

# Prevention of radiation-induced moist desquamation in the tropics: A literature review of non-prescription skin care products

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## Abstract

**Introduction:** Many patients undergoing radiation treatment experience moist desquamation, a severe acute skin reaction. The pain, discomfort and dressing applications subsequent to moist desquamation exacerbate the distress associated with the patients' cancer diagnosis and treatment.

**Background:** Radiation oncology nurses in a tropical area of Australia believe that moist desquamation occurs more often in patients undergoing radiation treatment in the summer months. It is surmised that this increase is due to a combination of high humidity and the consistency of the preventative cream currently recommended by the clinical staff.

**Method:** A narrative literature review was undertaken to identify a potential alternative non-prescription topical product, readily available in Australia, to prevent moist desquamation in a tropical environment. Research literature published in a 10-year time frame ending December 2010 was retrieved and reviewed.

**Main findings:** Seven individual trials met our inclusion criteria. No non-prescription moisturising cream, lotion or gel that was trialled was significantly better than any other at preventing moist desquamation, and none were trialled in a tropical climate. The literature did indicate possible alternatives to the currently recommended preventative cream.

**Conclusion:** There is no evidence to support recommending the use of any specific non-prescription topical product to prevent radiation-induced acute skin reactions. This literature review has informed a randomised controlled trial of two non-prescription creams in a tropical setting. It is anticipated that the trial will provide evidence-based preventative skin care recommendations for patients receiving radiation treatment in a tropical climate.

*Keywords: radiation skin reaction, radiation dermatitis, skin care, moist desquamation, tropical nursing.*

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### What is known

- There are known factors that contribute to the severity of radiation-induced acute skin reactions.
- Radiation-induced acute skin reactions add to distress experienced by patients undergoing radiation therapy.
- Whilst nurses caring for patients undergoing radiation therapy provide information about skin care, the protocols vary between institutions.

### What this paper adds

- There is little research that examines non-prescription topical skin care products readily available to patients undergoing radiation therapy in Australia.
- There is an absence of research that examines the use of skin care products in relation to radiation therapy in a tropical climate.
- The literature review has informed a randomised controlled trial of two topical creams in a tropical Australian setting.

## Introduction

Radiation therapy is an essential treatment modality for many types of solid tumour. Treatment is prescribed with curative intent, adjuvant to chemotherapy and surgery, or as palliation for control of pain and bleeding. The most common side effect of radiation therapy is acute skin reaction<sup>1</sup>; such reactions cause further distress and discomfort for the patient. Factors associated with the development and severity of an acute radiation skin reaction include radiation dose, radio-sensitising chemotherapy, age, nutritional status, vascularity and oxygenation, skin colour, connective tissue disease, infectious disease and sun exposure<sup>1-3</sup>. Skin reactions vary from mild erythema, to dry desquamation, to moist desquamation characterised by blistering and ulceration<sup>4</sup>. Most skin reactions heal rapidly one to two weeks after treatment completion due to the repopulation of basal cells in the epidermis layer of the skin<sup>5</sup>.

Salvo *et al.*<sup>6</sup> claim moderate to severe acute skin reactions occur in 90% of radiation patients, depending on the dose of radiation. Moist desquamation, the most severe acute skin reaction, occurs when the dermis is exposed and seeps serous fluid, due to epidermal damage during radiation treatment<sup>7</sup>. Potentially, the patient may require an interruption in radiation treatment to allow time for the skin to heal. Interruption to planned treatment potentially interferes with the destruction of tumour cells, which is the desired outcome of radiation therapy<sup>8</sup>. As stated in a recent systematic review, the likelihood of moist desquamation is debated by authors and can range from 3% to 45%<sup>4</sup>. People with moist desquamation report pain and discomfort and require dressings to provide comfort, protection and absorption of serous fluid. The daily removal of dressings prior to radiation treatment also results in pain<sup>4</sup>. Overall, the experience associated with the development of such a severe acute skin reaction negatively affects the person's quality of life.

Internationally, there is a lack of consistency of practice, evidence and general consensus regarding the optimal product for use during radiation treatment to prevent moist desquamation<sup>9,10</sup>. However, the application of a moisturising agent in the treatment field is generally accepted as a method for preventing acute skin reactions<sup>6</sup>. Literature pertaining to the prevention of moist desquamation specifically in a tropical environment could not be found.

