Abstract of dissertation entitled

“An evidence-based guideline of skin care management for older adults with incontinence-associated dermatitis”

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Background

Incontinence-associated dermatitis (IAD) is a common and preventable condition in older adults with incontinence. People suffering from IAD are usually disdained by individuals, professionals, policy makers, caregivers, and communities. To date, a standard guideline on IAD management is still lacking in Hong Kong. Thus, it is important to develop an evidence-based incontinence-associated guideline for older adults with incontinence in Hong Kong.

Objectives

This thesis aims to identify the best available evidence for skin care management for people suffering from IAD and to develop an evidence-based practice guideline to reduce the incidence of IAD.

Methods

Review of literature related to the management of IAD was performed on electronic database according to the inclusion and exclusion criteria. The inclusion criteria included
randomized controlled trials and quasi-experiments. In addition, the studies should be in English and should contain the full text. The target participants should be patients aged 60 or above who are suffering from urinary, fecal, or double incontinence and are using diapers. Participants should include cognitively impaired patients, as well as those experiencing skin redness or injury at the perineal or thigh area resulting from incontinence. All non-medical regimens, skin care products, and absorbent diapers or pads designed for managing incontinence related to skin breakdown in older adults with incontinence were also included. The quality of the literatures was assessed according to the checklist provided by the Scottish Intercollegiate Guidelines Network (SIGN) (2011), and the data obtained from the reviewed papers were extracted and summarized in eight tables of evidence. Then, an IAD skin care management guideline was developed based on these pieces of evidence. The transferability, the feasibility, and the cost-benefit ratio of implementing the proposed IAD skin care management guideline were assessed. In addition, the communication plan, the evaluation plan, and the pilot study of the proposed guideline were included in this thesis.

**Results**

The proposed IAD skin care management guideline is a structured skin care management program for older adults with incontinence. With the help of the proposed guideline, registered nurses could provide a standard IAD skin care program based on best available evidence. Moreover, reviewed studies show that the IAD severity score, which is used to evaluate the prevalence of IAD, can be reduced by 47% by implementing the proposed guideline. In addition, a systematic communication plan with stakeholders, an evaluation plan,
and a pilot study were designed to examine the feasibility and the transferability of
the proposed guideline. Patient outcome is the main outcome measure, and this
measure is directly related to the IAD severity score. In this study, the IAD severity
score was reduced, indicating that the proposed IAD skin care management program
is effective, feasible, and cost-effective in the local setting.

**Conclusion**

The proposed skin care management guideline for caring for older adults with IAD
was developed based on best available evidence. The prevalence of IAD is expected
to be reduced after the implementation of this guideline.
“An evidence-based guideline of skin care management for older adults with incontinence-associated dermatitis”

by

Chan Pui Yan

A dissertation submitted in partial fulfillment of the requirements for the Degree of Master of Nursing at The University of Hong Kong.

July 2013
Declarations

I declare that this dissertation represents my own work, except where due acknowledgement is made. It has not been previously included in a thesis, dissertation, or report submitted to this university or to any other institution for a degree, diploma, or other qualifications.

Signed ………………………………

Chan Pui Yan
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Abbreviations

BMI Body Mass Index
BSS Barden Scale Score
IAD Incontinence-associated dermatitis
NPUAP National Pressure Ulcer Advisory Panel
RCT Randomized controlled trial
RN Registered Nurse
SCAT Skin Condition Assessment Tool
SIGN Scottish Intercollegiate Guidelines Network
TEWL Transepidermal water loss
Chapter 1 Introduction

The background, the affirming needs, the objectives, and the significance of this dissertation are introduced in this chapter.

1.1. Background

Incontinence-associated dermatitis (IAD) is an inflammation of the skin, with or without partial thickness wound, caused by prolonged exposure to urine or stool (Gray, 2010). IAD is manifested by redness, with or without blisters and erosion. For people with darker skin tones, the inflammation may appear yellow, white, or purple. When palpated, the affected area exhibits firmness and in duration compared with the surrounding tissue (Junkin & Selekov, 2008). People affected with IAD may experience burning, itching, or tingling feeling, consequently affecting quality of life. Previous studies show that IAD is often associated with pressure ulcers, and that distinguishing the former from the latter is difficult (Junkin & Selekov, 2008). A study conducted in Europe showed that among 1452 nurses asked to identify pressure ulcers and moisture lesions using photographs, only 22% could classify the photos correctly (Beeckman, Schoonhoven, Verhaeghe, Heyneman, & Defloor, 2010). In addition, the severity of IAD in a number of clinical situations has worsened because of the presence of Candida albicans and Staphylococcus aureus (Gray et al., 2012).

The National Pressure Ulcer Advisory Panel (NPUAP) has spent 5 years since 2007 to reach a consensus and improve the pressure ulcer definition and staging system. Moisture lesions, such as IAD, were previously classified as stage II pressure ulcers because both ailments were characterized by partial thickness skin loss (Gray et al., 2012). In a recent convention, the NPUAP stated that IAD should not be categorized as stage II pressure ulcers because of the differences in
epidemiology, etiology, and pathophysiology between IAD and pressure ulcers. Furthermore, IAD should replace terms such as perineal dermatitis or diaper rash, because the infected area is not only confined to the perineal or diaper areas. Moreover, the word “diaper” may seem insulting to certain adults (Junkin & Selekov, 2008). IAD can be distinguished from pressure ulcers based on color, location, depth, and shape (Gray, 2010). IAD is considered as top-down lesions (Gray et al., 2012) confined to the areas of skin exposed to urine or feces, such as the inner thigh and the buttock area. Moreover, the skin lesion merely affects the epidermis and the dermis, and necrotic tissue is absent. By contrast, pressure ulcers merely occur at the bony prominences, and the injuries may even extend to the muscle, the bone, or the fascia, with the formation of slough or eschar (Gray, 2010). The wound shape of IAD is irregular with indistinct borders, whereas that of pressure ulcers is regular with distinct borders. IAD prevention includes gentle cleansing, moisturization, and application of skin protectant or moisture barrier. IAD treatment involves the removal of irritants, such as feces and urine, and cutaneous infections, such as candidiasis, and the establishment of a healing environment. Meanwhile, the prevention of pressure ulcers consists of reducing the duration and the intensity of pressure and shearing forces on the tissue by using pressure-relieving devices, such as mattresses and cushion, and by regularly changing the position of a person (Beeckman et al., 2010). The correct differentiation between IAD and pressure ulcers is important ethically, legally, and financially.

The skin has a variety of physiological functions, such as thermoregulations, immune functions, and vitamin D metabolism. The skin is also the barrier against irritants and toxins from the external environment and is responsible in preventing
excessive water and electrolyte loss from the internal environment. The quantified measurement of transepidermal water loss (TEWL) is related to the movement of water across the stratum corneum over time, that is, the skin moisture barrier. Lower values denote a slower movement of water across the stratum corneum and indicate a more efficient moisture barrier. Aged skin affects TEWL (Gray, 2010). The elderly has higher risks of acquiring single or double incontinence, which induces greater risks of IAD. Compromised aged skin is drier, thinner, more fragile, and less resistant to infection and surface sensory perception. Prolonged exposure to feces and urine causes numerous irritants to the skin. The ammonia in the stool raises the pH level, and the digestive enzyme in the stool causes erosion on the skin. Overhydrated skin is more vulnerable to tearing (Farage, Miller, Berardesca, & Maibach, 2007). Daily use of restraints, poor diet, recent fever, decreased immobility, and impaired cognition are factors contributing to IAD (Gray, 2010).

1.2. Affirming needs

Studies conducted from 2005 to 2011 showed that the prevalence rate of IAD in acute care or long-term care settings varies from 5.7% to 27% (Gray, 2012). Up to 30% of women and 15% to 30% of men with urinary incontinence were older than 70. Meanwhile, approximately 3% to 15% of the elderly older than 65 were suffering from fecal incontinence (Gray, 2010). In an acute care hospital in the United States, 19.7% of 608 patients were incontinent, and 42.5% had perineal skin injury (Gray, 2010). In Japan, the prevalence rate of IAD for older patients with incontinence who are using diapers and absorbent pads is 17% (Sugama, Sanada, Shigeta, Nakagami, & Konya, 2012). The median onset time for IAD is 13 days in a long-term care setting and 4 days for critically ill patients. The
healing time for IAD is 11 days (Gray et al., 2012). A study revealed that the cost for treating IAD in the United States was approximately $136.3 million (Bliss, Zehrer, Savik, Smith, & Hedblom, 2007), proving that the treatment of IAD requires great expenditure.

In Hong Kong, approximately 14,000 of hospital admissions are caused by skin and subcutaneous tissue, which resulted in approximately 17 elderly deaths from 2008 to 2009 (Hospital Authority, 2010). In mid-2011, approximately 941,000 Hong Kong residents aged 65 or above accounted for 13% of the total population. By 2021, this demographic would increase to 18.7% (Census and Statistics Department, 2010). The aging population problem is not restricted to Hong Kong, but is a worldwide phenomenon. With the remarkable growth of the elderly population, the risks of IAD incidence must be recognized before IAD becomes the burden of the healthcare system in Hong Kong.

In the acute medical ward of a Hong Kong hospital, approximately 90% of the monthly admissions consists of patients aged 60 or above, of which approximately 70% are chairbound or bedbound and 70% are using diapers during hospitalization. In 2010, the pressure ulcer team of that hospital reported that although skin assessment is compulsory during the admission, the misclassification of IAD as stage I or II pressure ulcer is common, and that dressing is performed on the IAD wound instead of commencing skin care program. In addition, the IAD issue is overlooked by the staff who merely cleansed the perineal area with water-soaked cotton wool cloth without applying moisturizers or skin protectants after each episode of incontinence. Moreover, the staff is uncertain when choosing the appropriate products among moisturizers or skin protectants, such as Vaseline, or barrier creams for patients experiencing...
redness in their buttocks. All of these issues are caused by the lack of a specific nursing protocol related to the management of IAD in Hong Kong. Thus, the staff handles this clinical issue based on their own experiences, resulting in confusion. Various nursing interventions may cause overuse, unpredictable outcome measures, unnecessary expenditure, and misuse of products. Therefore, continuing to ignore this clinical issue would cause more elderly to suffer from IAD. Moreover, the lack of a specific nursing protocol causes longer hospitalization, poor quality of life to patients and greater hospital expenditures. Numerous studies stated that skin care regimen, such as perineal cleansing, moisturization, and skin protectant application, can reduce IAD incidence (Gray et al., 2012). Given the previously stated reasons, an evidence-based guideline for managing IAD patients for medical ward nursing staff is urgently needed.

