining the position the patient is to lie in for treatment, and acquiring the appropriate data to calculate the radiation dose required. Planning computers are used to tailor the dimensions, shape and appropriate number of radiation fields for each patient's tumour while limiting the dose to the surrounding normal tissues. Simulation or 3D CT planning are two methods of treatment planning. The patient may need explanations about the procedure, why it is required

and the possible use of immobilisation devices such as 'shells', as well as the need for 'tattoo' marks on the skin to provide parameters for the treatment field for use during treatment set-up. Once radiotherapy commences, the patient will be expected to attend the radiotherapy department at an appointed time every day for up to 30 minutes. This may be from one day to six weeks or more, depending on the site, the protocol, and the intent (whether the treatment is curative or palliative). Following the completion of the radiation treatment, the patient will be followed up for a period of years at routine intervals by the radiation oncologist and/or other participating medical specialist(s).

The effect of radiotherapy

The impact of radiotherapy to any site of the body is dependent on the site of the cancer, the radiation dose, the treatment volume, comorbid disease, and the treatment protocol. Therefore, over the course of the radiotherapy, patients may experience a range of complex physical and/or emotional responses, which may also include the residual or concurrent effects of other treatment modalities. Patients and their families may not realise that the dose of radiotherapy on the normal tissues surrounding the tumour target accumulates and intensifies over time. Nurses need to support the patient and family by providing information to address this knowledge deficit and to enhance their capabilities and personal resources to manage the side effects[8]. Radiation side effects can be acute, occurring during the treatment, or late, occurring weeks to years later[9].

Patients' physical responses to radiotherapy

Every patient will react differently to the radiotherapy as a result of treatment factors and the patient's personal characteristics. Radiation affects the cellular level of tissues, damaging target DNA that eventually results in cell death, and this has consequences for the tissues and organs within the treatment beam[1]. This effect on body tissues is generally localised and predictable, but can also lead to systemic and chronic effects[10]. The major toxicities for the individual patient are generally a response of the protective mechanisms of the body to the radiotherapy, mainly the skin and mucous membranes. These tissues are particularly radiosensitive due to their cell-replicating properties[1]. Radiation treatment toxicities generally worsen over the course of the radiotherapy, and may take several days or weeks to resolve after the radiotherapy has been completed. Late effects of radiotherapy are the consequences of radiation damage to less mitotically-active cells. They may affect local tissues long after the treatment has been completed, and negatively impact on the person's quality of life and well-being[9]. Late injury may result in fibrosis, telangectasia, pruritus, increased vulnerability to injury, and loss of skin elasticity in the treated area[11].

Protective mechanisms: skin

The skin is the largest organ in the body. Regardless of the body site treated, an area of skin will generally be affected by the radiation beams as they pass through the skin to the target area. Radiotherapy causes changes in the cellular components

of the epidermis, dermis and microvasculature epithelium[12], and injury is a result of damage to the basal layer of cells. Early changes may result in dryness of the skin, erythema, pigmentation, irritation (folliculitis) or loss of hair follicles, and dry desquamation, which may eventually result in moist desquamation if the basal layer fails to renew[13]. The degree of skin toxicity depends on a number of radiotherapy and patient-related factors[14]. Radiation treatment factors include the use of superficial beams, tissue-equivalent bolus material on the skin to bring the skin dose closer to the skin surface, and large treatment fields[1]. Personal factors include skin folds in the irradiated area, bra cup size for women, and smoking[14]. Skin folds such as those in the inframammary and inguinal areas produce an uneven distribution of radiation dose in an environment of increased moisture, friction and warmth. Irritation between the skin folds may result in skin breakdown over the course of the radiotherapy, causing degrees of discomfort for the patient[11,13].

Protective mechanisms: mucous membranes

The mucous membranes are important radiosensitive protective tissues in the body. These layers of epithelial cells and connective tissue line body passages and cavities and direct and indirect contact with the external environment. Inflammation of the mucous membranes resulting from radiotherapy potentially affects all areas from the oral cavity to the anus, depending on the area of the body treated with the radiotherapy[15].

Oral mucositis is an inflammatory response which occurs as a result of destruction of the mucosal or glandular cells within the oral treatment field. Cells throughout the mucosa, including the epithelium, connective tissue and blood vessels, are affected by the release of free radicals following radiotherapy, causing complex mucosal injury[16]. Large amounts of fine vasculature exist in the oral cavity, and radiotherapy can cause vascular congestion and increased permeability. Pressure is exerted on the surrounding small vessels from the resulting oedema, which in turn decreases blood flow to the tissues and promotes the development of mucositis. When the salivary glands are included in the radiation treatment field, salivary secretion decreases rapidly, particularly if the parotid and submandibular glands are irradiated. This may adversely affect patient comfort and nutrition by changing the normal moist environment of the mouth, which is required for comfort, mastication and oral hygiene[17]. As the effects of the radiotherapy accumulate, the mucosa becomes denuded, then ulcerated, and finally covered with an exudate. Oral mucositis may be prolonged by secondary infections such as candidiasis and patients may experience a moderate to severe reduction in well-being and quality of life during, and often well beyond, the course of treatment[17]. The localised, inflammatory process caused by radiation produces symptoms such as xerostomia, dysphagia and pain, and the patient may lose weight through inadequate oral intake[9]. Newer radiation techniques, such as Intensity Modulated Radiation Therapy (IMRT), have the ability to deliver precise doses of tumourcidal radiotherapy to such areas as the head and neck region, while limiting toxicity to uninvolved but adjacent structures, and this may reduce some of these side effects[18].

Throughout the gastrointestinal tract (GIT) early side effects may be the result of thinning of the mucosal membranes, resulting in denuded areas, superficial ulcerations, and inflammation of the submucosa. This may cause a range of site-specific toxicities such as nausea and diarrhoea, many of which can be very uncomfortable and distressing for the patient. Despite advances in planning and treatment techniques, these side effects may be dose-limiting due to excessive toxicity[15].

Common symptom experiences associated with radiotherapy

As well as skin and mucous membrane toxicities, there is a range of other symptoms that may cause distress for patients. These include fatigue, sleeplessness, pain, swelling, loss of taste, anorexia, dyspnoea, dysphagia, cough and nausea. These symptoms may impact on emotional well-being and may be associated with reduced functional status[19].

Patients' responses: fatigue and sleep disturbance

Fatigue and pain are complex affective, sensory and cognitive phenomena, and, with sleep disturbance, are common symptoms in patients undergoing radiotherapy. Fatigue results from an energy deficit caused by disease, treatment factors and other biological, psychological and environmental factors. The complex underlying aetiologies of fatigue may include surgical recovery, tumour burden, anaemia, infection, fever, patterns of poor sleep, pain and prolonged stress[20]. These aetiologies may be further complicated by the effects of radiotherapy and/or chemotherapy. The systemic effect of radiation that contributes to fatigue is not fully understood but may be related to its cytotoxic effect, where metabolites contribute to an inflammatory reaction[21].

Fatigue may become progressively more intense over the course of the radiotherapy. Worsening pain, skin reactions, sleep disturbance and depressive symptoms may also increase the burden and distress for some patients[22]. Studies have reported that the interrelated symptoms of fatigue, anxiety, changes in functional ability and sleep problems may determine how well the patient manages the radiation treatment[23]. The effects of fatigue can result in significant alterations to role function, physical function and cognitive function[24]. It has also been reported that up to 40% of individuals treated for a range of different tumours could suffer from chronic fatigue following radiotherapy[25].

