Strategies to Reduce Skin Injury in Critically Ill Patients

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Disclosures

- Sage Products Speaker Bureau & Consultant
- Hill-Rom Speaker Bureau
- Eloquest Healthcare Speaker Bureau & Consultant
Objectives

• Discuss the new strategies to determine patients at risk for injury

• Outline evidence-based prevention strategies for incontinence associated dermatitis, friction reduction and pressure injury prevention

• Describe key care process changes that lead to a successful reduction of skin injury and prevent healthcare worker injury
“It may seem a strange principle to enunciate as the very first requirement in a Hospital that it should do the sick no harm.”

Florence Nightingale

Advocacy = Safety
Background of the Problem

- HAPU are the 4\textsuperscript{th} leading preventable medical error in the United States
- 2.5 million patients are treated annually in Acute Care
- NDNQI data base: \textbf{critical care: 7\%} med-surg: 1-3.3\%
- Acute care: 0-12\%, critical care: 3.3\% to 53.4\% (International Guidelines)
- Most severe pressure ulcer: \textbf{sacrum (44.8\%)} or the \textbf{heels (24.2\%)}
- Pressure ulcers cost $9.1\textendash$11.6 billion per year in the US.
  - Cost of individual patient care ranges from $20,900 to 151,700 per pressure ulcer
  - 17,000 lawsuits are related to pressure ulcers annually
- 60,000 persons die from pressure ulcer complications each yr.
- National health care cost $10.5\textendash$17.8 billion dollars for 2010

http://www.ahrq.gov/professionals/systems/hospital/pressureulcertoolkit/pugmd1.html#11

Dorner, B., Posthauer, M.E., Thomas, D. (2009), \url{www.npuap.org/newroom.htm}
Whittington K, Briones R. \textit{Advances in Skin & Wound Care}. 2004;17:490-4.
Clarification of Definitions:

- Pressure Injury to replace Pressure Ulcer
- Accurately describes pressure injuries of both intact and ulcerated skin

Stage I and Deep Tissue Injury (DTI) describe intact skin

Stage II through IV describe open ulcers

PRESSURE INJURY
Label & Definitions of Pressure Injury

• Stage 1 Pressure Injury: Non-blanchable erythema of intact skin

• Stage 2 Pressure Injury: Partial thickness skin loss with exposed dermis

• Stage 3 Pressure Injury: Full thickness skin loss

• Stage 4 Pressure Injury: Full-thickness skin and tissue loss

http://www.npuaap.org/resources/educational-and-clinical-resources/
Label & Definitions of Pressure Injury

• Un-stageable Pressure Injury: Obscured full-thickness skin and tissue loss

• Deep Tissue Pressure Injury: Persistent non-blanchable deep red, maroon or purple discoloration

• Medical Device Related Pressure Injury: Etiology-Described by staging system

• Mucosal Membrane Pressure Injury: Cannot be staged

http://www.npuap.org/resources/educational-and-clinical-resources/
Moisture Injury: Incontinence Associated Dermatitis

• Inflammatory response to the injury of the water-protein-lipid matrix of the skin
  – Caused from prolonged exposure to urinary and fecal incontinence
• Top-down injury
• Physical signs on the perineum & buttocks
  – Erythema, swelling, oozing, vesiculation, crusting and scaling
• Skin breaks 4x more easily with excess moisture than dry skin

Brown DS & Sears M. OWM 1993;39:2-26
Systematic Review on Impact of Incontinence

- Review 2013-2014 incontinence data from International PUP survey
- Determine relative risk of pressure injury development from incontinence & Braden score grouping
- 91% acute care; 205,144 patients
  - 182,832 from US
  - 22,282 Canada
  - Other-Europe/Middle East

- Results
  - 53% had incontinence
  - Mean Braden score significantly lower in incontinent group (16.5 vs 19.5 p<0.0001)
  - Overall PI: 16.3% incontinent vs. 4.1% for continent patients (p<0.0001)
  - Facility acquired PI: 6.0% vs. 1.6% (p<0.0001)
IAD: Multisite Epidemiological Study

- 5342 patients in 424 facilities in Acute & Long Term Care in US
- Prevalence study
  - To measure the prevalence of IAD in the acute care setting,
  - To describe clinical characteristics of IAD, and
  - To analyze the relationship between IAD and prevalence of sacral/coccygeal pressure ulcers
- Results: 1716 patients incontinent (44%)
  - 57% both FI and UI, 27% FI, 15% UI
  - 24% IAD rate
    - 60% mild
    - 27% moderate
    - 5% severe
  - 73% was facility acquired
  - ICU a 36% rate
  - IAD 5x more likely to develop a HAPU

Giuliana K. Presented at the CAACN September 25-27th Winnipeg, Manitoba, CA
Gray M. Presenting a Wound Care Conference, 2016, New York City, NY
Part of the Picture

- Medical Adhesive-Related Skin Injury: Single center study shows prevalence rates 3.4% to 25%*
- Skin Tears: 1.5 million skin tears occurring in elderly residents of institutions in the US annually**

Beyond the Scope of this Talk

**Baranoski S. Adv Skin Wound Care 2005;18(2):74-5
Driving Change

Structure

- Gap analysis
- Build the Will
- Protocol Development

Process

- Make it Prescriptive
- Overcoming barriers
- Daily Integration

Outcomes
Gap Analysis of Prevention Strategies

- Assessment of Risk
- Pressure Injury/Turn/Shear reduction
- Health Care Worker Safety
- Early Mobility
- Device Related Injuries
- Managing Incontinence & Other Moisture
- Hemodynamic Instability
Identify Patients at High Risk
HELLO, LOOK AT OUR BUTTS
Risk Assessment on Admission, Daily, Change in Patient Condition (B)

