From Hygienic Task to Preventive Intervention: Preventing and Managing Incontinence Associated Dermatitis in the Critical Care Unit

Presented by:
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Objectives

• Review etiology and epidemiology of IAD in the critical care unit.
• Discuss the natural history of IAD in the acute and critical care settings and its relationship to pressure ulcer risk.
• Identify strategies to prevent IAD in the critical care unit, and its incorporation into preventive care bundles for hospital acquired pressure ulcers and catheter associated urinary tract infection.
• Outline strategies for managing IAD in the critical care unit, including strategies for containing urinary and fecal incontinence.

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 (candidiasis)
Etiology

- Two etiologic factors
  - Fecal incontinence
  - Urinary incontinence
- Multiple possible risk (associated) factors
  - Nutrition
  - Acuteness of illness
  - Immobility

IAD: Etiologic Factors

- Stool: fecal enzymes
  - Proteases and lipases are pH sensitive
  - Both destroy down principal elements of skin’s moisture barrier (proteins and fats)\(^1,2\)
  - In vivo evidence shows that exposure to digestive enzymes in human skin leads to\(^3\)
    - ↑ TEWL
    - ↑ pH
  - Damage is exacerbated with liquid stool (diarrhea)

IAD: Etiologic Factors

- Urine: hyperhydration, pH, mechanical effects
  - ↓ skin hardness, rendering it more susceptible to friction, shear and erosion\(^1,3\)
  - Hyperhydration also ↑ pH of skin\(^4\)
    - ↑ permeability to pathogenic species
    - ↑ activates/supports activity of lipases and proteases
  - Effects exacerbated by saturated occlusive device such as warp around incontinence brief

References:
Epidemiology of IAD: Prevalence in Acute Care (includes critical care units)

- Junkin and Selekof: 22%-27% in multisite study of three acute care facilities
- National QI database with 3,884 patient observations involving 424 acute care facilities
  - 1,716 were incontinent of urine or stool
    - 57% had double incontinence (UI and FI)
    - 27% had FI alone
    - 15% had UI alone
  - Prevalence of IAD: 24%

Epidemiology of IAD: Prevalence in Acute Care (includes critical care units)

- National QI database (3,884 patient observations; 424 acute care facilities)
  - 60% of IAD ranked as mild
  - 27% of IAD ranked as moderate
  - 5% of IAD ranked as severe
- 74.7% of IAD was facility acquired
- Patients with double UI and FI were more likely to develop UI than patients with FI or UI alone (p<0.001)

Epidemiology of IAD: Incidence in Critical Care

<table>
<thead>
<tr>
<th>Reference</th>
<th>N</th>
<th>Health Care Setting</th>
<th>Incontinence Type</th>
<th>Method of Measurement</th>
<th>Duration of Stay in the Critical Care Unit/Phase</th>
<th>Incidence, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neri et al.</td>
<td>45</td>
<td>Critical care</td>
<td>Fecal incontinence</td>
<td>Direct observation</td>
<td>36 days/procedure</td>
<td>36</td>
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<tr>
<td>Neri et al.</td>
<td>12</td>
<td>Critical care</td>
<td>Fecal incontinence</td>
<td>Direct observation</td>
<td>Phase 1: 30 days/procedure</td>
<td>15</td>
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<tr>
<td>Neri et al.</td>
<td>12</td>
<td>Critical care</td>
<td>Fecal incontinence</td>
<td>Direct observation</td>
<td>Phase 2: 14 days/procedure</td>
<td>15</td>
</tr>
<tr>
<td>Neri et al.</td>
<td>12</td>
<td>Critical care</td>
<td>Fecal incontinence</td>
<td>Direct observation</td>
<td>Phase 3: 7 days/procedure</td>
<td>15</td>
</tr>
<tr>
<td>Neri et al.</td>
<td>12</td>
<td>Critical care</td>
<td>Fecal incontinence</td>
<td>Direct observation</td>
<td>Phase 4: 0 days/procedure</td>
<td>15</td>
</tr>
</tbody>
</table>

*Researches implemented defecation care regimen, using 3:1 wash with sitz baths, medications, and diversion-based 4:1 procedures during phase 3 of study.*

IAD and Pressure Ulcer Risk

- Association between these conditions is extremely strong but precise nature of the relationship is not entirely understood
- IAD vs. Stage II PU especially problematic\(^1\)
- FI and double incontinence strongly associated with PU risk, mixed evidence concerning UI alone\(^2\text{-}^6\)