Sleep disturbance for patients undergoing radiotherapy has received limited attention in the literature, but may be a predictor of severe fatigue. It is a concern for those patients who consistently report difficulty falling asleep, who wake up frequently during the night and who wake up regularly earlier than necessary[26]. Insomnia was reported as of moderate severity by patients undergoing radiotherapy for nasopharyngeal cancer[27], and in a longitudinal study of symptoms experienced by women treated by primary radiotherapy for breast cancer, sleep alterations were consistently reported during (45%) and at three months (42%) following the radiotherapy[19].

Patients' responses: pain

Radiation-induced pain may be the result of inflammation to tissues in the local treatment area and usually resolves once the tissue damage heals following completion of the radiotherapy. The pain caused by radiotherapy is generally reported as a specific tissue response. For example, this may include mucositis, skin tissue damage, enteritis, proctitis, dysphagia and abdominal cramping[28]. Palliative doses of radiotherapy are also used effectively as treatment for pain caused by metastatic disease[29].

Patients' responses: dysphagia and anorexia

Radiation oesophagitis can result in pain and dysphagia, and, over time, may affect the patient's ability to swallow. Increased mucous production can be both unpleasant and difficult to manage, causing gagging and difficulty for the patient in clearing the secretions[15]. The symptoms may begin towards the end of the second week of treatment and be quite severe, requiring pharmacological interventions[15]. Loss of taste, anorexia, infection and trismus, as a result of radiotherapy to the head, neck and upper digestive tract, may affect the oral environment and impact on nutritional intake[30]. Patients may frequently struggle to maintain adequate dietary and fluid intake during the middle to latter part of the radiotherapy course, especially those patients undergoing radiotherapy to the head, neck and upper GIT[10]. Anorexia may be related to dysphagia and, in combination with nausea and vomiting, may result in weight loss requiring artificial feeding and nutritional supplementation. Thick ropey saliva may precipitate coughing, gagging and retching, causing sleeplessness and fatigue[26]. These toxicities generally continue into the post-treatment phase for a period of days to weeks[30].

Patients' responses: dyspnoea and cough

Radiotherapy to the lung and upper GIT may cause patients to experience levels of fatigue, cough, dyspnoea, pharyngitis and oesophagitis. Radiotherapy to lung tissue may cause cilia to cease functioning early in the course of the treatment. The dry, irritated mucosa can produce a decrease in mucosal secretion, resulting in a dry, irritated, non-productive cough, which may be distressing for the patient and ultimately affect sleep and general functioning[31]. Later radiation effects to the lung may include the result of arteriocapillary fibrosis and may result in increased breathlessness[32].

Patients' responses: nausea and vomiting

Radiotherapy fields that include areas of the abdomen may result in dyspepsia and gastritis. However, these side effects are usually temporary and are generally managed with standard pharmacological preparations and dietary modifications[15]. The main side effect of radiotherapy to the abdomen is nausea, which may be disabling for the patient, and may result in a reduced quality of life which can potentially affect treatment adherence. Any radiation field, including radiotherapy to the spinal cord and other prophylactic and palliative courses to at least some portion of the abdomen, may cause this unpleasant symptom. Anti-emetics are generally prescribed for the patient daily before treatment[33].

Patients' responses: intestinal and urinary symptoms

Patients undergoing GIT and pelvic radiotherapy may experience symptoms and signs of acute small bowel toxicity such as nausea, abdominal pain and diarrhoea[1,24]. Despite significant advances in radiotherapy technology, diarrhoea may still be a treatment-limiting side effect, although these acute symptoms usually settle down within two to four weeks of completing treatment[15]. However, damage to normal tissue in the GIT can lead to chronic urinary and/or faecal incontinence. A majority of patients will develop a permanent change in their bowel habit, resulting in diarrhoea, pain, wind, bloating, rectal bleeding and/or lethargy[9]. Patients need to be aware of the late consequences of the radiotherapy, when to report changes and how to manage the toxicities that may result[34].

Manifestations of bladder irritation may include frequency, dysuria, nocturia and cystitis[35]. These effects can be distressing and painful, and can interfere with sleep. They require careful monitoring and supportive measures aim to provide comfort, reduce pain and prevent possible infection. These uncomfortable urinary tract symptoms may also affect travelling to treatment and being in public for prolonged periods. Potentially uncomfortable side effects to the female pelvis may include dysuria and frequency, vaginal discharge and perineal irritation. All these symptoms may affect comfort, personal hygiene and, ultimately, self-concept[36].

Due to the close proximity of rectal tissue when treating the prostate with radiotherapy, side effects may include urgency in defecation, pain, tenesmus, faecal incontinence, discomfort and rectal bleeding[37]. Other uncomfortable symptoms associated with radiotherapy to the prostate may include hot flashes and some patients report impaired sexual functioning related to nerve damage, which may interfere with personal relationships[38]. This may impact on the person's well-being and self-concept, both physically and emotionally. Pain, discomfort and frequent trips to the toilet may interfere with sleep and rest patterns, and possibly limit normal activities[39].

Late effects of radiotherapy to the female pelvis may result in inflammation, mucosal atrophy, lack of elasticity and ulceration of the vaginal tissue[40]. Vaginal stenosis following radiotherapy may occur as a result of the formation of adhesions and fibrosis of upper vaginal tissues, which, in turn, leads to contraction of the vaginal vault and finally to a shortened vagina. This may result in discomfort and difficulty with penetration during sexual intercourse, and over time may make medical examination of this area of the body difficult during routine follow-up. Issues relating to sexuality may be an important predictor of well-being for these women over the longer term[40].

Psychosocial effects

The psychosocial experience of undergoing a course of radiotherapy can cause significant levels of distress, including anxiety and depression[41,42]. These psychoemotional issues may impact on the person's perceived quality of life, their adjustment to treatment, and their ability to develop effective coping responses to manage the radiotherapy and its side effects. There are potentially many sources of distress that can influence the well-being of patients undergoing radiotherapy, including uncertainty, the impact of physical symptoms, issues of loss, changing social roles and personal relationships.

Uncertainty

Patients may experience heightened stress levels at the beginning at the radiotherapy treatment due to unfamiliarity with the radiotherapy, the technology, the potential side effects of the treatment and the possibility of being in an environment with other cancer patients[23]. Delays may occur from consultation to treatment planning, and, more importantly, the time from treatment planning to actual commencement of treatment. Patients may not fully comprehend the rationale for these delays, with resulting anxiety. This may impact on well-being and be a source of concern resulting in a range of anxieties, including worry about the spread of the disease[43]. Patients perceived[44] that being properly informed about the radiotherapy experience influenced how they were able to manage their radiotherapy situation, enabled them to be better prepared for what was to happen, increased their feelings of control and reduced their anxiety levels. Similarly, in a study involving a sample of head and neck patients[45] it was reported that the treatment period was mostly experienced as safe and secure, but patients also reported that they were given insufficient information and lack of time to ask questions. These authors also reported that before and during pauses in radiotherapy and after completion of the treatment, patients were often left alone with their problems, questions and worries about the future. It was suggested that care and support must be provided with greater consistency and continuity throughout the whole trajectory of care.

The psychological impact of physical symptoms

The response of patients to the radiation treatment, and the relationship between physical and psychological effects of radiotherapy, is multilayered[26]. The discomfort that may be associated with the physical side effects of the radiotherapy is often predictable and generally manageable with the appropriate intervention. However, these physical effects can be a significant cause of distress for patients, especially if they are unrelieved and poorly understood by the patient and the family. Physical symptoms such as nausea, mood change, loss of appetite, insomnia, pain, reduction in mobility, fatigue, change in bowel pattern, lack of concentration and change in appearance have been identified as potential causes of emotional distress[46].