- Use standard EBP risk assessment tool
- Research has shown Risk Assessment Tools are more accurate than RN assessment alone
- Braden Scale for Predicting Pressure Sore Risk
  - 6 subscales
    - Rated 1-4
  - Pressure on tissues
    - Mobility, sensory perception, activity
  - Tissue tolerance for pressure
    - Nutrition, moisture, shear/friction
  - Score 6-23

www.ihi.org;
Risk Assessment on Admission, Daily, Change in Patient Condition (B)

- Use standard EBP risk assessment tool
- Research has shown Risk Assessment Tools are more accurate than RN assessment alone
- Braden Scale for Predicting Pressure Sore Risk
  - 6 subscales
    - Ratios
    - Pressure on tissue
    - Mobility, sensory perception, activity
  - Tissue tolerance for pressure

Clinical judgment of nurses alone achieve inadequate capacity to assess PU risk
Extremely obese patient 2x more likely to develop a PU*

www.ihi.org
Its About the Sub-Scale’s

- Retrospective cohort analysis of 12,566 adults patients in progressive & ICU settings for yr. 2007
- Identifying patients with HAPU Stage 2-4
- Data extracted: Demographic, Braden score, Braden subscales on admission, LOS, ICU LOS, presence of Acute respiratory and renal failure
- Calculated time to event, # of HAPU’s
- Results:
  - 3.3% developed a HAPU
  - Total Braden score predictive (C=.71)
  - Subscales predictive (C=.83)

Multivariate model included 5 Braden subscales, surgery and acute respiratory failure $C=0.91$ (Mobility, Activity and sensory perception more predictive when combined with moisture or shear and friction)
Vasopressors/Pressure Injury

- Retrospective correlation design
- 306 medical surgical and CV ICU patients who receive vasopressors
- Examine the type, dose and duration of vasopressor agents and PU development

Results
- 13% PI rate
- MV > 72 hours 23x more likely to develop a PI
- Receiving 2 vasopressor (Norepi & vasopressin) significant

Significant Predictors of PI Development

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE</th>
<th>Wald</th>
<th>P</th>
<th>Exp (B)</th>
<th>95% CI</th>
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<tbody>
<tr>
<td>Cardiac arrest</td>
<td>1.359</td>
<td>0.605</td>
<td>3.831</td>
<td>.05</td>
<td>3.894</td>
<td>0.998-15.188</td>
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<tr>
<td>Mechanical ventilation &gt; 72 hours</td>
<td>3.161</td>
<td>0.664</td>
<td>22.686</td>
<td>&lt;.001</td>
<td>23.604</td>
<td>6.427-86.668</td>
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<tr>
<td>Hours of MAP &lt; 60 mm Hg while receiving vasopressors</td>
<td>0.092</td>
<td>0.037</td>
<td>6.199</td>
<td>.01</td>
<td>1.096</td>
<td>1.020-1.178</td>
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<tr>
<td>Use of vasopressin</td>
<td>1.572</td>
<td>0.542</td>
<td>8.423</td>
<td>.004</td>
<td>4.816</td>
<td>1.666-13.925</td>
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<tr>
<td>Cardiac diagnosis at ICU admission</td>
<td>-3.360</td>
<td>1.577</td>
<td>4.539</td>
<td>.03</td>
<td>0.035</td>
<td>0.002-0.764</td>
</tr>
</tbody>
</table>

Addition of a second agent

Abbreviations: ICU, intensive care unit; MAP, mean arterial pressure.
# IAD Assessment Tool

## Hospital Survey on Incontinence & Related Skin Injury

### Instructions:
- This survey is limited to inpatient care areas and excludes the following:
  - Labor & Delivery
  - Obstetrics
  - Nursery
  - Emergency Department
  - Operating Room
- Note: Complete ONLY ONE form for each unit.

### Date of Survey: __/__/____

### Unit: ______

Please check the unit specialty that best describes the care provided.

<table>
<thead>
<tr>
<th>Specialty</th>
<th>Specialty</th>
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</thead>
<tbody>
<tr>
<td>Burn</td>
<td>LTAC</td>
</tr>
<tr>
<td>Critical Care</td>
<td>Medical</td>
</tr>
<tr>
<td>ICU - General</td>
<td>ICU - Interventional</td>
</tr>
<tr>
<td>ICU - Cardiovascular</td>
<td>ICU - General</td>
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<td>ICU - Medical ICU</td>
<td>ICU - Pediatrics</td>
</tr>
<tr>
<td>ICU - Surgical</td>
<td>ICU - Psychiatric - General</td>
</tr>
<tr>
<td>ICU - Surgical</td>
<td>ICU - Wound Care</td>
</tr>
</tbody>
</table>

### Patient Census of Unit at Time of Survey: ______

### Incontinence Collection Products:
- Check all that apply to a specific unit/area:
  - Disposable plastic-backed
  - Disposable or flow-backed
  - Reusable cloth
  - Reusable or flow-backed