1.3. Objectives

This study aims to identify effective interventions for IAD in older adults and to develop an evidence-based protocol for nursing practice.

1.4. Hypothesis/question

By using PICO, the searchable and answerable question is presented as follows:

Would skin care management program better prevent and reduce incontinence-associated dermatitis than usual care among older adults with incontinence?

Patient population of interest (P) is patients aged 60 or above with single or double incontinence;

Intervention of interest (I) is the skin care management program (i.e., structured skin care regimen and absorbent products) for preventing IAD;
Comparison of interest (C) is the current practice (i.e., usual practice/care of ward);

Outcome of interest (O) is the reduction and prevention of the IAD rate.

1.5. Significance

As previously mentioned, IAD is a significant problem for incontinent patients. Thus, an evidence-based guideline for IAD management would be beneficial to patients, nurses, and hospitals.

For patients, an IAD related guideline can prevent or reduce the IAD rate in older adults, (Bliss et al., 2007; Junkin & Seleko, 2008; Beeckman et al., 2010; Gray, 2010) thereby enhancing the comfort and the quality of life of patients (Junkin & Seleko, 2008). For nurses, the guideline can provide the best skin care management for older adults (Rees & Pagnamenta, 2009; Gray et al., 2012). Moreover, the guideline can standardize the nursing care provided, reduce confusion among colleagues, and provide a systematic approach in planning, implementing, and evaluating nursing care. For hospitals, the guideline can improve the quality of care given to patients, thereby enhancing the patient’s satisfaction, reducing healthcare costs, and allowing appropriate resource allocation (Gray et al., 2012).
Chapter 2 Literature Review

The search and appraisals strategies are discussed in this chapter. The primary studies selection criteria, as well as the synthesis and the summary of the data from the selected papers are also included.

2.1. Search Strategies

The electronic search was conducted from 29 May 2012 to 3 September 2012 in four electronic databases, namely, Cinhal, Cochrane Library, Medline (Ovid SP), and PubMed, to include suitable primary studies related to IAD in older adults. Articles published from 2001 onward were chosen to generate recent data and information. Keywords related to the study, such as “incontinence” and “dermatitis,” were used, and the age limit was set to 65 years old or above. 52 studies were generated from Cinhal, 31 studies from Cochrane Library, 71 studies from Medline (Ovid SP) and 81 studies from PubMed. All of these studies were then reviewed manually based on the title of the articles, then the abstracts, and then the full text according to the inclusion criteria. A manual search was also performed to determine whether additional studies could be identified based on the citations of the selected papers. However, no study was added. Finally, after discarding the literature reviews and the duplicated studies, eight papers were selected according to the inclusion and exclusion criteria. The details of the search history are presented as a flowchart in Appendices A and B.

Inclusion criteria

The inclusion criteria include randomized controlled trials (RCTs) and quasi-experiments, which can provide a high level of evidence. Studies in English that contain the full text are preferable because of the language barrier. The target groups of the subjects are older adults aged 65 or above who are suffering from
urinary, fecal, or double incontinence. Any non-medical regimen, skin care products, and absorbent diapers or pads designed for managing incontinence related to skin breakdown in incontinent older adults are also included. Primary studies published from 2001 onward are preferable.

*Exclusion criteria*

Studies with non-English and without the full text are excluded because of the language barrier and the difficulty in extracting information and synthesis data. Any interventions related to pressure-relieving program for preventing skin breakdown or products for incontinence management, such as anal pouches, urinary sheaths, or catheters, are excluded because these products are not related to the study’s aim.

**2.2. Appraisal Strategies**

The eight selected studies were published from 2001 to 2012. The studies consisted of five RCTs and three quasi-experimental studies. These papers were evaluated, and their level of evidence was rated according to the checklist provided by the Scottish Intercollegiate Guidelines Network (SIGN) (2011). The methodology checklists, which included internal validity and overall assessment, were chosen according to the study design. The level of evidence of these papers ranged from 1- to 1++. The results are shown in Appendix C. After the appraisal, the data were extracted and tabulated as follows: bibliographic citations, study design, country, evidence level, subject characteristics, intervention, control, length of follow up, outcome measures, and effect size. The eight tables of evidence were based on the SIGN framework (2011), which is shown in Appendix C.
2.3. Quality assessment of the reviewed articles

For the five RCTs (Beeckman et al., 2011; Baatenburg de Jong & Admiraal, 2004; Cooper & Gray, 2001; Fader et al., 2003; Sugama et al., 2012), their level of evidence of the five RCTs ranged from 1+ to 1++. In the internal validity assessment, all of these papers clearly stated the research question. Two papers (Cooper & Gray, 2001; Sugama et al., 2012) sufficiently covered the randomization method. None of these papers addressed the concealment method. However, three papers (Cooper & Gray, 2001; Fader et al., 2003; Sugama et al., 2012) adequately mentioned whether the subjects and the researchers were kept “blind” during the treatment process. Four of these papers sufficiently covered the subject characteristics for the treatment. In these studies, the control groups were similar, and the only different between the groups were the treatment under investigation; the relevant outcomes were measured in a standard, valid, and reliable. Four of the studies mentioned the dropout rate, which ranged from 3.22% to 25%. One study (Fader et al., 2003) sufficiently covered the intention-to-treat method. Three papers adequately stated that the study was conducted at more than one site, and that the results were comparable for all sites. In general, most of the studies were considered to have medium- to high-level of evidence, and the overall effects were due to the study intervention, which required a large sample size to minimize the bias and to make the results directly applicable to the targeted patient group.

For the three quasi-experimental studies (Hunter et al., 2003; Bliss et al., 2006; Brunner, Drogemueller, Rivers, & Deuser, 2012) ranged from 1- to 1+. In the internal validity assessment, the randomization, the concealment, and the blinding process were not applicable in this study design. All of these papers sufficiently
covered the research question, and the subject characteristics of the treatment and control groups were similar. The only difference between the groups was the treatment under investigation, and the relevant outcomes were measured in a standard, valid, and reliable manner. The dropout rate in two papers (Hunter et al., 2003; Bliss et al., 2006) ranged from 0.4% to 22%. However, the other paper (Brunner et al., 2012) did not report the dropout rate. Only one paper (Bliss et al., 2006) adequately covered the intention-to-treat method. All three papers stated that the studies were conducted in more than one site, and that the results were comparable between the sites. In general, with large sample size and available intervention for minimizing bias, the results of the studies were applicable to the targeted patient group.

2.4. Summary of the evidence from the reviewed articles.

2.4.1. Study Design

The eight selected papers consisted of five RCTs (Beeckman et al., 2011, Baatenburg de Jong & Admiraal, 2004, Cooper & Gray, 2001; Fader et al., 2003; Sugama et al., 2012) and three were quasi-experimental studies (Hunter et al., 2003; Bliss et al., 2006; Brunner et al., 2012). One paper each was from Belgium, the Netherlands, and Japan. Three papers were from the United States, and two papers were from the United Kingdom. Six papers were conducted in a long-term care setting, that is, nursing homes, one was conducted in a geriatric medical hospital (Sugama et al., 2012), and one was conducted in an acute critical care hospital (Brunner et al., 2012).

2.4.2. Subject characteristics

Both male and female subjects were recruited in six of the studies. Two papers (Fader et al., 2003; Sugama et al., 2012) recruited female subjects only, because
these studies suggested that females with higher incidence rate of urinary incontinence had higher IAD risks. The races of the subjects consisted of Asian, Caucasian, and African, and the median age ranged from 67 to 85. The types of incontinence included either urinary or fecal incontinence (Fader et al., 2003; Sugama et al., 2012) or both urinary and fecal incontinence (Beeckman et al., 2011; Hunter et al., 2003; Cooper& Gray, 2001; Baatenburg de Jong & Admiraal, 2004; Brunner et al., 2012). In these studies, the older adults were classified whether they had skin injury, which manifested in the form of erythema of perineal skin caused by hyperhydrated skin and in the moderate to severe erosion of the epidermis in buttock areas involved with the dermis. The patients were either chairbound or bedbound. They had a Braden Risk Score of approximately 17 (Hunter et al., 2003; Beeckman et al., 2011) and a Cognitive Performance Scale Score of 3 out of 6, which suggests impaired cognitive performance (Bliss et al., Fader et al., 2003). These characteristics were important because the older adults with reduced mobility may be unable to access the toilet facilities and thus having higher probabilities of soil clothing, which increases the incidence of IAD (Cooper & Gray, 2001). The patients used diapers and absorbent pads. The patients experienced four to five episodes of incontinence every 24 hours (Cooper & Gray, 2001).