Loss, changing roles and relationships

A diagnosis of cancer and the need to undergo radiotherapy treatment may result in a sense of loss for the patient and may also cause changes in some social relationships. A number of studies have reported that the presence of supportive family, friends and work colleagues is important to the way patients adjust to their situation. For example, treatment demands that lead to changes in social roles, such as the work or family role, may challenge the concept of self-worth for patients[47]. Similarly, if a patient perceives that there has been loss of the self through

a changed bodily appearance or body function, this may lead to anxiety, mourning and depression[48].

Summary

Radiotherapy is an important treatment modality for patients with cancer, but it is not without its physical and psychological side effects. Nurses have an important role is the supportive care of patients undergoing radiotherapy, whether it is radiotherapy alone or in combination with other treatment modalities such as chemotherapy. Many past supportive care practices in radiotherapy have been anecdotal and based on historical practices. This is improving; however, research of the impact of radiation treatment on an increasingly ageing population is minimal. As we progress our practice into the future, this care needs to be based on good evidence. This opens up many avenues for nurses in this speciality to engage with research to provide this evidence.

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Use of deodorant in breast cancer patients undergoing radiation treatment: a national survey of nursing advice

Sharron Carson • RN, BHSc, MIR
Clinical Nurse Manager, Sir Charles Gairdner Hospital, Hospital Avenue, Nedlands, WA 6009
sharron.carson@health.wa.gov.au

Abstract

Skin care practices recommended for people undergoing external beam radiation (EBRT) vary between radiation oncology departments. Nurses caring for women undergoing EBRT to the breast commonly recommend avoidance of deodorants, especially those that are aluminium-based. However, many women view deodorant use as part of their hygiene routine and are anxious when deodorant use is prohibited. A national survey, using a self-report questionnaire, was undertaken to explore advice given by nursing staff regarding deodorant use to women with a diagnosis of breast cancer undergoing EBRT. The majority of nurses who responded to the survey endorsed the use of aluminium-free deodorants for women undergoing EBRT for breast cancer. Avoidance of aluminium-free deodorants for women undergoing EBRT does not seem to be supported by evidence or current practice. The question of whether aluminium deodorants can be safely used during radiation therapy remains unanswered and presents an opportunity for future nursing research in this area.

Introduction

Skin care practices recommended for people undergoing external radiation vary between radiation oncology departments[1-3]. However, nurses caring for women undergoing external beam radiation (EBRT) to the breast commonly recommend avoidance of deodorants, especially those that are aluminium-based[2]. There is no robust evidence to support this practice[4]. However, many women view deodorant use as part of their hygiene routine and are anxious when deodorant use is prohibited[4,5].

With a view to assessing the feasibility of conducting a randomised controlled trial to assess whether deodorant use affects radiation skin reactions, a survey of advice given by radiation oncology nurses in Australia to women regarding deodorant use was undertaken.

Pathophysiology

The skin is made up of a superficial layer of cells (the epidermis) and a deep layer (the dermis). The basal layer of the epidermis rapidly produces new cells to replace cells shed from the surface of the epidermis. Within the dermis are the blood vessels, glands, nerves and hair follicles[6,7]. The basal layer of the epidermis is particularly sensitive to the effects of radiation and visible skin damage is noticed by about three weeks into a course of treatment, at approximately 20–25Gy[8]. Damage occurs as a result of radiation injury that impairs the ability of the cells in the basal layer to reproduce and accordingly replace cells shed from the surface layer of the epidermis[6,9]. The skin characteristically displays erythema and oedema due to a combination of inflammatory responses and capillary dilation. Patients often state that their skin feels hot, tender and tight[7,8]. Skin may become hyperpigmented due to migration of melanin cells closer to the surface of the epidermis[7]. Dry desquamation develops due to a decline in basal cell numbers characterised by dry, flaking skin[7,8]. Moist desquamation occurs when the epidermis becomes so damaged that the dermis is exposed. Exudate may be seen and the skin may peel and blister. Patients commonly report that the skin is very painful.

Moist desquamation is more likely to occur in skin folds and areas of friction[6,8]. As the patient develops radiation-induced skin changes such as pain, itch and desquamation, assessment and timely initiation of care are crucial to managing symptoms and preventing complications such as infection[6,7]

Background

Skin care regimes vary between radiation oncology departments with inconsistent evidence to support practice. A survey of 67 nurses from nine radiation oncology departments in Belgium indicated that management of radiation skin reactions varied and that translating research into practice was unstructured[10]. As a result, skin care practices in radiation oncology departments across Belgium were standardised. Nurses advised patients to wear loose-fitting, natural fibre clothes; wash with mild, non-perfumed soap and warm water; avoid exposure to extremes of temperature and sun exposure; moisturise the skin; avoid powders or perfumed products and avoid deodorant in the radiation field[10].

Whilst patients are advised by radiation oncology nurses to avoid using aluminium-based deodorants, there is no evidence to support this advice[2]. The rationale behind this advice is based on the following propositions: 1) that as aluminium is a metal, its presence during radiation therapy leads to radiation 'scatter';

and 2) that with prolonged use, a cover of deodorant (and thus traces of metal) builds up on the skin, resulting in an increase in total Gray delivered at the radiation therapy entry site. There is evidence to dispute these views.

A study undertaken by Burch, Parker, Vann *et al.*[11] set out to record surface dose measurements of 6-Mv photon radiation using a phantom (that is, a device for simulating the *in vivo* effect of radiation on tissues). Normal applications of six deodorants (metallic and non-metallic) were applied to the phantom. Three of the deodorants were solids, two were roll-ons and one was a spray. Data indicated there was no significant change in radiation surface dose after application of the deodorants and provide an incentive to conduct further research in relation to the impact of metallic or non-metallic deodorant on skin reaction during breast irradiation.

A survey of 414 women[4] who had undergone radiotherapy for breast cancer was undertaken to establish what advice they had been given about using deodorant during treatment. The aims were to assess whether the women adhered to the advice given and to determine if refraining from deodorant use affected their social life and perception of body odour. Over half of the women (n=280/68%) remembered that they had been given advice prohibiting deodorant use during radiotherapy but of these women, 45 (16%) decided not to adhere to this advice and had used deodorant. Of the 233 women who had not used deodorant, over half (n=149/64%), reported concerns about body odour and of these, 50 (34%) were so concerned they had not wanted to go out.

A randomised controlled trial (RCT) of 192 patients conducted in the United Kingdom[5] found no difference in skin reaction between women using no deodorant and those using an aluminium-free deodorant. Two further underpowered RCTs[1,12] reported conflicting results. The first, using a sample of 84 patients receiving treatment for breast cancer assigned to a no-deodorant or an aluminium-free deodorant group, found no difference in toxicities between the groups and also reported less sweating in the deodorant arm[12]. The second, a trial of 36 women found that skin reactions were "slightly worse" but not statistically significant in patients using an aluminium-free deodorant[1].

Despite being unsupported by robust evidence, the experience in Canada has led to a change in practice, where deodorant use is now recommended whilst skin in the treatment area remains intact[8]. Interestingly, radiation has been shown to reduce sweat gland function[13,14] after about 42Gy[15]. Moist desquamation usually manifests at a cumulative dose of 40Gy or greater[8]. Thus, skin desquamation usually manifests about the same time as sweat gland function deteriorates, making an antiperspirant deodorant physiologically less necessary.

