

Review Article

Incontinence in the aged: contact dermatitis and other cutaneous consequences

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Urinary and faecal incontinence affects a significant portion of the elderly population. The increase in the incidence of incontinence is not only dependent on age but also on the onset of concomitant ageing issues such as infection, polypharmacy, and decreased cognitive function. If incontinence is left untreated, a host of dermatological complications can occur, including incontinence dermatitis, dermatological infections, intertrigo, vulvar folliculitis, and pruritus ani. The presence of chronic incontinence can produce a vicious cycle of skin damage and inflammation because of the loss of cutaneous integrity. Minimizing skin damage caused by incontinence is dependent on successful control of excess hydration, maintenance of proper pH, minimization of interaction between urine and faeces, and prevention of secondary infection. Even though incontinence is common in the aged, it is not an inevitable consequence of ageing but a disorder that can and should be treated. Appropriate clinical management of incontinence can help seniors continue to lead vital active lives as well as avoid the cutaneous sequelae of incontinence.

Key words: contact dermatitis; dermatological effects; faecal incontinence; incontinence dermatitis; infection; infections; pressure ulcers; urinary incontinence. © Blackwell Munksgaard, 2007.

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Prevalence of Incontinence

As part of the ageing process, the bladder becomes more irritable, holds less, and empties less efficiently (1). These normal changes, when accompanied by concomitant illnesses or medications, obstetrical injury, dementia, or changes in nutrition or hormonal status, can produce incontinence (1, 2).

While reported prevalence rates vary widely, incontinence tends to increase with age and becomes a relatively common affliction in those older than 50 (3). A community-based study of American women older than 50 found that 48.4% experienced urinary incontinence, 15.2% suffered from faecal incontinence, and 9.4% experienced both (4). Studies have reported the prevalence of faecal incontinence in nursing homes to be as high as 50% (5). Risk factors include advancing age, female gender, and multiparity (5); the numerous underlying causes of faecal incontinence are shown in Table 1. Incontinence is thus an important clinical problem in the elderly today and one that is expected to grow.

Cutaneous Effects of Incontinence

Although urinary and faecal incontinence increase with age, neither are natural sequelae of ageing but disorders that could be treated (6). After 6 months, transient incontinence is more likely to be established as chronic, with a decreased prognosis for long-term resolution (1). Incontinence of any type creates a hostile environment for the skin (1).

The skin's ability to provide a barrier between the internal and external environment depends on the integrity of the skin and its histological structure, the presence of intra- and extracellular lipids, and the skin's pH (7). Genital hygiene is of particular importance to the health and well-being of older women, as perineal dermatitis is frequently encountered in patients with urinary and/or faecal incontinence (8). Moreover, the risk of pressure ulcers and incontinence dermatitis can be significant when older women suffer impaired mobility and urinary or faecal incontinence (3).

Occlusion of the skin, which is often induced by incontinence pads or other containment devices,

Table 1. Contributing factors in faecal incontinence

Intrinsic factors (concomitant diseases)	
Anorectal dysfunction (44)*	
Arthritis (46)	
Cancer (44)	
Dementia (6)	
Diabetes (44)	
Faecal impaction (6)	
Gastrointestinal infections (44)	
Inflammatory bowel disease (44)	
Liver failure (44)	
Neuromuscular dysfunction (6)	
Neurosensory dysfunction (8)	
Stroke (46)	
External factors	
Obstetrical injury (5)	
Patient restraint (46)	

*Full citations are included in References list.

has a profound influence on the skin surface as shown in Table 2. Skin occluded by diapering is wetter, with higher pH, bacterial count, and susceptibility to erosion (9). Barrier permeability, as well as molecular and cellular homeostasis (10), is affected as well.

Table 2. Dermatological effects of occlusion

Parameter measured	Influence of occlusion
pH	Increases pH (47)*
Integrity of stratum corneum	Disrupts lipid organization and metabolism (47)
	Prevents expected increase in epidermal lipid synthesis (48)
	Increases TEWL (48)
	Increases hydration of stratum corneum (49)
Bacterial counts	Increased (9)
Function of stratum corneum	Prevents recovery of elevated TEWL (48)
	Increases permeability, especially to nonpolar lipids (47, 50)
	Inhibits barrier restoration (51)
Carbon dioxide emission rate	Increased (9)
Cellular function	Decreases mitotic activity (52)
	Inhibits DNA synthesis (53)
	Induces intercellular adhesion molecule 1 (54)
	Increases CD3+ epidermal lymphocytes (54)
	Inhibits increase in epidermal cell proliferation (55)
	Reduces epidermal pool of interleukin-1 α (56)
	Increases skin surface temperature (10)
Visible changes	Deepens skin furrows (49)
	Increases inflammation (54)
	Increases frequency of hydration dermatitis (57)

TEWL, transepidermal water loss.

