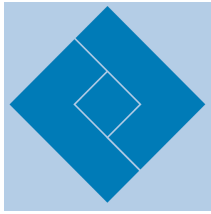


**WOUND CARE**

Incontinence-associated Dermatitis

A Consensus

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Incontinence-associated dermatitis (IAD) is an inflammation of the skin that occurs when urine or stool comes into contact with perineal or perigenital skin. Little research has focused on IAD, resulting in significant gaps in our understanding of its epidemiology, natural history, etiology, and pathophysiology. A growing number of studies have examined clinical and economic outcomes associated with prevention strategies, but less research exists concerning the efficacy of various treatments. In the clinical and research settings, IAD is often combined with skin damage caused by pressure and shear or related factors, sometimes leading to confusion among clinicians concerning its etiology and diagnosis. This article reviews existing literature related to IAD, outlines strategies for assessing, preventing, and treating IAD, and provides suggestions for additional research needed to enhance our understanding and management of this common but under-reported and understudied skin disorder.

Even though incontinence-associated dermatitis (IAD) is widely recognized as a frequent complication of urinary and fecal incontinence, surprisingly little is known about its epidemiology, pathophysiology, diagnosis, or management. To focus greater attention on this problem and to define the existing research and the gaps in clinical evidence, a panel of experts met in Chicago in July 2005. This review, authored by all the panel members, summarizes current knowledge concerning incontinence-associated skin problems in adults and points out some of the many questions and issues that require further investigation.

Methods

MEDLINE and CINAHL databases were searched using the following key terms: diaper rash, moisture maceration injury, perineal dermatitis, irritant dermatitis, contact dermatitis, intertrigo, and heat rash. Articles cited were limited to any published reference that specifically focused on dermatitis associated with fecal and/or urinary incontinence. Thirty-six review, theory-based, and research articles were identified and all were included in our review.

Definition

A variety of terms have been used to describe incontinence-associated skin problems, but a search of the MEDLINE and CINAHL databases reveals no predominant name for this disorder. When applied to infants, diaper rash is the principal term, and diaper rash is listed as an established keyword in both MEDLINE and CINAHL databases with 414 and 119 references published between January 1966 and February 2006, respectively. However, this term is not preferred when describing skin problems in adults for a variety of reasons including (1) differences in barrier function of the skin in adults vs neonates or infants, (2) differences in products used to contain urine or fecal materials, and (3) the pejorative connotations of the word diaper when applied to adults with urinary or fecal incontinence.

Therefore, a number of alternative terms were identified that have been applied to adults, including moisture maceration injury, perineal dermatitis, irritant dermatitis, contact dermatitis, intertrigo, or heat rash. However, a search of MEDLINE and CINAHL databases reveals that no single term predominates and none adequately describes skin problems associated with urinary and fecal incontinence.

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For example, a search using the term perineal dermatitis revealed only 19 articles published between January 1966 and February 2006 in MEDLINE and 14 published during a similar period in CINAHL. The terms heat rash and moisture maceration injury were associated with even fewer articles, and most of them did not mention incontinence as a causative factor. Irritant dermatitis, contact dermatitis, and intertrigo are established key words with multiple associated articles (more than 10,000 combined), but they are not specific to skin problems associated with urinary or fecal incontinence.

Among the existing terms, perineal dermatitis produced the highest number of articles specifically associated with incontinence-associated skin problems (19 articles listed in the MEDLINE database and 14 in CINAHL between 1966 and 2006). However, the perineum is defined as the area of skin between the vulva and anus in women and the scrotum and anus in men,¹ an area much smaller than that affected by incontinence-related skin problems. Therefore, we elected to describe this condition as Incontinence-associated Dermatitis (IAD). This term was chosen because it adequately describes the response of the skin to chronic exposure to urine or fecal materials (inflammation and erythema with or without erosion or denudation), specifically identifies the source of the irritant (urine or fecal incontinence), and acknowledges that a larger area of the skin than the perineum is commonly affected.

■ Clinical Manifestations and Classification

Researchers and clinicians consistently describe IAD as characterized by inflammation of the surface of the skin with redness, edema, and in some cases bullae (vesicles) containing clear exudate.^{2,8} Erosion or denudation of superficial layers also has been described and is generally associated with more advanced or severe cases. Nevertheless, several researchers and clinicians point out that IAD should be distinguished from wounds caused by differing etiologies, such as full-thickness wounds (caused by pressure and shear) or linear lesions (caused by a skin tear).^{4,5,9} Kennedy and Lutz³ noted that areas of redness may be patchy or consolidated, and Gray and colleagues⁶ observed that IAD associated with urinary incontinence tends to occur in the folds of the labia majora in women or the scrotum in men, whereas IAD associated with fecal incontinence tends to originate in the perianal area. Candidiasis, with its characteristic maculopapular rash and satellite lesions, is identified as a common complication of IAD.^{3,6} Other potential complications, such as erythrasma, a bacterial infection of the skin caused by *Corynebacterium*, have also been observed, but no research was found identifying how often these conditions occur among patients with IAD.