2.4.3. Intervention and Control

Skin care products group

Six studies (Beeckman et al., 2011; Hunter et al., 2003; Baatenburg de Jong & Admiraal, 2004; Cooper&Gray, 2001; Bliss et al., 2006) focused on skin care products. For the skin care products intervention group, the investigators in most of the studies (Beeckman et al., 2011; Hunter et al., 2003; Cooper&Gray, 2001;
Bliss et al., 2006) conducted a briefing session which lasted for thirty minutes to 1 week in service briefing education regarding IAD definitions, skin assessment, documentation methods, and skin care products to the staff in the study sites to reduce artifacts or confusion among the staff. During the briefing sessions, videotaping, photographs, or models were used as education tools to reduce the confusion of the nursing staff and to standardize the study protocol information. Then, an initial skin assessment was conducted for the baseline data collection before the study commenced. Five studies suggested that the skin assessment should be repeated daily, particularly in morning routine care, to allow the comparison with the initial assessment (Beeckman et al., 2011; Baatenburg de Jong & Admiraal, 2004; Bliss et al., 2006; Fader et al., 2003; Sugama et al., 2012). Three papers (Baatenburg de Jong & Admiraal, 2004; Cooper & Gray, 2001; Sugama et al., 2012) suggested the use of photographs for data recording and comparison; an appropriate distance where the camera should be placed was also provided. Cooper and Gray (2001) suggested that the camera should be placed two to three inches distal from the anus to standardize the color, the angle of view, and the light of the photographs taken to minimize bias or artifacts that cause errors in the comparison. For the cleansing method, the gentle cleansing technique with washcloth without rubbing the skin was preferred by two studies (Beeckman et al., 2011; Bliss et al., 2006) to reduce the shearing force or the friction causing the tearing of vulnerable skin in older adults. No-rinse, one-step cleansers with neutral pH (i.e., pH 5.5), such as Clinisian, were preferred by five studies (Beeckman et al., 2011; Cooper & Gray 2001; Hunter et al., 2003; Bliss et al., 2006; Hodgkinson et al., 2006). The increase in pH value of the skin from 3.5 to 5.5 provided an acidic environment, which prevented the invasion of bacteria and
fungi and thus reduced the risk of the stratum corneum, which is the superficial layer of skin, to swell and alter the lipid rigidity of the skin layers. In this way, the body wash could prevent skin breakdown (Beeckman et al., 2011). A number of one-step cleansers are even incorporated with protectant and moisturizer components. For the skin protectant and moisturizer, studies suggested that application of moisturizers, such as Vaseline with petrolatum or dimethicone, every episode of incontinence prevented skin breakdown (Hunter et al., 2003; Bliss et al., 2006). Skin protectants, such as Cavilon with acrylate terpolymer-based barrier film, should be applied every 24 hours to 72 hours when skin breakdown is present. In general, skin care products were suggested to be applied after each episode of incontinence (Beeckman et al., 2011; Bliss et al., 2006).

For the skin care product control group, the compared products used pH neutral soap with a pH value of 6.5 to 7, which people commonly considered as the “neutral” pH range, and water. However, this alkaline pH value might be a favorable environment for bacterial growth, resulting in higher risks of IAD (Hodgkinson, et al., 2006). Skin protectants, such as zinc oxide cream or oil, were used in this group. The other routines were similar to that of the skin care product intervention group. Although capable of preventing skin breakdown, zinc oxide and oil are messy and difficult to remove during the cleansing procedure (Baatenburg de Jong & Admiraal, 2004).

**Absorbents pad and diaper group**

Two papers (Fader et al., 2003; Sugama et al., 2012) focused on absorbent pads and diaper products. For the experimental group, subjects were assigned to change
diaper every eight hours. High-absorption diapers with longer frontal area design or with special polymer content were used to hold more water content and to prevent the urine from diffusing to the back of the diaper to provide a hydrated environment to the perineal area and to prevent the risk of IAD. Meanwhile, the control group was assigned to change diapers every four hours and to use local hospital-standard diapers or incontinence pads. Procedure and skin care routines were according to the hospital’s care standards. The skin assessment was conducted daily by photo taking.

2.4.4. Length of follow up

The length of follow up varied from 4 days (Brunner et al., 2012; Baatenburg & Admiraal, 2004; Cooper & Gray, 2001) to 120 days (Beeckman et al., 2011).

2.4.5. Outcome measures

Six studies mentioned the IAD prevalence or incidence rate (Beeckman et al., 2011; Hunter et al., 2003; Baatenburg de Jong & Admiraal, 2004; Bliss et al., 2006; Fader et al., 2003; Sugama et al., 2012), and all of these studies showed statistically significant reduction of IAD prevalence or incidence rate. For example, Beeckman et al. (2011) stated that the IAD prevalence rate was 22.3% on day 1 of the intervention. However, the rate dropped to 8.1% on day 120. Three papers (Beeckman et al., 2011; Baatenburg de Jong & Admiraal, 2004; Sugama et al., 2012) used IAD skin condition assessment tool to assess the IAD severity. The assessment tool measured the surface in centimeters square, the redness, and the depth of the perineal lesion. This tool could generate a cumulative severity score of maximum 10 marks based on the area of the affected skin, the degree of redness, and the depth of erosion (Junkin & Selekof, 2008). For instance, Beeckman et al. (2011) showed that the score dropped from 9 out of
10 to 3.8 out of 10 after the intervention. Other examples are presented in the table of evidence in Appendix C.

2.4.6. Effect Size

All eight studies (Beeckman et al., 2011; Hunter et al., 2003; Baatenburg de Jong & Admiraal, 2004; Cooper & Gray, 2001; Bliss et al., 2006; Fader et al., 2003; Sugama et al., 2012; Brunner et al., 2012) used the p-value for the outcome measures. Most of the studies showed statistical significant intervention in reducing the IAD prevalence or rate (p<0.001 to p=0.05).

2.5. Synthesis from the reviewed articles

Review of these eight primary studies suggests that IAD is a common and distressing problem for older adults aged 65 or above, and, more importantly, that IAD is preventable. Skin care management involving cleansing, moisturization and protectant application, frequency of diaper changing, and type of diaper used, can reduce the IAD prevalence rate (Beeckman et al., 2011; Hunter et al., 2003; Baatenburg de Jong & Admiraal, 2004; Cooper & Gray, 2001; Bliss et al., 2006; Fader et al., 2003; Sugama et al., 2012; Brunner et al., 2012). Gently cleansing the skin using a one-step no-rinse cleanser with pH of 5.5 is preferable (Beeckman et al., 2011; Cooper & Gray, 2001; Hunter et al., 2003). A skin care regimen with a one-step cleanser can help maximize the time efficiency so that the staff can adhere to the regimen (Beeckman et al., 2011). Petroleum-based moisturizer should be applied to prevent skin breakdown at the high-risk IAD area after each episode of incontinence. A skin protectant with dimethicone-based or liquid film forming acrylates should be applied to prevent skin breakdown at the high-risk IAD area after each episode of incontinence or according to the severity of IAD (Baatenburg de Jong & Admiraal, 2004; Hunter et al., 2003; Bliss et al., 2006).
Skin assessment must be conducted for the baseline record and repeated everyday for monitoring (Beeckman et al., 2011; Baatenburg de Jong & Admiraal, 2004; Bliss et al., 2006; Fader et al., 2003, Sugama et al., 2012).

Photo taking for data recording is preferable (Baatenburg de Jong & Admiraal, 2004; Cooper & Gray, 2001; Sugama et al., 2012). The effect of the frequency of diaper changing on the IAD prevalence rate is not statistically significant. Thus, a diaper change every eight hours is suggested if the older adults are wearing high-absorption diaper or pads to reduce the IAD rate and to prevent overhydration of the skin (Fader et al., 2003; Sugama et al., 2012). Briefing session regarding skin assessment and skin care management of IAD to the staff is encouraged to standardize the skin care management and to enhance the adherence (Beeckman et al., 2011; Hunter et al., 2003; Cooper & Gray, 2001; Bliss et al., 2006).
Chapter 3 Translation and Applications of the Findings

The implementation potential at the target setting should be assessed before the commencement of the proposed guideline (Polit & Beck, 2008). In this chapter, the implementation potential of the evidence-based guideline is assessed based on the transferability of the findings, the feasibility, and the cost-benefit ratio of the guideline.

3.1. Target Setting

The target setting is an acute medical ward of a public hospital in Hong Kong. The ward has 46 beds, which are always fully occupied. Patients are admitted for various acute medical problems, such as chest pain and pneumonia. Patients usually stay for five to seven days. The target setting is managed by the medical department. Four physicians and one medical intern are in charge of this ward. Six nurses and two healthcare assistants are on duty during daytime shifts, and two nurses and one healthcare assistant are on duty during night shifts.

3.2. Target audience

The target audience consists of patients aged 60 or above who are suffering from urinary, fecal, or double incontinence and are using diapers. The patients are cognitively impaired and may have skin redness and injury caused by incontinence at the perineal or thigh areas. On the basis of the eight reviewed studies, patients who have other dermatological problems or pressure ulcers and who are using incontinence catheterization or pressure-relieving devices or methods are excluded.
3.3. Transferability of the findings

3.3.1. Setting

Six of the reviewed studies were conducted in elderly nursing homes (Beeckman, Verhaeghe, Defloor, Schoonhoven & Vanderwee, 2011), two were conducted in geriatric medical hospitals (Sugama, Sanada, Shigeta, Nakagami & Konya, 2012), and one was conducted in an acute critical care unit (Brunner, Drogemueller, Rivers & Deuser, 2012). The environmental and physical setting of the eight reviewed studies are comparable with the local target setting because both settings have a confined number of residents, with approximately 130 eligible patients monthly who require relevant nursing care and resemble the patient characteristics and the duration of IAD development as the review studies.

3.3.2. Audience

The target population characteristics in the proposed setting are similar to the eight reviewed studies. The participants in the reviewed studies had a mean age of 65 to 85. The participants were suffering from urinary, fecal, or double incontinence and were using diapers. The participants were cognitively impaired and may have experienced skin redness or injury caused by incontinence. The incontinence episodes of the participants were around 4 to 5 times per day (Beeckman et al., 2011; Baatenburg de Jong & Admiraal, 2004; Cooper & Gray, 2001; Hunter et al., 2003; Bliss, Zehrer, Savik, Thayer & Smith, 2006; Fader et al., 2003; Sugama et al., 2003; Brunner, Drogemueller, Rivers, & Deuser, 2012).

Meanwhile, in the local setting from December 2011 to December 2012, approximately 90% of monthly admissions are patients aged 60 or above, 70% of which were immobile; cognitively impaired; experiencing urinary, fecal, or double incontinence; and using diapers using, with or without skin injury and redness.
during the hospitalization. Thus, approximately 130 patients are eligible per month.

3.3.3. Philosophy of care

The philosophy of care of the eight reviewed studies is similar to that of the proposed project. The objectives of the proposed project are to provide a structured skin care regimen to reduce and prevent IAD and to maintain the physical and psychological wellbeing of the participants. Given that the Hospital Authority in Hong Kong is promoting the client-centered care for maintaining the quality of life of a patient, the proposed guideline must also produce better patient outcome and satisfaction. Thus, the philosophy of care in the previous chapter is transferable to the target ward setting.