## Background

The radiation oncology unit located at The Townsville Hospital delivers radiation treatment to patients from a vast geographical area in northern Queensland, from Mackay in

the south, extending north to the Torres Strait Islands and west to the Northern Territory border. The next closest public radiation therapy unit is located almost 1400 kilometres away in the state capital, Brisbane. Townsville's (latitude 19.20S) environment is tropical, although Townsville receives less rainfall than nearby towns because of its geographical location. According to Australian Bureau of Meteorology data pertaining to the last three decades, Townsville's mean maximum daily temperature ranges from 25.30°C in July, to 31.80°C in December. February is the most humid month, with a mean 9 am relative humidity of 73%; the mean annual 9 am relative humidity is 65%. Most rain falls between November and April, the 'wet season'<sup>11</sup>.

Prevention, treatment and management of acute skin reactions during radiation treatment are essential components of the radiation oncology nurse's role. Consistent and concise information provided by nurses results in trust and less confusion for the patient<sup>12</sup>. The skin care information provided to patients by nurses of the radiation oncology unit during an education session prior to their first treatment is supported by the radiation oncologists and radiation therapists. The staff currently recommend that the patients use a sorbolene (basic moisturising) cream to minimise the severity of radiation-induced skin reactions, which includes the prevention of moist desquamation. The patient is instructed to pat the skin dry after showering and to apply the cream at least twice daily to intact skin within the treatment field, commencing on the first day of treatment and continuing until one month after completion of treatment. Each treatment week, nurses review patients and use a standardised grading tool, the Common Terminology Criteria for Adverse Events (CTCAE) Version 4.0<sup>13</sup> when documenting any side effects, including acute skin reactions. Additionally, nursing staff answer questions and provide further education to patients regarding skin care whenever the need is identified; and the nurses are responsible for applying and providing dressings to patients who develop moist desquamation.

During the summer months when humidity levels are at their highest, nurses in this radiation oncology unit believe that there is a significant increase in the numbers of patients who develop moist desquamation; and that this increase is related to the consistency of the sorbolene cream. Nursing staff observe that the sorbolene cream remains on the patients' skin between skin folds and appositional skin; perhaps this accumulation potentially causes skin maceration. Also, patients report that they find sorbolene cream thick, difficult to apply and that it smells unpleasant. A small in-house trial in 2009 of an alternative product to sorbolene cream led the staff to question whether there was evidence to support or refute the use of sorbolene cream during radiation treatment.

It is essential to provide evidence-based care to patients receiving radiation therapy. Topical products that are readily available, do not require a doctor's prescription and are of a reasonable cost for patients in our regional, rural and remote locations are of essential focus. This paper is a narrative literature review of the evidence pertaining to non-prescription skin care products and the prevention of the development of moist desquamation. Because the authors were primarily interested in exploring the issue of prevention of moist desquamation, a related but important topic, the management of moist desquamation, was excluded from the current literature review. Our question was: "Is there a non-prescription topical product available in Australia that reduces the incidence and degree of severity of acute radiation skin reactions in a tropical environment?"

## Method

A comprehensive search of the research literature published, in English, between January 2001 and December 2010 was undertaken of the CINAHL, Medline and PubMed databases. Primary search terms were "radiation therapy", "radiotherapy", "radiation skin reaction/s", "radiation dermatitis", "erythema", and "moist desquamation". Combinations of search terms "prevention + radiation skin reaction" and "prevention + radiation dermatitis" and "prophylaxis + radiation skin reaction" were also used. The terms "cream", "sorbolene", "Australia", "tropical", "climate" and "humidity" were used when reading the literature. Both ancestry and descendent approaches were used to search for additional literature; the internet was also used in an endeavour to source grey material such as conference presentations or reports<sup>14</sup>.

