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REVIEW

Incontinence-Associated Dermatitis in Older Intensive Care Patients: A Review and Case Report

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Background: Incontinence-Associated Dermatitis is a serious skin injury causing suffering, secondary infection, and inducing almost six times more pressure sore than normal skin patients. This moisture and chemical skin irritation is a concern, especially for intensive care unit nurses. This study aimed to review the effective nursing strategy for preventing and caring for incontinence-associated dermatitis in older intensive care unit patients and pilot its feasibility.

Methods: The five databases, including PubMed, Google Scholar, CINAHL Complete, WanFang, and CNKI, were searched, and articles were screened and extracted. The strategies and details of prevention and care for incontinence-associated dermatitis were reviewed and summarized. Finally, selected strategies were applied to five intensive care unit patients with various health conditions and levels of Incontinence-Associated Dermatitis severity.

Results: The literature review found that there is a standardized nursing process for incontinence-associated dermatitis. The prevention and care strategies for incontinence-associated dermatitis include assessment, risk factor management, skin cleaning, skin protection, and health education and training. In actual clinical application, personalized nursing measures can positively impact patients. Five case studies from our pilot confirmed this finding.

Conclusion: Personalized nursing measures can positively impact patients in actual clinical applications. Our five case studies implementing the strategies from the review confirmed this finding. In clinical work, it is recommended to develop personalized nursing programs for specific risk factors of older intensive care unit patients.

Protocol Registration: TCTR20230808004.

Keywords: case report, intensive care unit, older patients, incontinence-associated dermatitis, nursing

Introduction

Incontinence-associated dermatitis (IAD) is inflammation and skin damage in perianal and perineal areas. This type of dermatitis results from chemical irritation from urine and feces among patients with urinary and fecal incontinence.[1,2] Statistics and impacts of IAD indicate this dermatitis is a global skin problem, particularly among older patients, especially those in the Intensive Care Unit (ICU).[3]

According to data from the Seventh National Census on the Chinese Government Website, the number of older people in China is increasing year by year,[4] and the number of older people with various health problems in the ICU is also increasing. The ICU patient's median age has steadily increased over the past few decades. Patients in many ICUs are now over 65 years.[5] Most patients in ICU are severe, with gastrointestinal function decline, malnutrition, and neurological dysfunction, then they are prone to experiencing IAD.[6]

Studies from Turkey (6.89%), Canada (19.00%), Thailand (20.67%), the United States (21.30%), and Australia (50.00%) have reported that the incidence of IAD in ICU patients can reach from 6.89 up to 50%.[7–11]This skin damage can cause great trouble to patients, such as skin ulceration and pain, which will not only increase the discomfort of patients but also cause stress injury and increase the cost of treatment when admitted to hospital.[7,12] Moreover, IAD can

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cause both secondary infection and pressure ulcers, which these two health problems correlate with prolonged length of stay and in-hospital mortality.[10,12]

Using standardized nursing methods can reduce the incidence of IAD, reduce patients' pain, and promote skin recovery from IAD. This paper used the mixed learning method to study and analyze literature in the last five years. Older population statistics, older adults in the ICU, and the situation of patients with IAD in the ICU were summarized for this study. Moreover, prevention and care strategies for older adults with IAD were also summarized for guiding practice. Finally, the five case studies were piloted to prove the feasibility of prevention and care for ICU older adults with IAD to guide intervention development and future study.

Objective

This study aimed to review and summarize statistics on the aging population and older adults admitted to ICU, IAD older ICU patients, prevention and care strategies for IAD among older adults, and pilot the feasibility of selected prevention and care strategies among older patients in the ICU.

Method

The five databases, including PubMed, Google Scholar, CINAHL Complete, WanFang, and CNKI, were searched to find articles reporting prevention and care for older adults with IAD. Keywords including incontinence-associated dermatitis, IAD, older adult, Intensive Care Unit, and nursing strategy were used for the search process, and only articles specifically studying or reporting prevention and care for older adults with IAD were included for this review. Searching was limited for five years, between 2017–2022.

An initial search from five databases found 2415 articles and 28 papers were selected after the two independent reviewers completed the title and abstract screening. The two reviewers agreed to review the article together when finding disagreements. After reviewing the full papers, we included 17 articles for data extraction and generated the results. Because we found both academic and research articles and the time of measuring outcomes from each study were different, a meta-analysis could not be conducted, and the narrative method was applied to present our results. To provide brief information about the aging population, strategies summarization, and feasibility of interventions, the structures of the finding report were as follows: aging population and older ICU patients, IAD in older ICU patients, what should be done clinically (summarized prevention and care strategies for older adults with IAD), and cases study. Finally, discussion and recommendations were provided.