3.3.4. Number of patients

According to the Hospital Authority (2010), approximately 14 000 hospital admissions from 2008 to 2009 were due to skin and subcutaneous tissue problems. Approximately 300 patients admitted to the target ward every month monthly are comparable with the reviewed studies. Thus, patient recruitment in the local setting is sufficient.

3.3.5. Duration of implementation and evaluation

The entire program begins with a two-hour training session on distinguishing IAD and differentiating skin care products for the five nursing staff. After the training, the IAD skin care management guideline is implemented to the targeted population. The duration of the skin care regimen is approximately eight weeks, which include the implementation (six weeks) and the evaluation (two weeks). The estimated duration of each part was determined after integrating the reviewed studies and determining the duration applicable to the target ward.
3.4. Feasibility

3.4.1. Freedom to carry out or terminate the innovation

The staff participating in the innovation has the freedom to conduct and terminate the program whenever undesirable outcome occurs for the target population or if the patient is at risk.

3.4.2. Interference with current staff function

The implementation has a minor interference to the current routine work. A senior registered nurse (RN) who has 15 years of experience and a gerontology post-registration course certificate in the skincare management team of the target ward is designated as the leader of this program. The leader is tasked with training another five RN group members regarding the differences between pressure ulcers and IAD before the implementation. The leader observes and monitors the process of the innovation. The team leader then organizes a two-hour training session for the team members who will commence the IAD skin care management program and will document the skin integrity and product used during the process. Given that the innovation is going to be incorporated with the skin care routine in the target ward, no additional manpower and environmental issues are needed from the routine work.

3.4.3. Administration support

The skincare management team at the target ward has one senior RN team leader and five RN team members who will be trained by the team leader regarding the proposed IAD skin care management program. Thus, no additional time, workload, and manpower is needed, and the routine of the ward is only slightly affected. Two clinical nursing protocols are being run in the target ward. Various nursing teams, such as the infection control team and the diabetes mellitus nursing team,
conduct meetings periodically to discuss the most updated issues and amend the current practice. Thus, the climate of research utilization is supportive and positive because all of the nursing staff wants to promote a better nursing care to maintain the wellbeing of the patients and to sustain a better patient outcome and satisfaction.

3.4.4. Availability of skills and facilities

The nurses in the target ward currently perform skin assessment during the admission of older adults, particularly those who are chairbound or bedbound and diaper users. Various types of skin care products are then applied to the affected area. Thus, the nurses already have the skills for skin assessment and the techniques for applying skin care products. The group training includes the differentiation of pressure ulcer from IAD, the function and types of skin care products, and the IAD management in older adults. The training and evaluation method can be completed within two weeks. All facilities, including various types of skin care products, such as Vaseline, Clinician, diapers, and absorbents pads, are available in the ward. Thus, no additional equipment is needed.

3.4.5. Evaluation tools

IAD Skin Condition Assessment Tool (SCAT) is chosen as the pre and post skin assessment tool for evaluating the IAD condition of the patients. All of the nurses in this proposed IAD skin care management program should familiarize themselves with this evaluation tool prior to the commencement of this evidence-based guideline.
3.5. Cost-benefit ratio of the proposed guideline

3.5.1. Potential risk

The potential risk of implementing this innovation to the target population is low, and no potential risk exists for the ward staff. The erythema at the perineal or thigh areas is worsened if the compliance to the skin care management regimen is low (Hunter et al., 2003; Beeckman et al., 2011). However, if the current practice is maintained, IAD will be overlook by the staff in the target ward, and the condition of IAD will deteriorate, causing the development of pressure ulcers, prolonging the length of stay, deteriorating the quality of life of the patients.

3.5.2. Potential benefits

If the innovation is accomplished successfully in the target ward, the prevalence, rate, or severity of IAD in incontinent older adults would be decreased by 47% (Beeckman et al., 2011; Hunter et al., 2003; Bliss et al., 2006; Fader et al., 2003). Therefore, this innovation can improve the quality of care and patient satisfaction. In addition, this innovation can reduce healthcare expenditure and the length of stay, allowing hospital resources to be allocated appropriately (Gray et al., 2012).

3.5.3. Material costs

The material costs of the innovation can be estimated in terms of staff training materials, assessment tools, manpower, and equipment. The detailed budget plan is listed in Appendix D.

A two-hour training session is given by the senior nurse to the five nurses who will commence the proposed program. The training is held in the conference room of the department and is free of charge. Teaching equipments, such as computers and projectors, are provided in-kind by the hospital. The teaching material handouts cost $10 per nurse. The hourly mean salary of the RN is $171.
the total cost for the staff training sessions is approximately $1710.

Approximately 130 patients participate in this IAD skin care management program monthly. Each nurse spends approximately $43 daily on each patient in commencing the program. Therefore, the total cost for the nursing implementation is $222,300. The skin assessment and evaluation forms and the photographs cost $20 per patient, totaling to approximately $2600 for 130 patients.

Meanwhile, the expenses for the skincare products and the treatment-related products, such as gloves, spatulas, washcloth, on 130 patients are $8060 and $175,500 respectively. Thus, the total expenditure of skincare management program is $410,170 per month. The daily hospital fee per adult in a general ward is $100 (Hospital Authority, 2010). The mean number of days for IAD healing time if the proposed skin care program is not commenced is 11 days (Gray et al., 2012). In 2011, the number of older adults with incontinence who are at risk of IAD in the target ward is approximately 1560. Thus, the total benefit is $1716000. Comparison of the cost-benefit ratios suggests that the estimated benefits overcome the expenses. Therefore, this evidence-based skincare management program is cost-effective.

3.5.4. Nonmaterial costs

Implementation of the skin care management program can help reduce the rate and prevalence of IAD in older adults. This program implies that the hospital is providing a good quality of care and applies the motto of the Hospital Authority—“Patient-centered care.” In addition, conducting a structured and standardized nursing care program helps reduce confusion among colleagues and improve patient satisfaction and staff morale.
Chapter 4 Evidence-based Practice Guideline

In this chapter, an evidence-based innovation of skincare management for older adults with IAD will be developed. Each recommendation in this guideline is graded with the strength of the supporting evidence according to the Scottish Intercollegiate Guidelines Network (SIGN, 2008).

4.1. Guideline Title

An evidence-based guideline of skin care management for older adults with incontinence-associated dermatitis

4.2. Intended Users

The registered nurses of the targeted ward setting

4.3. Aim

To develop a feasible and cost-effective skin care management for reducing and preventing IAD in older adults with incontinence in the local setting.

4.4. Objectives

To provide registered nurses of the local setting with evidence-based recommendations regarding the structured skin care management program and to enhance the competency in terms of managing older adults with IAD.

4.5. Major Outcomes Considered

Major outcomes are the prevalence rate and severity score of IAD in older adults with incontinence; both parameters will be measured in later paragraphs.

4.6. Target population

Older adults aged 65 years old or above who are experiencing urinary/fecal incontinence or double incontinence, using diaper, and suffering from impaired cognition and mobility.
4.7. Recommendations

The Scottish Intercollegiate Guidelines Network (SIGN) (2008) is used to grade the recommendation and the levels of evidence in this guideline.

(See Appendix E)

**Recommendation 1.0**

A structured and concordant skin care regimen is advocated for managing IAD in older adults with incontinence (Grade of recommendation: A).

**Evidence**

Studies show that a consistent, defined skin care regimen is important to prevent and treat IAD in elderly with incontinence (Beeckman et al., 2011; Cooper&Gray, 2001; Brunner et al., 2012) (1+;1+; 1−).

**Recommendation 2.0**

The staff members are provided by the investigators with in-service education sessions regarding the definition of IAD, assessments, documentation methods, and skin products (Grade of recommendation: A).

**Evidence**

In-service education sessions regarding skin care management prior its commencement can help the staff differentiate IAD from other types of skin diseases; various skin products can ensure consistency of the assessment and documentation methods (Beeckman et al., 2011; Hunter et al., 2003; Cooper&Gray, 2001; Bliss et al., 2006) (1+;1+;1+;1+).

**Recommendation 3.0**

Initial skin assessment is recommended for baseline measurement. This assessment is repeated daily or after morning round (Grade of recommendation: A).
Evidence

The perineal or thigh areas of the participants should be observed initially and then reevaluated daily or each morning by a nurse. Photographs should be taken to record the changes in skin integrity, for instance from 2 in to 3 in distal to the anus (Beeckman et al., 2011; Hunter et al., 2003; Cooper & Gray, 2001; Bliss et al., 2006)(1+;1+;1+;1+).

Recommendation 3.1

IAD SCAT should be used to measure IAD in older adults that will be generated with marks as the maximum score (Grade of recommendation: A) (See Appendix F).

Evidence

IAD SCAT is used to measure the area of affected skin, degree of redness, and depth of erosion. This tool creates a cumulative severity score of 10 marks in maximum (Beeckman et al., 2011; Baatenburg de Jong & Admiraal, 2004; Sugama et al., 2012) (1+; 1+; 1++).

Recommendation 4.0

One-step, no-rinse, neutral pH (5.5) cleansers incorporated with protectants (e.g., dimethicone or zinc oxide based) and moisturizers (e.g., petrolatum, lanolin, and dimethicone) should be used to manage IAD (Grade of recommendation: B).

Evidence

A pH-balanced cleanser whose pH range approximates to the acid mantle of healthy skin is suggested because high pH solutions alter the lipid rigidity of the skin. No-rinse skin cleansers combined with protectants and moisturizers can help remove irritants and restore or preserve skin barrier function and hydration. A one-step cleansing method can enhance the compliance (Beeckman et al.,
2011; Hunter et al., 2003; Cooper & Gray, 2001; Bliss et al., 2006; Brunner et al.,
2012) (1+,1+,1+,1+,1−).

Recommenda**tion 4.1**

A gentle cleansing method should be used instead of the over rubbing technique
with washcloth to minimize skin friction that causes laceration (Grade of
recommendation: A).

**Evidence**

Reduced rubbing over the perineal skin to remove urine or feces reduces
damaging frictional effects on the barrier function of the skin (Beeckman et al.,
2011) (1+).

