Incontinence Associated Dermatitis in the Person with Inflammatory Bowel Disease

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Objectives

- Define Incontinence Associated Dermatitis (IAD) and its epidemiology
- Identify persons with Inflammatory Bowel Disease who are at risk for IAD
- Discuss the etiology and pathophysiology of IAD focusing on the adverse effects of stool in contact with the skin
- Review the assessment of IAD
- Describe options for prevention and treatment
**Definition:**
*Incontinence Associated Dermatitis (IAD)*

- Irritation and inflammation associated with exposure to stool or urine
- Often accompanied by erosion of the skin
- Sometimes accompanied by secondary cutaneous infection (ie: candidiasis)
- Etiology and pathophysiology distinct from pressure ulceration

**Prevalence in Acute Care**

- 976 Total number of patients surveyed
- 35% had Foley catheter (deemed continent)
- 20.3% (198) prevalence of incontinence urine or stool
- 21% had more than 1 type of injury
- 27% had IAD
- 33% had a pressure ulcer
- 18% had a probable fungal infection

Junkin J, Selekof J. IAD prevalence in acute care. WOCN National Conference, June 2006 Minneapolis, MN.
Epidemiology of IAD

- 95% of 44 ICU patients with incontinence (n=44)\(^1\)
- MDS mined data suggests at least 5.7% prevalence from 10,217 residents in 31 states\(^2\)
- 3.4% incidence in 981 residents on IAD prevention program (over 14 days)
- Median (range) time to onset 13 days
- 39% still had IAD after 2 weeks


IAD Risk in Persons with IBD

- Prevalence of fecal incontinence higher in parous women with IBD as compared to those without IBD\(^1\)
- Onset of FI associated with vaginal delivery; caesarean section may be protective
- Prevalence of daytime FI ↑ from 5%-11% and nighttime FI from 12%-21% within first 1-2 decades after IPAA\(^2\)
- Meta-analysis of 43 observational studies with 9317 subjects found mild FI in 17% and severe FI in 3.7%\(^3\)

**Physiology: Skin’s Moisture Barrier Prevents MASD**

- **Stratum corneum:** avascular, keratinocytes or corneocytes
- **Lipid matrix:** slows movement of water & electrolytes
- **Water:** hydrates corneocytes
- **pH:** (range 5.0-5.9) “acid mantle”
- **Bacterial flora:** compete with pathogens to prevent infection
- **Temperature:** regulates permeability

**Barrier Function: The Bricks**

- **Corneocytes (keratinocytes)**
  - Anucleated cells filled with keratin & other molecules created by breakdown of filaggrin
  - Collectively referred to as natural moisturizing factor (NMF)
  - Surrounded by cornified envelope (corneodesmosomes) that degrade as they move to surface of skin
  - ~20% content is H₂O


Figure: [http://www.bioinskinregeneration.com/wrinkles/skin.jp]**


Moisture Barrier:  
Natural Moisturizing Factor (NMF)  

- Natural Moisturizing Factor contains various hygroscopic molecules¹:  
  - Amino acids 40%  
  - pyrrolidone carboxylic acid 12%  
  - Lactate 12%  
  - Urea 7%  

- NMF levels ↓ by:  
  - Repeated washing with soaps or detergents²  
  - Low humidity (<10%), UV exposure³  
  - Age⁴  
  - Atopy⁵


Skin’s Moisture Barrier:  
The Mortar (Lipid Matrix)  

- Primary components¹:  
  - Ceramides ~50%  
  - Cholesterol ~23%  
  - Free fatty acids ~15%  
  - Organized in lamellar arrangement as bi-layers with water; stores water needed for adequate hydration and slows water passage

- Lipid Matrix ↓ by:  
  - Age²  
  - Seasonal effects¹  
  - Atopy²

**Moisture Barrier: Additional Factors**

- **Aquaglyceroporin AQP3**
  - Membrane protein that forms water channels across cell facilitating transport of water, urea, glycerol within epidermis but preventing excessive loss via SC
  - Expressed from the granulosum to just below the SC

- **Tight Membrane Junctions**
  - Water gradient steepest at junction or stratum corneum and stratum granulosum
  - TMJ comprises transmembrane proteins that control skin permeability


**Adverse Effects of Stool on Skin**

- **Fecal enzymes**
  - Protease & lipase potentially break down both principal elements of moisture barrier
  - In vivo evidence shows that exposure to digestive enzymes in human skin led to
    - ↑ TEWL & ↑ pH
    - Damage exacerbated when bile salts present
    - Visible damage ONLY when occlusion present
    - Evidence of damage present after 12 days

Adverse Effects of Stool on Skin

- **Stool Consistency**
  - Overwhelming clinical experience suggests that liquid stool more damaging than solid (formed) stool
  - Diarrhea emerged as risk factor in multivariate analysis of 532 children managed by diapers
  - Diversion of stool in SICU unit for patients with FI & diarrhea ↓ incidence of skin damage from 43.0% to 12.5%


Pathogenic Factors

- **Candida albicans**
  - Found in stool, skin and diaper in 2 groups of infants with incontinence associated (nappy) dermatitis
  - Both studies reported absence in comparison cohorts without skin damage
  - Oral thrush emerged as risk factor for incontinence associated dermatitis in multivariate analysis of 532 infants and children in diapers

Pathophysiology of IAD

IAD: Diagnosis

- Relies solely on inspection
- Inflammation (bright red) in light skinned persons
- IAD located in skin fold or underneath containment device, borders are poorly demarcated & irregular
- Surface of skin may "glisten" owing to serous exudate
IAD: Diagnosis in persons with Darker Skin Tones

- Inflammation not readily apparent (i.e., not bright red); often presents as area of hyperpigmentation or subtle red tone.
- Hypopigmented areas with chronic inflammation.
- Pattern of skin damage does not vary.