Three instruments have been developed that are specifically designed to evaluate IAD^{2,3,7} (Table 1). The Perineal Assessment Tool² evaluates IAD risk based on (1) the type of irritant, (2) the duration of contact, (3) the condition of

the perineal skin, and (4) the total number of contributing factors. The Perineal Dermatitis Grading Scale is an expansion of the Perineal Assessment Tool⁷ that incorporates elements of the conceptual framework proposed by Brown and Sears.⁸ It is designed to assess the scope and severity of IAD and measure changes in these factors as the result of nursing interventions. Kennedy and Lutz³ developed the IAD Skin Condition Assessment Tool that generates a cumulative severity score based on area of skin affected, degree of redness, and depth of erosion.

Despite the presence of these tools specifically designed for the assessment of IAD, the most common instrument used for moisture-related skin damage in the perineum and groin is the staging system promulgated by the National Pressure Ulcer Advisory Panel (NPUAP).¹⁰ Under this system, a stage 1 wound is defined as a change in skin temperature, tissue consistency, or sensation in the presence of intact skin and a stage 2 wound indicates partial thickness skin loss involving epidermis, dermis, or both. Whether stage 1 and stage 2 wounds are intended to describe lesions caused by irritants acting at the surface of the skin (top-down injury) or pressure acting on deep tissues (bottom-up damage) remains unclear. Higher stages (3 and 4) indicate full-thickness wounds, but they are clearly associated with deep tissue injury and subsequent pressure ulceration.

Since the NPUAP staging system was designed to measure the extent of tissue destruction caused by pressure injury, we do not recommend its use for the classification of IAD. The Perineal Assessment Tool has undergone content validation by WOC nurses and may be used to assess IAD risk.² Inter-rater reliability was reported as 87%. The Perineal Dermatitis Grading Scale was described by Brown in 1993,⁷ but a review of MEDLINE and CINAHL databases did not reveal any reports of validity or reliability testing, or subsequent studies using the tool. Because none of these instruments has been used extensively in research or clinical settings, we recommend that they be combined with regular, descriptive assessments of skin folds within the perineum, the lower abdomen, between the buttocks and adjacent skin folds of the inner thighs, scrotum, or labia majora when assessing an individual patient.

■ Epidemiology

A limited number of studies were identified that report prevalence or incidence of IAD. Reported prevalence rates vary from 5.6% to 50%.¹¹⁻¹⁸ Incidence rates, usually reported over a period of 4 weeks, vary from 3.4% to 25%.^{13,15} Most studies were conducted in long-term care settings and were based on small samples in single institutions, although two studies^{15,16} were drawn from multiple nursing homes in the United States representing a sample size of 1918 residents, and a single acute care based study¹⁸ was based on a sample of 976 subjects. Although data from these studies provide some estimate of the prevalence and

TABLE 1.**Instruments for Evaluating Incontinence-associated Dermatitis (IAD)**

Reference (Instrument Name)	Factors	Scoring
Nix ² (Perineal Assessment Tool)	<ul style="list-style-type: none"> I. Type and intensity of irritant <ul style="list-style-type: none"> 0. Formed stool and/or urine 1. Soft stool with or without urine 2. Liquid stool with or without urine II. Duration of irritant <ul style="list-style-type: none"> 0. Linen/pad change at least every 2 hours or less 1. Linen/pad change at least every 4 hours or less 2. Linen/pad change at least every 8 hours or less III. Perineal skin condition <ul style="list-style-type: none"> 0. Clear and intact 1. Erythema/dermatitis with or without candidiasis 2. Denuded/eroded skin with or without dermatitis IV. Contributing factors (low albumin, antibiotics, tube feeding, <i>Clostridium difficile</i>) <ul style="list-style-type: none"> 0. 0 to 1 contributing factor 1. 2 contributing factors 2. 3 or more contributing factors 	Cumulative score calculated, higher score indicates higher risk for IAD
Brown, ⁷ Brown and Sears ⁸ (Perirectal Skin Assessment Tool)	<ul style="list-style-type: none"> I. Skin color <ul style="list-style-type: none"> 0. No erythema 1. Mild erythema 2. Moderate erythema 3. Severe erythema II. Skin integrity <ul style="list-style-type: none"> 0. Intact 1. Slight swelling with raised areas 2. Swollen raised areas 3. Bullae or vesicles 4. Open or macerated areas 5. Crusted or scaling areas III. Size <p>Measured in centimeters, reporting both length and width, first for the right side then for the left side</p> IV. Patient symptoms <ul style="list-style-type: none"> 0. None 1. Tingling 2. Itching 3. Burning 4. Pain 	Descriptive instrument, no cumulative score is calculated, clinicians are encouraged to include additional descriptors to describe IAD when indicated
Kennedy and Lutz ³ (IAD Skin Condition Assessment Tool)	<ul style="list-style-type: none"> I. Area of skin breakdown <ul style="list-style-type: none"> 0. None 1. Small area (<20 cm²) 2. Moderate area (20-50 cm²) 3. Large area (>50 cm²) II. Skin redness <ul style="list-style-type: none"> 0. No redness 1. Mild redness (blotchy and nonuniform in appearance) 2. Moderate redness (severe in spots but not uniform in appearance) 3. Severe redness (uniformly severe in appearance) III. Erosion <ul style="list-style-type: none"> 0. None 1. Mild erosion involving epidermis only 2. Moderate erosion involving epidermis and dermis with no or little exudate 3. Severe erosion of epidermis with moderate involvement of dermis (low volume or no exudate) 4. Extreme erosion of epidermis and dermis with moderate volume (persistent exudate) 	Cumulative score calculated with higher numbers indicating more severe IAD