**Recommendation 4.2**

Cleansing should be done after each episode of incontinence to reduce the direct
contact of urine and feces (Grade of recommendation: B).

**Evidence**

Apply the cleanser after each perineal hygiene round to minimize the contact time
of urine or feces to skin (Beeckman et al., 2011; Hunter et al., 2003; Cooper &
Gray, 2001; Bliss et al., 2006) (1+,1+,1+,1+).

**Recommendation 5.0**

Apply petrolatum or dimethicone-based emollient moisturizer (Vaseline) after
each episode of incontinence to prevent skin breakdown on intact skin (Grade of
recommendation: B).

**Evidence**

Lubricating the skin well with topical agents, such as moisturizers, can diminish
skin breakdown in aging skin, whose stratum corneum surface becomes fraught
with waterloss (Hunter et al., 2003) (1+).
**Recommendation 5.1**

Skin protectants, such as acrylate terpolymer-based barrier film (Cavilon) or petrolatum, should be applied daily to prevent skin breakdown (Grade of recommendation: B).

**Evidence**

Skin protectants are non-toxic and non-irritating moisture barriers that contain petrolatum; they protect the skin and promote skin injury healing (Hunter et al., 2003) (1+).

**Recommendation 6.0**

Diaper change should be performed every 8 h provided that the diaper is highly absorbent with longer frontal area design or with special polymer (Grade of recommendation: A).

**Evidence**

Diaper change every 4 h has no significant difference with diaper change every 8 h; subjects wearing high-absorbent diaper have lower rate of IAD than those wearing regular diaper (Fader et al., 2003; Sugama et al., 2012) (1++,1++).
Chapter 5 Implementation Plan

The implementation plan, which facilitates the evidence-based guideline of skin care management for older adults with IAD, emphasizes the utilization of synthesized findings and recommendations for the practice (Stetler, 2001). This plan consists of a communication plan with the stakeholders and a pilot test for the trial of guideline.

5.1. Communication Plan

Achieving approval and support from stakeholders is vital in implementing the proposed skincare management program in the target setting. Therefore, a good communication plan must be developed to make the stakeholders understand the evidence-based skincare management program.

5.1.1. Identify and analyze stakeholders

The stakeholders in the evidence-based skincare management program include the administrators, five frontline nurses, a senior registered nurse trainer, other healthcare professionals and target patients.

The Ward Manager, Department Operation Manager (Medicine) (DOM), General Manager of Nursing (GMN), and Chief of Service (Medicine)(COS) are the important stakeholders who endorse the commencement of the IAD skincare management guideline at the target setting. Thus, the objectives of the innovation, necessity for the changes, and benefits that can be reaped after the changes must be explained to these stakeholders to obtain their approval.

First, gaining support from the Ward Manager and DOM (Medicine) is essential because they are responsible for the nursing management. The proposal can be promoted and run smoothly and easily if the Ward Manager and DOM (Medicine)
agree with the proposed skincare management program. They can be a liaison among the frontline nurses and other administrators for negotiating the benefits of running the proposed guideline. The nursing experience of these stakeholders can give valuable opinion on the proposed guideline.

The five frontline nurses of the skincare management team are responsible for conducting the proposed program. A 2 h training session led by the senior RN team leader will be provided to familiarize these nurses with the skin lesion differentiation and the types of skin care products. These nurses must assess and evaluate the patients continuously. Most of them support this program because of the knowledge they gain related to skincare management. The training session standardizes the nursing care and reduces confusion among nurses when managing IAD and pressure ulcer among older adults with incontinence. Some nurses may oppose attending the training session because of the extra workload and time needed to learn the new intervention.

The senior nurse who has 15 years of clinical experience with Gerontology Post Registered Certificate Course validation is responsible for training the other five registered nurses about the IAD skincare management program. The highly experienced senior nurse can be a good mentor in sharing experiences and answering queries that may arise from the program.

Other health care professionals, such as doctors and allied health care assistants, should be informed about this intervention. Although this program will not directly affect the daily work of these professionals, they can still help by giving opinions.

Before the start of the program, verbal consent will be obtained from the patients
or relatives for the participation. Patients or proxies who feel uncomfortable to continue during the intervention can withdraw at any time. Patients who suffer from any complication or death are automatically withdrawn from the intervention. Approximately 130 eligible patients with incontinence or one key caregiver representative among the eligible patients will be interviewed to inform them about the program. Benefits and risks will also be explained to them.

5.1.2. Communication process

A top-down approach will be adopted in the communication process. Administrators are the first to be approached because they approve the skin care management program at the managerial level. Individual meeting can be conducted with the Ward Manager to explain details about the background of the proposed program, the affirming needs of change, the evidence-based skin care management program, the potential benefits and risks, cost benefit, and the feasibility in the ward. The Ward Manager can provide some comments and suggestions to refine the proposal before the meeting with other administrators. A formal presentation to GMN and DOM will be given at the monthly meeting with the nurses and DOM. During this meeting, the proposal of training and implementation plan will be presented, and the Ward Manager serves as the liaison between the senior administrators and frontline nurses. Manpower, resources, and budget will be further discussed during this meeting. Agreement from the frontline nurses is important for the success of the proposed program. After gaining the support from the nursing staff, the COS of the Medicine Department will be invited to approve the program because this stakeholder decides the allocation of resources, budget, and equipment. After the meetings, follow up discussions with the administrators via e-mail or telephone will
continuously be given to revise the innovation, gain further support and understanding from the administrators, and thus run the innovation smoothly at the target setting.

A 2 h training session will be provided to the frontline nurses to explain the details of the innovation and the potential benefits to the patients. Also, minimal influence to their routine is emphasized to encourage them to participate. A question–answer session will also be included in the training session for their enquiries.

5.2. Pilot Testing

Pilot testing is performed to examine the feasibility of the implementation of the evidence-based skin care management program at the specific ward. Only two nurses will be involved and trained in the pilot testing.

A 2 h training session will be provided by the senior nurse trainer to the two nurses only. The training session will be conducted during working hours to prevent the staff from spending extra time for the training session. This training session is identical to the authentic one, and it will be completed within the first week of the pilot test. Feedback from the members who completed the training sessions will be assembled to further revise and refine the training program. The feedback of these members is necessary because training participation is crucial in successfully gaining the compliance of nursing staff in this program.

The pilot test will last for 4 weeks, which is shorter than the genuine rundown of the proposed IAD skincare management program. Ten patients experiencing incontinence will be recruited within the first week of the pilot test by the senior nurse according to the inclusion and exclusion criteria. The skin care program will
be commenced within 24 h of the recruitment and followed up after 2 weeks and then after 1 week for the evaluation. A 60 min group discussion will be held with the two nurses during evaluation. The discussion will focus on the strengths and weaknesses of the program, the interference to routine work, and other suggestions to identify unexpected problems, evaluate and refine the proposed program before the implementation, and enhance the compliance of nurses.
Chapter 6 Evaluation Plan

This chapter describes an evaluation plan to decide whether the innovation is effective and efficient. The evaluation plan will describe the outcome measures, the nature of clients to be involved, the number of clients, and the data collection and analysis methods. The results of this evaluation will serve as a basis to change and ameliorate the innovation.

6.1. Outcome measures

The aim of this innovation is to reduce the prevalence of IAD in older adults experiencing incontinence to make patient outcome the main measure to decide whether the innovation is effective. A specific tool is used to assess the outcome.

6.1.1 Patient outcome

Primary outcomes are the IAD prevalence and the IAD severity score. IAD SCAT will be used to assess the severity of the skin condition (Beeckman et al., 2011; Baatenburg de Jong & Admiraal, 2004; Sugama et al., 2012). The IAD SCAT is used to measure the area of affected skin, degree of redness, and depth of erosion. The area of skin breakdown and redness will be scored from 0 to 3, whereas the erosion part will be scored from 0 to 4. This tool generates a cumulative severity score of 10 marks in maximum. The higher the score, the more severe is the IAD. A patient with 3 marks or lower is considered to have mild IAD. A patient with 4 to 6 marks is considered to have moderate IAD. A patient with 7 marks or above is considered to have severe IAD.

IAD SCAT is commonly used in other continence care studies in America, Asia, or Turkey because of its simplicity and accessibility (Junkin & Selekof, 2008). It measures the changes in skin color compared with the surrounding skin and the existence of blisters or other symptoms present in the area affected by
incontinence. Risk factors will be identified to decide whether the patient has intact but at-risk skin or already has mild, moderate, or severe IAD. These three categories in the assessment tool can guide the interventions of nursing care plan to prevent further deterioration of IAD. This tool does not require extensive training and can be used during each incontinent episode.

IAD SCAT has good psychometric properties and high validity with p < 0.03. Beeckman et al. (2011) reported that the IAD severity score will decrease from 6.9 to 3.8 out of 10 marks (p=0.06) after the intervention and that the prevalence rate will drop from 22.3% to 8.1% (p<0.05). Hunter et al. (2003) revealed that IAD can be reduced by 47% through a structured skin care program. Therefore, the innovation is deemed successful in patients with an IAD severity score of 4 out of 10 or a prevalence reduction of 47%.

6.2. Nature of clients to be involved

The patients to be involved in the evaluation plan include incontinent older adults who are using skin care products or absorbent diaper or pads in the target clinical setting. These patients are recruited according the inclusion and exclusion criteria. The entire target patients who participated in the evidence-based skin care program for managing the IAD will be evaluated.

6.3. Number of clients to be involved

The effectiveness of the guideline can be assessed by determining the prevalence of IAD before and after the intervention. According to Beeckman et al. (2011), prevalence rate will decrease from 22.3% to 8.1% after the intervention. A sample size of 108 is needed to achieve an improvement in IAD prevalence rate that is comparable with those in previous studies (Beeckman et al., 2011; Hunter et al., 2003). This sample size was calculated by the software of Russ Lenth with
95% confidence interval and 47% prevalence rate. As suggested in a previous study, 0.94 was set as the acceptable margin of error in this innovation.

Approximately 130 patients in the targeted ward setting are eligible per month. Approximately 70% of eligible patients will join the evaluation plan. Therefore, the recruitment period of the program should take approximately one month to gather a sufficient sample size for assessing the significance of the guideline.

