The Forgotten Organ: Eliminating Moisture, Shear & Friction Risk to Impact Patient Outcomes

Kathleen M. Vollman MSN, RN, CCNS, FCCM, FCNS, FAAN
Clinical Nurse Specialist / Educator / Consultant
ADVANCING NURSING
kvollman@comcast.net
Northville Michigan
www.Vollman.com

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Disclosures

• Consultant-Michigan Hospital Association Keystone Center
• Subject matter expert CAUTI, CLABSII, HAPI, Safety culture
• Consultant and speaker bureau for Sage Products, now part of Stryker
• Consultant and speaker bureau for Eloquest Healthcare
Objectives

• Discuss transforming a culture that creates safety for the patient and staff while achieving evidence-based outcomes

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

• Describe key care process changes that lead to a successful reduction of skin injury and address healthcare worker injury
Notes on Hospitals: 1859

• “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
Protect The Patient From Bad Things Happening on Your Watch

Implement Interventional Patient Hygiene
Interventional Patient Hygiene

• Hygiene…the science and practice of the establishment and maintenance of health

• Intervventional Patient Hygiene….nursing action plan directly focused on fortifying the patient’s host defense through proactive use of evidence-based hygiene care strategies
Interventional Patient Hygiene (IPH)

Pressure Injury Prevention
Background of the Problem

• HAPU are the 4th most common preventable medical error in the United States
• 2.5 million patients are treated for HAPU annually in acute care
• NDNQI data base: 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: sacrum (44.8%) or the heels (24.2%)
• Pressure ulcers cost $9.1-$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 year
• National healthcare cost $10.5-17.8 billion dollars for 2010
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
Top-Down vs Bottom Up Tissue Damage

Top-Down
• Stage 1, 2

Bottom-Up
• Stage 3, 4, Unstageable, DTI

Deep Tissue Pressure Injury

Persistent non-blanchable deep red, maroon or purple discolouration

Intact or non-intact skin with localized area of persistent non-blanchable deep red, maroon, purple discolouration or epidermal separation revealing a dark wound bed or blood filled blister

www.npuap.org
Skin Failure

• “An event in which the skin and underlying tissue die due to the hypoperfusion that occurs concurrent with severe dysfunction or failure of other organ systems” (Langemo, 2005; Langemo & Brown, 2006)

• Associated with hemodynamic changes, impaired thermoregulatory control, and metabolic complications

• Hypoperfusion of skin due to shunting to vital organs
  - Hypothermia resulting from hypoperfusion
  - Metabolic abnormalities of toxic metabolites from catabolism

Study of Acute Skin Failure in ICU Patients

• N=552 ICU patients

• 5 variables significantly & independently associated with skin failure:
  - PAD (vascular compromise): (OR=3.8)
  - Respiratory failure (OR=3.2)
  - Mechanical ventilation >72 hr (OR=3.0)
  - Liver failure (OR=2.9)
  - Severe sepsis/septic shock (OR=1.9)

Types of Skin Failure

**Acute:**
“an event in which skin and underlying tissue die due to hypoperfusion concurrent with a critical illness”

- E.g., sepsis, MI, etc.

**Chronic:**
“an event in which skin and underlying tissue die due to hypoperfusion with a chronic disease state”

- E.g., nephropathy/HD, neuropathy, PVD, MS

**End-Stage Skin Failure:**
“an event in which skin and underlying tissue die due to hypoperfusion concurrent with the end of life”

- E.g., cancer, ALS, MS,

Evidence in Support of the Definition

- Multiorgan failure: leading cause of morbidity & mortality resulting from organ dysfunction or failure

- Based on SCALE (2008) statements and NPUAP positions (2011, 2014), the 2 conditions necessary for establishing the diagnosis of skin failure are skin hypoperfusion and severe organ dysfunction or failure (White-Chu & Langemo, 2012).

- ICD-10 diagnosis of skin failure: L98.9 Disorders of the skin
Why the Term Skin Failure?

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Skin failure is a subset of multiple organ dysfunction syndrome (MODS) (Bone et al., 1992)</td>
<td>• It is not a PU (Langemo, 2005; Langemo &amp; Brown, 2006; White-Chu &amp; Langemo, 2012; Delmore et al., 2015)</td>
</tr>
<tr>
<td>• Distinguishes it from a PU (Langemo, 2005; Langemo &amp; Brown, 2006; White-Chu &amp; Langemo, 2012; Delmore et al., 2015)</td>
<td>• No other term at present to describe phenomena</td>
</tr>
</tbody>
</table>
Distinguishing PI & Skin Failure

• SF and PI are 2 distinct phenomena, yet interrelated & *can* occur simultaneously.