incidence of IAD in the acute and long-term care settings, further research is urgently needed to determine its occurrence in critical care units, in acute care, and in the community and homecare settings.

Only one study was identified that reported the prevalence of associated fungal infections. Junkin and associates¹⁸ found that 18% of a group of 198 patients with urinary, fecal, or double incontinence had evidence of fungal infection of the skin in the perineum, perianal, or groin area. Diagnosis was based on visual inspection, and no reliability testing of diagnosis was reported.

Little research exists focusing on the natural history of IAD, including the time to onset, spontaneous remission, and recurrence rates. Additional research is needed to elucidate these factors because this knowledge is essential in order to identify risk factors.

■ Pathophysiology

Given the paucity of data on the epidemiology of IAD, it is not surprising that relatively little is known about its etiology and pathophysiology. Nevertheless, a number of factors have been identified that are likely to interact, producing the characteristic skin damage of IAD (Figure 1). Brown¹⁹ designed a conceptual framework for factors contributing to IAD based on an integrative review of 16 articles. Brown¹⁹ hypothesized a multifactorial etiology and identified 3 principal areas contributing to IAD: (1) tissue tolerance, (2) perineal environment, and (3) toileting ability. Critical elements determining tissue tolerance include the patient's age, health status, nutritional status, oxygenation, perfusion, and core body temperature. The perineal environment is affected by the character of incontinence (urinary, fecal or double urinary and fecal incontinence), the volume and frequency of incontinence, mechanical chafing, inducing agents such as irritants or allergens, and factors that compromise the skin's barrier function such as hydration, pH, fecal enzymes, and fungal or bacterial pathogens. Toileting ability is conceptualized as mobility, sensory perception, and cognitive awareness. Brown¹⁹ subsequently completed a validation study of this framework with a group of 166 patients being treated in an acute care facility. Among the factors identified in the conceptual framework, fecal incontinence, frequency of incontinence, poor skin condition, pain, poor skin oxygenation, fever, and compromised mobility were statistically significantly correlated with IAD.

Bliss and associates¹⁷ extended the application of Brown's model¹⁹ to elderly nursing home residents. They operationally defined the model's variables using items on the Minimum Data Set (MDS), a standardized computerized instrument used for the comprehensive assessment of the cognitive, physical, and social function, and clinical status of nursing home residents. Unlike Brown,¹⁹ Bliss and associates¹⁷ were able to analyze cognitive status and add restraint use and double incontinence to their analy-

sis given the scope of the MDS and their large data set. Perineal dermatitis was defined using clinician's orders in the medical record. The final data set contained 59,558 MDS records and 2,883,049 practitioner orders for residents in 555 nursing homes in 31 states. Data from 2 subsamples, each with the records of 10,215 older nursing home residents, were analyzed using logistic regression to identify the significant factors associated with perineal dermatitis.

Of note among the findings of Bliss and associates¹⁷ was that having fecal incontinence only held the strongest relationship to perineal dermatitis; there was no significant association between perineal dermatitis and having urinary incontinence only. Other significant factors for perineal dermatitis in the perineal environment category were having double incontinence and more MDS items associated with mechanical chafing. Impairments of tissue tolerance category (ie, more health problems, presence of fever, requiring nutrition support, and having more problems of diminished perfusion or oxygenation) and altered toileting ability from daily use of restraints were other significant factors.