Results

Aging Population and Older ICU Patients

The life span of people all over the world is getting longer, and the proportion and number of older people in every country is growing. The number of people aged 60 and over in the world will increase to 1.4 billion by 2030 and 2.1 billion by 2050.[4] China is a country with a large population. According to the data of the seventh Chinese census, the population aged 60 and above is 264.02 million, accounting for 18.70% (among which, the population aged 65 and above is 190.64 million, accounting for 13.50%), up 5.44 percentage points compared with 2010. The population is aging further.[13]

Older adults have become the central group of patients in the hospital due to the aging process of various tissues and organs of the body and their chronic and acute health problems, such as falling and accidents. At the same time, they are more experienced with complex and life-threatening diseases and become the main population in ICU.[14] In the ICUs of different countries, the proportion of the older is different. According to the research, the proportion of the older in the ICUs of Israel, the United States, and Australia can reach 17.2%, 57.1%, and 25.7%, respectively.[15]

IAD in Older ICU Patients

The Physiological Structure of the Skin

Skin is a tissue structure covering the surface of the human body. It is the body's outermost organ and is constantly exposed to external pathogens.[16] Human skin uses functional layers, cell types, and extracellular matrix to provide

physical integrity and immune protection from the external environment, with the perianal and perineal skin having a thinner cortex than other areas.[17]

Skin barrier maintenance and other functions decline with age in older adults, and skin aging is the cumulative effect of both internal and external factors. Due to changes in epidermal and dermal structures in the older skin, the effectiveness of skin barrier function is reduced, and surface lipid production is significantly decreased.[3] A reduced skin barrier makes older adults more sensitive to irritants such as cleaning products. With the increase of age, the incidence of xerosis, pruritus, and skin irritation increase in the older population.[18] The skin of the older is more easily damaged, and the incidence of IAD caused by contact with irritants such as urine and feces is higher after incontinence. Decreased immune response in older adults can also lead to delayed wound healing, increased sensitivity to irritants, and increased inflammation and infection.[3]

Incontinence

Incontinence has a high incidence in the older population. According to a multi-center study, the prevalence of all types of incontinence in older people aged 65 years or older was 28.3%, including 18.2% urinary incontinence, 2.3% fecal incontinence, and 7.8% dual urinary incontinence.[18] Another epidemiological study conducted in 32 STATES in the United States found that 46.6% of patients had urinary, fecal, or double urinary incontinence. Gray and Giuliano reported in their article that the prevalence of IAD was 45.7% in patients with any type of urinary incontinence.[10] The significant type of incontinence in ICU patients is double incontinence, and urinary incontinence is usually managed with an indwelling catheter.[19]

Pathology of IAD

Incontinence-associated dermatitis (IAD) is characterized by erythema, red rash, skin infiltration, erosion, or desquamation, with or without infection, mainly in the buttocks, perineum, perianal area, or groin.[1] The pathophysiology is that when urine and feces come into contact with the skin for a long time, they change the skin's PH, clog pores, destroy the skin's barrier function, and make the skin over-hydrated, leading to an inflammatory response.[1,20] Increasing the frequency of cleaning to keep skin clean can damage the cuticle, accelerating the damage to the skin barrier. When the skin has an inflammatory response, the patient's skin will be eroded or exfoliated, and the skin is more susceptible to candida infection and fungal dermatitis, called secondary infection.[1]

Epidemiology of IAD

Gray and Giuliano investigated the prevalence of IAD in 36 states of the United States in 2018. They found that the overall prevalence of IAD was 21.3% (1140/5342), and the prevalence of IAD in incontinence patients was 45.7% (1140/2492).[10] Data showed that the incidence of IAD in hospitalized patients was 19%-50%, and incontinence dermatitis in stroke was 5.6%-50%.[11] In the ICU, the incidence of IAD can be as high as 45%, with an even higher incidence among older patients in the ICU.[1] Chinese studies have reported a 37% to 50% incidence of IAD in the ICU.[21]

Factors Affecting IAD

Cognitive decline and frequent incontinence in loose or fluid stools were independent risk factors for the early development of IAD. Other studies have shown that gender, nutritional support, cancer history, and hypnosis/sedation are associated with IAD in ICU patients.[2] Male sex, diabetes mellitus, fecal incontinence, friction, and shear force are also risk factors for IAD.[22] Patients with a higher body mass index (BMI) are more likely to develop IAD. Loose stools, diabetes, age, smoking, non-diaper use, fever, and hypoxia were independently associated with IAD Class 2 in patients with severe fecal incontinence.[22] In conclusion, factors related to IAD were aging, patients with cognitive decline, smoking, non-diaper use, frequent incontinence, loose or fluid stool, male, malnutrition, high BMI, fever, cancer history, getting hypnotic/sedative drugs, hypoxia, diabetes mellitus, friction, and shear force.