## Results of review process

Thirty-eight articles were retrieved using our search strategies. Eleven articles were excluded because they: focused on treatment of moist desquamation<sup>4</sup>; focused on wound care after radiation treatment<sup>15</sup>; focused on aspects of nursing practice rather than evidence about specific products<sup>12,16</sup>; were undertaken on animals<sup>17-19</sup>; were not published in English<sup>20,21</sup> or a copy of the full article was unable to be sourced<sup>22</sup>. Another article retrieved was a literature review of trials, mostly about management of skin reactions, that was published before 2000<sup>23</sup>. Thirteen additional studies were later excluded during the literature review, because they investigated the effectiveness of products that are not available in Australia and/or products that require a doctor's prescription in Australia: trolamine<sup>3,24-26</sup>; RayGel<sup>27</sup>; specific urea formulations<sup>28,29</sup>; corticosteroids<sup>30-32</sup>; Thêta-Cream<sup>33</sup>; unspecified silver-leaf nylon dressing<sup>34,35</sup>.

Fourteen articles were subsequently retained. Seven of those were literature reviews, which we used to ensure that we had identified all original studies pertinent to our question<sup>6,7,9,36-39</sup>. This paper reviews the remaining seven research trials<sup>40-46</sup>. The individual trials are summarised in Table 1 and are discussed in more detail below in terms of the products' effects on the skin reaction, subjective symptoms associated with skin changes, the patients' preferences for particular products and the relevance of the products to use in a tropical climate.

## Products trialled and their effects on acute radiation-induced skin reactions

The creams, lotions and gels used in the trials fall within the category of 'moisturisers', which are used to "relieve symptoms of dry skin and optimise skin hydration"<sup>47</sup>. Four studies<sup>41,42,44-46</sup> compared a cream, lotion or gel to another moisturiser; one study compared a moisturiser to a barrier film<sup>40</sup>; another study compared a moisturiser to a powder<sup>44</sup>; and three studies compared a moisturiser to no product<sup>42,43,45</sup>.

The Australian study conducted by Graham *et al.*<sup>40</sup> found that a barrier film (3M Durable No-Sting Barrier Film) was more effective than sorbolene cream in reducing the incidence of moist desquamation. The film was applied by the nursing staff on treatment days; the sorbolene was applied by the nurses on treatment days and by the patients between treatments. The authors claimed that the film would be difficult for the patients to apply correctly due to its transparency, and that having nursing staff apply the film ensured compliance. Presumably, it also ensured that the appropriate area of the chest wall was covered with each of the products. The authors proposed a large multicentre trial be conducted to compare a cream preparation similar to the No-Sting Film (3M Cavilon™ Durable Barrier Cream) to sorbolene cream.

Another larger but earlier Australian study, also with patients receiving radiation to the breast area<sup>41</sup>, compared aloe vera gel to aqueous cream. Heggie *et al.*'s<sup>41</sup> results, that aqueous cream was superior to aloe vera gel with respect to dry desquamation and pain, was the reverse of their findings in an earlier pilot study. The authors stated that their finding that women older than 57 years in both groups had less dry desquamation than the younger women was counterintuitive. The patients were asked not to show the nurses responsible for assessing skin reactions which cream they had been assigned to use – it is not known if they complied with that instructions. Additionally, although the name of the product was not included on the creams' instructions-for-use labels, the investigators hinted that some patients may well have guessed which product they had been assigned to, given their different consistencies.

The 20 participants in the randomised trial of two different moisturising creams, sorbolene and wheatgrass extract<sup>46</sup>, were blinded to the product allocated to them to use during their radiation treatment to the breast. Although more of the patients in the experimental (wheatgrass extract) group had factors known to increase the incidence of a skin reaction, there were no statistically significant differences in the skin reactions between the groups. Given the small number of participants in this pilot study, the statistical analyses need to be viewed with caution. The authors concluded that their findings were convincing enough to suggest that a larger trial be conducted to investigate this herbal preparation that is purported to have anti-inflammatory effects.

In addition to Heggie *et al.*'s<sup>41</sup> study discussed above, two other studies investigated the effect of aloe vera on acute skin reactions. The Swedish study by Nyström and colleagues<sup>42</sup>, while comparing two different non-prescription products (aloe vera gel and an emollient) to using no product, was primarily concerned with establishing the effectiveness of each of the three objective assessment methods (digital colour photography, near infrared photography and laser Doppler imaging) at grading radiation-induced skin reactions. Nyström *et al.* found that neither moisturising lotion was any more effective than no lotion at preventing skin reactions and recommended clinical photography be used in the clinical settings.

