Microclimate

- Local temperature and moisture at body/support surface interface

- Role in pressure injury etiology
Impact of Moisture

- Perspiration
- Drainage
- Incontinence

- Moisture increases friction and shear
  - Increased tissue deformation
  - Maceration
Impact of Position on Microclimate

Skin temperature
- Alteration in superficial blood flow
- Changes in positioning
- Contact with skin
  - Sleep positions
Blood flow Changes

- Blood flow over bony prominences
  - Most impacted in superficial skin

- 30° lateral position over trochanter
  - Decreased significantly compared to supine
  - Expected 90° lateral position to have largest decrease
  - Greater interface pressure

Superficial changes to blood flow

Significant differences between subjects in both depth and location
• Same patients did not have decrease in all positions
• Blood flow response to any situation is unique
• Not easy to predict

Impact of Age on Microclimate

Elderly reduced ability to dissipate heat

- Blood vessel changes
- Increased temperature and skin moisture
Role of Microclimate – Temperature

As temperature rises
– Increased metabolic demand
– Ischemia risk
– Increased moisture
– Tissue properties
Altering Microclimate

• Patient skin interface
  – Support Surface
  – Medical Devices
  – Linen
Support Surfaces

A specialized device for pressure redistribution and management of tissue load and microclimate.

(Int. Guidelines 2014)
Pressure Redistribution: Keystone of Pressure Ulcer Management

Support Surface Selection – should consider microclimate

Features of surface includes:

  - Ability to control moisture
  - Ability to control temperature
Support Surface categories

- **Active Support Surface** – a powered support surface with the capability to change its load distribution properties

- **Integrated bed system** – a bed frame and support surface that are combined into a single unit

- **Mattress** – a support surface designed to be placed directly on the existing bed frame

- **Powered** - any support surface requiring or using external sources of energy to operate, either electric or battery

- **Reactive support surface** – a powered or non powered support surface with the capability to change its load distribution properties only in response to applied load.
Specialized Support Surface

• Low air loss
  – Aid management by allowing air to flow through surface

No evidence for optimal levels of skin temperature and moisture

Clinical judgement
Support Surface Cover Selection

• Moisture and temperature
  – In contact with the skin
  – Selection to control microclimate

– Vapor permeable surface cover
  • Draw moisture and heat away from interface

• Guidelines SOE = C
Support Surface Selection

How to select a support surface
Guideline Recommendations: Support Surface Algorithm

Identifying the Right Surface for the Right Patient at the Right Time: Generation and Content Validation of an Algorithm for Support Surface Selection

Laurie McNichol, Carolyn Watts, Dianne Mackey, Janice M. Beitz, Mikel Gray
SUPPORT SURFACE ALGORITHM

An Evidence-and Consensus-Based Support Surface Algorithm

Skin & Pressure Ulcer Risk Assessment

1. Assessment
   - Initial skin assessment
   - Pressure ulcer screen
   - Past medical history
   - Obstetric history
   - Current health status
   - Functional status

2. Wound Characteristics
   - Ulcer bed depth
   - Ulcer bed appearance
   - Ulcer bed texture
   - Ulcer bed moisture

3. Risk Factors
   - Diabetes
   - Obesity
   - Immobility
   - Incontinence
   - Malnutrition
   - Fatigue

4. Pressure Ulcer Stage
   - Stage 1
   - Stage 2
   - Stage 3
   - Stage 4

5. Prevention
   - Use of appropriate intersecting prevention
   - Use of appropriate intersecting prevention
   - Use of appropriate intersecting prevention

6. Treatment
   - Use of appropriate intersecting treatment
   - Use of appropriate intersecting treatment
   - Use of appropriate intersecting treatment

7. Rehabilitation
   - Use of appropriate intersecting rehabilitation
   - Use of appropriate intersecting rehabilitation
   - Use of appropriate intersecting rehabilitation

8. Follow-Up
   - Use of appropriate intersecting follow-up
   - Use of appropriate intersecting follow-up
   - Use of appropriate intersecting follow-up

9. Education
   - Use of appropriate intersecting education
   - Use of appropriate intersecting education
   - Use of appropriate intersecting education
TABLE A:
Suggested Support Surface Selection for Pressure Ulcer Prevention & Treatment
Based on Braden-Modingl & Moisture Subscores