Research consistently demonstrates that women prefer to use deodorant during their treatment[5,12], indicating that management of body odour is important to this cohort[4]. The treatment period for breast cancer is a stressful time and being able to continue usual hygiene and grooming routines may minimise some anxiety experience by women[2,3].

Rationale for the study

Given the emerging evidence outlined above, it seemed timely to conduct a survey to assess the views of radiation oncology nurses in Australia to ascertain: 1) what advice is given to women having breast irradiation regarding use of deodorants and 2) to ascertain whether the advice to refrain from aluminium-based deodorants is as widespread the literature implies.

Method

Study design

A descriptive, self-report survey was used.

Sample

A questionnaire was sent to 40 radiation oncology nurses across Australia via the Radiation Oncology Nurses Special Interest Group (RONSIG) of the Cancer Nurses Society of Australia (CNSA) emailing list. The CNSA is the peak professional body for cancer nurses in Australia and has a membership of approximately 770 nurses.

Instrument

A questionnaire (Figure 1) was developed by experienced radiation oncology nurses to obtain information about the advice nurses give in relation to deodorant use during radiotherapy for breast cancer. The instrument was made up of 8 structured questions focusing on advice given and usual care practices regarding deodorant use. It also included an opportunity for participants to add additional qualitative comments. Questions were also included to collect demographic data, including the nurses' role titles and geographical location. All participants were allocated an identification (ID) number.

Ethics

The study was endorsed by the Sir Charles Gairdner Hospital (SCGH) Quality Improvement (QI) Department with approval to publish. In addition, details of the QI proposal were forwarded to the SCGH Human Research Ethics Committee for formal acknowledgement, who deemed it to be a negligible risk and thus exempt from review.

Results

The sample

Fourteen nurses (35%) reporting a variety of nursing role titles, all working in radiation oncology, responded to the survey (Table 1).

Figure 1. Radiation Oncology Nurse Questionnaire – Deodorant study.

1. Do you allow women to use deodorant during breast radiotherapy?	Yes ☐ No ☐
2. If you ticked yes in question 1, do you specify which type/brand of deodorant/s they can use?	Yes ☐ No ☐ Comments _____
3. If you ticked yes in question 2, what type/brand of deodorant/s do you recommend?	_____
4. If you advise women 'not to use deodorant', do they tell you that they find this change to their hygiene/grooming practice upsetting?	Yes ☐ No ☐ Comments_____
5. Have you been given advice on this topic from any of your non-nursing radiation oncology colleagues?	Yes ☐ No ☐ Comments_____
6. If yes, who? (you may tick more than one)	Radiation therapist ☐ Medical physicist ☐ Radiation oncologist ☐ Other ☐ Comments_____
7. What were you advised?	Comments_____ _____ _____
8. Please add any other comments that you feel are relevant.	Comments_____ _____ _____

Table 1. Demographic data.

Variable	n=14
Nursing role title:	
Clinical nurse manager/clinical nurse specialist/ nurse manager	9 (64%)
Clinical nurse/registered nurse	5 (36%)
Response by state:	
Western Australia	1 (7%)
Queensland	5 (36%)
New South Wales	3 (21.5%)
Victoria	3 (21.5%)
Tasmania	2 (14%)

There was representation from most states of Australia, with the exception of South Australia and the Northern Territory.

Recommendations for deodorant use

The first question asked radiation oncology nursing staff whether they advised women against the use of deodorant during radiation therapy. Eleven of the 14 (78.6%) radiation oncology nurses did not advise women having breast radiation against its use (Table 2).

Type of deodorant recommended

Of the 11 nurses who did not advise against the use of deodorant, they all reported that they specified the type or brand of deodorant that the women could safely use (Table 2). All of the deodorants recommended were aluminium-free. The types of aluminium-free deodorants recommended included brands such as "Avon", "QV" and "Redwin" or non-branded recommendations such "Tea Tree", "herbal" or "crystal" deodorants. None of the respondents recommended the use of aluminium-based deodorants.

Table 2. Survey responses.

Item	n=14
Is deodorant use recommended?	
Yes	**11(78.5%)**
No	**3 (21.5%)**
Type of deodorant recommended	
Aluminium-based	**0 (0)**
Non-aluminium-based (various)	**11 (100%)**

Do women find 'not using deodorant' upsetting?	
Yes	**6 (43%)**
No	**4 (28.5%)**
Sometimes	**1 (7%)**
Did not answer	**3 (21.5%)**
Did you get advice from non-nurse colleagues?	
Yes	**7 (50%)**
No	**7 (50%)**
Who gave you advice?	
Radiation oncologist	**4 (57.1%)**
Radiation oncologists and therapists	**2 (28.6%)**
Radiation oncologist and biomedical physicist	**1 (14.3%)**

Women's experiences of 'not using deodorant'

Nursing staff were asked if women told them they found this change to their hygiene/grooming practice upsetting. Just under half (n=6/42.8%) of the nurses said women did report that they find this upsetting. This is consistent with evidence presented above[2,4,5].

Practice advice

Seven respondents (50%) had been given advice from non-nursing radiation oncology colleagues on the issue of deodorant use. This advice came mainly from radiation oncologists (n=4/57.1%), but also from radiation therapists or biomedical physicist (Table 2). Several comments concerning advice from non-nursing colleagues were presented:

- "... some radiation oncologists (ROs) believe there is no problem but others ban deodorant with aluminium just in case" (ID 3).
- "... differing opinions among ROs with little real evidence" (ID 3).
- "ROs say they may use whatever they wish" (ID 8).
- "... no commercial deodorants to be used in treatment areas" (ID 9).
- "... aluminium-free product in treatment field or no deodorant" (ID 10).
- "... no aluminium – it causes scatter and enhances skin reaction" (ID 11).
- "... some ROs agree to deodorant use provided this is cleaned off prior to radiation therapy" (ID 12).
- "... as it is practice in my department, we all say the same thing. However, one of our ROs is not sure this needs to be the case" (ID 14).

Discussion

Data from this small, first of its kind, national survey in Australia demonstrates that the advice given by nurses working in radiation units across the country is congruent with emerging evidence that supports the use of aluminium-free deodorants in this context[1,5,12]. There is no evidence to support use of aluminium-based deodorants and the results of this survey demonstrate that the participants in this study are cognisant of this knowledge gap.

Limitations

This was a small study limiting the capacity to generalise findings beyond this sample. However, this is the first of its kind in Australia and forms the basis for a much-needed program of work to standardise nursing practice in radiotherapy units across Australia. Interpretation of the data was limited by the structured format of the questions and future surveys should include a combination of structured and open-ended questions to more fully elicit nurses' views and beliefs.

Recommendations for future research

Further research is needed in this area and an RCT to evaluate the impact of deodorant use on skin during radiation therapy is currently being planned. In addition to grading skin reactions, secondary aims will include testing for degree of pain, itch and skin burning, axillary perspiration, perception of body odour and quality of life concerns of women who will be recruited to the RCT.

Conclusion

Almost 80% of respondents in this study endorsed the use of aluminium-free deodorants. However, there is no definitive evidence to guide the type of advice to be given by nurses to women having radiation treatment regarding aluminium-based deodorants. Further research is needed in this area to inform excellent cancer nursing care.