Other researchers and clinicians have focused on topical factors influencing the skin's barrier function.^{6,13,20} In a review of the pathophysiology of contact dermatitis that was not specific to IAD, Ghadially²¹ defined the skin's barrier function as a 2-component system comprising a multilayered plate of hydrophobic lipids (sometimes described as mortar) filling the intercellular spaces between lipid-depleted keratinocytes. These lipids are composed of ceramides, free fatty acids, and cholesterol, as well as hydrolytic enzymes that optimize the efficiency of the skin barrier. Disruption of this barrier leads to release of cytokines and localized inflammation characterized by an increased production of cholesterol, ceramides, and fatty acids, and inhibition in enzyme function reducing the normal cycle of lipid breakdown until the skin's barrier function is fully restored. In addition, cytokine release and inflammation provoke DNA synthesis and epidermal hyperplasia, in an attempt to restore the "bricks" of the skin's barrier, the keratinocytes of the stratum corneum. Given an isolated injury to the skin's barrier function such as tape stripping, the body is able to complete repairs within a period of a few days to several weeks. However, when the skin is exposed to an irritant over a prolonged period or is exposed multiple times before it can fully repair itself, a vicious cycle is established characterized by incomplete repair and increasing inflammation and damage. Aging skin has been shown to have lower baseline function and recovery time following an acute insult and is particularly vulnerable to damage from long-term exposure to surface irritants such as urine or stool.²¹

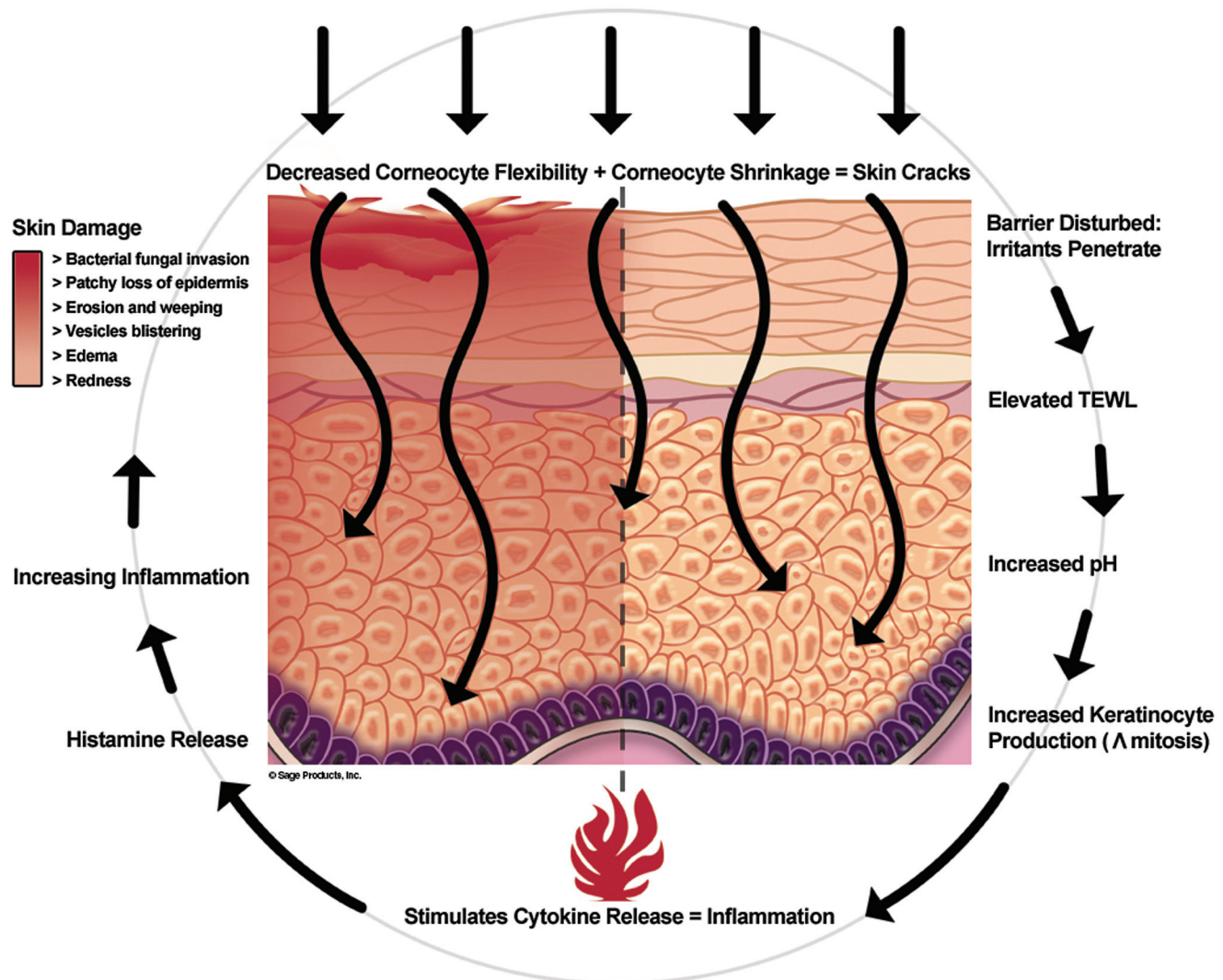
The use of absorptive or occlusive containment devices has also been identified as a contributing factor. In one study of incontinent patients in acute care facilities, 93% of a group of 198 patients with urinary and/or fecal in-