*Full citations are included in References list.

Aged skin is additionally compromised (11). Skin becomes drier, with more tendency to crack (12), as well as be thinner, more fragile, and less resistant to infection. Loss of elasticity leaves it more susceptible to injury, while its ability to repair itself diminishes. Skin ageing also results in less surface sensory perception, increasing the risk of injuries like pressure ulcers (11).

Incontinence in aged skin produces chemical irritation, mechanical injury, and increased susceptibility to infection. Chemical irritation can be defined as an imbalance of moisture, salts, enzymes, or other chemicals (8). The pH of normal healthy skin ranges from 4.0 to 6.8, with an average of approximately 5.5. With exposure to excess moisture, pH can increase to as much as 7.5; pH with exposure to urine can reach 8.0 (8). Deterioration of the acid mantle interferes with the production of lipids and enzymes critical for barrier integrity, as well as keratinization critical to the repair of damage caused by prolonged exposure to urine or faeces (8).

The acid mantle of the skin provides significant resistance against dehydration as well as bacterial invasion (13). Disruption of the acid mantle by incontinence allows for secondary infection (14). *Staphylococcus*, indigenous to perineal skin, is the most common culprit (8). Secondary infection by *Candida albicans*, a common resident of the gastrointestinal (GI) tract, is also common (8). In those with impaired immune function, the overgrowth of cutaneous pathogens or invasion of faecal bacteria is more likely to be a complication (3).

Exposure to excess water alone can cause damage in 48 hr, with numerous effects as shown in Table 3. Stool and urine contain numerous

Table 3. Dermatological effects of water

Parameter measured	Influence of water
Visible changes	Increases erythema (58, 59)* Increases irritation (10)
Function of stratum corneum	Trend to increased cutaneous blood flow (58, 59)
	Increases TEWL (58, 59)
	Increases permeability to low-molecular-weight irritants (24)
	Increases frictional coefficient, causing increased susceptibility to trauma (14, 24)
Pathogenesis	Increases risk of pressure ulcers (13)
	Increases risk of loss of skin integrity (13, 24)
	Increases susceptibility to bacterial colonization (14, 24)
pH	Increase in pH (60)

TEWL, transepidermal water loss.

*Full citations are included in References list.

substances with the potential to further irritate skin: ammonia, which raises pH; urea, which gets converted to ammonia in the presence of bacteria-containing faeces (15); and digestive enzymes that are erosive to skin (8), creating increased erythema, transepidermal water loss, and susceptibility to fungal infection (16). A 3-week exposure to physiological concentrations of faecal enzymes and bile salts *in vivo* produced significant barrier disruption and erythema in 1 human model (16).

Excess moisture on the skin will eventually produce mechanical damage. Twice as much energy is required to produce frictional erosions on dry skin as on skin subjected to 24-hour water exposure (17); therefore, incontinence is a major risk factor in pressure ulcers (18). Skin hydration following occlusion is significantly higher and slower to dissipate in aged skin (19).

Overhydrated skin is also more vulnerable to tearing (14, 17), as immobile patients are moved (8). In addition, overzealous scrubbing during cleansing procedures on fragile elderly skin can strip away the protective horny layer, an event usually limited to epidermis, but may involve huge areas of skin (8). Any breach of skin integrity in an elderly individual can become a serious injury because of the potential for infection, loss of fluid and electrolytes, decreased thermoregulatory function, and impaired metabolism and communication (3).

Incontinence dermatitis

Perineal dermatitis, or incontinence dermatitis, is a broad term describing skin problems in patients with urinary or faecal incontinence. The condition creates much pain and discomfort in elderly suf-

ferers, causing inflammation and tissue damage to the vulva, perineum, perianal region, and buttocks (3). Prevalence of risk of perineal dermatitis, predictably, increases as mobility declines. Frequency of incontinence, baseline skin condition, overall health, management of excess moisture (20), cognitive impairment, and concurrent medications are also factors (21, 22), as shown in Fig. 1.

60% of faecal matter is micro-organisms (23). Urine and faeces in contact with the dry, cracked skin characteristic of the elderly is absorbed into the crevices, providing an excellent environment for bacterial growth (18, 24, 25). When urine and stool mix, bacteria present in the stool convert urea to ammonia (26); ammonia raises the skin pH, destroying the acid mantle and facilitating penetration of irritants. Faeces also contain proteolytic and lipolytic digestive enzymes, normally deactivated in the digestive tract (13), which are reactivated in the presence of ammonia, with the potential to erode skin (16, 26).