The study by Olsen and colleagues<sup>43</sup> involved a heterogeneous sample of participants receiving radiation to diverse body areas, not just the breast area as in the previous trials discussed<sup>40-42,46</sup>. Participants in both the treatment and control groups were instructed to use Dove™ unscented soap and, in addition, participants in the treatment arm applied aloe vera gel. The authors concluded that their results indicated that aloe vera appeared to have a protective effect at higher radiation dose levels. At the time of this study, the authors claimed that using aloe vera was quite new, and despite not finding any statistically significant differences in the median time to skin changes they recommended a change to clinical practice.

Another small study published early in the time frame for this literature review<sup>44</sup> was the comparison of a combination of moisturisers with a dry powder used by patients receiving radiation to the head and neck region. The patients acted as their own controls by implementing the various regimens on either side of their head and neck region. It appears that it was usual practice not to use moisturisers at that time in Germany, while the recommendation to keep the skin in the irradiated area moisturised has been accepted practice at many facilities (including the radiation oncology unit prompting this

literature review). Even though the results were presented descriptively, the sample size being too small to undertake any statistical analyses, the authors concluded that there was room for institutional and individual preferences as to the type of skin care product to be used to relieve discomfort associated with radiation treatment.

A much larger, multicentre randomised trial that compared two different creams to no product<sup>45</sup> concluded that there was no support for recommending the prophylactic application of either product to prevent radiation-induced acute skin reactions. Those conclusions were consistent with those of most other authors.

### Effects of the products on subjective symptoms associated with skin changes

All except two of the studies<sup>42,46</sup> included an assessment of pain and itching and whether the products used had any effect on those symptoms. Although assessed differently, four studies assessed both pain and itching<sup>40,41,44,45</sup> and one study<sup>43</sup> assessed itching only.

Graham and colleagues<sup>40</sup> found that No-Sting Film was statistically significantly better in reducing itching compared to sorbolene cream, although there was no difference in pain scores. In the study by Heggie and colleagues<sup>41</sup>, statistically significantly more pain was associated with aloe vera use by women who had lymphocele drainage, who did not have chemotherapy, or who were in the younger age category. There was a tendency for the degree of itching to be greater in the aloe vera group, although this was not statistically significant. Although participants' self-reports did not identify any statistically significant differences between aqueous cream, sucralfate cream or no cream in relation to itching or pain, those patients receiving treatment to the anorectal area reported more itching and patients receiving head and neck treatment reported higher levels of pain<sup>45</sup>. Participants in the trial comparing cream to powder expressed no difference in itching or pain in relation to the products<sup>44</sup>. Aloe vera was not statistically significantly different to the use of unscented soap only in relation to itching in the study conducted by Olsen and colleagues<sup>43</sup>.

### Patients' preferences for particular products

The design of only two studies<sup>40,44</sup> enabled the patients to directly compare products; in other studies individual patients may have commented whether or not they liked the particular product they had been assigned to use. The descriptions provided by the patients did not clearly favour either the moist or dry regimens, with the majority of patients finding no difference on the subjective assessment criteria<sup>44</sup>. The finding that the No-Sting Film was more effective in

Table 1. Summary of articles of individual research trials included in literature review.