SKIN DAMAGE DEPENDENT UPON:

1. Irritant: Moisture < Urine < Formed Stool < Urine and Stool < Liquid Stool

2. Duration of Exposure

3. Frequency of Exposure



REFERENCES: Brown DS. Perineal dermatitis risk factors: clinical validation of a conceptual framework. *Ostomy/Wound Management* 1995; 41(10): 46-8, 50, 52-3.
Ghadially R. Aging and the epidermal permeability barrier: implications for contact dermatitis. *American Journal of Contact Dermatitis* 1998; 9(3): 162-9.

FIGURE 1. Reproduced with permission from Sage, copyright 2006.

continence and IAD were managed with absorptive products, compared to 7% who were not.¹⁸ Prolonged occlusion of the skin under an absorptive incontinence product for 5 days has been shown to cause an increased sweat production and compromised barrier function, resulting in elevated transepidermal water loss, CO₂ emission, and pH.²²⁻²³ In addition, the microflora of the skin undergoes a marked increase in coagulase-negative staphylococci. Zhai and Maibach²⁴ demonstrated that application of a continence containment device to normal skin produces hyperhydration that is proportional to exposure time. Warner

and coworkers²⁵ demonstrated that saline, or water alone, acts as an irritant leading to contact dermatitis in the presence of an occlusive device that does not effectively wick moisture away from the surface of the skin.

Incontinence-associated dermatitis has also been associated with an alkaline pH of the surface of the skin. Berg and coworkers²⁶ combined data from 4 clinical trials to determine the influence of moisture and pH on IAD risk in infants. Consistent with the results of Aly's group,²³ they found that skin covered by a diaper had a higher pH compared to skin that was left open to air. Although moisture

emerged as the principal factor associated with IAD, an alkaline pH was also associated with an increased likelihood of developing IAD. Burgoon and colleagues²⁷ hypothesized that microflora from fecal incontinence might convert urea from urinary leakage to ammonia, but Leyden and associates²⁸ did not support this assertion. However, Berg and coworkers²⁶ did demonstrate that an alkaline pH in persons with double fecal and urinary incontinence activates fecal enzymes, increasing the likelihood of damage when exposed to intact skin.

Urinary leakage is postulated to contribute to the risk of IAD by hyperhydrating exposed skin, by increasing its pH, and possibly by interacting with stool to activate fecal enzymes.²⁸ In addition, urine may diminish the tissue tolerance of the perineal and perigenital skin. In a study of healthy adult volunteers, Mayrovitz and Sims²⁹ demonstrated that skin wetted with synthetic urine exhibited a significant decrease in skin hardness, temperature, and blood flow during pressure load when compared to dry sites. Fader and associates³⁰ demonstrated that absorbent products actually increased tissue interface pressures when soaked, even when used in conjunction with pressure-reducing or relieving support surfaces.

When multiple factors are entered into a multivariate statistical analysis, fecal incontinence tends to emerge as even more strongly associated with IAD than use of an absorptive containment device or urinary incontinence alone.^{5,8} Several elements of stool may contribute to this association, including fecal enzymes, intestinal flora, and moisture if the stool is liquid in nature. Nix² differentiates liquid stool from solid stool in her instrument, based on clinical experience and the expert opinion of others that liquid stool tends to be richer in digestive enzymes, which, when combined with its elevated water content, is particularly damaging to the skin.

■ Prevention

Literature review reveals 5 studies that evaluated the efficacy of a routine skin care protocol for the prevention or treatment of IAD.^{13,16,31-33} Although the protocols for skin care varied in product choice or number of steps, each included cleansing with soap and water or a perineal skin cleanser, with or without application of a moisturizer and/or a skin protectant. Soap is made from a mixture of alkalis and fatty acids. Its ability to cleanse the skin requires decomposition in water releasing free alkali and insoluble acid salts that remove dirt and irritating substances from the skin.³⁴ Perineal skin cleansers combine detergents and surfactant ingredients to loosen and remove dirt or irritants; many also contain emollients, moisturizers, or humectants to restore or preserve optimal barrier function. Because they contain alkalis, the pH of soap tends to be higher than that of normal skin. In contrast, many perineal skin cleansers are "pH balanced" in order to ensure that their pH is closer to that of healthy skin (5.0-5.9).³⁵ A skin protectant is a product

that isolates exposed skin from harmful or annoying substances. In the context of a skin care regimen for IAD, skin protectants are capable of isolating the skin from excessive moisture, urine, or stool.