IAD and PU Risk: Multisite National Database Analysis

- National QI database (3,884 patient observations; 424 acute care facilities)
  - Relationship of IAD to all sacral pressure ulcers (Stage II-IV, unstageable), based on modeling using logistic regression
    - Incontinence was not associated with PU occurrences
    - Persons with IAD were more likely to develop PU than those without IAD and immobility (OR=4.56; 95% CI 3.68-5.65)
    - IAD was associated with greater likelihood of developing any PU, even when analysis adjusted for immobility (35.4% vs. 12.4%, \(p<0.001\))

- Relationship of IAD to full thickness sacral pressure ulcers (Stage III-IV, unstageable), based on modeling using logistic regression
  - Persons with IAD were more likely to develop a full thickness sacral pressure ulcer (OR=2.65, 95% CI 1.74-4.03)
  - Persons with IAD were more likely to develop a full thickness PU than were persons without IAD, even when controlling for immobility (6.9% vs. 3.3%, \(p<0.001\))
IAD: Diagnosis

• Diagnosis primarily based on visual inspection
  – Inflammation (bright red) in persons with lighter skin tones
  – Located in skin fold or underneath containment device
  – Borders are poorly demarcated and 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 when confined to epidermal layer); often seen as areas of hypopigmentation or variable red tones
• Hypopigmented areas with chronic inflammation
• Pattern of skin damage does not vary

IAD: Diagnosis

• Inspect Skin Folds
  – Opposing skin surfaces trap and 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 candidiasis
  - Opportunistic infection with *candida albicans*
  - Thrives in warm, moist environment and damages stratum corneum
  - Seen in 18% of one group of 976 acute care inpatients

IAD: Diagnosis

- **Suspect** PU when wound
  - Lies over bony prominence
  - Has distinctive borders
  - Full thickness
  - Necrotic tissue (black eschar) is present
  - Skin is dark to purplish red
IAD Diagnosis: History is Essential

- Emerging evidence reminds us that isolated photographs do not reflect clinical reality
- The biggest aid in this case is a thorough history

Differential Diagnosis: IAD vs. PU

<table>
<thead>
<tr>
<th>Factors</th>
<th>IAD</th>
<th>Stage A / Pressure Ulcers</th>
<th>Stage B / Pressure Ulcers</th>
</tr>
</thead>
<tbody>
<tr>
<td>History of condition</td>
<td>Exposure to a wire or tool</td>
<td>Exposure to pressure, skin and muscle necrosis, pain, and ulceration</td>
<td></td>
</tr>
<tr>
<td>Location of affected area</td>
<td>Shear of skin occurs where skin and subcutaneous tissue are exposed to shearing forces.</td>
<td>Exposure to pressure, skin and muscle necrosis, pain, and ulceration</td>
<td></td>
</tr>
<tr>
<td>Color of wound bed</td>
<td>Red to yellow</td>
<td>Red to yellow</td>
<td>Red to yellow</td>
</tr>
<tr>
<td>Color of perineal tissue</td>
<td>Red to yellow</td>
<td>Red to yellow</td>
<td>Red to yellow</td>
</tr>
<tr>
<td>Characteristics of wound area</td>
<td>Hemorrhagic, serous drainage</td>
<td>Hemorrhagic, serous drainage, and serous exudate</td>
<td>Hemorrhagic, serous drainage, and serous exudate</td>
</tr>
<tr>
<td>Pain</td>
<td>Sharp, throbbing, or dull</td>
<td>Sharp, throbbing, or dull, and deep</td>
<td>Sharp, throbbing, or dull, and deep</td>
</tr>
<tr>
<td>Hair</td>
<td>None or minimal</td>
<td>None or minimal</td>
<td>None or minimal</td>
</tr>
<tr>
<td>Other</td>
<td>Candida albicans</td>
<td>Candida albicans</td>
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</tr>
</tbody>
</table>

Descriptive, ranks severity allowing longitudinal assessment; responsiveness has not yet been tested.

IAD and its Severity Instrument

- Designed and validated by WOC nurses and their faculty
- Two WOC nurses established initial face validity
- Content and criterion validity via 9 WOC nurses in North Central Region of the WOCN Society
- Interrater reliability via 247 WOC nurses attending 2007 National Conference
- Descriptive, ranks severity allowing longitudinal assessment; responsiveness has not yet been tested
Does Technology Play a Role?