• Inadequately perfused skin is more susceptible to pressure & shear forces

• PI can occur in relatively healthy individual; SF can occur in acutely or chronically ill individuals or at end of life.
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
IAD: Multistate Epidemiology Study

• 5,342 patients in 189 acute care facilities in 36 states

• Prevalence study
  - To measure the prevalence of IAD, describe clinical characteristics of IAD, and analyze the relationship between IAD and prevalence of sacral/coccygeal pressure ulcers

• Results: 2,492 patients incontinent (46.6%)
  - 57% both FI and UI, 27% FI, 15% UI
  - 21.3% IAD rate overall/14% also had fungal rash
  - 45.7% in incontinent patients
    • 52.3% mild
    • 27.9% moderate
    • 9.2% severe
  - 73% was facility-acquired
  - ICU a 36% rate
  - IAD alone and in combination with immobility statistically associated with FAPI
Identify Patients at High Risk
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

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

It’s About the Sub-Scales

- Retrospective cohort analysis of 12,566 adult 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>
</tr>
</thead>
<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>
</tr>
<tr>
<td>Mechanical ventilation&gt;72 hours</td>
<td>3.161</td>
<td>0.664</td>
<td>22.68</td>
<td>&lt;.001</td>
<td>23.604</td>
<td>6.427-86.668</td>
</tr>
<tr>
<td>Hours of MAP&lt;60 mm Hg while receiving vasopressors</td>
<td>0.062</td>
<td>0.037</td>
<td>6.199</td>
<td>.01</td>
<td>1.096</td>
<td>1.020-1.178</td>
</tr>
<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>
</tr>
<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
### 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:
- Burn
- Cardiac Surgery
- CCO - General
- CSU - Interventional
- ICU - Cardiovascular
- ICU - General
- ICU - Medical
- ICU - Neuro
- ICU - Neonatal
- ICU - Pediatric
- ICU - Surgical
- Other
- Surgical
- Telemetry - General
- Telemetry - Medicine
- Wound Care
- Psychiatric - General
- Psychiatric - Geriatric
- Rehabilitation
- Renal/Urinary
- Respiratory/Primary Care
- Skilled Care (LTCH)
- Orthopedic/Transition

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

### Incontinence Collection Products:
Check all that apply to a specific unit/work area:
- Pad
- Clamp
- Reusable cloth
- Disposable plastic-backed
- Disposable air-backed

### Incontinence Cleanup & Skin Protection:
Check all product categories that are available in a specific unit/work area:

#### Cleansing:
- Barrier Protection (Tubes, Bottles or Sprays):
  - Petroleum
  - Zink Oxide
  - Dimethicone
  - Liquid Barrier Barrier
  - Other

#### Moisturizers:
- All-in-one products:
  - Barrier cloth with skin protectant

### Patient Information:

#### Patient Gender:
- Male
- Female

#### Patient Age Group:
- 0-11 yrs
- 12-19 yrs
- 20-29 yrs
- 30-39 yrs
- 40-49 yrs
- 50-59 yrs
- 60 yrs

#### ADL Status:
- Independent
- Requires assistance
- Totally dependent

### Section 1 - Complete for all patients surveyed:

#### Patient Location:
- Nil
- Partial
- Stool
- Slight
- Moderate
- Severe

### Section 3 - Complete only for incontinent patients:

#### Incontinence Clean-up Products:
Check products used or patient:
- Barrier Protection (Tubes, Bottles, or Sprays):
  - Petroleum
  - Zink Oxide
  - Dimethicone
  - Barrier
  - Other

#### Skin Care Products:
- Barrier Cream
- Ointment
- Other

### Section 4 - Complete for incontinent patients with presence of buttock or perineal skin excoriation:

#### Condition:
- Infection
- Sacral Pressure Ulcer
- Perineal Pressure Ulcer
- General

#### Treatment:
- Lipid
- Steroid
- Other

### Section 5 - Complete for incontinent patients with skin excoriation:

#### Containment Products:
- Peri-Anal
- Perineal
- General

#### Other Uses:
- Barrier ointment
- Barrier cloth
- Barrier plastic-backed
- 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