### Incontinence Cleanup & Skin Protection:
- Check all product categories that are available in a specific unit/area:
  - Cleansing
    - Soap/Water:
      - Peri-Wash (spray)
      - Cleaning Foam
      - Cleansing Wipes
      - Wipes
      - Moisturizer
    - Liquid Film Barrier
    - Other
  - Barrier Protection (Tubes, Bottles or Sprays):
    - Liquid barrier
    - Non-adherent
    - Dressing
    - Other
  - Disposable/stock products:
    - Bibs
    - Urinary bags
    - Wound care
    - Other
  - Moisturizers:
    - Lotion
    - Cream
    - Ointment
  - All-in-one products:
    - Barrier cloth
    - Barrier cloth with skin protection

### Section 1 - Complete for all patients surveyed

#### Patient Information

- **Patient Unit:**
- **Patient Gender:**
- **Patient Age Group:**
  - Less than 1 year
  - 1 to 4 yrs
  - 5 to 19 yrs
  - 20 to 39 yrs
  - 40 to 69 yrs
  - 70 yrs or older

#### Continence Status
- Incontinence: inability to control the flow of urine or stool in the preceding 24 hours.

#### Section 2 - Complete only for incontinent patients

### Contributing Factors & Co-morbidities

<table>
<thead>
<tr>
<th>Co-morbidity</th>
<th>Score</th>
</tr>
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<tbody>
<tr>
<td>Asthma</td>
<td></td>
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<tr>
<td>Diabetes</td>
<td></td>
</tr>
<tr>
<td>Heart Disease</td>
<td></td>
</tr>
<tr>
<td>COPD</td>
<td></td>
</tr>
<tr>
<td>Stroke</td>
<td></td>
</tr>
<tr>
<td>Renal Disease</td>
<td></td>
</tr>
<tr>
<td>Ulcer</td>
<td></td>
</tr>
<tr>
<td>HIV</td>
<td></td>
</tr>
<tr>
<td>Other medical condition</td>
<td></td>
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<tr>
<td>Gastrointestinal obstruction</td>
<td></td>
</tr>
</tbody>
</table>

### Section 3 - Complete only for incontinence patients

#### Skin Protection
- **Barrier Protection:** (Tubes, Bottles or Sprays)
- **All-in-one products:**
- **Barrier Cloth with skin protection**

### Section 4 - Complete only for incontinence patients with rash/redness of buttock or perineal skin

#### Perineal Skin Injury
- **Area Affected:**
  - Hemorrhoids
  - Folliculitis
  - Fissures
  - Necrotizing fasciitis
  - Other
- **Consent:**
  - Yes
  - No
  - Other

### Section 5 - Complete only for incontinence patients who have had surgery on the buttock or perineal skin

#### Perineal Skin Injury
- **Area Affected:**
  - Hemorrhoids
  - Folliculitis
  - Fissures
  - Necrotizing fasciitis
  - Other
- **Consent:**
  - Yes
  - No
  - Other

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“One’s mind, once stretched by a new idea, never regains its original dimensions.”

Oliver Wendell Holmes
The Goal: Patient & Caregiver Safety

- Patient Progressive Mobility
- Safe Patient Handling
- Prevention of Pressure Ulcers
Pressure & Shear as a Risk Factor

Sacrum & Heels
EBP Recommendations to Achieve Offloading & Reduce Pressure (A)

- Turn & reposition every (2) hours (avoid positioning patients on a pressure ulcer)
  - Repositioning should be undertaken to reduce the duration & magnitude of pressure over vulnerable areas
  - Consider right surface with right frequency*
  - Cushioning devices to maintain alignment /30 ° side-lying & prevent pressure on boney prominences
    - Between pillows and wedges, the wedge system was more effective in reducing pressure in the sacral area (healthy subjects) (Bush T, et al. WOCN, 2015;42(4):338-345)
    - Assess whether actual offloading has occurred
    - Use lifting device or other aids to reposition & make it easy to achieve the turn

EBP Recommendations to Reduce Shear & Friction

• Loose covers & increased immersion in the support medium increase contact area
• Prophylactic dressings: emerging science
• Use lifting/transfer devices & other aids to reduce shear & friction.
  • Mechanical lifts
  • Transfer sheets
  • 2-4 person lifts
  • Turn & assist features on beds
  – Do not leave moving and handling equip underneath the patient

Prophylactic Dressings: Emerging Therapies

• Consider applying a polyurethane foam dressing to bony prominences in the areas frequently subjected to friction and share (B)
• Consider placement prior to prolonged procedures or continuous head elevation (B)
• Consider ease of application and removal and the ability to reassess the skin.
• Continue to use all of other preventative measures necessary when using prophylactic dressings (C)
Systematic Review: Use of Prophylactic Dressing in Pressure Injury Prevention

- 21 studies met the criteria for review
- 2 RCTs, 9 had a comparator arm, five cohort studies, 1 within-subject design where prophylactic dressings were applied to one trochanter with the other trochanter dressing free

Evaluated nasal bridge device injury prevention

Evaluated sacral pressure ulcer prevention

EBP Recommendations to Reduce Shear & Friction

- Loose covers & increased immersion in the support medium increase contact area
- Prophylactic dressings: emerging science
- Use lifting/transfer devices & other aids to reduce shear & friction.
  - Mechanical lifts
  - Transfer sheets
  - 2-4 person lifts
  - Turn & assist features on beds
  - Breathable slide stay in bed glide sheet
- Do not leave moving and handling equip underneath the patient
Current Practice:  
Turn & Reposition

- Specialty Bed
- Disposable Slide Sheets
- Breathable Glide Sheet
- Lift Device

Draw Sheet/Pillows/Layers of Linen
REPOSITIONING THE PATIENT

CAREGIVER INJURY
50% of nurses required to do repositioning suffered back pain

High physical demand tasks
- 31.3% up in bed or side to side
- 37.7% transfers in bed