- Three technologies have been proposed to enhance diagnosis at the bedside
- All attempt to aid clinician to differentiate “bottom up” damage from “top down” damage such as exposure to urine/stool
  - High Resolution Ultrasonography
  - Subepidermal moisture detection
  - Thermal imaging
High Resolution Ultrasound

- Study using high resolution ultrasound showed differences in appearance of normal volunteers and NH residents with Braden scores ≤ 18

Sub-Epidermal Moisture Measurement

- Employs small wand that measures SEM when attached to the skin for several seconds
- Generates a number called DPU (dermal phase unit) ranges from 0-999; no standard unit attached
- Differentiated Stage I PU vs. erythema in 31 residents in 2 NH1
- ↑ SEM associated with 8.5-15 fold increase in Stage I and Stage II PU in 66 subjects with darker skin tone2

Thermography

- Thermography evaluates local tissue circulation by visualizing temperature of targeted tissue3
- Sparse evidence suggests it does not characterize severity but may differentiate PU from MASD, and may be useful for prediction of SDIT progression
- Imaging system recently approved for use by United States FDA (early 2015); device weighs about 2 pounds; attached to laptop computer
IAD Prevention and Management

- Identify/treat reversible causes of incontinence
- Structured skin care regimen
  - Cleanse and protect
  - Restore (moisturize) as indicated
  - Contain as indicated
- Education and collaboration
  - Overlapping bundles:
    - CAUTI (C), HAPU (P), and Falls (F)

Address Reversible Causes of Incontinence!

- Restricted mobility or dexterity (F, P, C)
- Psychological conditions/delirium (F, P, C)
- Stool impaction or constipation (F, P, C)
- Urinary retention (C, P)
- Pharmaceuticals (F, P, C)
- Infection (F, P, C)

Restricted Mobility/Dexterity

- **Scheduled** assistance with urinal, bedpan, or commode
- As normal of a position as possible
  - Commode preferable to bedpan
  - Toilet preferable to commode
  - Male and female urinals
Diarrhea in Critical Care

- Incidence 14-15%¹,²
- Linked to
  - increased LOS¹
  - significant mortality and morbidity¹,²
- Several Types/causes
  - osmotic
  - secretory
  - exudative
  - motility disorders
  - infections


Infection Induced Diarrhea

- C. difficile = most common HA diarrhea¹,²
- 20-40% of hospitalized patients¹
- 5-30% suffer relapse¹
- Early identification/culture¹,²
- Prevent transmission¹,²


Medication Induced Diarrhea

- Digoxin
- Quinidine
- Bethanechol
- Donepezil
- Chemo
- Mycophenolate
- Antibiotics

Stool Impaction/Constipation

• Incidence of constipation in ICU up to 70-83%\(^1,2\)
• Linked to failure to wean, increased LOS, and delayed enteral feeding\(^1,2\)
• Evaluate history and symptoms
  ✓ Continuous leaking of stool
  ✓ Continuous urge to defecate
  ✓ Restlessness and agitation
  ✓ Hydration
  ✓ Medications (opioids, diuretics, CA channel blocker, CNS depressants)
  ✓ Rectal exam

ICU Bowel Management Protocols

• Ferris & East (2007) 13% ↓ diarrhea, 8% ↓ ICU days\(^1\)
• McPeake, et al. (2011) 20.7% ↓ constipation, 15.2% ↓ diarrhea\(^2\)
• Knowles, et al. (2014) no change in practice despite education sessions, printed facts sheets and reminders\(^3\)

**References**


ICU Bowel Management Protocol

• Effectiveness of education
• 6 critical care units and 230 nurses
  – web-based module
  – unit based skills session/competency
  – Self efficacy scores
• Significant (P<.001) improvement in knowledge and self efficacy scores
• Enhanced collaboration with the WOC nurses/CNS
Skin Care

- Cleanse
- Restore (if indicated)
- Treat infection (if indicated)
- Protect
- Contain (if indicated)

Safe and Gentle Cleansing (P, C)

- Specifically indicated for continence care
- Low dermatitis potential (hypoallergenic)
- pH alkaline similar to normal skin
- No-rinse skin cleanser; liquid or wipe
- Minimal friction, rubbing
- Soft, disposable non-woven cloth
- Dry skin if needed after cleansing

Avoid

- Bar Soap
  - Bacteria, pH
- Basins
  - Bacteria
- Fragrance
  - Sensitivities
- Regular Washcloths
  - Friction
- Antibacterials
  - Normal flora, pH, sensitivities
Antibacterials and CAUTI

- CDC and CAUTI\(^1\)
  - Use routine hygiene while catheter in place
  - Routine antimicrobial prophylaxis NOT recommended
  - Cleaning periurethral area with antiseptics NOT recommended

- Dedicated meatal cleansing?
  - One option to prevent cross contamination
  - Choose products that are pH balanced and without antiseptics

[\(^1\) http://www.cdc.gov/hicpac/cauti/001_cauti.html]

Moisturize/Restore as Needed

- Prevents TEWL and dryness
- Not indicated for overhydrated or maceration skin
- No need for another product IF cleanser or barrier contains moisturizer ingredient
  - Emollients smooth and soften skin (e.g., oils and synthetics)
  - Humectants draw and hold water in the stratum corneum (e.g., urea and glycerine)
  - Lipids (e.g., ceramides)