Table A: Suggested Support Surface Selection for Pressure Ulcer Prevention & Treatment Based on Braden-Modingl & Moisture Subscores

<table>
<thead>
<tr>
<th>MAIN REPORT WASAG FORM</th>
<th>SUPPORT SURFACE</th>
<th>INDICATIONS</th>
<th>CONTRAINDICATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Braden-Modingl</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>2</td>
<td>Modingl</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>3</td>
<td>Moisture</td>
<td>Low</td>
<td>Moderate</td>
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Table B: Select Support Surface Precautions & Considerations

Table B: Select Support Surface Precautions & Considerations

<table>
<thead>
<tr>
<th>SUPPORT SURFACE</th>
<th>PRECAUTIONS</th>
<th>CONSIDERATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Braden-Modingl</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Modingl</td>
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</tr>
<tr>
<td>Moisture</td>
<td>Low</td>
<td>Moderate</td>
</tr>
</tbody>
</table>
Controlling Microclimate

- No heat applied directly to skin
  - Hot water bottles
  - Heating pads
  - Built in bed warmers

  Increased Metabolic rate
  Induce sweating
  Decrease tissue tolerance

Guidelines SOE=C
Controlling Microclimate Devices

- Foam offloading devices
  - Pads
  - Cushions
  - Boots

Should not contribute to heat or moisture of the patients skin
Significance of Temperature

- Reactive Hyperemia
  - Increased significantly at higher
    - Temperature (32-36°C)

Lachenbruch C OWM Feb 2015
Controlling Microclimate

Fabrics and textiles
Usual Linens: Bedding

Usually Polycotton or 100% Cotton bedding
Usual Linens: Gowns, underpads

Linens should be capable of wicking away moisture to prevent adding heat to patients high risk areas.
Impact of linens on patient microclimate

- Modern sports apparel → wicking fabrics
- Reduces shear and friction
  - Cotton bed linens increase friction significantly when wet.
  - Synthetic silk-like fabrics are smooth, not slippery
Impact of linens on patient microclimate

Water loss from fabric is facilitated through rapid wicking and evaporation

Wicking and evaporation
- Removes heat from the body
- Reduces perspiration
Impact on Pressure Injuries

Reduced incidence of hospital acquired pressure injuries

• Reduced deterioration of pressure injuries

• 4 Studies – RCT, non-blinded CT, Cohort, retrospective record analysis
Prophylactic Dressings

Use of dressing to decrease friction and reduce localized shear forces

An elastic adhesive (silicone), the number of dressing layers and their construction, and the size of the selected dressing all contributed to its ability to protect the skin

Call et al

2013
Prophylactic Dressings

Apply to bony prominences for prevention of pressure injuries
- Reduces friction and shear at ‘at risk’ areas
- Traps moisture
- Increases temperature at skin surface
Prophylactic Dressings

Considerations for selecting a prophylactic dressing:
Ability of dressing to manage microclimate
Ease of application and removal
Ability to regularly assess the skin
Anatomical location where the dressing will be applied
Correct dressing size
Prophylactic Dressings

Continue to use all other preventative measures while using these dressings

Assess skin at each dressing change or daily to confirm continued use

Replace prophylactic dress when damaged, loosened or excessively wet
Prophylactic Dressing Application to Reduce Pressure Ulcer Formation in Cardiac Surgery Patients

C. Tod Brindle • Jacob A. Wegelin

Reduction of Sacral Pressure Ulcers in the Intensive Care Unit Using a Silicone Border Foam Dressing

Use of a Sacral Silicone Border Foam Dressing as One Component of a Pressure Ulcer Prevention Program in an Intensive Care Unit Setting

Nancy S. Walsh • Alyson W. Blanck • Lisa Smith • Mari Beth Cross • Liane Anderson • Carol Polito
Non-device related
Anti-Embolism or Compression Stockings


Cock, K. Anti-embolism stockings: are they used effectively and correctly? *Bri Jour Nsg* 2006;Vol 15 No 5
Impact on Microclimate

- Trap moisture
  - Humidity
  - Dressing transpiration properties

Increase temperature at skin surface
Moisture Associated Skin Damage

Must differentiate between MASD & pressure injuries, skin tears and other wounds
Moisture Associated Skin Damage

MASD Part 2: Incontinence-Associated Dermatitis and Intertriginous Dermatitis
A Consensus