40% of critical care unit caregivers performed repositioning tasks more than six times per shift

Number one injury causation activity: Repositioning patients in bed

Harber P, et al. J Occupational Medicine, 27;518-524
Fragala G. AAOHN, 2011;59:1-6
Injury Facts

• Back and other musculoskeletal “injuries” are the result of repeated exposure to ergonomic risk factors rather than a single, instantaneous event

• In an eight hour shift, the cumulative weight that nurses lift equal to an average of 1.8 tons per day

Tuohy-Main, K. (1997). Geriacton, 15, 10-14)
<table>
<thead>
<tr>
<th>Year</th>
<th>Ownership</th>
<th>Occupation</th>
<th>Total Cases</th>
<th>Incidence Rate</th>
<th>Median Days Away from Work</th>
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* Incidence rate per 10,000 FTE

## Number, Incidence Rate, & Median Days Away From Work for Occupational Injuries RN’s with Musculoskeletal Disorders in US, 2003 – 2014

<table>
<thead>
<tr>
<th>Year</th>
<th>Ownership</th>
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<th>Total Cases</th>
<th>Incidence Rate*</th>
<th>Median Days Away From Work</th>
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<td>10,050</td>
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</tr>
</tbody>
</table>

* Incidence rate per 10,000 FTE

Achieving the Use of the Evidence For Pressure Ulcer Reduction

Factors Impacting the ability to Achieve Quality Nursing Outcomes at the Point of Care

Resource & System
- Breathable glide sheet/stays
- Foam Wedges
- Microclimate control
- Reduce layers of linen
- Wick away moisture body pad
- Protects the caregiver

Skills & Knowledge

Value
Attitude
& Accountability
Comparative Study of Two Methods of Turning & Positioning

- Non randomized comparison design
- 59 neuro/trauma ICU mechanically ventilated patients
- Compared SOC: pillows/draw sheet vs turn and position system (breathable glide sheet/foam wedges/wick away pad)
- Measured PU incidence, turning effectiveness & nursing resources

<table>
<thead>
<tr>
<th>Demographic Comparison</th>
<th>SOC</th>
<th>PPS</th>
<th>P</th>
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<tbody>
<tr>
<td>Mean time on product (range), d</td>
<td>7 (1-29)</td>
<td>7 (1-45)</td>
<td>1.00</td>
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<tr>
<td>Mean age (SD) (range), y</td>
<td>57.72 (18.45) (18-89)</td>
<td>57.73 (17.67) (23-92)</td>
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</tr>
<tr>
<td>Gender</td>
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</tr>
<tr>
<td>Female</td>
<td>14</td>
<td>10</td>
<td>.43</td>
</tr>
<tr>
<td>Male</td>
<td>16</td>
<td>19</td>
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<td>Braden Scale score</td>
<td>12.77</td>
<td>13.23</td>
<td>.46</td>
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<tr>
<td>Mobility</td>
<td>0-1</td>
<td>0-1</td>
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<tr>
<td>BMI</td>
<td>29.62</td>
<td>30.97</td>
<td>.65</td>
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</tbody>
</table>

Comparative Study of Two Methods of Turning & Positioning

- Results:
  - Nurse satisfaction 87% versus 34%
  - 30° turn achieved versus -15.4 in SOC/7.12 degree difference at 1hr (p<.0001)

<table>
<thead>
<tr>
<th></th>
<th>SOC</th>
<th>PPS</th>
<th>P</th>
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</thead>
<tbody>
<tr>
<td>PU development</td>
<td>6</td>
<td>1^a</td>
<td>.04</td>
</tr>
<tr>
<td># of times patients pulled up in bed</td>
<td>3.28</td>
<td>2.58</td>
<td>.03</td>
</tr>
<tr>
<td># of staff required to turn patient</td>
<td>1.97</td>
<td>1.35</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

^a PU development with 24hrs of admission

Safe Patient Handling Initiative: Decreases Staff Musculoskeletal Injuries & Patient Pressure Ulcers

SAFE PATIENT HANDLING INITIATIVE PROTOCOL

1. Does the patient have a total Braden Score of 14 or less, including Braden mobility score of 1 and/or a Braden moisture score of <2?
2. Does the patient have ANY of the following co-morbidities?
   - Limited mobility post-op for 24 hours or more
   - Morbid Obesity
   - Limited mobility in general due to condition
   - Paral Quad paresis
   - Unconscious/Comatose
3. Does the patient have a past history of pressure ulcers?

If YES to the above questions, please use the turning and repositioning device:
- If ordering a turning and repositioning device, also order 1 heel protector and rotate foot every 2 hours
- If patient is at risk for foot drop or heel ulcers, order 2 heel protectors i.e. immobile patients

DISCONTINUE USE:
1. When patient is able to independently perform a turn.
2. No longer at risk for potential moisture injury.
3. Braden mobility score of 3 and/or moisture score of 3.

PRECAUTIONS:
1. Single use only. If soiled, wipe the glide sheet or body wedge with damp cloth to clean. DO NOT launder.
2. Periodically check product for signs of wear. Replace if product is damaged.