**Immobility Risk**

- Skin Risk Factors
  - Moisture
  - Pressure
  - Shear Friction
  - Deconditioning Falls Delirium ICU and Hospital LOS

**Mobility, Skin & Fall Prevention Strategies**

- Clean & Protect
- Reduce Pressure & Shear
- In-bed Exercise & Out of Bed Mobility

**Caregiver Risk**

- Repetitive motion, Lifting
- Repetitive motion, Lifting & Limb holding
- Repetitive motion, Dragging, patient weight

**Mobility, Skin & Fall Prevention Strategies**

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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 & avoid 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
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

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

Draw Sheet/Pillows/Layers of Linen
Lift Device
• 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
Oh, My Aching Back!

Back Pain Incidence in Nursing:

• 8 out of 10 nurses work despite experiencing musculoskeletal pain\(^1\)

• 62\% of nurses report concern regarding developing a disabling musculoskeletal injury\(^1\)

• 56\% of nurses report musculoskeletal pain is made worse by their job\(^1\)

• Nursing assistants had the 2\(^{nd}\) highest and RNs had the 6\(^{th}\) highest number of musculoskeletal disorders in the U.S.\(^2\)


Contributing Factors to Injury

• Healthcare is the only industry that considers 100 pounds to be a “light” weight

• Other professions use assistive equipment when moving heavy items

• On average, nurses and assistants lift 1.8 tons per shift (ANA, n.d.)
<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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</thead>
<tbody>
<tr>
<td>2009</td>
<td>private industry</td>
<td>RNs</td>
<td>8,760</td>
<td>51.6</td>
<td>8</td>
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<tr>
<td>2010</td>
<td>Private industry</td>
<td>RN</td>
<td>9,260</td>
<td>53.7</td>
<td>6</td>
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<tr>
<td>2011</td>
<td>Private industry</td>
<td>RN</td>
<td>10,210</td>
<td></td>
<td>8</td>
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<tr>
<td>2012</td>
<td>Private industry</td>
<td>RN</td>
<td>9,900</td>
<td>58.5</td>
<td>8</td>
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<tr>
<td>2013</td>
<td>Private Industry</td>
<td>RN</td>
<td>9,820</td>
<td>56.2</td>
<td>7</td>
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<tr>
<td>2014</td>
<td>Private Industry</td>
<td>RN</td>
<td>9,820</td>
<td>55.3</td>
<td>9</td>
</tr>
<tr>
<td>2014</td>
<td>Private Industry</td>
<td>NA</td>
<td>18,510</td>
<td></td>
<td>6</td>
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<tr>
<td>2005</td>
<td>private industry</td>
<td>RNs</td>
<td>9,060</td>
<td>-</td>
<td>7</td>
</tr>
<tr>
<td>2004</td>
<td>private industry</td>
<td>RNs</td>
<td>8,810</td>
<td>-</td>
<td>7</td>
</tr>
<tr>
<td>2003</td>
<td>private industry</td>
<td>RNs</td>
<td>10,050</td>
<td>-</td>
<td>6</td>
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</tbody>
</table>

* Incidence rate per 10,000 FTE

Achieving the Use of the Evidence for Pressure Injury Reduction

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

Impact of a Turn & Position Device on PI & Staff Time

- Prospective, QI study (1 SICU & 1 MICU)
- 2 phases
  - SOC: pillows, underpads, standard low airloss bed and additional staff if required
  - Interventional: turn and position system, a large wicking pad (part of the product)
- Inclusion criteria: newly admitted, non-ambulatory, required 2 or more to assist with turning/repositioning
- Turning procedures were timed/admitting till ICU discharge

Results
- No difference in sociodemographic and clinical data between the groups
- Phase 1: 14 patients (28%) Stage II sacral PI
- Phase 2: zero sacral PI (p<.0001)
- Timing:
  - Phase 1: 16.34 mins (range 4-60min) SD= 10.08
  - Phase 2: 3.58 mins (range 1.12-8.48) SD = 2.31 (p=0.0006)