Joyce M. Black ■ Mikel Gray ■ Donna Z. Bliss ■ Karen L. Kennedy-Evans ■ Susan Logan ■ Mona M. Baharestani ■ Janice C. Colwell ■ Margaret Goldberg ■ Catherine R. Ratliff

A consensus panel was convened to review current knowledge of moisture-associated skin damage (MASD) and to provide recommendations for prevention and management. This article provides a summary of the discussion and the recommendations in regards to 2 types of MASD: incontinence-associated dermatitis (IAD) and intertriginous dermatitis (ITD). A focused history and physical assessment are essential for diagnosing IAD or ITD applicable to 4 forms of MASD. The second in a 3-article series, this discussion details essential clinical knowledge related to IAD and ITD. A third article will offer a detailed examination of peristomal and periwound forms of MASD.

Incontinence-Associated Dermatitis
Guideline Recommendations:
Keep skin clean and dry

Use of a 3-in-1 disposable washcloth that included a no-rinse skin cleanser, emollient based moisturizer, and dimethicone-based skin protectant decreased IADS scores and the occurrence of PU.

Multivariate analysis revealed that higher IADS scores were associated with a greater likelihood of developing a PU.

Park & Kim 2014
Guideline Recommendations: Keep skin clean and dry

CONTINENCE CARE

Effect of a Structured Skin Care Regimen on Patients With Fecal Incontinence
A Comparison Cohort Study

Kyung Hee Park • Keum Soon Kim

ABSTRACT

PURPOSE: The purpose of this study was to measure the effect of a structured skin care regimen for critically ill patients with fecal incontinence.

DESIGN: A nonrandomized, quasi-experimental research design (comparison cohort) was used for data collection.

SUBJECTS AND SETTING: Seventy-six patients with fecal incontinence-associated dermatitis (IAD) who were exposed to urine or stool were included in the study.

Introduction

Incontinence-associated dermatitis (IAD) is defined as erythema of the skin when exposed to urine or stool; it is often accompanied by erosion of the skin and cutaneous candidiasis. A pressure ulcer (PU) is defined as localized injury to the skin and/or underlying tissue, usually over a bony prominence, as a result of pressure or pressure in
Guideline Recommendation

Protect the skin from exposure to excessive moisture with a barrier product in order to reduce the risk of pressure damage.

Consider using a skin moisturizer to hydrate dry skin in order to reduce risk of skin damage.
IAD – Prevention and Care

Incontinence-Associated Dermatitis
Consensus Statements, Evidence-Based Guidelines for Prevention and Treatment, and Current Challenges

Dorothy Doughty, Joan Junkin, Peter Kurz, Joan Seleko, Mikel Gray, Mandy Fader, Donna Z. Bliss, Dimitri Beeckman, Susan Logan

In 2010, an international consensus conference was held to review current evidence regarding the pathology, prevention, and management of incontinence-associated dermatitis (IAD). The results of this literature review were published in a previous issue of this Journal. This article summarizes key consensus statements agreed upon by the panelists, evidence-based guidelines for prevention and management of IAD, and a discussion of the major challenges currently faced by clinicians caring for these patients. The panelists concur that IAD is clinically and pathologically distinct from pressure ulcers and intertriginous dermatitis, and that a consistently applied, structured, or defined skin care program is effective for prevention and management of IAD. They also agreed that differential assessment.

Evidence Gaps
Skin Care - IAD

Recommendation

A consistently applied, defined, or structured skin care regimen is recommended for prevention and treatment of IAD

Doughty et al JWOCN 2012
Skin Care IAD – Recommendation

Product Selection

• Skin care products used for prevention or treatment of IAD should be selected based on consideration of individual ingredients in addition to consideration of broad product categories such as cleanser, moisturizer, or skin protectant.
Timing

Cleansing should occur as soon as possible following an episode of incontinence to limit contact with urine and stool.

Timely cleansing, moisturizing, and application of a skin protectant are especially important following an episode of fecal incontinence.
Skin Care IAD - Recommendation

Cleansing:

• A pH-balanced skin cleanser (one whose pH range approximates the acid mantle of healthy skin)
• No rinse skin cleansers
• Gentle cleansing - using a soft cloth to minimize friction damage.
Skin Care IAD - Recommendation

Moisturizing:

Routine use of a moisturizer is recommended to replace intercellular lipids and promote moisture barrier function of the skin.
Skin Care IAD - Recommendation

• A moisturizing product or combination product with an emollient moisturizer is recommended to prevent IAD in intact skin, not recommended for hyperhydrated skin.