RESULTS

- 28% ↓
- 58% ↓

$184,720 savings
$247,500 savings

Way H Presented at the 2014 Safe Patient Handling East Conference on March 27, 2014
EBP Recommendations to Achieve Offloading & Reduce Pressure

- Turn & reposition every 2 hours (avoid positioning patients on a pressure ulcer)
  - Use active support surfaces for patients at higher risk of development where frequent manual manual turning may be difficult
  - Microclimate management
  - Heel Protection
  - Early Mobility programs
  - Seated support surfaces for patients with limited mobility when sitting in a chair

Support Surfaces In Critically Ill Patients

• Comparison cohort study of 2 different support surfaces in critically ill patients
• 52 critically ill patients with anticipated 3 day LOS in a 12 bed cardiovascular unit in a University Hospital in the Mid-west were included until d/c from ICU
• 31 patients: low air-loss weight-based pressure redistribution-microclimate management bed
• 21 patients: integrated powered air redistribution bed
• Measured: positioning, skin assessment, heel elevation
• Results:
  – Mean LOS 7 days (on the surface equal amount of days)
  – LAL-MCM bed = zero pressure ulcers
  – IP-AR bed = 4/21 or 18% (p=0.046)

EBP Recommendations to Achieve Offloading & Reduce Pressure

- Turn & reposition every 2 hours (avoid positioning patients on a pressure ulcer)
  - Use active support surfaces for patients at higher risk of development where frequent manual turning may be difficult
  - Microclimate management
  - Early Mobility programs
  - Heel Protection
  - Seated support surfaces for patients with limited mobility when sitting in a chair


EBP Recommendations to Achieve Offloading & Reduce Pressure

- Ensure the heels are free of the bed surface
  - Heal-protection devices should elevate the heel completely (off-load) in such a way as to distribute weight along the calf
  - The knee would be in slight flexion
  - Remove device periodically to assess the skin
Successful Prevention of Heel Ulcers and Plantar Contracture in the High Risk Ventilated Patients

Study Inclusion Criteria

- Sedated patient > 5 days
- May or may not be intubated
- Braden equal to or less than 16

Procedure

- Skin assessment and Braden completed on admission
- All pts who met criteria were measured for ROM of the ankle with goniometer, then every other day until pt did not meet criteria
- Heel appearance, Braden and Ramsey scores were assessed every other day and documented
- Identified and trained ICU nurses completed the assessments

53 sedated patients over a 7 month period

Results

Sustainability of Heel Injury Reduction: QI Project

- 490 bed facility
- Evidence based quality Improvement initiative
- 4 tier Process
  - Partnership
  - Comprehensive product review
  - Education & engagement
  - Support structures & processes

Hanna-Bull D. WOCN, 2016;43(2):129-132
EBP Recommendations to Achieve Offloading & Reduce Pressure

• Turn & reposition every 2 hours (avoid positioning patients on a pressure ulcer)
  – Use active support surfaces for patients at higher risk of development where frequent manual turning may be difficult
  – Microclimate management
  – Early Mobility programs
  – Seated support surfaces for patients with limited mobility when sitting in a chair


Any Work on Skin Should Be Incorporated into a Progressive Mobility Protocol
Outcomes of Early Mobility Program

- ↓ incidence of skin injury
- ↓ time on the ventilator
- ↓ incidence of VAP
- ↓ days of sedation
- ↓ delirium
- ↑ ambulatory distance
- Improved function

Thomsen GE, et al. CCM 2008;36;1119-1124
Winkelman C et al, CCN,2010;30:36-60

51
EBP Recommendations to Achieve Offloading & Reduce Pressure

- Turn & reposition every 2 hours (avoid positioning patients on a pressure ulcer)
  - Use active support surfaces for patients at higher risk of development where frequent manual manual turning may be difficult
  - Microclimate management
  - Early Mobility programs
  - Safe handling for out of bed & chair positioning

Out of Bed Technology
Current Seating Positioning Challenges

- Airway & Epiglottis compressed
- Body Alignment
- Shear/Friction
- Sacral Pressure

Potential repositioning & potential caregiver injury
Potential fall risk

Uncomfortable
Repositioning Patients in Chairs: An Improved Method (SPS)

- Study the exertion required for 3 methods of repositioning patients in chairs
- 31 care giver volunteers
- Each one trial of all 3 reposition methods
- Reported perceived exertion using the Borg tool, a validated scale.

Method 1: 2 care givers using old method of repositioning
246% greater exertion than SPS

Method 2: 2 caregivers with SPS
Method 3: 1 caregiver with SPS
52% greater exertion than method 2

Prevention Strategies for IAD
Evidence-Based Components of an IAD Prevention Program

• 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. (Grade C)
  – A skin protectant or disposable cloth that combines a pH balance no rinse 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. (Grade B)
  – Commercially available skin protectants vary in their ability to protect the skin from irritants, prevent maceration, and maintain skin health. More research is needed (Grade B)
EBP Recommendations to Reduce Injury From Incontinence & Other Forms of Moisture

- Clean the skin as soon as it becomes soiled.
- Use an incontinence pad and/or briefs that wick away moisture.
- Use a protective cream or ointment.
  - Disposable barrier cloth recommend by IHI & IAD consensus group.
- Ensure an appropriate microclimate & breathability.
- < 4 layers of linen.
- Barrier & wick away material under adipose and breast tissue.
- Support or retraction of the adipose tissue (i.e. KanguruWeb).
- Pouching device or a bowel management system.