Lyder and colleagues¹³ enrolled 15 patients who were free of IAD at baseline and compared 2 skin care regimens over a 10-week period. During a 4-week period, subjects were managed by an unstructured perineal skin care regimen. During a subsequent 4-week period, subjects were managed by a structured regimen, described as application of a cleanser, moisturizer, and moisture repellent to the perineal skin after each incontinent episode (specific products used in the structured program were not specified). The incidence of IAD over a 4-week period was 23%; it was identical in the two groups.

Byers' group³¹ and Lewis-Byers and Thayer³³ compared soap and water to no-rinse perineal cleansing products in 10 elderly women without IAD over a period of 3 weeks. They compared 4 skin care regimens: (1) cleansing with soap and water alone, (2) cleansing with a no-rinse skin cleanser alone, (3) cleansing with soap and water followed by application of a skin protectant, and (4) cleansing with a no-rinse skin cleanser plus a moisturizer. Erythema, transepidermal water loss, and altered skin pH were most severe among women managed by soap and water alone and least severe for women managed by the regimen that combined the lower pH cleanser with a moisturizer. Although these indirect outcomes favored use of a no-rinse skin cleanser with a pH similar to that of healthy skin, the study was not adequately powered, and data collection did not occur over a sufficient period of time to measure whether these outcomes reflected differences in the occurrence of IAD in the various treatment groups.

Lewis-Byers and Thayer³³ randomly assigned 32 nursing home residents to 1 of the 2 skin care regimens: (1) cleansing with soap and water after each incontinence episode, followed by application of a moisturizing lotion or (2) cleansing with a no-rinse skin cleanser after each episode, followed by application of a barrier cream after the first incontinence episode of each shift. After 3 weeks of data collection, no statistically significant difference in maintenance of skin integrity between the groups was detected (69% vs 72%). However, use of the no-rinse cleanser did significantly reduce the amount of staff time required to perform perineal skin care (mean time reduction = 79 minutes per day).

Bliss and coworkers¹⁶ compared the efficacy of 4 skin care regimens to prevent IAD in nursing home residents in a multisite, nationwide study. The skin care regimens included (1) an acrylate polymer-based barrier film applied 3 times per week, (2) a 43% petrolatum ointment applied after each incontinent episode, (3) a combination of 12% zinc oxide-1% dimethicone cream applied after each incontinence episode, and (4) a 98% petrolatum-containing ointment that was applied after each incontinence episode. Of the 1918 nursing home residents who were screened for enrollment, 51% (n = 981) had urinary and/or fecal incon-

tinence and were free from perineal skin damage qualifying for a 6-week prospective surveillance of the occurrence of IAD. There was no significant difference in the development of new cases of IAD in any of the regimens. The overall incidence of IAD among the nursing home residents was 3.4% and the incidence of any perineal skin damage (eg, including pressure ulcers) was 4.6%. The results suggest that use of a defined skin care regimen and quality skin care products is associated with a low incidence of IAD in a high-risk population.

One study was identified that focused on the efficacy of a thick, disposable washcloth that combined a no-rinse cleanser, a moisturizer, and a skin protectant (3% dimethicone).³² During a 12-week preintervention observation period, 5 of 34 subjects with fecal or urinary incontinence (15%) developed what were described as stage 1 or stage 2 wounds. No subject developed a stage 1 or stage 2 wound during the 12-week intervention phase, a statistically significant difference.

In addition to these studies, 3 research reports were identified that examined the effects of "structured perineal skin care regimens" in patients with a variety of skin problems including IAD, skin tears, and/or pressure ulcers.^{5,14,32} They are not included in considerations of the efficacy of a structured skin care regimen for the prevention of IAD because they enrolled subjects who were continent at baseline, and outcomes were based on any form of skin breakdown rather than the development of IAD specifically. Nevertheless, each of these studies did find that institution of a structured skin care regimen over a 12-week period resulted in a statistically significant reduction in the incidence of perineal and/or sacral skin breakdown.