Perineal dermatitis is thus more likely when stool and urine are simultaneously present (27) as pathogens in stool overwhelm the skin's defences, leading to breakdown and subsequent colonization (28). In a study of geriatric psychiatric patients, all patients with both urine and faecal incontinence developed perineal dermatitis within 2 days (27).

Incontinence dermatitis in older people begins with mild erythema of the skin, which may worsen and develop into blistering and erosion (8). Severe or improperly managed cases can result in full-thickness wounds (29). Initial inflammation may be harder to detect in darker skin. With urinary incontinence, dermatitis begins between the labial folds; dermatitis associated with faecal incontinence

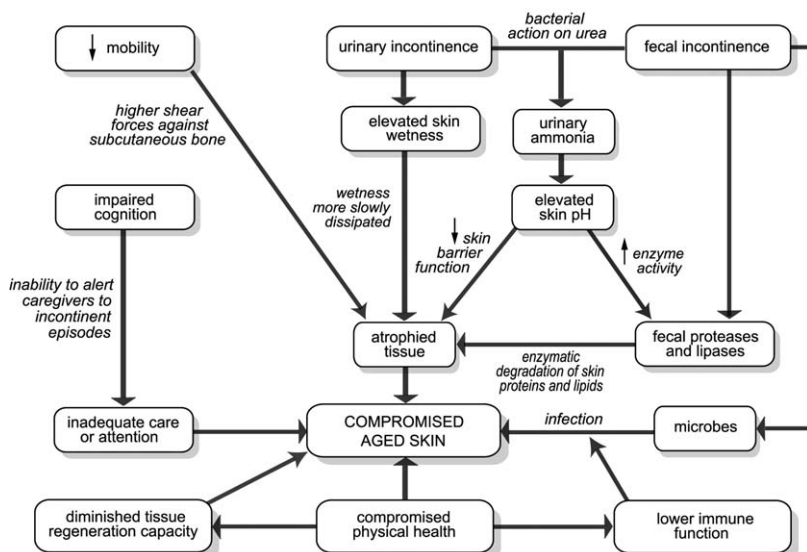


Fig. 1. Factors that contribute to the morbidity of incontinence dermatitis in older people. Copyright (2006) from Farage M, Bramante M. Genital hygiene: culture, practices, and health impact. In: *The Vulva: Anatomy, Physiology, and Pathology*. Farage M A, Maibach H I (eds): Informa Healthcare, 2006 (3). Reproduced by permission of Routledge/Taylor & Francis Group, LLC.

originates in the perianal area and progresses to the posterior aspect of the upper thighs (8). Unusual patterns may reflect occlusion of the skin by a containment device (8).

Selection of proper treatment must take into account the fragility of elderly skin (17) as additional tissue injury is an all too common sequelae of cleansing (22). Treatment for incontinence dermatitis must be carefully considered to avoid further unintentional damage (30). Although the use of products such as vegetable shortening, shaving cream, or veterinary supplies is common, legal liability makes this practice unsupportable (13).

Dermal infections

Fungal infections. Fungal infections of the skin related to incontinence involve primarily 1 of 2 organisms: *Tinea* and *C. albicans*. *Tinea* is a fungal infection of the vulvar skin folds, more commonly known as ringworm. Though rare, its prevalence rises in older women because of diminished cellular immune response (12, 31). Characteristic presentation is a ring-shaped eruption with an actively advancing border but healing centre. Any pruritic, scaly eruption of the vulva, however, should be scraped for microscopic examination and treated with antifungal therapy, if appropriate. Avoiding overhydration of the skin will generally prevent this condition (3).

Secondary infection with *C. albicans* will result in erythematous, punctuate pustules with a central confluence; satellite lesions may be visible at the border of the infection (32). Lesions can take on a macular appearance from friction (8). Yeast may extend into the groin and thigh folds (21), with curd-like plaques on mucous membranes (2). Even mild inflammation is accompanied by significant burning, requires pain management (21), and can be accompanied by intense pruritus of affected areas (2). Chronic infection can cause darkened or reddened skin, which may be mistaken for a pressure ulcer (8).

The GI tract is an important reservoir of *C. albicans* and faecal incontinence increases the risk of *Candida* colonization (33). Routine administration of amoxicillin doubled the counts of *C. albicans* observed from the rectum and skin with an increased risk of dermatitis (34). Treatment for candidiasis consists principally of topical antifungal agents (2). Use of systemic antibiotics should be discontinued, when possible (2), while affected areas are kept dry and, as much as possible, exposed to air (2).

Bacterial infections. A primary skin function is the prevention of invasion by external pathogens. Compromised skin may be less effective, allowing

the proliferation and invasion of microbials (24). *Staphylococcus* can readily colonize skin already compromised by incontinence dermatitis (33). About 20% of cases of necrotizing fasciitis, a particularly destructive necrosis of the skin and deeper tissues, have been associated with the presence of infected hair follicles (35). In addition, the use of incontinence therapies such as transobturator and vaginal tape has a demonstrated association with both necrotizing fasciitis and cellulitis (36, 37).