• A product that combines a cleanser and emollient-based moisturizer ensures application of both products in a single step.
Skin Care IAD - Recommendation

A skin protectant or disposable cloth that combines a cleanser, emollient-based moisturizer, and skin protectant is recommended for prevention of IAD in persons with urinary or fecal incontinence and for treatment of IAD, especially when the skin is denuded.
Skin Care IAD - Recommendation

- Commercially available skin protectants vary in their ability to protect the skin from irritants, prevent maceration, and maintain skin health.
- Additional research is needed to establish a benchmark for measuring various skin protectants’ ability to block exposure to a specific irritant, maintain hydration of underlying skin, and prevent maceration.
Skin Assessment - Education

Licensed staff can leverage CNA knowledge of resident daily routines, likes, and dislikes and incorporate CNA feedback into clinical decision making and care planning.
Educate staff - IAD

- Importance of intact skin barrier and characteristics of healthy skin (acidic, soft, dry)
- Overview of IAD: prevalence; impact on patient; impact on staff; link between IAD and increased risk of pressure ulcer development
- Definition, risk factors, and pathology of IAD
- Assessment of IAD, including differential assessment of wounds with similar clinical appearance such as stage I and II pressure ulcers
- Preventive care guidelines for cleansing, moisturizing, and protecting skin, to include basic discussion of product categories and indications for each
- Treatment of IAD using an established decision tree (and ideally a pictorial guide)
Skin Assessment - Education

Leveraging Certified Nursing Assistant Documentation and Knowledge to Improve Clinical Decision Making: The On-Time Quality Improvement Program to Prevent Pressure Ulcers

CME CATEGORY 1
1 Credit
CE
2.0 Contact Hours

Siobhan Sharkey, MBA • Principal • Health Management Strategies • Austin, Texas
Sandra Hudak, RN, MS • Principal • Health Management Strategies • Austin, Texas
Susan D. Horn, PhD • Senior Scientist, Institute for Clinical Outcomes Research • Salt Lake City, Utah
William Spector, PhD • Senior Social Scientist • Agency for Healthcare Research and Quality • US Department of Health and Human Services • Rockville, Maryland

This work was supported by the Agency for Healthcare Research and Quality, US Department of Health and Human Services, contract #HHS1002005-0020.
Pressure Ulcer Prevention in Long-Term-Care Facilities: A Pilot Study Implementing Standardized Nurse Aide Documentation and Feedback Reports

Susan D. Horn, PhD; Siobhan S. Sharkey, MBA; Sandra Hudak, MS, RN; Julie Gassaway, MS, RN; Roberta James, MStat; and William Spector, PhD

ABSTRACT
OBJECTIVE: To design and facilitate implementation of practice-based evidence changes associated with decreases in pressure ulcer (PU) development in long-term-care (LTC) facilities and promote these practices as part of routine care.

DESIGN: Pre/post observational study.

SETTINGS AND PARTICIPANTS: Frail older adult residents in 11 LTC facilities.

INTERVENTION: Project facilitators assisted frontline multidisciplinary teams (certified nurse aides [CNAs], nurses, and dietitians/dietary aides) to develop streamlined standardized CNA documentation and weekly reports to identify high-risk residents and to integrate clinical reports into day-to-day practice and clinical decision making. The program was called "Real-Time Optimal Care Plans for Nursing Home QI" (Real-Time).

MAIN OUTCOME MEASURES: Prevalence of PUs using Centers for Medicare & Medicaid Services (CMS) standardized assessment tool.

INTRODUCTION
Pressure ulcer (PU) incidence and prevalence remain high among long-term-care (LTC) facility residents, despite much effort to create and implement guidelines for prediction and prevention of ulcers (eg, Agency for Healthcare Research and Quality [AHRQ], 2006; NPUAP, 2015)
Margaret Goldberg,  
margoldb@comcast.net
References


Horn SD et al. Pressure Ulcer Prevention in Long-Term-Care Facilities: A Pilot Study Implementing Standardized Nurse Aide Documentation and Feedback Reports. Adv Wound Care 2014 23(3):120-131