| Reference  | Design   | Products  | Results  | Comments   |
|--|--|---|--|--|
| Graham P <i>et al.</i><br>Randomised, paired comparison of No-Sting Barrier Film versus sorbolene cream (10% glycerine) skin care during post-mastectomy irradiation. <i>Int J Radiat Oncol Biol Phys</i> 2004; 58(1):241–246 <sup>40</sup> .              | Design: Randomised case control.<br>Sample: 61 women.<br>Treatment area: Chest wall for breast cancer.<br>Assessment methods: Skin – Radiation Therapy Oncology Group (RTOG) Tool completed by physicians and photographs taken.<br>Pain and pruritus – patients completed five-point Likert scales related to each area. A maximum of 12 weekly assessments completed.<br>Location: Sydney, NSW, Australia.   | 3M Cavilon No-Sting Barrier Film (intervention), and sorbolene (with 10% glycerin) cream (standard institutional practice).<br>No-Sting Film applied laterally (n=30) or medially (n=61). Sorbolene applied to other aspect of breast than No-Sting Film. | No-Sting Film significantly different (better) statistically than sorbolene on following measures: skin toxicity, rates of moist desquamation, pruritus score.<br>No statistically significant differences in pain scores.   | Film applied by nursing staff either two or three times weekly according to aspect of breast. Cream applied twice a day (once daily by nurses on treatment days, by patients at other times).<br>Sorbolene readily available to patients in Australia. No-Sting Film not so readily available; it can be purchased via the internet. |
| Heggie S <i>et al.</i> A phase III study on the efficacy of topical aloe vera gel on irradiated breast tissue. <i>Cancer Nurs</i> 2002; 25(6):442–451 <sup>41</sup> .  | Design: Phase III double-blind randomised study; two sites. Stratified according to: bra cup size, postoperative lymphocele drainage and history of smoking.<br>Sample: 225 women – 208 completed trial<br>Treatment area: Breast after lumpectomy or partial mastectomy.<br>Assessment methods: Weekly skin assessments completed by nurses; erythema, dry desquamation, moist desquamation, itching, pain.<br>If unable to return to radiation facility two weeks following completion of treatment, assessment completed by telephone.<br>Location: Brisbane, QLD, Australia. | 98% aloe vera gel (n=101) and aqueous cream (n=107).  | Aqueous cream significantly better statistically than aloe vera at reducing dry desquamation and treatment-related pain.<br>Participants with larger breast cup size experienced higher grades of erythema, irrespective of product used.<br>Cumulative probability of dry desquamation statistically significantly less in aqueous group.<br>Cumulative probability of itching was greater (but not statistically significant) in the aloe vera group.<br>Incidence of pain significantly greater statistically in younger women. | Application frequency was three times per day during treatment and for the first two weeks after.  |
| Nyström J <i>et al.</i><br>Comparisons of three instrumental methods for the objective evaluation of radiotherapy induced erythema in breast cancer patients and a study of the effect of skin lotions. <i>Acta Oncol</i> 2007; 46:893–899 <sup>42</sup> . | Design: Non-blinded, three-armed.<br>Sample: 50 women post-mastectomy.<br>Treatment area: Breast post-mastectomy.<br>Assessment: Digital colour photography, near infrared photography, and laser Doppler imaging prior to commencement of radiation therapy and weekly during therapy.<br>Location: Sweden.   | Aloe barbadensis 97% lotion, Essex lotion (standard institutional practice, moisturising and protective effects) and no lotion.   | No statistically significant differences between either lotion or no lotion in prevention of erythema, as measured via either of the three objective assessment methods.   | Lotions were applied by nurse immediately following radiation therapy and then after four hours; it is assumed that the patient waited in the centre for that time period.   |