IAD: Diagnosis

- Inspect Skin Folds
  - Opposing skin surfaces trap & harbor moisture.
  - Warm moist environment encourages bacterial and fungal colonization, overgrowth, and infection.
  - Friction occurs as skin folds rub against one another.
IAD: Diagnosis

- Assess for skin erosion
  - Partial thickness erosion occurs with IAD
  - Necrotic tissue: eschar or slough, full thickness damage indicates pressure ulceration

IAD: Diagnosis

- Look for secondary cutaneous infection, especially candididiasis
  - Opportunistic infection with candida albicans
  - Thrives in warm, moist environment & damages stratum corneum
  - Seen in 18% of one group of 976 acute care inpatients

   Minneapolis, MN.
Differentiate MASD from Pressure Ulceration

**TABLE 1.**

<table>
<thead>
<tr>
<th>Property</th>
<th>Incontinence-Associated Dermatitis (IAD)</th>
<th>Pressure Ulcer</th>
<th>Useful for Differential Diagnosis?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Diffuse; often present in skin folds</td>
<td>Well demarcated, usually over a bony prominence</td>
<td>✓</td>
</tr>
<tr>
<td>Color</td>
<td>Fruiter bright red</td>
<td>Red to bluish/purple</td>
<td>✓</td>
</tr>
<tr>
<td>Depth</td>
<td>Partial thickness wound</td>
<td>Partial or full thickness wound</td>
<td>✓</td>
</tr>
<tr>
<td>Neuroticity</td>
<td>None</td>
<td>Necrotic tissue may be present</td>
<td>✓</td>
</tr>
<tr>
<td>Symptoms</td>
<td>Pain and itching</td>
<td>Pain and itching</td>
<td>✓</td>
</tr>
</tbody>
</table>

Gray M et al. JWOCN 2007; 34(2).

**Clinical Evidence: Prevention and Treatment**

- Structured skin care regimen should be defined based on available evidence and followed routinely

IAD: Prevention & Treatment

Cleanse

Moisturize

Protect

IAD: Cleanse

- When frequent bathing necessary, current evidence suggests…
  - Gentle cleansing: NO scrubbing
  - Select a cleanser with pH close to acid mantle of skin
  - Select product that minimizes potential irritants, scents, etc.
  - Towel drying has been found to compromise moisture barrier, consider no-rinse formulation for frequent bathing

Cleanse

- **Incontinence skin cleansers**
  - ‘pH Balanced’ designed to maintain the acid mantle of perineal skin
  - Many are “no rinse” (avoids need to towel dry)
  - Require **less time** than basin cleansing with soap and water
  - Many contain emollients or humectants to preserve lipid barrier, thus combining 2 steps into a single action

Moisturize

- **Three categories**
  - **Humectants** attract water to the skin
  - **Emollients** replace lipids to stratum corneum; designed to smooth skin surface
  - **Occlusives** act to protect skin from exposure to moisture and potential irritants; vary in their ability to maintain skin hydration
  - Some prefer emollient based on clinical considerations, no research available to verify or refute
Protect

Skin Protectants should

- Act as a "moisture barrier", protecting skin from deleterious effects of exposure to irritants and excess moisture
- Maintain hydration and favorable skin’s normal transepidermal water loss (TEWL)
- Avoid maceration when left on for prolonged period of time
- Options
  - Ointment based skin protectants
  - Liquid acrylates (marketed as a skin barrier)

Protect

Ointment based skin protectants

- Petrolatum: blend of castor seed oil & hydrogenated castor oil
- Dimethicone: silicone based oil
- Zinc Oxide: white powder, mixed with cream or ointment base
Protect

- Petrolatum
  - Good protection against irritant
  - Avoided maceration
  - Modest skin hydration

- Dimethicone
  - Variable protection against irritant
  - Modest protection against maceration
  - Good skin hydration

- Zinc Oxide
  - Good protection against irritant
  - Did not avoid maceration
  - Poor skin hydration


Protect

- Skin barriers (polymer acrylate)
  - Non-alcohol preferred
    - Less pain
    - Less drying

- No different when compared to ointment based skin protectants in one robust RCT (powered for economic rather than efficacy outcomes)

Cleanse, Moisturize & Protect: Single Step Approach

- Disposable Bathing Cloth: Cleanses & moisturizes
- Shield Cloths: Tailored cloths, cleanse (chlorhexidine gluconate), moisturize (glycerine, aloe), protect (3% dimethicone)

IAD: Treatment

- Establish or continue structured program based on “cleanse, moisturize & protect”
- Minimize exposure to irritants (Aggressively manage UI or FI)
- Treat secondary cutaneous infections
- Allow skin to heal or apply protectant with active ingredients designed to promote healing
IAD Treatment

- Aluminum sulphate or acetate (Burow’s Solution) with Stomahesive powder:
  - Applied as compress; causes protein precipitation & has antimicrobial properties
  - Exerts drying & soothing effect; followed by application of moisture barrier
  - Often used when dermatitis complicated by extensive erosion and serous exudate

IAD Treatment: Candidiasis

- Candidiasis
  - Topical antifungals are effective for the treatment of cutaneous infections
  - Effective agents include the polyene antibiotics, azoles and the allylamines\(^1\)
  - Resistance to antifungals is emerging, careful monitoring of research literature is essential

**Conclusion**

- IAD is an increasingly recognized and clinically relevant condition associated with FI and urinary incontinence.
- Patients with IBD are at increased risk for FI and associated sequelae, including IAD.
- Prevention and treatment of IAD is based on a structured skin care regimen that employs principles of cleanse, moisturize and protect.