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Prevention of vaginal stenosis after treatment for gynaecological cancer

Pauline Tanner • RN, Certificate of Oncology, SBCN
Gynaecology Cancer Nurse Coordinator, Western Australian Cancer and Palliative Care Network, WA

Gae Lindsay • B Nurs(Hons), RN, RM
Nurse Manager, Perth Radiation Oncology, WA

Shirilee Kerrison • M ClinNurs, GDip Ed, RN, ICU Cert, Training and Assessment Cert IV;
Staff Development Educator, Western Australian Cancer and Palliative Care Network, WA

Leanne Monterosso • PhD, BNurs(Hons), RN, RM, NNT, FRCNA
Chair of Nursing (Clinical Research), The University of Notre Dame Australia and St John of God Hospital Murdoch
Adjunct Professor, Edith Cowan University, WA

Abstract

Background Radiotherapy to the pelvis is an effective treatment for gynaecological cancers. This treatment, however, can result in vaginal stenosis, which may lead to dyspareunia, affecting psychosocial health and intimate relationships. It can also result in painful vaginal examinations and even preclude a full clinical examination, which is often an essential component for follow-up care. Several nurse-led initiatives were implemented across Western Australian Gynaecological Cancer Services (WAGCS) during 2008–2009 to prevent development of vaginal stenosis including the *Prevention of vaginal stenosis* clinical pathway.

Aim To ascertain whether implementation of the *Prevention of vaginal stenosis* clinical pathway resulted in increased knowledge of vaginal stenosis and use of vaginal dilators in accordance with best practice.

Method A clinical audit of women who received care before (n=20) and after (n=18) implementation of the clinical pathway.

Results The best practice *Prevention of vaginal stenosis* clinical pathway led to better understanding of vaginal stenosis and increased use of vaginal dilators in women at risk.

Conclusion Use of evidence-based support and education can prevent or ameliorate some of the known debilitating side effects of cancer treatment.

Background

Radiation to the pelvis is a key component of treatment for many women with cervical, uterine and vaginal cancers. Improvements to screening, diagnosis and treatment have resulted in improved five-year survival rates for these women. However, a large proportion of women who undergo pelvic radiation will develop vaginal stenosis[1]. This condition is associated with sexual dysfunction and may persist long after the fear of cancer has passed[1-5]. Despite long-held concerns about the longer term impact of radiation to the pelvis on sexual function[3,5], controversy surrounds current evidence about the prevention and management of outcomes such as vaginal stenosis[6,7]. Hence, attempts to develop patient care pathways often result in conflicting views on what is best practice[6-8], leading to significant variations in practice across health care settings.

As with all cancer care, well-coordinated, evidence-based practice is essential for women diagnosed with a gynaecological cancer to ensure the best possible care is delivered in a timely manner[9-12]. This is particularly relevant for women considered to be at risk for psychosocial distress and/or those known to be disadvantaged including the following: Aboriginal and Torres Straight Islanders; women from culturally and linguistically diverse backgrounds; and those living in remote or regional towns who may travel long distances for treatment away from the support of family and friends[10-12]. Other groups at risk of psychosocial distress include women with advanced disease or poor prognosis, those with children under 21 years of age and younger patients[12].

The clinical findings and collaborative nature of services to women with gynaecological cancers and who require pelvic radiation in Western Australia (WA) highlighted the need for a combined approach to address the issues of prevention of vaginal stenosis.

The purpose of this project was, therefore, to develop nursing strategies to ensure that all women receiving pelvic radiotherapy

had access to evidence-based strategies and to eliminate inconsistencies in patient education regarding the use of vaginal dilatation, as was revealed in a UK study[13].

Australian cancer statistics reveal that mortality from gynaecological malignancies has fallen in the past 50 years[14]. Five-year survival has increased as a result of screening programs, earlier detection and improved treatment. Women are, therefore, surviving cancer and living with the longer term side effects of treatment that may continue to affect physical functioning and self-esteem long after the fears of cancer have passed[2,5,8,15-17]. Longer term effects can impact on emotional well-being, financial status, fertility, body image, sexual function and other physical effects and may also impact on personal relationships[10,12,16]. Indeed, Jones *et al.*[18] found that cervical cancer survivors continued to suffer a number of symptoms, including anxiety, body image and sexual worries from two to five years after completion of treatment.

Pelvic radiotherapy in combination with chemotherapy is commonly offered to women for advanced uterine and cervical cancer. This is delivered by external beam radiotherapy with or without vaginal brachytherapy (where the radiation source is inserted directly into the vagina). Radiotherapy treatment is targeted to the required field using techniques that restrict the total dose to surrounding areas such as the bowel and bladder to the known tolerance dose for these organs. However, there is minimal available evidence for a specific tolerance dose for the vagina to prevent vaginal stenosis.

Radiotherapy induces acute and late toxicities which can have a profound effect on a woman's quality of life[2,8,16,17]. Acute effects start soon after treatment commences and can include fatigue, skin reactions, bladder dysfunction, hair loss, diarrhoea, early menopause and infertility[4]. Late effects develop or persist more than three months after completion of treatment and often include vaginal stenosis, sexual dysfunction, lymphoedema and bowel dysfunction[8]. As many as 88% of women treated for cervical cancer and other gynecologic malignancies develop vaginal stenosis[1], which can result in long-term sexual dysfunction[8,13].

Vaginal stenosis

Vaginal stenosis occurs as a result of the formation of adhesions, along with circumferential fibrosis of the vagina[8,19]. Scarring and loss of elasticity occurs, resulting in shortening and narrowing of the vagina (vaginal stenosis)[4,7,8]. Furthermore, there is loss of lubrication to the vagina, which can be exacerbated by radiation-induced menopause[4]. There is no consensus for a definition of the clinical changes to the vagina in order to diagnose the degree of vaginal stenosis after radiotherapy[4,8,13]. One useful grading tool for recording vaginal toxicities has been described by Brand *et al.*[19] (Table 1).

Table 1. Description of vaginal toxicity[19].

Grade	Description of vaginal toxicity
Grade O	None. Flimsy adhesions easily broken down.
Grade 1	Partial stenosis or shortening but less than complete occlusion.
Grade 2	Complete occlusion. Telangectasia with frequent bleeding.
Grade 3	Radio necrotic ulcer.
Grade 4	Fistula to bladder, bowel or peritoneal cavity.

Concerns have been raised about the effects of post-radiation vaginal changes on psychosexual health. Vaginal stenosis can result in dyspareunia[13], and the combined treatment of radiotherapy and surgery has been shown to increase the risk of sexual dysfunction to greater than 50%[20]. It is, therefore, not surprising to find that patients who are disease-free after cervical cancer treatments are at high risk of experiencing compromised sexual function and satisfaction[2].

If psychosexual issues are not managed they can compound over time and result in sexual dysfunction impacting on intimate relationships[2,20]. In addition to psychosexual concerns, vaginal stenosis can make vaginal examinations a painful experience and even preclude the full clinical examination required for ongoing surveillance[8,16].

Prevention of vaginal stenosis following pelvic radiotherapy

Several studies have revealed that patients receive limited or conflicting information from health care professionals about the prevention of vaginal stenosis[8,16,21]. Opinions differ with regard to whether remaining sexually active is sufficient to prevent stenosis[8,16,21]. Though sexual intercourse continued to be advocated at some centres to prevent vaginal stenosis, Lancaster[8] discusses a prospective study by Decruze where 57% of sexually active women still went on to develop stenosis after brachytherapy. Indeed a literature search yielded little data on the risk factors to prevent or minimise the possibility of vaginal stenosis following pelvic radiotherapy. Brand *et al.*[19] cited a 38% incidence of vaginal stenosis while others suggest 88% of women who received pelvic radiotherapy for cervical cancer[1] and 54.7% receiving postoperative vault brachytherapy for endometrial cancer may be at risk for vaginal stenosis[20].