6.4. Data collection

The severity score of IAD will be assessed using IAD SCAT. The preliminary skin assessment using IAD SCAT will be done before the start of the program during the recruitment of the first week. The assessment will be repeated every morning skin care round during the first week of the implementation period and then repeated weekly starting from the second week until the end of the implementation period.

6.5. Data analysis

IAD severity will be compared using a two-tailed paired t-test because it is a repeated measurement on the same scale, that is, the IAD severity score, for the same target group of patients before and after the intervention. The null hypothesis is accepted when no difference exists between the pre and post mean scores of the IAD severity for the target patients. The null hypothesis is rejected when variation in the mean scores of the pre and post interventions exists. The innovation is deemed effective when the IAD severity score is significantly reduced after implementing the innovation.

6.6 Basis for an effective change of practice

The effectiveness of the innovation will be decided by the severity score. The innovation is deemed effective when the severity score is decreased after
implementing the innovation.

The proposed IAD skin care management program is considered effective and efficient when IAD prevalence is reduced after the skin care program. According to the eight primary studies, IAD can be reduced by a structured skin care program and by the proper use of skin care and absorbent products (Beeckman et al., 2011; Hunter et al., 2003; Baatenburg de Jong & Admiraal, 2004; Cooper & Gray, 2001; Bliss et al., 2006; Fader et al., 2003; Sugama et al., 2012; Brunner et al., 2012). Thus, the skin care program is regarded as effective when the IAD severity score is reduced to 8.1% after implementing the IAD skin care management guideline.

The nurses are anticipated to be more competent and compliant in applying the skin care program if the proposed change is effective. The skin care program will give the nurses more knowledge and confidence about IAD and its management. As a result, nurses can be more satisfied in their work and thus lead higher morale and competency with an effective innovation. The program also benefits the patients by reducing their suffering and length of stay.
Chapter 7 Conclusion

IAD is common and serious among incontinent older adults in Honk Kong. Structured IAD skin care management program can reduce IAD prevalence and thus benefit the patients. No evidence-based protocols in managing IAD are available at the local setting; thus, an evidence-based skincare protocol with a high implementation potential must be developed. An effective communication plan to gain support from the stakeholders is developed, and an evaluation plan is well designed to review the main outcomes at the target clinical setting. Hence, the proposed IAD skin care management guideline is recommended to be implemented in target clinical settings in the future.
Appendix A- Search History

Database: CINAHL (EBSCOhost)

Searched done from May, 2012 to Aug, 2012


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<td>S3</td>
<td>S1 AND S2</td>
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<td>S4</td>
<td>Limit S3 to aged 65+ years</td>
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</tr>
<tr>
<td>S5*</td>
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At total of 52 studies were screened by title and abstract. Literature reviews about IAD, protocols and guidelines, studies with target groups aged below 65 years, and studies involving patients who use products related to management of urinary or fecal incontinence (e.g., urinary sheath and anal pouch) were excluded. Finally, four studies were selected.

Note: * means related or truncated words used
Database: Cochrane Library

Searched done from May, 2012 to Aug, 2012


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A total of 31 studies were screened by title and abstract. Literature reviews about IAD, protocols and guidelines, studies with target groups aged below 65 years, and studies involving patients who use products related to management of urinary or fecal incontinence (e.g., urinary sheath and anal pouch) or to drug treatment of incontinence were excluded. Finally, two studies were selected.

Note: * means related or truncated words used
Database: Medline (OvidSP)

Searched done from May, 2012 to Aug, 2012


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<td>5</td>
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A total of 71 studies were screened by title and abstract. Literature reviews about IAD, studies with target groups aged below 65 years, and studies involving patients who use products related to management of urinary or fecal incontinence (e.g., urinary sheath and anal pouch) or to pharmacological therapy of handling incontinence were excluded. Finally, five studies were selected.

Note: * means related or truncated words used
Database: PubMed

Searched done from May, 2012 to Aug, 2012


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A total of 81 studies were screened by title and abstract. Literature reviews about IAD, studies with target groups aged below 65 years, and studies involving patients who use products related to management of urinary or fecal incontinence (e.g., urinary sheath and anal pouch) or drug treatment of incontinence were excluded. Finally, eight studies were selected.

Note: * means related or truncated words used
**Appendix B - Search Flowchart**


- CINHAL, Cochrane Library, Medline(OvidSP), PubMed
- Published in 2001 onwards
- Screen electronically by limit (aged ≥65 years)
- Total papers: 235

- Manual screening papers by inclusion and exclusion criteria
- Excluded reasons are pharmacological treatment for IAD, below target aged group, products used for managing incontinence (e.g., urinary sheath and anal pouch), study protocols or guidelines
- Total paper: 19

Discard duplicated papers

Manual search from the citation reference of selected paper: 0

Overall results: 8
### Appendix C-SIGN Critical Appraisal for the Retrieved RCTs

Critical Appraisal for the Randomized Controlled Trials and Quasi-experimental study

<table>
<thead>
<tr>
<th>RCT</th>
<th>Beeckman et al., 2011</th>
<th>Hunter et al., 2003</th>
<th>Baatenburg de Jong &amp; Admiraal, 2004</th>
<th>Cooper &amp; Gray, 2001</th>
<th>Bliss et al., 2006</th>
<th>Fader et al., 2003</th>
<th>Sugama et al., 2012</th>
<th>Brunner et al., 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Section 1: Internal Validity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1 The study addresses an appropriate and clearly focused question</td>
<td>Well covered</td>
<td>Well covered</td>
<td>Well covered</td>
<td>Well covered</td>
<td>Well covered</td>
<td>Well covered</td>
<td>Well covered</td>
<td>Well covered</td>
</tr>
<tr>
<td>1.2 The assignment of subjects to treatment groups is randomised</td>
<td>Adequately addressed</td>
<td>Not applicable</td>
<td>Adequately addressed</td>
<td>Well covered</td>
<td>Not applicable</td>
<td>Adequately addressed</td>
<td>Well covered</td>
<td>Not applicable</td>
</tr>
<tr>
<td>1.3 An adequate concealment method is used</td>
<td>Not addressed</td>
<td>Not applicable</td>
<td>Not addressed</td>
<td>Not addressed</td>
<td>Not applicable</td>
<td>Not addressed</td>
<td>Not addressed</td>
<td>Not applicable</td>
</tr>
<tr>
<td>1.4 Subjects and investigators are kept ‘blind’ about treatment allocation</td>
<td>Not addressed</td>
<td>Not applicable</td>
<td>Not addressed</td>
<td>Adequately addressed</td>
<td>Not applicable</td>
<td>Adequately addressed</td>
<td>Not applicable</td>
<td>Not applicable</td>
</tr>
<tr>
<td>1.5 The treatment and control groups are similar at the start of the trial</td>
<td>Well covered</td>
<td>Well covered</td>
<td>Well covered</td>
<td>Adequately addressed</td>
<td>Well covered</td>
<td>Well covered</td>
<td>Well covered</td>
<td>Well covered</td>
</tr>
<tr>
<td>1.6 The only difference between groups is the treatment under investigation</td>
<td>Well covered</td>
<td>Well covered</td>
<td>Well covered</td>
<td>Adequately addressed</td>
<td>Well covered</td>
<td>Well covered</td>
<td>Well covered</td>
<td>Well covered</td>
</tr>
<tr>
<td>1.7 All relevant outcomes are measured in a standard, valid and reliable way</td>
<td>Well covered</td>
<td>Well covered</td>
<td>Poorly addressed</td>
<td>Well covered</td>
<td>Well covered</td>
<td>Well covered</td>
<td>Well covered</td>
<td>Well covered</td>
</tr>
<tr>
<td>1.8 What percentage of the</td>
<td>Not reported</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

44
<table>
<thead>
<tr>
<th>1.9</th>
<th>All the subjects are analysed in the groups to which they were randomly allocated (often referred to as intention to treat analysis)</th>
<th>Not addressed</th>
<th>Not addressed</th>
<th>Poorly addressed</th>
<th>Adequately addressed</th>
<th>Adequately addressed</th>
<th>Well covered</th>
<th>Adequately addressed</th>
<th>Not addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.10</td>
<td>Where the study is carried out at more than one site, results are comparable for all sites</td>
<td>Not addressed</td>
<td>Well covered</td>
<td>Not addressed</td>
<td>Adequately addressed</td>
<td>Well covered</td>
<td>Adequately addressed</td>
<td>Adequately addressed</td>
<td>Adequately addressed</td>
</tr>
</tbody>
</table>
### Section 2: Overall assessment of the study

<table>
<thead>
<tr>
<th>2.1</th>
<th>How well was the study done to minimise bias?</th>
<th>+</th>
<th>+</th>
<th>+</th>
<th>-</th>
<th>+</th>
<th>++</th>
<th>++</th>
<th>-</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2</td>
<td>Taking into account clinical considerations, your evaluation of the methodology used, and the statistical power of the study, are you certain that the overall effect is due to the study intervention?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>2.3</td>
<td>Are the results of this study directly applicable to the patient group targeted by this guideline?</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Remarks:** Section 2 relates to the overall assessment of the paper. It starts by rating the methodological quality of the study, based on your responses in Section 1 and using the following coding system:

| ++ | All or most of the criteria have been fulfilled. Where they have not been fulfilled the conclusions of the study or review are thought very unlikely to alter. |
| +  | Some of the criteria have been fulfilled. Those criteria that have not been fulfilled or not adequately described are thought unlikely to alter the conclusions. |
| -  | Few or no criteria fulfilled. The conclusions of the study are thought likely or very likely to alter. |
Table of Evidence 1