Effects of IAD on Patients

Skin damage is a sensitive quality indicator closely related to patient safety, posing significant challenges in clinical practice.[23] IAD patients often feel uncomfortable and experience pain, burning, itching, or tingling in the infected skin area.[2] Skin lesions associated with IAD are susceptible to infection due to impaired barrier function. In addition, IAD

prolongs a patient's hospital stay, increases medical costs and caregiver workload, and reduces the patient's quality of life.[12]

What Should Be Done Clinically?

The intensive care unit (ICU) has advanced patient care equipment for long-term observation, treatment, and care of critically ill patients. Nursing staff should pay special attention to the skin care of patients. Based on our review, five nursing interventions should be done for all patients in ICU, especially older adults.

Assessment

The first step that caregivers need to take when they come into contact with a patient is assessment before they can develop a care plan for the patient. The assessment included incontinence type and severity, skin condition assessment, IAD rating, and pain assessment.[24,25] IAD grade evaluation, including Incontinence-associated Dermatitis and its severity (IADS), IAD Assessment Intervention Tool (IADIT), Skin Assessment Tool, IAD Severity Classification Tool, Perineal Assessment Tool, Perirectal Skin Assessment Tool, and the Ghent Global IAD Categorization Tool can be used in the clinic. Standardized assessment can help nurses determine the degree of risk and severity of IAD and provide a basis for implementing personalized nursing measures.[26] The selection of assessment tools in clinical practice should be accurate and conducive to nurses' implementation. Therefore, evaluation tools should be those that do not add much clinical work and are illustrated.

Risk Factor Management

Risk factors of IAD include patient factors, health condition factors, and skin intervention factors. Patient factors included gender, age, nutritional status, and higher BMI; health condition factors included high fever, various urinary incontinence, decreased fecal handling ability, decreased mobility, additional linen layers, longer hospital stay, and lower Braden scale score; skin intervention factors include skin assessment, skin cleansing techniques, dryness of the skin, exposure time to urine and feces, skin cleanliness, and use of skin protectants. However, the most direct risk factor for IAD is incontinence.[1,27,28]

Clinical management of factors leading to IAD should be carried out according to the actual situation of patients.[26] Patients' age, gender, and other fundamental factors cannot be changed. Therefore, treatment and nursing care should focus on independent factors that can cause IAD, such as incontinence control and management. The primary solution is to remove the patient's skin from the moist environment. If the incontinence is difficult to control, the patient's excreta should be well managed to avoid long-term skin maceration.[29] Urinary management is often achieved with catheters. Feces management tools include placing a stool drainage catheter or sticking an ostomy bag to the anus. Oily skin protectors can separate the skin from excrement, while zinc oxide ointment can help the skin inflammation subside quickly.[30] Patients with malnutrition should be fortified with nutritional supplements to promote epidermal growth.[25] If the patient's incontinence is due to diet, appropriate nutritional products should be selected for the patient and treatment of other diseases.

Skin Cleaning

Clean the skin as soon as possible when it is contaminated is the first recommendation to reduce skin irritation and damage caused by excreta components.[23,29] In addition, the whole body should be cleansed at least once a day.[19] The cleaning method should not increase the friction of the skin surface and damage the cuticle as a principle. In the same way, the cleaning method should be washing or drying, and rough rubbing should be avoided.[23,31] After cleansing, the skin should be gently patted to dry the skin's surface.[19] Soap is not recommended for skin cleansing products. Instead, skin cleansers such as sprays and foams[32] can be used, with mild ingredients that form a protective film over the skin's surface while cleansing. Disposable wet towels are recommended in the ICU[33] to reduce bacterial growth and cross-infection. Using a breathable mattress promotes air ventilation on the skin's surface. The skin should be kept dry by avoiding sticking together with the absorbent or bed surface and being exposed to air as much as possible.[31,34] If the patient has IAD, special attention should be paid to the disinfection of damaged skin areas. Damaged skin should be

washed with normal saline and disinfected with disinfectant to kill bacteria. Drugs such as epidermal growth factor, like Recombinant Bovine Basic Fibroblast Growth Factor External Solution, can promote epidermal growth recovery.[35]