In 2005 the National Forum of Gynaecology Oncology Nurses (NFGON) in the United Kingdom developed *Best Practice Guidelines* for women receiving pelvic radiotherapy, which recommend that all women at risk should be provided with information, instructions and support on the use of vaginal dilators to prevent stenosis[21]. Furthermore, compliance is increased if a designated staff member offers education as well

as ongoing support and guidance on the use of dilators[13,21]. A mapping survey of gynaecological clinical services in WA by the gynaecology cancer nurse coordinator in 2006 revealed that women were often given only a single-sized dilator that required insertion of their finger to use and were informed about where they could purchase others. For women who had no transport or had travelled from regional areas this presented yet another obstacle to follow-up care. There was no consistency in the support and information given to women regarding the use of dilators; others did not remember any discussion regarding the effects on sexual function following pelvic radiotherapy.

The Western Australian context

Gynaecological oncology services in WA are provided by the Western Australian Gynaecological Cancer Services (WAGCS). King Edward Memorial Hospital for Women (KEMH) has been identified as the direct referral pathway for women in WA with gynaecological malignancies where women remain under the care of a multidisciplinary team throughout treatment and subsequent follow-up care. Chemotherapy services are predominantly provided off-site at a large tertiary cancer referral centre and are also available in two regional areas by visiting specialists affiliated with KEMH. Radiation oncology services are provided by Perth Radiation Oncology (PRO), a private service that treats both public and private patients. The radiation oncologists are affiliated with KEMH.

Well-coordinated care, a single point of contact and ongoing support is important for all cancer patients[11]. In 2006, inconsistencies in the information given to Western Australian women for the prevention of radiation-induced vaginal stenosis were elicited through informal discussions with patients and health care providers at KEMH and PRO. The inconsistencies identified in the information being provided to women reflected findings from two recent reviews of gynaecological practice related to pelvic radiation and treatment of vaginal stenosis conducted in Australia and the United Kingdom[8,13]. This prompted the development and implementation of the following initiatives designed to provide evidence-based care to women cared for by WAGCS:

1. Development of a clinical pathway titled *Prevention of vaginal stenosis*.
2. Support and information given to women before, during and after radiotherapy.
3. Identification and supply of a range of vaginal dilators and lubricants.
4. Review of patient information on the use of vaginal dilators (Figure 1).
5. Distribution of patient information to all gynaecological oncology clinical areas.
6. Establishment of a nurse-led Pelvic Fitness Clinic in the Radiation Oncology Department (Figure 2).

Figure 1. WAGCS patient information on the use of vaginal dilators.

Begin with smaller size and increase as comfortable.
Use for 10 minutes three times per week.
Use gentle rocking and twisting technique with plenty of water-based lubricant – leave in place 10 minutes.
Report any difficulties such as persistent vaginal bleeding.
If sexual intercourse occurs, adjust dilator use accordingly.
Commence use within four weeks after completing radiotherapy (when inflammatory phase has settled).
If not sexually active, dilator use recommended to continue indefinitely.

Figure 2. Core components of the WAGCS Pelvic Fitness Clinic.

A comprehensive assessment of the patient including medical history (bladder and bowel status, sexual activity) and current treatment.
Practical and written (see Figure 1) patient information on use of vaginal dilators.
Brochures from Continence Advisory Service of WA *Pelvic floor muscle training for women* and The Cancer Council Booklet *Sexuality for women with cancer* (if appropriate).
Telephone point of contact if further assistance required (Gynaecology Cancer Nurse Coordination Service).
Referral for additional support if required, for example, psychosocial or physiotherapy services.

Aim of study

To ascertain whether implementation of the *Prevention of vaginal stenosis* clinical pathway resulted in increased knowledge of vaginal stenosis and use of vaginal dilators in accordance with best practice.

Design

A clinical audit was undertaken comprising the administration of a survey titled *Prevention of vaginal stenosis* to two groups of women who received care for cervical cancer and received pelvic radiotherapy.

Method

The nurse manager at Perth Radiation Oncology (PRO) provided the contact details for women who met the eligibility criteria. Women were contacted by mail. They received an information pack that included a consent form and a list of questions to complete and return in two reply-paid envelopes.

Sample and size

The target population included women who attended KEMH for treatment of cervical cancer and received pelvic radiotherapy. Group 1 included women who received care between January 2006 and December 2007 prior to the implementation of the clinical pathway (n=60). Group 2 included women who received care between January 2007 and December 2008

(n=60) following implementation of the pathway. The response rate for Group 1 was 33% where 20 women returned completed surveys. Eighteen women from Group 2 returned completed surveys (response rate 30%). The overall response rate was 31.5%. No women dropped out of the audit.

Inclusion criteria

- Women aged 18 years or more.
- Women with a histologically confirmed diagnosis of cervical cancer who had received radiotherapy treatment.
- Women who had completed radiotherapy to the pelvis from 2006 onwards.
- Women who could read and speak English.

Exclusion criteria

- Women who had a gynaecological cancer other than cervical cancer.
- Women receiving end-of-life care.
- Women who could not read and speak English.

Instrument

The survey comprised two sections. Section 1 consisted of questions (n=7) to elicit demographic data. Questions in Section 2 (n=20) were based on the key best practice principles of the *Prevention of vaginal stenosis* clinical pathway. These questions related to the mode and type of education provided to women about vaginal stenosis and vaginal dilators, and to women's perceived knowledge. Participants were encouraged to provide open-ended responses to some questions. Anecdotal comments were encouraged. Questions specifically targeted women about their:

- Knowledge of possible vaginal changes (stenosis) following pelvic radiotherapy.
- Understanding of rationale for use of vaginal dilators.
- Compliance with the frequency of use and correct technique for insertion of vaginal dilators.

Ethical and governance considerations

Approval to conduct this clinical audit was obtained from the Human Research Ethics Committee of KEMH and was submitted as a quality improvement activity on the Governance, Evidence, Knowledge, Outcomes (GEKO) database for registration and monitoring.

Statistical analysis

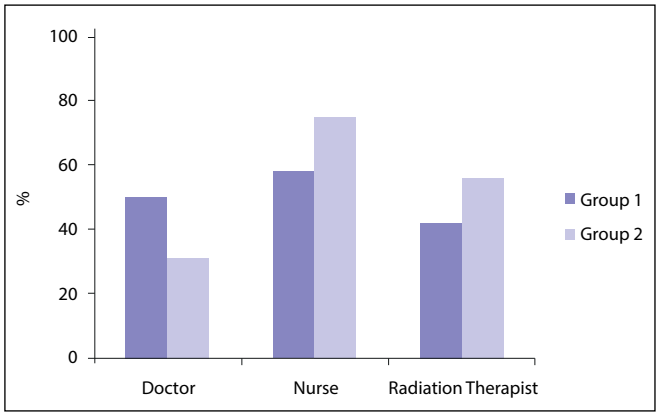
Demographic characteristics and categorical variables were summarised using descriptive statistics such as frequencies and percentages using Excel and SPSS. Where possible, Chi-square difference tests were computed to determine if there were significant differences between variables and time. Proportions of those who agreed (strongly agree and agree) were compared with those who disagreed (disagree and strongly disagree). Respondents with "no opinion" were not included.

Additional, open-ended comments were invited for some questions. Data from these questions follows descriptive statistics where appropriate. Open-ended responses were collated and analysed using content analysis to identify key themes.