Current Practice: Moisture Management

Reusable Incontinence pads

Adult diaper

Disposable Incontinence Pads

Airflow pads for Specialty Beds
EBP Recommendations to Reduce Injury From Incontinence & Other Forms of Moisture

- Clean the skin as soon as it becomes soiled.
- Use an incontinence pad and/or briefs that wick away
- Use a protective cream or ointment
  - Disposable barrier cloth recommend by IHI & IAD consensus group
- Ensure an appropriate microclimate & breathability
- < 4 layers of linen
- Barrier & wick away material under adipose and breast tissue
- Support or retraction of the adipose tissue (i.e. KanguruWeb)
- Pouching device or a bowel management system

www.ihi.org
IAD/HAPU Reduction Study

- Prospective, descriptive study
- 2 Neuro units
- Phase 1: prevalence of incontinence & incidence of IAD & HAPU
- Phase 2: Intervention
  - Use of a 1 step cleanser/barrier product
  - Education on IAD/HAPU
- Results:
  - Phase 1: incontinent 42.5%, IAD 29.4%, HAPU 29.4%, LOS 7.3 (2-14 days), Braden 14.4
  - Phase 2: incontinent 54.3%, IAD & HAPU 0, LOS 7.4 (2-14), Braden 12.74

EBP Recommendations to Reduce Injury From Incontinence & Other Forms of Moisture

- Clean the skin as soon as it becomes soiled.
- Use an incontinence pad and/or briefs that wick away moisture.
- Use a protective cream or ointment.
- Disposable barrier cloth recommend by IHI & IAD consensus group.
- Ensure an appropriate microclimate & breathability.
- < 4 layers of linen.
- Barrier & wick away material under adipose and breast tissue.
- Support or retraction of the adipose tissue (i.e. KanguruWeb).
- Pouching device/bowel management system/male external urinary device.

Medical Device Related Pressure Ulcers

- Prospective descriptive study to determine, prevalence, risk factors and characteristics of MDR’s PI
- 175 adults in 5 ICU’s
- 27 developed non-device related HAPI (15.4%)
- 70 developed MDR’s HAPI (45%)
- 42% were stage 2

<table>
<thead>
<tr>
<th>Type of Device</th>
<th>MDR Devices Rate (n=175 patients)</th>
<th>Ulcer Rate by Medical Device Type (n=211 Devices)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Monitoring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECG leads</td>
<td>173</td>
<td>98.8</td>
</tr>
<tr>
<td>ECG electrodes</td>
<td>172</td>
<td>98.2</td>
</tr>
<tr>
<td>BP cuff</td>
<td>171</td>
<td>97.7</td>
</tr>
<tr>
<td>SpO2 probe</td>
<td>170</td>
<td>97.1</td>
</tr>
<tr>
<td>GI/GU</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nasogastric</td>
<td>43</td>
<td>24.5</td>
</tr>
<tr>
<td>Orogastic</td>
<td>15</td>
<td>8.5</td>
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<tr>
<td>PEG</td>
<td>1</td>
<td>0.5</td>
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<tr>
<td>Foley</td>
<td>162</td>
<td>92.5</td>
</tr>
<tr>
<td>Vascular lines</td>
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<td></td>
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<tr>
<td>Central</td>
<td>72</td>
<td>41.1</td>
</tr>
<tr>
<td>Arterial</td>
<td>119</td>
<td>67.4</td>
</tr>
<tr>
<td>Peripheral</td>
<td>89</td>
<td>50.8</td>
</tr>
<tr>
<td>Respiratory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ET tube</td>
<td>67</td>
<td>38.2</td>
</tr>
<tr>
<td>Nasal cannula</td>
<td>54</td>
<td>30.8</td>
</tr>
<tr>
<td>CPAP mask</td>
<td>20</td>
<td>11.4</td>
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<tr>
<td>Oxygen mask</td>
<td>40</td>
<td>22.8</td>
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<tr>
<td>Preventive devices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TED</td>
<td>38</td>
<td>21.7</td>
</tr>
<tr>
<td>Cervical collar</td>
<td>4</td>
<td>2.2</td>
</tr>
<tr>
<td>Splint</td>
<td>2</td>
<td>1.1</td>
</tr>
<tr>
<td>Other devices</td>
<td>18</td>
<td>10.2</td>
</tr>
<tr>
<td>Total</td>
<td>211</td>
<td>100.0</td>
</tr>
</tbody>
</table>

MDR HAPU = medical device-related hospital-acquired pressure ulcer; BP = blood pressure; CPAP = continuous positive airway pressure; ECG = electrocardiograph; ET = endotracheal; GI/GU = gastrointestinal/gentoorinary; PEG = percutaneous endoscopic gastrostomy; SpO2 = peripheral oxygen saturation of hemoglobin; TEDs = thrombo-embolism deterrent.

* n>175 due to >1 medical device per patient; * n > 211 due to >1 MDR PU per device; * Airway, endotracheal tube holder, and plaster
Medical Device Related Pressure Ulcers