Reducing HAPI & Patient Handling Injuries

- Compared pre-implementation turning practice: pillows/draw sheet vs turn and position system (breathable glide sheet/foam wedges/wick away pad)
- Baseline: November 2011-August 2012
- Implementation period: November 2012 to August 2015
- 3660 patients
- Compared HAPI rates, patient handling injuries, and cost

Way H, Am JSPHM, 2016;6(4):160-165

<table>
<thead>
<tr>
<th>Patient Handling Injury and Costs</th>
<th>74% reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<tr>
<td><strong>Injuries/Cost</strong></td>
<td></td>
</tr>
<tr>
<td>January 2012 to October 2012 (Before)</td>
<td>November 2012 to August 2013 (After)</td>
</tr>
<tr>
<td>19/$427,500</td>
<td>8/$180,000</td>
</tr>
</tbody>
</table>
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
  • Heel protection
  • Early mobility programs
  • Seated support surfaces for patients with limited mobility when sitting in a chair

In-Bed Technology
EBP Recommendations to Achieve Offloading & Reduce Pressure

• Ensure the heels are free of the bed surface
  • Heel protection devices should elevate the heel completely (off-load) in such a way as to distribute weight along the calf
  • The knee should be in slight flexion
  • Remove device periodically to assess the skin

Successful Study 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
- Trained ICU nurses completed the assessments

Results
53 sedated patients over a 7 month period
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

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Transition: In-Bed to Out-of-Bed & Back
Out-of-Bed Technology
Current seating positioning challenges

- Airway & epiglottis compressed
- Body alignment
- Shear/Friction
- Sacral pressure
- Frequent repositioning & potential caregiver injury
- Potential risk of sliding from chair
Repositioning patients in chairs: an improved method (SPS)

• Study the exertion required for 3 methods of repositioning patients in chairs

• 31 caregiver volunteers

• Each one trialed all 3 reposition methods

• Reported perceived exertion using the Borg tool, a validated scale

Method 1: 2 caregivers 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

Ambulation Assist Devices
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 balanced 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 recommended 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

References:
Current Practice: Moisture Management

Disposal incontinence pads
Airflow pads for specialty beds
Reusable incontinence pads
Adult diaper
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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

Innovated Male External Catheter Study

- This project was conducted in a 107-bed long-term acute care hospital
- **Timeline:**
  The QI initiative started on 02/21/16
- **Appropriate ECD Application:**
  The nursing team was educated on appropriate assessment of male anatomy for ECD placement
- **Measurement:**
  - Before and after catheter utilization and CAUTI infection rates
  - Increased adherence to best practices was reported on staff surveys (N=30 [15 RNs, 15 CNAs].)
- **Foley Catheter Appropriateness Criteria:**
  Benign prostatic hypertrophy; neurogenic bladder; stage 3 and 4 sacral pressure injury; and strict I&O
- **ECD Appropriateness Criteria:**
  No restraints; no neurogenic bladder; no benign prostatic hypertrophy; and cooperative with no urinary issues.
- **ECDs were contraindicated:**
  - Patient was unable to void or had known urinary retention
  - Unhealed wound on glans of penis
  - Active inflammation or infection of the glans, foreskin, or urethra
  - Severe phimosis or severe hypospadias
Quayle BL, Presented at APIC 44th Annual Conference in Portland, Oregon; June 14-16, 2017
Alternative Female External Collection Devices

How do they work?

• They are placed between the labia and the urethral opening

• The devices are attached to wall suction

• When female voids, the urine flows through the fabric into the collection chamber at the distal end, the suction takes the urine to the collection container
Quality Improvement Project

• 18 bed adult SICU
• 10 month pre/post QI study
• Utilization of an external female collection device
• Daily rounds discussion
  • Inter-professional discussion regarding indications
    • Avoid placement
    • Early removal
• Measurement: CAUTI & SIR rates

Beeson T, Davis C & Vollman K. Presented at the NACNS Meeting in Austin Tx, March 2, 2018
Outcomes