Based on these findings and clinical experience, review articles tend to recommend a routine perineal skin care program that includes cleansing with a product whose pH range approximates that of normal skin (Table 2). Care providers were counseled that the skin should be cleansed gently, being careful to avoid rigorous scrubbing or friction in order to minimize the risk of further compromising the skin's barrier function.^{4,6,35} Moisturization of the skin was also recommended for all patients. A variety of over-the-counter products containing humectants or emollients may be applied in a second step, or a moisturizer may be incorporated into a specially designed cleanser or cleansing system. Finally, routine use of a skin protectant is recommended for patients considered at risk of IAD, including those experiencing high volume or frequent incontinence or double urinary and fecal incontinence. Multiple products that act as skin protectants are advocated; most of them are applied as an ointment containing petrolatum, dimethicone, or zinc oxide. However, clinicians also advocate application of products that incorporate a skin protectant into a 1-step cleansing solution or system, thus reducing the time required to adequately cleanse and protect the perineal and perigenital skin in persons with urinary or fecal incontinence.

■ Treatment

An extensive literature review revealed only one study that specifically evaluated a treatment protocol for existing IAD. Warshaw and colleagues³⁶ examined the effectiveness of a cleanser containing a skin protectant in an open label uncontrolled study of 19 elderly patients with IAD characterized by erythema of the skin and associated pain but without denudation. Following 7 days of treatment in which subjects averaged 2.3 care episodes per day, both the severity of erythema and pain were significantly reduced.

Because of the lack of research focusing on the management of existing IAD in adults, recommendations for treatment must be based on clinical experience and expert opinion (Table 2). Recommendations for treatment of mild-to-moderate IAD (characterized by erythema and tenderness of intact skin) consist of a structured skin care regimen similar to those recommended for prevention with the addition of a skin protectant.^{4,6,35} Structured skin care should be provided following each major incontinence episode, particularly if fecal matter is present. This regimen should include a cleanser that is no-rinse and "pH balanced" (formulated with a pH range similar to that of healthy skin), and a skin protectant should be applied at least daily. The moisture protectant should be applied more frequently in patients with high-volume or frequent episodes of incontinence.³ Combination products are usually encouraged, because they reduce several steps into a single intervention, maximizing time efficiency and encouraging adherence to a structured skin care regimen. Combination products include moisturizing cleansers, moisturizer-skin protectant creams, and disposable washcloths that incorporate cleansers, moisturizers, and skin protectants into a single product. Staff should be educated about principles of perineal skin care, including the need to avoid vigorous scrubbing that may damage already compromised skin.

Complementary interventions include active measures to minimize urinary or fecal incontinence including a scheduled toileting program when feasible, use of a polymer-based absorptive product to wick urine or liquid stool away from the skin, or consideration of a containment device such as a condom catheter or anal pouch that reduces the area of skin exposed to stool or urine. Maximizing hydration and ensuring adequate nutritional support to meet the needs for wound healing are also recommended.

Recommendations for treatment of patients with more severe IAD associated with denudation of the skin vary somewhat. Limited clinical evidence pertaining to the prevention of IAD and multifactorial perineal skin breakdown prevention programs suggest that a structured skin care program combined with regular application of a skin protectant product may provide adequate protection to promote healing in some patients,^{5,14,32} particularly when combined with complementary interventions designed to reduce the frequency of incontinent episodes. Other interventions

TABLE 2.
Recommendations for Prevention and Treatment of Incontinence-associated Dermatitis (IAD)

Condition of Skin	Treatment Goals	Interventions
Intact skin in person with urinary or fecal incontinence	Prevent IAD Minimize contact with irritants (urine, stool, and excessive moisture) Maintain skin protection Reduce barriers to appropriate care	Begin a structured skin care regimen (1) Cleanse perineal skin daily and after each major incontinence episode using a no-rinse cleanser (2) Avoid scrubbing the skin; use a soft or disposable washcloth (3) Apply an appropriate moisturizer (often a cream product containing humectant and emollient) (4) Apply a skin protectant to minimize contact between urine and/or stool [ointment containing petrolatum, zinc oxide, dimethicone, or combination of these products, or apply a copolymer film product (skin sealant) in patients judged to be at high risk for developing IAD (high-volume/high-frequency urinary or fecal incontinence, double fecal and urinary incontinence, and fecal incontinence with liquid stool)] (5) Combine steps using a product containing a cleanser plus a moisturizer with or without a skin protectant (6) Educate caregivers to apply structured skin regimen and routinely assess for IAD (7) Begin aggressive treatment program for underlying incontinence
Mild-to-moderate IAD (skin remains intact but erythema present, with or without candidiasis)	Minimize contact with irritants (urine, stool, and excessive moisture) Maintain skin protection Eradicate cutaneous candidiasis	(1) Combine a structured skin care program with active treatment of IAD (2) Routinely cleanse and moisturize the skin using the steps noted above (3) Routinely apply a skin protectant, options include: (a) an ointment containing petrolatum, zinc oxide, dimethicone, or combination of these products (b) a copolymer film product (skin sealant) (c) skin protectant ointment with active ingredients designed to promote wound healing [Balsam-Peru, castor oil, and trypsin (BCT) ointment or BCT gel] (4) Treat cutaneous candidiasis when present (5) Apply moisturizer or moisture-barrier combination product with antifungal agent (azole or allylamine) (6) Educate caregivers to apply structured skin regimen and routinely assess for resolution or progression of IAD (7) Evaluate or begin management program for underlying incontinence