**Figure 1.** Distribution (percentage) of MDR PU’s by stage (n=211).

**Figure 2.** Distribution (percentage) of MDR PU’s by anatomical location (n=211).

**Table 4.** Odds ratios of MDR HAPU risk factors (n=564)

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>P</th>
<th>OR</th>
<th>95% CI for OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced age</td>
<td>.095</td>
<td>1.023</td>
<td>.996 - 1.050</td>
</tr>
<tr>
<td>Enteral feeding</td>
<td>.045b</td>
<td>2.12</td>
<td>.785 - 3.125</td>
</tr>
<tr>
<td>With traditional HAPUs</td>
<td>.001b</td>
<td>6.600</td>
<td>1.210 - 15.120</td>
</tr>
<tr>
<td>Medical ICU</td>
<td>.001b</td>
<td>7.041</td>
<td>2.144 - 23.126</td>
</tr>
<tr>
<td>Neurosurgical ICU</td>
<td>.011b</td>
<td>6.221</td>
<td>1.520 - 25.454</td>
</tr>
<tr>
<td>Chest diseases ICU</td>
<td>.009b</td>
<td>6.014</td>
<td>1.557 - 23.228</td>
</tr>
<tr>
<td>High risk Braden Scale score</td>
<td>.040b</td>
<td>1.815</td>
<td>1.029 - 3.205</td>
</tr>
<tr>
<td>Mechanical ventilation</td>
<td>.147</td>
<td>2.075</td>
<td>.773 - 5.588</td>
</tr>
<tr>
<td>Use of steroids</td>
<td>.649</td>
<td>.806</td>
<td>.318 - 2.042</td>
</tr>
<tr>
<td>Use of anticoagulants</td>
<td>.138</td>
<td>2.079</td>
<td>.791 - 5.466</td>
</tr>
<tr>
<td>Use of sedatives</td>
<td>.088</td>
<td>2.565</td>
<td>.866 - 7.578</td>
</tr>
<tr>
<td>Low albumin g/dl</td>
<td>.056</td>
<td>.527</td>
<td>.280 - .990</td>
</tr>
<tr>
<td>Low hemoglobin g/dl</td>
<td>.104</td>
<td>1.170</td>
<td>.968 - 1.413</td>
</tr>
</tbody>
</table>

HAPUs = hospital-acquired pressure ulcers; ICU = intensive care units; MDR PU = medical-device related pressure ulcers; CI = confidence interval; OR = odds ratio
*mean age 67.4±16.1; bP <0.05; cmean albumin 2.8±0.7; dmean hemoglobin 9.7±1.7

National incidence estimated 25%-29%

Minnesota Hospital Association/http://www.mnhospitals.org/pressure-ulcers

Having a medical device you are 2.4 x more likely to develop a HAPU of any kind (p=0.0008) Black JM., et al. International Wound J, 2010;7(5)358-365
Prevention of MDR’s-HAPI

Best Practices for Prevention of Medical Device-Related Pressure Ulcers in Critical Care

- Choose the correct size of medical device(s) to fit the individual
- Cushion and protect the skin with dressings in high-risk areas (e.g., nasal bridge)
- Inspect the skin in contact with device at least daily (if not medically contraindicated)
- Avoid placement of device(s) over sites of prior or existing pressure ulcer
- Educate staff on correct use of devices and prevention of skin breakdown
- Be aware of edema under device(s) and potential for skin breakdown
- Confirm that devices are not placed directly under an individual who is bedridden or immobile

Haugen V, Perspectives; 2016 http://www.perspectivesinnursing.org/current.html
"Even if you are on the right track, you will get run over if you just sit there."

Will Rogers
Hemodynamic Instability

Is it a Barrier to Positioning?
The Role of Hemodynamic Instability in Positioning\(^1,2\)

- Lateral turn results in a 3%-9% decrease in SVO\(_2\), which takes 5-10 minutes to return to baseline
- Appears the act of turning has the greatest impact on any instability seen
- Minimize factors that contribute to imbalances in oxygen supply and demand
- Factors that put patients at risk for intolerance to positioning:\(^3\)
  - Elderly
  - Diabetes with neuropathy
  - Prolonged bed rest
  - Low hemoglobin and cardiovascular reserve
  - Prolonged gravitational equilibrium\(^4,5\)

Decision-Making Tree for Patients Who Are Hemodynamically Unstable With Movement

Screen for mobility readiness within 8 hrs of admission to ICU & daily initiate in-bed mobility strategies as soon as possible

Is the patient hemodynamically unstable with manual turning?
- O₂ saturation ≤ 90%
- New onset cardiac arrhythmias or ischemia
- HR < 60 <120
- MAP < 55 >140
- SPB < 90 >180
- New or increasing vasopressor infusion
  - Yes
  - No
  - Begin in-bed mobility techniques and progress out-of-bed mobility as the patient tolerates

Is the patient still hemodynamically unstable after allowing 5-10 minutes' adaption post-position change before determining tolerance?
  - Yes
  - No
  - Begin in-bed mobility techniques and progress out-of-bed mobility as the patient tolerates

Screen for mobility readiness within 8 hrs of admission to ICU & daily initiate in-bed mobility strategies as soon as possible

Has the manual position turn or HOB elevation been performed slowly?
  - Yes
  - No
  - Allow the patient a minimum of 10 minutes of rest between activities, then try again to determine tolerance

Initiate continuous lateral rotation therapy via a protocol to train the patient to tolerate turning

HOB=head of bed; HR=heart rate; MAP=mean arterial pressure; SPB=systolic blood pressure.
Clinical Findings Which Prevent Patient Turning

1. Development of life threatening arrhythmia with symptomatic response (VFIB/VTACH/VT) This does NOT include asymptomatic AFIB.

2. Active Fluid Resuscitation: (i.e. no volume going in= no systemic blood pressure).

3. Active Hemorrhaging:
   - Following Cardiac Surgery/Active Tamponade
   - Massive GI bleeding with use of Blakemore tube
   - Active hemorrhage following Trauma.

4. Change in baseline hemodynamic parameters (BP, HR, Oxygen Saturation, RR, etc) that does not recover within 10 Minutes of position change and is not an expected result based on diagnosis.