Skin Protectants/Moisture Barriers

- Knowing about a protectant ingredient is useful (e.g., Petrolatum, Dimethicone, Zinc Oxide)

- Total formulation MORE important
  - Creams/ointments (oils/lipid + water)
  - Pastes (ointment + absorbent powder adheres to wet, weepy skin)
  - Films (liquid + polymer dissolved in a solvent applied with wand or spray)

**Protectant Ingredients**

- **Petrolatum**
  - Occlusive, transparent, increases skin hydration, may impair fluid uptake of absorbent pads/briefs, often found in combination with Zinc or Dimethicone
- **Dimethicone silicone (siloxane)**
  - Non-occlusive, transparent
- **Zinc oxide**
  - Opaque/white, requires remove for skin inspection
- **Acrylate terpolymer film**
  - Liquid transparent film, dissolved in solvent for delivery then dries, does not moisturize, fewer applications if compatible skin cleanser used

*Hoggarth, et al. 2005*
*Dimethecone hydrates > petrolatum*
*Petrolatum macerates > dimethecone*
*Zinc associated with more irritation than others*

*Interpret with caution!*
  - Applied under occlusive tape
  - On healthy forearms

**Ideal* Skin Protectant/Moisture Barrier**

- Waterproof to protect repel moisture/irritants
- Stays in place on the skin
- Long lasting, durable
- Breathable to prevent maceration
- Easy to apply/remove or no removal required
- Comfortable, no sting
- Able to observe skin through the barrier

* If not ideal, how will you compensate?
Treat Candidiasis When Present

- Do not treat prophylactically
- Clotrimizole/Miconizole common choices in absence of lab test (broad spectrum and low cost)
- Available in powders, sprays, ointments, creams or antifungals/moisture barriers combined
- If not combined; apply antifungal followed by moisture barrier
- Occasional need for systemic antifungals

IAD Skin Care

Intact no redness
Prevention with _______ (e.g., 3 and 1 product)

Intact mild red OR anticipated diarrhea- add additional protection _______ (e.g., ointment)

Moderate to severe nonintact weepy, denuded _______ (e.g., Paste, Spray Film, Containment device)

Candidiasis erythema satellite lesions _______ (e.g., antifungal followed by skin protectant)

Reassessment

- Expect improvement in 2-3 days
- If no improvement:
  - Ensure plan of care is in place
    - If compliance is an issue, don’t ask what’s wrong with the patient or staff before asking “what’s wrong with the plan?”
  - Re-evaluate differential diagnosis
  - Adjust plan of care
  - Keep it simple, save time
Save Time, Improve Compliance

- No rinse cleansers
- Moisturizing cleanser and skin protectant incorporated into a spray
- Cleanser, moisturizers, and skin protectant incorporated into a disposable cloth
- Antifungal and skin protectant combined into an ointment or cream
- Products that require fewer applications
- Containment devices (external pouches and FDA approved indwelling devices)

External Pouches

- Pouches with attached adherent solid skin barrier
- Clamp or attach to drainage
- Skin under adhesive must be moisture and emollient free
- As needed – cut larger opening, dust denuded weepy areas with ostomy powder and add ostomy paste for better seal and/or add barrier film to protect exposed skin, LET IT DRY

FDA Approved Indwelling Fecal Devices

- Inserts into rectum
- Closed system diverts stool away from skin
- Saves time, skin, and spread of C-diff
- Use with moisture barrier in case of leakage
- Critical to know indications and contraindications for safety
- Complications include mucosal injury, lower GI bleeding, temporary anal sphincter atony
- Complication rate correlates with length of time used

Absorptive Pads/Briefs: Complaints

• Traps moisture
• Increases perspiration
• Increases pH
• May impair pressure redistribution capacity of some products
• Product clogged/less effective due to moisture barrier ointments
• Look alike pads not intended for incontinence use


Absorptive Pads/Briefs: Improving

• High absorbent polymers “wick” moisture off skin
• Maintain acidity of skin pH
• More sizes for better fit and less leakage
• Breathable/air permeable materials
• Microclimate Disposable Body Pad


Special Populations

• Bariatric
  – Assist to lift panniculus/pannis for urinal placement
  – Commode with size and weight specifications for safety
  – Elbow length gloves
• Neonatal
  – Sensitivities
  – Transcutaneous absorption

Education (F, P, C)

- Leaders, KOL, and IT for overlapping bundles
  - Infection control, Falls committee, CAUTI Champions
- Materials Management
  - Quality and accessibility of products
- Patients and Family
- Clinical Staff AND Administrators
- Build your case!

THANK YOU!