<table>
<thead>
<tr>
<th>Pre/Post Comparison Using Female External Device</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAUTI Rate</td>
<td>2.55</td>
<td>0.7</td>
</tr>
<tr>
<td>Standardized Infection Ratio (SIR)</td>
<td>1.395</td>
<td>0.381</td>
</tr>
<tr>
<td>Indwelling Catheter Days</td>
<td>↓ 9%</td>
<td></td>
</tr>
</tbody>
</table>
Fecal Containment 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>Table 3. Type of attached medical devices and rate of MDR HAPUs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Medical devices rate</strong></td>
</tr>
<tr>
<td>(n=175 patients)</td>
</tr>
<tr>
<td><strong>n</strong></td>
</tr>
<tr>
<td><strong>Monitoring</strong></td>
</tr>
<tr>
<td>ECG leads</td>
</tr>
<tr>
<td>ECG electrodes</td>
</tr>
<tr>
<td>BP cuff</td>
</tr>
<tr>
<td>SpO₂ probe</td>
</tr>
<tr>
<td>GI/GU</td>
</tr>
<tr>
<td>Nasogastric</td>
</tr>
<tr>
<td>Orogastric</td>
</tr>
<tr>
<td>PEG</td>
</tr>
<tr>
<td>Foley</td>
</tr>
<tr>
<td><strong>Vascular lines</strong></td>
</tr>
<tr>
<td>Central</td>
</tr>
<tr>
<td>Arterial</td>
</tr>
<tr>
<td>Peripheral</td>
</tr>
<tr>
<td><strong>Respiratory</strong></td>
</tr>
<tr>
<td>ET tube</td>
</tr>
<tr>
<td>Nasal cannula</td>
</tr>
<tr>
<td>CPAP mask</td>
</tr>
<tr>
<td>Oxygen mask</td>
</tr>
<tr>
<td><strong>Preventive devices</strong></td>
</tr>
<tr>
<td>TED</td>
</tr>
<tr>
<td>Cervical collar</td>
</tr>
<tr>
<td>Splint</td>
</tr>
<tr>
<td>Other devices*</td>
</tr>
<tr>
<td><strong>Total</strong></td>
</tr>
</tbody>
</table>

MDR HAPI = medical device-related hospital-acquired pressure ulcer, BP = blood pressure, CPAP = continuous positive airway pressure; ECG = electrocardiograph; ET = endotracheal; Gastro- = gastrointestinal/ genitourinary; 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

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)
Prevention of MDRs-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
Progressive Mobility + Caregiver Safety + Skin Safety
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, CCM,2010;30:36-60
Challenges to Mobilizing Patients

• **Potentially Modifiable Barriers**
  
  • Patient – related barriers (50%)
    - Hemodynamic instability, ICU devices, physical & neuropysch
  
  • Structural (18%)
    - Human or technological Resources
  
  • ICU culture (18%)
    - Knowledge/ Priority/ Habits
  
  • Process related (14%)
    - Service delivery/ lack of coordination
    - Clinician function

Decision-Making Tree for Patients Who Are Hemodynamically Unstable With Movement\textsuperscript{1,2}


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?
  - \(O_2\) saturation \(< 90\%
  - New onset cardiac arrhythmias or ischemia
  - HR \(< 60\) \(< 120\)
  - MAP \(< 55\) \(> 140\)
  - SPB \(< 90\) \(> 180\)
  - New or increasing vasopressor infusion

  - Yes
  - No

  - No

  - Yes

- Is the patient still hemodynamically unstable after allowing 5-10 minutes’ adaption post-position change before determining tolerance?

  - Yes

  - No

  - No

  - Yes

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

  - Yes

  - No

  - No

  - Yes

  - No

- Has the manual position turn or HOB elevation been performed slowly?

  - Yes

  - No

  - No

  - Yes

  - Yes

- 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/SVT) 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 6 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.
It is not enough to do your best, you have to know what to do and then do your best.
- E Deming
How do we make it happen?
Driving Change

- Gap analysis
- Build the will
- Protocol development

- Make it prescriptive
- Overcoming barriers
- Daily integration

Structure + Process → Outcomes
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 increased compliance
• Yearly competencies on beds or positioning aids to ensure correct and maximum utilization
The Goal: Patient and Caregiver Safety

- Repetitive motion injury
- ↓ Musculoskeletal injury
- ↓ Days away from work
- ↓ Staffing challenges
- Retain experienced staff

- ↓ Skin Injury
- ↓ Costs
- ↓ Pain and suffering
- ↓ Hospital LOS
- ↓ ICU LOS

- ↓ Falls
- ↓ Falls with injury
- ↓ Hospital LOS

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

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.
Questions?
Thank you!

Contact Kathleen Vollman at kvollman@comcast.net
www.Vollman.com