Results

Data was available from 20 participants in Group 1 and 18 participants in Group 2. In Group 1, half the patients reported receiving information regarding stenosis from their doctor. Due to the establishment of the Pelvic Fitness Clinic, the women in Group 2 received information predominantly from a nurse or radiation therapist (Figure 3).

Figure 3. Source of information provided to women about vaginal stenosis by group.



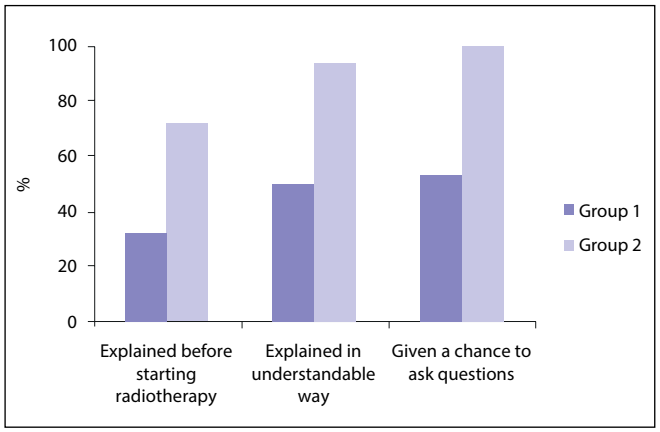
Significantly, more (p=0.019) women in Group 2 (72%; Figure 4) reported that information about possible vaginal changes (stenosis) was clearly explained prior to starting radiotherapy than the women in Group 1 (32%). However, the women in Group 1 reported a lack of verbal information or detail on potential long-term impact of vaginal radiation on sexual function or the required incremental size of dilators.

Comments from Group 1 participants were:

> *Nobody ever mentioned vaginal changes until the last day of treatment when I was passed the vaginal dilator (one size).*
>
> *No reference made to long-term impact of vaginal radiation on sexual function.*

Other patients from Group 1 commented that staff appeared rushed with no time to talk; they were not told about dilators or they didn't know what dilators were. Some participants in Group 2 commented that information about stenosis was not explained prior to treatment and could have been made clearer during treatment. Patients stated they were not informed about stenosis but rather about vaginal discharge, itchiness and dryness.

Figure 4. Rating of information provided to women regarding stenosis by group.



There was a significant difference (p=0.013) between the two groups (Group 1 – 71%; Group 2 – 100%) in the number of patients who reported receiving a clear explanation about the use of vaginal dilators after completion of radiotherapy treatment (Figure 5). Participants in Group 2 had a good understanding about the reason for use of vaginal dilators, reporting:

> *To stop narrowing of vaginal wall (muscles and tissue) so internal examinations can be done and intercourse is possible.*

> *To keep vagina open and supple, to stop scar tissue forming and keep the passage open.*

The number of patients advised about services that provided vaginal dilators for purchase doubled from 31% for Group 1 to 62% for Group 2. However, 60% of the women in Group 1 were given these by a health care worker and all of the women in Group 2 as per the clinical pathway.

A significant increase between Group 1 (61%) and Group 2 (94%) (p=0.020) was observed in the number of patients who were given written instructions about the use of vaginal dilators (Figure 5).

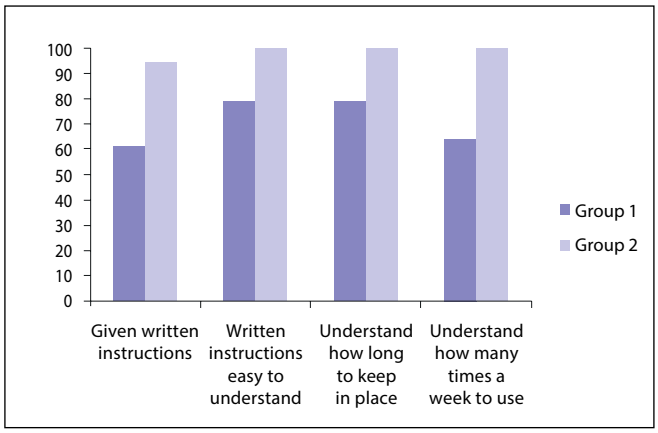
Women from Group 2 had a greater understanding about vaginal stenosis and there was increased compliance in the use of vaginal dilators for this group. A significantly higher (p=0.024) percentage of patients in Group 2 (75%) had been practising vaginal dilatation since completing radiotherapy than patients in Group 1 (37%). Reasons reported for not practising vaginal dilatation include forgetting and finding the process "highly distasteful". Additionally, women in Group 1 reported lack of information. The women in Group 2 also cited resumption of sexual intercourse as a reason for not using dilators.

Many patients (58%) felt uncomfortable using a dilator, finding it both painful and uncomfortable, reporting comments such as:

> *It is revolting/demeaning and disgusting. Makes me angry.*

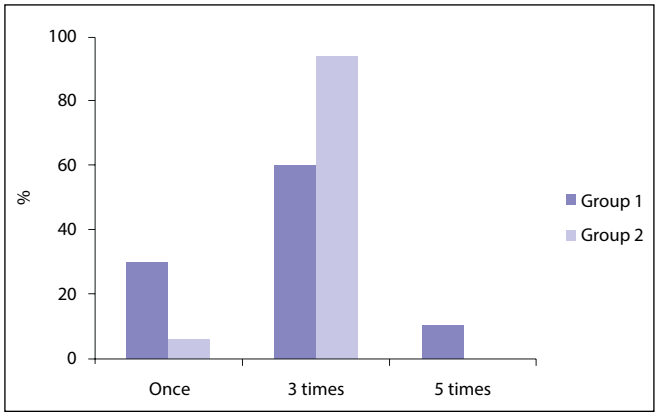
> *I don't exactly feel comfortable using it, but if that is what it takes to get well I will do it.*

Figure 5. Understanding of instructions provided to women about dilator use by group.



Women from Group 2 were better informed about vaginal stenosis and there was increased compliance in the use of vaginal dilators for this group (Figure 6).

Figure 6. Women's use of vaginal dilator per week and by group.



Nevertheless, most women still found this an unacceptable outcome of cancer treatment. Several expressed their anger at the need to use them and one stated:

Just don't like them really. Hard to find the time. Unpleasant. Makes me think of the treatment which I hated.

Discussion

Our project demonstrated two key findings: implementation of the *Prevention of vaginal stenosis* clinical pathway led to a better understanding of vaginal stenosis and its prevention, as well as an increased use of vaginal dilators by women who were diagnosed with cervical cancer and received pelvic radiation. The project showed the clinical pathway had successfully bridged a previously identified gap in gynaecological cancer services provided to women in WA. This was facilitated by nurse-led changes in practice across public and private services to ensure uniformity of evidence-based practice for all gynaecological cancer patients.

It should be noted our findings are limited by the small sample sizes of the two groups of women surveyed and the reliance on recall by women who completed the survey. However, given that KEMH is the sole tertiary referral centre for gynaecological cancer in WA, the opinions from this group of women diagnosed with cervical cancer is relevant to the aims of the project and provides support for the nurse-led interventions and strategies that were implemented to improve the care of women at risk for development of vaginal stenosis.

For women who have survived gynaecological cancer treatment, quality of life and sexual health are an important clinical issue[1,2,8]. Since combined treatment of radiotherapy and surgery may increase the risk of sexual dysfunction to greater than 50%[20] it is little wonder that patients who are disease-free after cervical cancer treatments are at high risk of experiencing compromised sexual function and satisfaction[2].