Skin Protection

Clinical Excellence Commission recommended in IAD Best Practice Principles (2021)[36] skin protectants provide appropriate barrier protection against exposure to moisture and excreta, exacerbating skin damage and secondary infections, while keeping the skin appropriately moist and not dry.[37] Skin protectants are increasingly being used in the prevention of incontinence dermatitis. It forms a protective film between the cuticle and excreta to protect the skin, promote skin recovery and IAD healing, and reduce pain and itching symptoms in patients.[30,38] Clinically common skin protectants include oils, moisturizing, and zinc oxide ointments.[30] Each skin protector has its characteristics and needs to be used according to the actual needs of patients. Skin protectants should be used regularly after each skin cleaning.

IAD Education and Training

Prevention and control of incontinence-related dermatitis are influenced by nurses' perceptions, knowledge, and behavior.[28,39] Lumbers and Holloway (2019) and Del et al both recommend that caregivers of older persons should be educated and trained on how to take care of their skin.[28,40] Management personnel should formulate standard preventive and therapeutic nursing procedures for IAD, standardize nursing behaviors, and improve nursing quality. The training content of nursing staff should include evaluation and recording of skin integrity, skin cleansing, skin protection measures, and nutritional implementation of patients,[19,40] to improve the knowledge, skills, abilities, and attitudes necessary for nursing staff in IAD care.

Pilot Methods

After finishing the literature review and summarizing the results, prevention and care strategies were implemented in five cases. The Center for Ethics in Human Research, Khon Kaen University committee approved this study before a pilot study. The approval date is 12 July 2023, and the approval number is HE662113. The different characteristics of patients and severity levels of IAD among five ICU patients were considered for providing various skin conditions and care strategies. Participants received study information and decided to participate in this study by signing the informed consent. Moreover, the patients consented to their cases being published. Finally, all collected information was anonymous, and the patient collection form was used by code.

Case Studies

Case 1

A 67-year-old male patient was admitted to the hospital due to hypertensive cerebral hemorrhage and was transferred to the ICU after the removal of an intracranial hematoma operation. The patient had urinary incontinence and began to have fecal incontinence on the third day of admission. Urinary incontinence was treated with a catheter, and the stools were 6–8 times a day, yellow and loose stools, which was considered to be caused by the patient's inadaptability to enteral nutritional milk. The treatment is to assess the patient's skin first to understand the patient's current skin condition. The result of the assessment using IADIT is high-risk. This patient has changed the varieties of enteral nutrition milk, used antidiarrheal drugs, cleaned the skin, and kept it dry. Because the patient's skin was dry all over the body, grease skin protectors were applied to the sites prone to IAD to protect the skin. The patient was reassessed on the fifth day after admission, and fecal incontinence was under control. He defecated only once, yellow and soft. No IAD occurred in the patient.

Case 2

An 87-year-old female patient was admitted to the hospital because of a fracture and was transferred to ICU for treatment after surgery. The patient has urinary incontinence and fecal incontinence, the stool will flow out at any time, and yellow loose stools, are considered to be caused by the relaxation of the anal sphincter. The assessed result of IADIT is high-risk. Urinary incontinence is treated with an indignant catheter and stool management. Clinical use an ostomy bag connected

to the patient's anus to collect stool to avoid stool contamination of the skin was used for fecal incontinence management. The ostomy bag was cleaned every shift and replaced every 5–7 days. However, this bag was replaced in time if there was leakage. The patient's skin was thoroughly cleaned, and a moisturizing skin protector was applied to the skin's surface for each change of stoma bag. After three days in the ICU, the patient's skin status was normal without IAD, and the patient was transferred back to the general ward for further treatment.

Case 3

An 80-year-old female patient was admitted to the hospital due to respiratory failure and was placed on mechanical ventilation in the ICU. The patient has urinary incontinence, spilling urine every time he coughs. The sacral caudal skin of the patient evaluated with IADIT had moderate incontinence dermatitis with redness on the skin surface and scattered oozing spots around the anus. The patient communicated by writing that she felt needle-like pain and itching. The management of urinary incontinence in this patient was using indwelling catheters. After a thorough daily cleansing, an ointment containing zinc oxide was applied to the dermatitis area. The patient felt a significant reduction in skin tingling and itching after treatment, and the injured skin began to improve on day 3rd and recovered entirely after ten days.