Intertrigo and vulvar folliculitis

Excess moisture and the breakdown of hygiene, related to incontinence, encourage the development of both intertrigo and vulvar folliculitis in the genital area. Intertrigo, a maceration of the tissue because of heat, moisture, and friction (2), affects areas with opposing skin surfaces such as the labia, perineum, and genitocrural folds (38).

Vulvar folliculitis, a result of bacterial infection in the presence of increased moisture, warmth, and decreased hygiene, is the development of red, tender pus-filled papules surrounding the hair follicles that may be associated with general staphylococcal or streptococcal infection. Both conditions respond to fastidious hygiene and keeping the perineal area dry (3).

Pruritus ani

Anogenital pruritus, characterized by perianal itching can be the result of minor incontinence but can also result from overzealous cleansing with harsh soaps (2). It is characterized by intense itching accompanied by erythema and/or excoriation. Chronic scratching may result in perianal inflammation and skin damage, particularly in the presence of impaired mental function (21).

Pressure ulcers

Pressure, or decubitus, ulcers are an area of localized cutaneous damage typically associated with pressure from bony protuberances on aged skin (39). Overhydration of the skin, typically in the form of incontinence, increases the susceptibility of the skin to this type of injury (14, 18). Skin needs to be as dry as possible and patients repositioned frequently (11). The frequency of pad changes for incontinent patients is directly related to the risk of stage II pressure ulcers (40). Adequate nutritional status should be maintained (11).

Little research, however, has been performed with regard to an effective skin care regimen for decubitus ulcer prevention. One retrospective study

showed that the use of a combined skin cleanser/protectant product on residents with incontinence decreased the incidence of nosocomial pressure ulcers in the sacral/buttock area (41). A 6-month prospective study found that the use of a body wash and skin protectant with incontinence patients reduced the risk of stage I and II pressure ulcers from 11.3% to 4.8% (42).

Incontinence Management

Few systematic trials document the impact of specific cleansing regimens on the prevention or treatment of incontinence dermatitis. The only published prospective study of preventative care was a preliminary trial of structured intervention in 15 institutionalized patients with dementia (27). An equal number developed dermatitis (2 in the structured care intervention group and 3 in the unstructured care group) regardless of whether cleansers, moisturizers, or moisture-barrier preparations were used. Dermatitis developed only in those with urofaecal incontinence and followed more than 4 incontinent episodes in 24 hr. None of the patients were capable of informing caregivers of incontinent episodes. The small number of subjects and their poor mental health limit the conclusions that can be drawn from this study.

Thus, patients who are incapable of reporting incontinent episodes should be monitored closely and promptly cleansed. Wet or soiled garments should be changed promptly and skin cleansing should follow every incontinent episode (13); efforts should be made to prevent further moisture from reaching the skin (22).

Skin cleansing must be performed using cleansers specifically formulated for incontinent patients, which have an acidic pH and a no-rinse formulation (22) to avoid frictional forces during cleansing (13). Where possible, air drying of the skin is optimal (13). The pH of cleansing products should be verified before use as many common products, even when supposedly appropriate for incontinent patients, have pH outside the recommended range (13).

Skin should be kept dry (13) using superabsorbent incontinence pads (24). Also, barrier ointments should be used to protect the skin from contact with moisture while at the same time preventing friction from diapers and bed linens (43). Case reports have supported their effectiveness (44).

Moisturizers can contain medicating ingredients that bind moisture, thus helping to heal damaged skin and prevent drying (13, 22). Topical antibiotics and antimicrobials should be used only when an infection is actually present (22). Anti-

fungal powders and creams can be applied underneath barrier creams or ointments where needed to control incontinence-associated fungal rashes (22).

The chronically incontinent person should be monitored closely for signs of impending loss of skin integrity, with particular attention to skin folds and creases. In women who are obese, skin folds of the lower abdomen must also be exposed and examined, particularly in women who are diabetic or immunocompromised (8).

Summary

The economics of incontinence reflect its impact on older adults in the USA: \$1.1 billion/year is spent on incontinence-related products, and \$16.4 billion/year on incontinence-related care (45). Restoring normalcy to the lives of incontinent seniors and offering proper clinical care will greatly decrease the risk for serious dermatological problems in the ageing population (1). Dermatologists who are knowledgeable about geriatric issues can help to maintain the health and quality of life of their older patients. Additional prospective clinical trials are needed to study the long-term efficacy of preventive hygiene measures as well as therapeutic interventions (3).

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