In 2004 Lancaster[8] concluded that "vaginal stenosis should be assessed and reported with the same rigor as other organ toxicities". Though these concerns have been echoed throughout the international literature, inertia remains in many centres around prevention of vaginal side effects and rehabilitation after pelvic radiotherapy. The literature review highlighted that current evidence is conflicting and limited with many gaps in the understanding of this side effect of pelvic radiotherapy. The 2009 Cochrane Review 'Interventions for psychosexual dysfunction in women treated for gynaecological malignancy'[22] did not show significant benefits for psycho-educational group therapy, couple coping or clinical nurse specialist interventions. The consequent recommendation is for further studies to establish best practice interventions for women with psychosexual dysfunction following treatment[22]. Furthermore, a recent Cochrane Review[6] has amplified conflicting views about the best approach to preventing vaginal stenosis. The report raised concerns about routine use of vaginal dilators and the risk of a negative psychological impact and physical harm. Miles and Johnson concluded that no study has produced convincing evidence or comparative data for routine use of vaginal dilators[6].

There is clearly a need to increase support for research on prevention of vaginal stenosis and reducing psychosexual dysfunction after pelvic radiotherapy[1,6,7,8,22]. The literature highlights the need for health care professionals to inform patients about the potential impact of pelvic radiotherapy to the vagina, and for women to be supported and offered sexual and relationship counselling as required. In addition, vaginal dilators should be offered as part of a total care package[21]. However, the women in Group 1 in this audit reported a lack of verbal information and detail on the potential long-term impact of pelvic radiotherapy on sexual function and the need for vaginal dilators of increasing diameter. Some women responded with anger in the questionnaires, others underlined their comments and reported that prior to the introduction of the Pelvic Fitness Clinic provision of dilators was inconsistent. Some women were given a single glass dilator and told where to purchase more; others received no information or advice. The clinical pathway now includes the provision to all women of three dilators of increasing diameter with written instructions on their use and a point of contact for referral to supportive services. Assessment and reporting of psychosexual issues, clarity of referral pathways and success of sexual and relationship counselling requires further exploration.

A multidisciplinary, collaborative approach to research and inclusion of national standards of patient information, education of the workforce and best practice guidelines is required for optimum care of cancer patients. The first step towards a multidisciplinary approach to the prevention of vaginal stenosis is the nurse-led Pelvic Fitness Clinic implemented as a result of identified gaps in cancer care. We have demonstrated that by introducing a clinical pathway all women who receive pelvic radiotherapy can be offered evidence-based supportive care. The survey demonstrated that the clinical pathway led to better patient understanding of the prevention of vaginal stenosis and an increased use of vaginal dilators for those who were at risk. This project was undertaken as a result of identified gaps in gynaecological cancer services. It describes nurse-led changes in practice across services to ensure uniformity of evidence-

based practice for all women at risk of vaginal stenosis following pelvic radiotherapy.

Conclusion

Many women in Australia are surviving gynaecological cancer and living with late side effects of pelvic radiotherapy treatment. These side effects can have a profound effect on sexual relationships and quality of life. There have been numerous recommendations for research to improve the evidence for interventions and to ensure equity of care for all women. Unfortunately a number of gaps and inconsistencies in the care of these women persist.

Clearly there is a need to increase the evidence for assessment and prevention of vaginal stenosis and to ensure all women at risk have access to comprehensive, evidence-based care. Health care professionals must ensure that women at risk of vaginal stenosis are adequately informed, supported and counselled before, during and after treatment. Nurses working in advanced practice roles are well placed to provide leadership, to contribute to research and to find innovative approaches in providing comprehensive cancer care to women with gynaecological malignancies.

Acknowledgements

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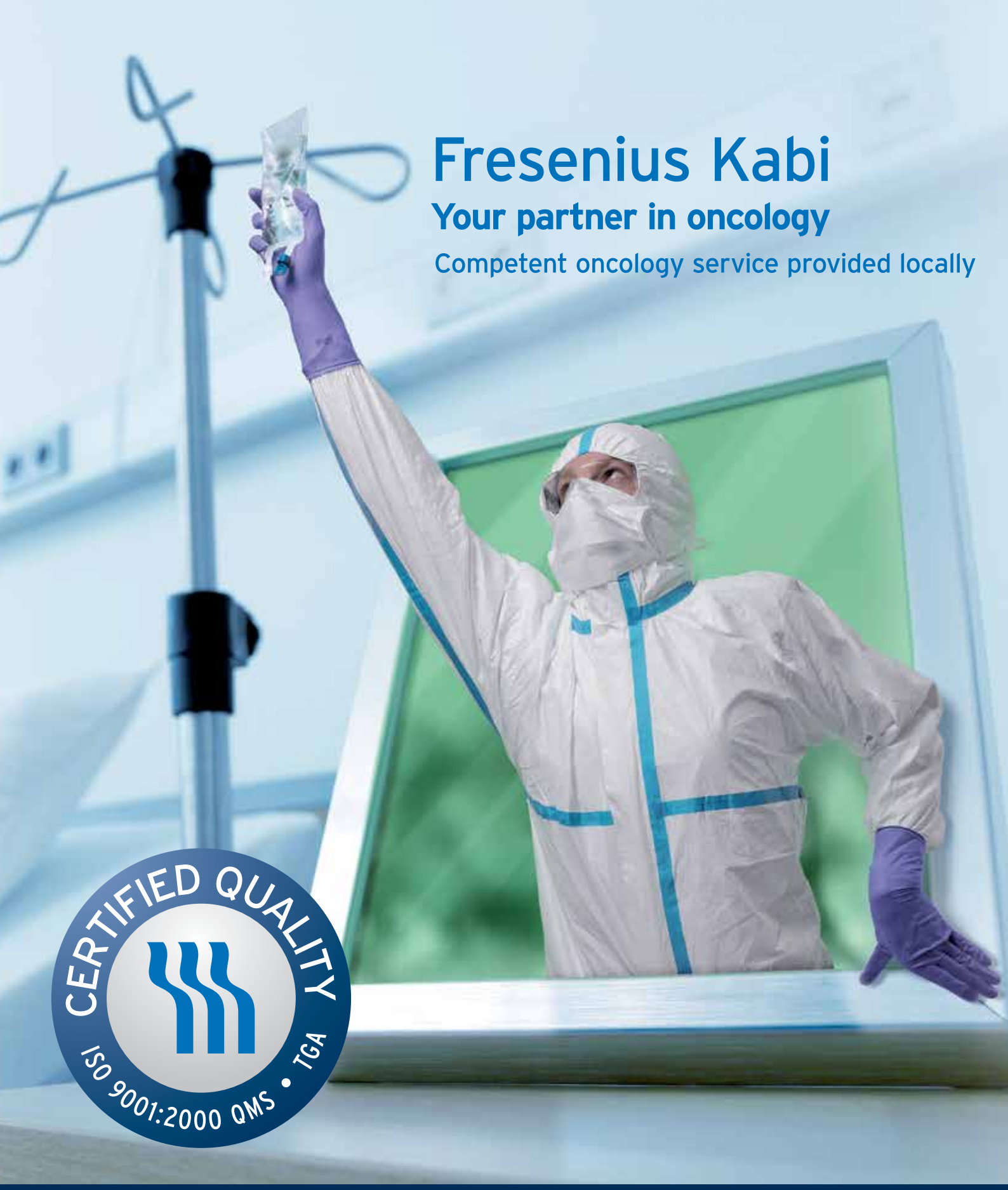
Editorial information



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