include application of a skin paste made of zinc oxide and an absorbent powder. Evidence also supports the use of a prescriptive ointment containing Balsam-Peru, castor oil, and trypsin (BCT ointment). BCT ointment has been shown to promote healing of partial thickness wounds in both laboratory and clinical settings.³⁷⁻³⁹ This formulation is hypothesized to be beneficial for the treatment of IAD because it contains ingredients that promote wound healing in an ointment that protects the skin against further moisture-related skin damage.

■ Economic Considerations

Although the cost of pressure ulcer treatment has been estimated in multiple studies,³² comparatively little is known about the economic impact of IAD. It is suspected that pressure ulcer treatment cost data may include some of the cost associated with misdiagnosed skin injuries that

are not pressure related but instead are skin injuries such as dermatitis due to incontinence, fungal infections, skin tears, and injuries caused from friction and shear. In order to accurately capture the cost of prevention and treatment of IAD, the staff assigned to collect data in the healthcare facility must have accurate skin care assessment skills to correctly differentiate pressure ulcers from other skin injuries in order to appropriately treat and determine cost.⁴⁰

Three studies were identified that incorporated the cost of preventing or treating IAD with wounds caused by other factors.^{14,32,37} Bale and coworkers¹⁴ measured costs associated with a reduction in staff time required to complete an intervention when using a no-rinse skin cleanser as compared to soap and water. Clever and associates³² calculated a reduced cost when a combination product was compared to a multiple-step skin care regimen in terms of staff time and direct product costs. Similarly, Narayanan and associ-

ates³⁷ found reduced staff time when BCT ointment was compared to a variety of other treatment interventions for partial thickness skin lesions in patients with urinary or fecal incontinence. These studies suggest that use of a no-rinse skin cleanser, or a skin cleanser that incorporates a moisturizer and/or skin protectant, has economic advantages compared to cleansing with soap and water.

Other studies examined the cost of individual products used to treat or prevent IAD. Nix and Seltun³⁵ studied direct costs of skin protectants and found an average of only \$0.10 per day spent on institutionalized incontinent patients, whereas the anticipated cost (based on average sale prices of barrier protectants) should be \$0.23 per application. Rather than suggesting positive cost savings, the results of this study suggest that prevention measures were not routinely administered, thus increasing the risk of developing IAD and the costs associated with its treatment.

In their nationwide study of IAD prevention in nursing homes, Bliss and coworkers¹⁶ conducted an economic analysis of 4 skin care regimens. As described previously, the regimens included (1) an acrylate polymer-based barrier film applied 3 times per week, (2) a 43% petrolatum ointment applied after each incontinent episode, (3) a combination of 12% zinc oxide-1% dimethicone cream applied after each incontinence episode, and (4) a 98% petrolatum-containing ointment that was applied after each incontinence episode. When total costs of the regimens (labor, products, and supplies) were compared, the average cost per treatment ranged from \$0.89 per episode of incontinence for the regimen in which the acrylate polymer-based barrier film was applied 3 times per week to \$1.74 per episode for the regimen in which petroleum (43%) ointment was applied after each episode of incontinence. The results suggest that the properties of the skin care products and their recommended administration need to be considered in cost analyses.

Two studies reported total skin care supply costs for incontinence care regimens in 3 separate long-term care facilities. Lyder and associates⁴¹ reported an average cost per day of \$5.19 when utilizing a no-rinse cleanser, skin moisturizer, and barrier ointment on incontinent residents after each episode. Clever and colleagues³² studied the impact of changing the skin care protocol in a long-term care facility to an all-in-one-step product that incorporates a thick disposable washcloth, a cleanser, a moisturizer, and a skin barrier. Estimated average cost per day per incontinent resident dropped from \$1.56 to \$1.67 utilizing the old standard of care (disposable wipes and a 1.5% dimethicone barrier cream) to \$1.07 to \$1.15 per day with the new regimen.

■ Summary

Incontinence-associated dermatitis is a common problem affecting as many as half of the patients with urinary or fecal incontinence who are managed with absorptive prod-

ucts. However, a review of the literature reveals sparse evidence concerning its epidemiology, etiology, and pathophysiology. A small but growing body of evidence exists that various preventive skin regimens are important, but significant additional research is needed in order to identify and evaluate the efficacy and effectiveness of various interventions for IAD.

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