<table>
<thead>
<tr>
<th>Study Design/ Country of Study</th>
<th>Evidence Level</th>
<th>Subject Characteristics</th>
<th>Intervention</th>
<th>Control</th>
<th>Length of follow up</th>
<th>Outcomes measures</th>
<th>Effect Size</th>
</tr>
</thead>
</table>
| • RCT • Belgium | + | • both sexes residents in 11 nursing home wards out of 4 nursing home (n=141)  
  • mean age >85  
  • chronically urine/stool incontinence or double incontinence  
  • erythema of perineal skin (not caused by pressure/shear) and/or with hyperhydrated skin  
  • BSS<17  
  • wear diaper  
  • p=0.07-0.63 | Experimental Group  
  • washcloth impregnated with Dimethicone 3%  
  • applied product during daily routine or after each diaper change  
  • drying by evaporation without rubbing skin and applying additional barrier product  
  • small group education provided regarding to skin observation and IAD and PU differentiation method  
  • perineal skin observed each morning (n=73) | Control Group  
  • soft washcloth, water, pH neutral soap (pH 6.5-7.5)  
  • same application routine as experimental group  
  • using soft towel rubbing technique  
  • same education session as experimental group  
  (n=68) | •120 days | 1) IAD prevalence  
  1) % of elderly with IAD:  
  Day 1: 22.3% vs 22.8% (p<0.001)  
  Day 120: 8.1% vs 27.1%, (p = 0.003)  
  2) IAD severity (score by IAD Skin Condition Assessment Tool)  
  2) Day 1: 6.9/10 vs 7.3/10 (p=0.99)  
  Day 120: 3.8/10 vs 6.9/10 (p = 0.06) | |

IAD: Incontinence-associated dermatitis; RCT: randomized controlled trial; BSS: Barden Scale score
Table of Evidence 2

<table>
<thead>
<tr>
<th>Study Design/ Country of Study</th>
<th>Evidence Level</th>
<th>Subject Characteristics</th>
<th>Intervention</th>
<th>Control</th>
<th>Length of follow up</th>
<th>Outcomes measures</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hunter, S., Anderson, J., Hanson, D., Thompson, P., Langemo, D. &amp; Klug, M. (2003). Clinical Trial of a Prevention and Treatment Protocol for Skin Breakdown in Two Nursing Homes. <em>JWOCN, 30</em>(5), 250-258.</td>
<td>+</td>
<td>• both sexes residents in 2 nursing homes (n=106 as 30 dropout) • mean age &gt;82 • BRS:17-19 • fecal or/and urinary incontinence • p=0.283</td>
<td>Experimental strategies: • 1 week in-service education session related to skin. • incorporated BW and SP with the routine usual care • applied SP each episode of incontinence (about every 8 hours) and no reapplication is needed after cleansing • reassess the skin weekly with BRS and pictorial diagram documentation</td>
<td>Usual care Normal agency routine of the nursing home</td>
<td>6 month and 1 week</td>
<td>1) prevalence of Skin breakdown 2) reduction% of PD</td>
<td>Experimental vs usual care 1) 21.3% vs 31.6% (p=0.728) 2) 47%</td>
</tr>
</tbody>
</table>

Conclusion: non-standardized usual care routine and staff’s awareness of the intervention may cause bias to the results.

BRS: Barden Risk Scale; BW: body wash; SP: skin protectant; PU: pressure ulcers; PD: perineal dermatitis
Table of Evidence 3

<table>
<thead>
<tr>
<th>Study Design/ Country of Study</th>
<th>Evidence Level</th>
<th>Subject Characteristics</th>
<th>Intervention</th>
<th>Control</th>
<th>Length of follow up</th>
<th>Outcomes measures</th>
<th>Effect Size</th>
</tr>
</thead>
</table>
• Netherlands | + | • both sexes residents in nursing home (n=30 as 10 dropout)  
• mean age >83  
• BMI:22-31  
• fecal or/and urinary incontinence  
• moderate to severe erosion of epidermis in buttock areas involved with dermis | Cavilon group  
• applied Cavilon according to severity of skin score from every 24 to 72 hours  
• weighed the amount product used with digital balance  
• measured time for washing the applied products for the first two applications  
• recorded each diaper changed and types of incontinence  
• repeated skin assessment daily  
• took photographs of skin on days 0,1,2,7, and 14 | Zinc oxide oil group  
• applied zinc oxide oil according to nursing home protocol  
• remove any remain zinc oxide oil each morning or evening before reapplication  
• measurement same as Cavilon group | 14 days | 1) Change of skin condition (skin condition assessment scale)  
2) Product cost  
3) Nursing time  
4) Total cost (i.e. cost of treatment related products) | 1) total skin damage scores improved in Cavilon group (p=0.04)  
Cavilon group vs Zinc Oxide oil group  
2) €7.55 vs €14.16  
3) 16196 min vs 20895 min  
4) €76.13 vs €102.96 |

Conclusion: The study is supported by educational grant from 3M which produced the study product and may cause bias to the results.

**RCT:** randomized controlled trial; **BSS:** Barden Scale score; **BMI:** Body Mass Index
### Table of Evidence 4

<table>
<thead>
<tr>
<th>Study Design/ Country of Study</th>
<th>Evidence Level</th>
<th>Subject Characteristics</th>
<th>Intervention</th>
<th>Control</th>
<th>Length of follow up</th>
<th>Outcomes measures</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cooper, P. &amp; Gray D. (2001) Comparison of two skin care regimes for incontinence. British Journal of Nursing, 10(6), S7-S18.</td>
<td>• RCT • Scotland</td>
<td>• both sexes</td>
<td>Clinisan Group</td>
<td>Soap and Water Group</td>
<td>14 days</td>
<td>1) % maintenance of healthy skin integrity 2) average episode of incontinence per 24 hrs 3) No. of incontinence types change with skin breakdown 4) No. of mobility change with skin breakdown</td>
<td>Clinisan Group vs Soap and Water group 1) 66% vs 37% (p=0.05) 2) 5 vs 4 3) 3/0 vs 6/3 4) 8/0 vs 6/2</td>
</tr>
<tr>
<td></td>
<td>+</td>
<td>• 5 different sites of long term care for elderly or dependent patients (n=87 as 6 dropped out)</td>
<td>• applied Clinisan when episode of incontinence</td>
<td>• same as Clinisan group except using water and soap for skin care after each episode of incontinence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• median age &gt;79</td>
<td>• took photographs on day 0, 7, 14 from 2-3 inches distal to the anus</td>
<td>• an expert panel of two individuals reviewed all photographs</td>
<td>• discontinue application of other barrier creams to sacral area</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• median length of stay = 0.38-1.72 years</td>
<td>• an expert panel of two individuals reviewed all photographs</td>
<td></td>
<td>• in-service education session by investigators was given to the staff before the study</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• number of episodes of incontinence/24 hr = 4-5 times</td>
<td>• discontinue application of other barrier creams to sacral area</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• bedfast to walk with assistance</td>
<td>• in-service education session by investigators was given to the staff before the study</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• urine or/ and stool incontinence with/without catheterized/urosheath</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Conclusion: The study is funded by Vernacare which produced the study product and may cause bias to the results and no standardized of routine care.

RCT: randomized controlled trial
Table of Evidence 5

<table>
<thead>
<tr>
<th>Study Design/ Country of Study</th>
<th>Evidence Level</th>
<th>Subject Characteristics</th>
<th>Intervention</th>
<th>Control</th>
<th>Length of follow up</th>
<th>Outcomes measures</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bliss, D.Z., Zehrer C., Savik, K., Thayer, D. &amp; Smith, G.(2006). Incontinence-Associated Skin Damage in Nursing Home Residents: A Secondary Analysis of a Prospective, Multicenter Student. Ostomy/Wound Management, 52(12)46-55.</td>
<td>• quasi-experimental • USA</td>
<td>• both sexes with different races • residents in 16 nursing homes in 4 geographic region of US (n=981) • mean age ≥65 • free of perineal skin damage • Cognitive Performance Scale ulcer=3/6 • urinary and/or fecal incontinence</td>
<td>Regimen X, Y, Z • X: ointment with 43% petrolatum • Y: ointment with 98% petrolatum • Z: 12% zinc oxide +1 % dimethicone • Skin assessment daily • applied after every episode of incontinence • washable clothes or disposable wipe used to apply the study product • in service education on appropriate skin care and recognizing IAD was given to all staff by investigators before study</td>
<td>Regimen W • applied 3M Cavilon No Sting Barrier (acrylate terpolymer-based barrier film) • applied 3 times per week • used washable clothes or disposable wipe to apply the study product</td>
<td>6 weeks</td>
<td>1) incidence of IAD 2) median onset of IAD(days) 3) healing time(days) 4) % of residents with location of IAD</td>
<td>1) W=3.6%; X=2.1%; Y=4/0% ; Z=4.1% (p=0.55) 2) W=20.5; X=11; Y=13; Z=12 (p=0.15) 3) W=13; X=10.5; Y=12; Z =8 (p=0.71) 4) Buttock&gt; anal area&gt; groin&gt; thigh&gt; sacrum</td>
</tr>
</tbody>
</table>

Conclusion: Lack of randomization and blinding may cause bias to the results.

IAD: incontinence associated dermatitis Regimen X, Y, Z, X=different composition of moisture barrier
<table>
<thead>
<tr>
<th>Study Design/ Country of Study</th>
<th>Evidence Level</th>
<th>Subject Characteristics</th>
<th>Intervention</th>
<th>Control</th>
<th>Length of follow up</th>
<th>Outcomes measures</th>
<th>Effect Size</th>
</tr>
</thead>
</table>
- median age=85.2  
- urine incontinence with incontinence pad using every night  
- physical or mental disabilities  
- median Norton Score=11  
- median Braden Score=13 | Experimental Group  
- Frequent pads changing regime(every 4 hours)  
- using standard pads(typical night pads used in UK homes which can be worn for 8 hours)  
- general skin care regime( washing perineal area with soap and water twice daily without applying creams or powder for urinary incontinence)  
- skin assessment each morning | Control Group  
- less frequent pads changing regime( every 8 hours)  
- others same as experimental group except the changing regime is different | 10 weeks | 1) severity of dermatitis/erythema in groin/inner thigh or lower buttock area (visual grading scale)  
2) pH level of skin  
3) TEWL | experimental vs control group  
1) no significant difference (p>0.2)  
2) no significant difference (p=0.13)  
3) frequent regime less wetter than control (p=0.01) |