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|--|--|---|--|--|
| <p>Olsen DL <i>et al.</i> The effect of aloe vera gel/mild soap versus mild soap alone in preventing skin reaction in patients undergoing radiation therapy. <i>Oncol Nurs Forum</i> 2001; 28(3):543–547<sup>45</sup>.</p>                           | <p>Design: Randomised, clinicians blinded to treatment arm.<br/>Sample: 73 patients (25 males, 48 females) undergoing radiation therapy except for those post-brain cancers and gynaecological cancers.<br/>Treatment area: Various – head/neck, chest, abdomen/pelvis, extremities.<br/>Assessment: By nurses and physicians weekly, using RTOG Acute Radiation Morbidity Scoring Criteria.<br/>Location: Florida, USA.</p>                                     | <p>Aloe vera gel and nothing (soap).</p>  | <p>No statistically significant difference in the median time to skin changes in patients who used aloe vera compared to those who used soap alone. Aloe vera delayed the onset of skin reactions in group of patients receiving larger cumulative dose of radiation; but did not have a statistically significant effect at lower doses of radiation.</p> | <p>Gel was applied by patient at least once each day following radiation treatment; they were encouraged to apply it as often as desired. Varied treatment areas make it difficult to know if aloe vera is more protective.</p>  |
| <p>Schreck U <i>et al.</i> Intraindividual comparison of two different skin care conceptions in patients undergoing radiotherapy of the head-and-neck region. <i>Cremae or powder?</i> <i>Strahlenther Onkol</i> 2002; 178:321–329<sup>44</sup>.</p> | <p>Design: Intraindividual, comparative study, random assignment of products to each side of neck.<br/>Sample: 12 patients.<br/>Treatment area: Head and neck region.<br/>Assessment: Weekly.<br/>Physicians assessed skin with a modified RTOG toxicity scale and took photographs of both sides of front of neck.<br/>Patients rated each of the following – warmth, tension, itch, pain, general discomfort.<br/>Location: Germany.</p>                       | <p>Creams – Linola® (linoleic acid) for discomfort or erythema, changing to Bepanthen® for erythema or dry desquamation, and Azulon® powder for erythema and dry desquamation.<br/>Crème and powder applied contralaterally to either side of neck.</p> | <p>Not analysed statistically. No clear difference between creams and powder according to either patients' subjective assessments, or objective assessments (RTOG scale and photographs).</p>  | <p>In this study, patients could directly compare both creams and powder.</p>  |
| <p>Wells M, Macmillan M, Raab G <i>et al.</i> Does aqueous or sucralfate cream affect the severity of erythematous radiation skin reactions? A randomised controlled trial. <i>Radiother Oncol</i> 2004; 73:153–162<sup>45</sup>.</p>                | <p>Design: Randomised control, blinded study.<br/>Sample: 357 patients.<br/>Treatment area: various – head/neck, breast, anorectal.<br/>Assessment: Weekly until at least two weeks following completion of radiation.<br/>By staff – modified RTOG acute toxicity scale; reflectance spectrophotometry to read erythema.<br/>By patients – dermatology quality of life questionnaire; plus a daily diary card.<br/>Location: Scotland.</p>                      | <p>Aqueous cream, sucralfate cream and no cream.</p>  | <p>No statistically significant differences in severity of skin reactions between products and patient groups. Patient-related and treatment-related factors influenced severity of skin reactions. Patients' discomfort levels as recorded on diary cards varied slightly between groups and product.</p>   | <p>Sucralfate script requires a doctor's prescription in Australia.</p>  |
| <p>Wheat J <i>et al.</i> (2007). Management of acute radiation skin toxicity with wheatgrass extract in breast radiation therapy: Pilot study. <i>Aust J Medical Herbalism</i> 2007; 9(2): 77–80<sup>46</sup>.</p>                                   | <p>Design: Randomised control, blinded pilot study.<br/>Sample: 20 patients.<br/>Treatment area: Breast following lumpectomy.<br/>Assessment: Acute skin toxicity assessed weekly during treatment by nurses using oncology nursing; also assessed at four weeks and six months after completion of treatment if patient returned to radiation centre.<br/>Patients completed the Spitzer Quality of Life (SQLI).<br/>Location: Wagga Wagga, NSW, Australia.</p> | <p>Wheatgrass extract (treatment group) and sorbolene (control group).</p>  | <p>No significant differences statistically between groups in either the degree of skin reaction or time to peak skin reaction. Trend towards improved quality of life for those in treatment group (significantly better statistically in weeks 2, 3, 5 and 6).</p>   | <p>Cream applied three times a day by patients for the duration of radiation treatment. It is not known if the wheatgrass extract cream is available commercially – it is a herbal product. Post-treatment data had not been collected at time of writing manuscript – patients in our centre do not routinely return to the radiation oncology unit for such follow-up.</p> |

reducing itching than was sorbolene cream was surprising to the authors of that study, because the film lacks the moisturising agents of products used to counter itching<sup>40</sup>. Although the authors allude to the different feel on the skin of a film compared to a cream, no other subjective data were collected in that study. Because the patients did not apply the film themselves, no assessment of the usability of the two products can be made. Some patients in the study by Wells *et al.*<sup>45</sup> commented that they liked the creams allocated to them, and found them to be soothing and cooling; some patients commented that they did not like the consistency of the creams.

### Relevance of products to use in a tropical climate

The effect of climate on the suitability of products used to prevent radiation-induced acute skin reactions was not explored in any the studies reviewed. The study comparing aloe vera gel to mild soap was undertaken in Miami, Florida<sup>43</sup>. Although located just north of the Tropic of Cancer, Miami has a tropical monsoon climate similar to the location of this northern Australian radiation oncology unit. All other studies were undertaken in subtropical<sup>41</sup> or much colder climates than experienced in northern Australia<sup>40,42,44-46</sup>.