Case 4

A 95-year-old male was in ICU due to severe pneumonia and was very serious, unable to move his body. On the second transfer day, the patient developed diarrhea 6–8 times per day. The patient's skin condition was good on the first day of hospitalization, with no incontinence dermatitis, and the skin care regimen was followed by keeping the skin clean and dry and applying emollient skin protectants. The next day when the patient starts to have diarrhea, change the type of skin protector to oily to separate the excrement from the skin. The patient's diarrhea improved on the fourth day of transfer, and the patient's perianal skin was assessed without IAD.

Case 5

A 71-year-old male patient was admitted to the hospital for intestinal obstruction, underwent intestinal resection, and was monitored in ICU after enterostomy. The patient had a colostomy, but the lower colon of the colostomy secreted intestinal fluid from the incontinence of the anus, causing the skin around the anus to remain moist for a long time. IADIT assessment on admission to ICU belongs to early IAD. The skin care measures are mainly to keep clean and dry. Due to the small amount of fluid flowing out, the nursing staff apply zinc oxide ointment after cleaning the patient's skin, pad dry gauze, and change it every two hours. The patient's skin had improved significantly on the third day after transfer. IADIT assessment indicates the result is high-risk. The next step is to replace zinc oxide ointment with emollient ointment to keep the skin clean and dry. After nine days of hospitalization, the patient was discharged with good skin and no IAD.

Discussion

The literature review shows that interventions in assessing IAD patients in older ICU units, early prevention, intervention management of risk factors, skin cleansing, and drying, use of skin protectants, and personnel training can be effective.[1,23–29,37,39] In particular, in the context of skin cleansing, much literature lists the steps of skin cleansing in detail.[23,32] Using skin protectants to protect the skin before IAD development is effective for skin management of IAD.[37] Many articles also mentioned the management of IAD pathogenic factors and proposed that the management of pathogenic factors is an effective measure to control the progression of IAD.[26]

This study was conducted in only five older ICU patients, and all nursing regimens did not violate basic nursing principles. According to the results of the case implementation, even if the patient's skin condition is good when the patient has incontinence, the IADIT evaluation result is a high risk, indicating that the patient's IAD may be aggravated. For prevention, skin protectants should be applied to the patient's skin as early as possible. With early control of incontinence factors, the patient's skin can recover quickly, even if it is in a broken state. Therefore, personalized nursing plans should be put forward according to the actual situation of patients, and nursing measures for IAD factor control should be implemented as soon as possible.

This study summarized the experience of previous studies on IAD nursing through a literature review and found that personalized nursing programs should be promoted and implemented in older ICU patients (Figure 1). Literature review methods can identify new IAD care options in the literature. This summarized and provided personal care plan can be used for IAD patients in the ICU. However, only some care options are suitable for local use.[1,23–29,37,39] Therefore, care plans based on research literature should be validated by local experts before they are rolled out.

According to nursing procedures, management of IAD should begin with an assessment. De Meyer et al reported ten tools for assessing IAD, which should be selected according to local conditions.[41] Identifying and managing risk factors are vital steps in IAD prevention and treatment. Proper collection and management of excreta can prevent the patient's