Recommended Interventions for the Unstable Patient

If patient is deemed too unstable to turn by above parameters:

A trial turn should be attempted at least every 8 hours to determine ability to resume frequent turning at least every 2 hours.

1. Provide mini-turns
2. Weight shift patient at least every 30 minutes
3. Elevate heels from surface of bed
4. Reposition patient’s head, arms and legs at least every hour, consider passive ROM
5. Consider use of Continuous Lateral Rotation Therapy to prevent development of “gravitational equilibrium”. Begin: SLOW AND LOW angles of turning to gauge patient response.
6. When turning patient: GO SLOW! Provide serial small turns from supine to lateral position to achieve linen changes, hygiene checks, and reposition with wedges and pillows.

Unstable Fractures

1. Patient’s with unstable pelvic injuries LOG ROLL PATIENT ONLY with approval of Attending MD. Consider wedges or pillows placed between the legs to maintain proper alignment.
2. Do not use continuous lateral rotation therapy (CLRT) with unstable spinal fractures; these patients should be positioned with multiple wedges to maintain proper alignment.
3. Cervical Fractures/Unstable: Patient must have appropriately fitted cervical collar in place. Ensure security and proper positioning of collar, then log roll patient, and wedge in proper alignment.

Brindle TC, et all.
WOCN, 2013;40(3): 254-267
How Do We Make It Happen?
Driving Change

- Gap analysis
- Build the Will
- Protocol Development

Structure

- Make it Prescriptive
- Overcoming barriers
- Daily Integration

Process

Outcomes
Universal PUP Bundle with WOC Support = HAPU

- Quasi experimental pre-post design
- Intact skin on admission
- 180 pre received SOC and 146 post intervention received UPUPB & 2x weekly WOC rounding
- Results:
  - HAPU ↓ from 15.5% to 2.1%
  - 204 rounds over 6 months
  - ↑ adherence to heel elevation (p<.001) & repositioning p<.015

SAFER

Patient Skin Integrity Bundle (InSPIRE)

Methodology

- Before & after design
- 105 ICU pts in experimental group
- 102 ICU pts in control group
- Control-SOC
- Intervention: InSPIRE
  - Skin assessment on admission (4hrs) & surface placement
  - Ongoing Q 12
  - Skin hygiene (1x bath pre-package)
  - Turning q 3hrs/turn clock
  - ET & NG evaluated q 12 & repositioned
  - Heel device
  - Microclimate

Results:

- Groups similar on major demographics (age, SOFA, ICU LOS)
- Cumulative HAPU ↓ in intervention group 18.1% vs. 30.4% (p=.04)
- Mucosal injuries ↓ 15% vs. 39% p <.001
- Overall processes of care did not differ
- Device observation/repositioned 76% vs 28% of days (p <.001)
- Bathed only 1x per day in intervention group
- Repositioning q3hrs 83% vs. 51% days observed (p<.001)
Intact Skin Is In: Making it Happen

• Advocacy
• Braden subscales
• Skin rounds/time frequency
• Hand-off communication
• The right products and processes-pressure/shear/moisture/prevent skin tear and medical adhesive related injuries
• Quarterly prevalence/incidence of PU & IAD
• Skin liaison/champion nurses
• Creative strategies to reinforce protocol use
  • Visual cues in the room or medical record
  • Rewards for increase compliance
• Yearly competencies on beds or positioning aids to ensure correct and maximum utilization
Prevention Strategies Focus

• Pressure Ulcer/Turn/Shear reduction
• Health Care Worker Safety
• Early Mobility
• Managing Incontinence & Other Moisture
• Hemodynamic Instability
The Goal: Patient & Caregiver Safety

↓ Hospital LOS
↓ ICU LOS
↓ Skin Injury
↓ CAUTI
↓ Delirium
↓ Time on the vent

Patient Progressive Mobility

Safe Patient Handling

Prevention of Pressure Ulcers

↓ Repetitive motion injury
↓ Musculoskeletal injury
↓ Days away from work
↓ Staffing challenges
↓ Loss of experienced staff
↓ Nursing shortage

↓ Skin Injury
↓ Costs
↓ Pain and suffering
↓ Hospital LOS
↓ ICU LOS
Forbid yourself to be deterred by poor odds just because your mind has calculated that the opposition is too great. If it were easy, everyone would do it.
Contact Kathleen Vollman at kvolllman@comcast.net www.Vollman.com
June 23  EXPLORING THE ROLE OF ENVIRONMENTAL SURFACES IN OCCUPATIONAL INFECTION PREVENTION
Dr. Amber Mitchell, International Safety Center, and Barbara DeBaun, Cynosure Health

June 29  (South Pacific Teleclass)
SHARPS INJURY PREVENTION
Dr. Terry Grimmond, Grimmond & Associates Ltd., New Zealand

July 14  RESULTS OF QUALITATIVE RESEARCH ON IMPLEMENTATION OF INFECTION CONTROL BEST PRACTICES IN EUROPEAN HOSPITALS
Dr. Hugo Sax, University Hospital Zurich, Switzerland

July 21  BEHAVIOURAL AND ORGANIZATIONAL DETERMINANTS OF SUCCESSFUL INFECTION PREVENTION AND CONTROL INTERVENTIONS
Dr. Enrique Castro-Sánchez, Imperial College London, England

August 18  (Free Teleclass)
USE OF HYPOCHLORITE (BLEACH) IN HEALTHCARE FACILITIES

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