## Discussion

The focus of this literature review was on the prevention, rather than ways of managing, acute radiation-induced skin reactions. This focus arose from the desire to improve the patients' experiences, to base our care on best available evidence, and to improve clinical outcomes associated with radiation therapy. It was regretful that several articles were excluded from this review because the specific products were either not available in Australia or were not able to be identified. For example, the Canadian study by Vuong *et al.*<sup>34</sup> found that the prophylactic use of a non-specified silver-leaf nylon dressing was effective in preventing moist desquamation in patients undergoing radiation to the anal area. However, although the authors stated that the product was available in Canadian drug stores, we were not able to ascertain if it was available in regional Australia, nor what the cost to the patients might be.

Although no trials investigated the same combination of products, the general consensus from the individual studies and the literature review articles retrieved was that mild moisturisers may be beneficial in minimising either the degree or duration of radiation-induced skin reactions. However, consistent with the stated conclusions of the retrieved literature review articles, there is a lack of evidence to support any one specific non-prescription topical product over another.

It is difficult to generalise from the studies' findings, given the heterogeneous samples, the different treatment areas, and small size or non-randomised designs of several of the studies. In addition to the variation in the products trialled, frequency with which products were to be applied and duration of application also varied between studies. Both of the Australian randomised controlled trials<sup>40,41</sup> compared different combinations of products on women receiving radiation for breast cancer. Results of one study favoured a barrier film over sorbolene cream, and the results of the other favoured an aqueous cream over aloe vera gel. Since we believe it important for patients to be actively involved in their care, the use of a film that can be difficult to apply and that is only available from online orders is not the most appropriate product to recommend for use in our radiology oncology unit. Further research may clarify if a particular product is more effective on a particular treatment area.

As would be expected, variation in individual institutional practices was evident from reading the articles. The practice of recommending the use of sorbolene as occurs in this northern Australian radiation oncology unit was also usual practice in one of the Australian studies<sup>40</sup> but differed from the recommendation to refrain from using anything in the other Australian study<sup>41</sup>. We were surprised to read that moisturising agents were not recommended in the American or the German studies<sup>43,44</sup>, but perhaps this practice has changed a decade later. We concur with Graham *et al.*<sup>40</sup> that it would raise ethical dilemmas to include a 'no treatment' arm to a randomised controlled trial, given that standard patient care information<sup>6,9</sup> about skin care during radiation therapy includes reference about keeping the area moist.

Schreck *et al.*<sup>44</sup> concluded that there was room for institutional and individual preferences as to the type of skin care product to be used to relieve discomfort associated with radiation therapy. However, in our opinion such an approach is too simplistic and superficial. For example, many people believe that aloe vera will be effective against radiation burns since it is in many skin care products including those used to relieve symptoms of sunburn. Yet Heggie *et al.*<sup>41</sup> identified that aloe vera was less effective than an aqueous cream in preventing radiation-induced skin reactions. Therefore, we concur with comments of other researchers<sup>42</sup> that it is ethically right to base patient information on evidence, and that further trials are required in order to be confident in the recommendations we provide to vulnerable patients.

There was minimal information gathered in the studies regarding the patients' experiences with the products they used. For example, they were not asked if they found the products easy to apply or asked if the products felt

comfortable on their skin. There were no trials that recruited patients in a tropical area; hence there were none that investigated relationships between climate data and the degree of skin reaction. These are areas for future research.

This literature review has highlighted that currently there is a lack of evidence to support the use of any specific particular non-prescription skin care product readily available to patients undergoing radiation therapy in tropical Australia. The radiation oncology unit will continue to recommend that patients use sorbolene to prevent and manage mild radiation-induced skin care reactions until either evidence is found for a suitable alternative or until evidence to support its continued use is available. The findings from this literature review have informed a randomised controlled trial of two topical non-prescription creams. This trial will also investigate the relationships between factors such as skin type, seasonal climate data, and the onset and severity of acute radiation-induced skin reactions (as measured by a validated grading tool). It will also seek information from patients about their experiences with the allocated skin care product, once again including relationships between various factors including local climate data.

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