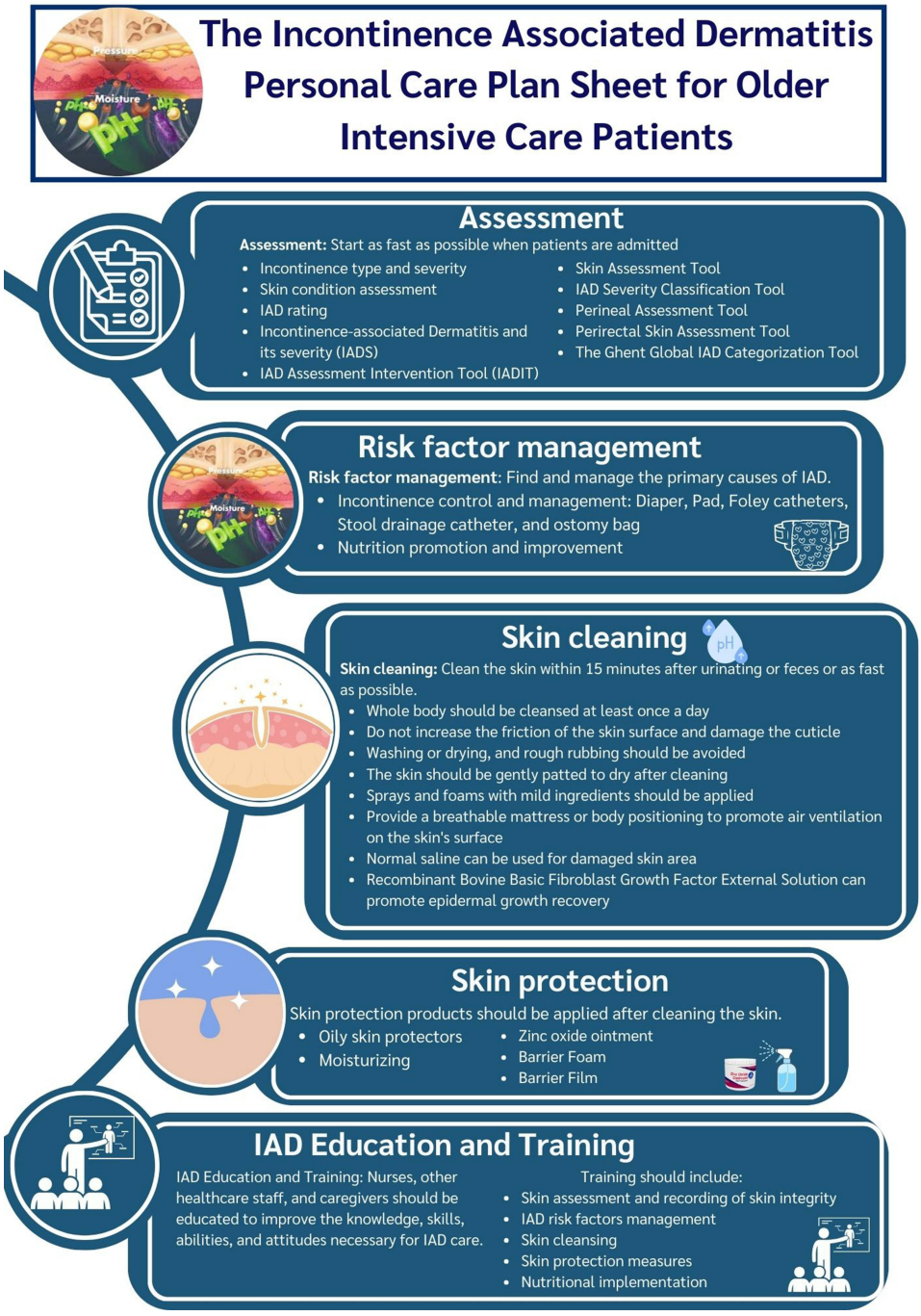

Figure 1 The Incontinence Associated Dermatitis Personal Care Plan Sheet among Older Intensive Care Patients.

skin from immersing in urine or feces, thereby protecting the skin barrier from being breached.[29] Timely skin cleaning should be performed when excreta is not appropriately collected.[23,29] Clean the skin using a tapping technique to protect the cuticle from damage and keep the skin dry and breathable after cleaning is recommended.[23] Different skin protectants have different functions, such as barrier creams to moisturize but not impregnate the skin, oils to separate the skin from excreta, and zinc oxide ointments to grow cells and control infection.[30,38] In addition, many traditional Chinese medicine preparations can be used. The study of Kaçmaz et al reported the relationship between nurses' knowledge and attitude and the prevalence and care of IAD,[7] Nursing staff should be regularly trained on IAD knowledge to implement nursing measures effectively.[19,40]

Conclusion and Recommendation

We found that older adults have become a significant group of people worldwide and take over half of the beds in the ICU. These older ICU patients become more prone to skin damage because of their aging process and chronic conditions. Moreover, they have often experienced feces and urinary incontinence, leading causes of IAD. Our review found that prevention and care strategies for older adults with IAD included assessment, risk factor management, skin cleaning, skin protection, and IAD education and training. However, individual nursing interventions were suggested for each patient. Finally, the five case studies were conducted to prove the feasibility of selected individual nursing interventions, and the patients' skins had improved significantly by these interventions.

According to the results of case implementation, it is recommended to make a personalized care plan for the patient, establish a personal care plan sheet, and carry out targeted care and treatment for the main risk factors of the patient to get the best care effect. The older patients in ICU are a large and developing group, so the nursing staff should pay more attention to their skincare.

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Disclosure

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