TEWL: transepidermal water loss
<table>
<thead>
<tr>
<th>Study Design/ Country of Study</th>
<th>Evidence Level</th>
<th>Subject Characteristics</th>
<th>Intervention</th>
<th>Control</th>
<th>Length of follow up</th>
<th>Outcomes measures</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sugama, J., Sanada, H., Shigeta, Y., Nakagami, G. &amp; Konya C. (2012). Efficacy of an improved absorbent pad on incontinence-associated dermatitis in older women: cluster randomized controlled trial. <em>BMCGeriatrics, 12:22.</em></td>
<td>• RCT • Japan ++</td>
<td>• female residents in 10 units at a geriatric medical hospital (n=60)  • mean age&gt;84 (p=0.832)  • mean BMI=17.3-17.7 (p=0.650)  • homebound to bedridden patient (p=0.267)  • full time user of diaper and absorbent pads because of urinary incontinence  • IAD patient</td>
<td><strong>Experimental Group</strong>  • test absorbent pad and diaper from 0900 to 2000  • wearing hospital standard pad and diaper from 2000 to 0900  • frequency, procedure and skin care routines of changing diapers followed hospital’s care standards  • skin assessment daily at 2000 by photo taking and skin observation with (IAD Skin condition assessment tool) (n=30)</td>
<td><strong>Control Group</strong>  • wearing hospital standard pad and diaper for whole time.  • other same as experimental group except the wearing different diaper (n=30)</td>
<td>1 month</td>
<td>1) % patients recover completely from IAD 2) moisture content of the stratum corneum 3) skin pH difference</td>
<td>experimental vs control group 1) 43.3 vs 13.3 (p=0.010); 2) no significant difference (p=0.823) 3) no significant difference (p=0.761)</td>
</tr>
</tbody>
</table>

IAD: incontinence-associated dermatitis
Table of Evidence 8

<table>
<thead>
<tr>
<th>Study Design/ Country of Study</th>
<th>Evidence Level</th>
<th>Subject Characteristics</th>
<th>Intervention</th>
<th>Control</th>
<th>Length of follow up</th>
<th>Outcomes measures</th>
<th>Effect Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brunner, M., Drogemueller, C., Rivers, S. &amp; Deuser, W. (2012). Prevention of Incontinence-Related Skin Breakdown for Acute and Critical Care Patients: Comparison Of Two Products. <em>Urologic Nursing</em>, 32(4)214219.</td>
<td>-</td>
<td>both sexes residents in 3 critical care &amp; 2 acute care in a local hospital (n=64) • mean age &gt;66 • urine/ stool incontinence or double incontinence • intact skin • immobile • p=0.05</td>
<td>Product A • washcloth impregnated with Dimethicone 3% • one step cleanser • applied when incontinence • education provided regarding to skin observation and grading tool • perineal skin observed daily (n=33)</td>
<td>Product B • two-step pH balanced, no-rinse cleanser and moisturizer containing glycerin dimethicone • same application routine as Product A group • same education session as Product A group (n=31)</td>
<td>4-5 days</td>
<td>Product A vs Product B 1) time to skin breakdown 1)91.1 hours vs 213.3 hours (p=0.0045) 2) intact: 72.7 vs 77.4 mild: 15.2 vs 19.4 moderate: 12.1 vs 3.1 severe: 0 3) product cost per study day 3) US$2.67 vs US$6.59 (p=0.006)</td>
<td><strong>Product A</strong> vs <strong>Product B</strong> 1) time to skin breakdown 1) 91.1 hours vs 213.3 hours (p=0.0045) 2) intact: 72.7 vs 77.4 mild: 15.2 vs 19.4 moderate: 12.1 vs 3.1 severe: 0 3) product cost per study day 3) US$2.67 vs US$6.59 (p=0.006)</td>
</tr>
</tbody>
</table>
Appendix D - Cost and Expenditure Table

Expenditure:

### On in-service training program to nurse (2 hours)

<table>
<thead>
<tr>
<th>Category</th>
<th>Calculation</th>
<th>Sub-total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Training (per nurse)</td>
<td>$171 \times 2</td>
<td>$342</td>
</tr>
<tr>
<td>Total training fee (five nurses)</td>
<td>$342 \times 5</td>
<td>$1710</td>
</tr>
<tr>
<td>Printed material for training (five nurses)</td>
<td>$10 \times 5</td>
<td>$50</td>
</tr>
</tbody>
</table>

### On Skin care management program implementation

<table>
<thead>
<tr>
<th>Category</th>
<th>Calculation</th>
<th>Sub-total</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Expense for 1 nurse to 1 patient)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. 5 min in each skin care regimen (3 times/day)</td>
<td>$171/60 \times 5 min \times 3 times/day</td>
<td>$43</td>
</tr>
<tr>
<td>2. 5 minutes for filling in daily assessment form</td>
<td>$171/60 \times 5 min</td>
<td>$14</td>
</tr>
</tbody>
</table>

130 eligible patients/month

<table>
<thead>
<tr>
<th>Category</th>
<th>Calculation</th>
<th>Sub-total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expense for nursing implementation (per nurse)</td>
<td>$(43+14) \times 30 days \times 26 patients</td>
<td>$44,460</td>
</tr>
<tr>
<td>Total expense for nursing implementation (five nurses)</td>
<td>$44,460 \times 5</td>
<td>$222,300</td>
</tr>
<tr>
<td>Printed Material for nurse implementation</td>
<td>$20/patient \times 130 patients/month</td>
<td>$2600</td>
</tr>
<tr>
<td>Expense for equipment and facilities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Skin care products</td>
<td>$62 \times 130 patients/month</td>
<td>$8060</td>
</tr>
<tr>
<td>2. Treatment-related products (gloves, spatulas, and washcloth)</td>
<td>$15 \times 3 times/day \times 30 days \times 130 patients</td>
<td>$175,500</td>
</tr>
<tr>
<td>3. Incontinence absorbent products (brought by patient)</td>
<td>$0</td>
<td>$0</td>
</tr>
</tbody>
</table>

**TOTAL expenditure on skin care management program**

\[ = $1710 + $222,300 + $2600 + $8060 + $175,500 = \$410,170 \text{ (per month)} \]

*Expense of training workshop:

Hourly salary of RN (general):
Estimated mean monthly salary = $30,695 (Association of Hong Kong Nursing Staff, 2012)
Hourly salary = $171
**Benefits (Cost saving)**
Hospital fee per adults per day in general ward = $100 (Hospital Authority, 2010)

Mean number of days for IAD healing time if skin care program not commenced = 11 days (Gray et al., 2012)

Number of older adults with incontinence and at risk of IAD in specific ward in 2011=130×12months=1560 (Department of Medicine, 2011)

**Total Benefit:** $100×11×1560 = $1,716,000

**Cost to benefit ratio**
Cost to benefit ratio = \(\frac{1,716,000}{410,170}\) = 4.2

The skincare management program is cost effective.
Appendix E - Level of Evidence and Grade of Recommendation

SIGN grading system: Level of evidence  
(Scottish Intercollegiate Guidelines Network, 2008)

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1++</td>
<td>High-quality meta-analyses, systematic reviews of RCTs*, or RCTs with very low risk of bias.</td>
</tr>
<tr>
<td>1+</td>
<td>Well-conducted meta-analyses, systemic reviews of RCTs, or RCTs with low risk of bias.</td>
</tr>
<tr>
<td>1-</td>
<td>Meta analyses, systematic reviews of RCTs, or RCTs with a high risk of bias.</td>
</tr>
<tr>
<td>2++</td>
<td>High quality systematic reviews of case-control or cohort studies. High quality case-control or cohort studies with a very low risk of confounding, bias, or chance and a high probability that the relationship is causal.</td>
</tr>
<tr>
<td>2+</td>
<td>Well-conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal.</td>
</tr>
<tr>
<td>2-</td>
<td>Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal.</td>
</tr>
<tr>
<td>3</td>
<td>Non-analytic studies, e.g. case reports, case series.</td>
</tr>
<tr>
<td>4</td>
<td>Expert opinion.</td>
</tr>
</tbody>
</table>

* RCT: randomized, controlled trial

SIGN grading system: Grade of Recommendation  
(Scottish Intercollegiate Guidelines Network, 2008)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>At least one meta-analysis, systematic review, or RCT rated as 1++, and directly applicable to the target population; or A body of evidence consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating overall consistency of results</td>
</tr>
<tr>
<td>B</td>
<td>A body of evidence including studies rated as 2++, directly applicable to the target population, and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 1++ or 1+</td>
</tr>
<tr>
<td>C</td>
<td>A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 2++</td>
</tr>
<tr>
<td>D</td>
<td>Evidence level 3 or 4; or Extrapolated evidence from studies rated as 2+</td>
</tr>
</tbody>
</table>

## Appendix F - Incontinence-associated Dermatitis Skin Condition Assessment Tool

<table>
<thead>
<tr>
<th>Score</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>None</td>
</tr>
<tr>
<td>1</td>
<td>Small area (&lt;20 cm²)</td>
</tr>
<tr>
<td>2</td>
<td>Moderate area (20-50 cm²)</td>
</tr>
<tr>
<td>3</td>
<td>Large area (&gt;50 cm²)</td>
</tr>
</tbody>
</table>

**Area of Skin Breakdown**

<table>
<thead>
<tr>
<th>Score</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No redness</td>
</tr>
<tr>
<td>1</td>
<td>Mild redness (blotchy and non-uniform)</td>
</tr>
<tr>
<td>2</td>
<td>Moderate redness (severe in spots but no in uniform in appearance)</td>
</tr>
<tr>
<td>3</td>
<td>Severe redness (uniformly severe in appearance)</td>
</tr>
</tbody>
</table>

**Redness**

<table>
<thead>
<tr>
<th>Score</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>None</td>
</tr>
<tr>
<td>1</td>
<td>Mild erosion involving epidermis only</td>
</tr>
<tr>
<td>2</td>
<td>Moderate erosion involving epidermis and dermis with no or little exudate</td>
</tr>
<tr>
<td>3</td>
<td>Severe erosion of dermis with moderate involvement of dermis with low volume or no exudate</td>
</tr>
<tr>
<td>4</td>
<td>Extreme erosion of epidermis and dermis with moderate volume and persistent exudate</td>
</tr>
</tbody>
</table>


Incontinence-associated dermatitis Does it have you seeing red? ANCC, 56hn2-56hn10.
References


