The Forgotten Organ: Reducing Hospital Acquired Skin Injury

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Driving Forces for Change

- Scientific Driver
  - Evidence-based practice movement
- Economic & Social Drivers
  - IOM/Medical error
    - Quality/Safety Organization
      - Australian Patient Safety Foundation (1999)/Safety &Quality Council (2000)/New Zealand part of Quality Network
      - Patient Safety First Campaign/NPSA/NICE/UK
      - IHI/VHA:100,000 lives campaign/5 million lives campaign
      - Building a culture of patient safety/Ireland
      - Safer Health Care Now/Canada
  - Accreditation bodies
- Professional Driver: Back to the basics

Evidenced-Based Practice

The conscientious, explicit, and judicious integration of
  - the best available evidence from systematic research,
  - with individual clinical expertise and
  - patient preference
at the bedside in making decisions about clinical practice.
Driving Forces for Change

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  - Evidence-based practice movement

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- **Professional Driver: Back to the basics**

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Technology/Medical vs. Fundamental Basic Care Practices

- **Prior to 5 Years Ago**
  - How was quality nursing care measured?
    - Reduced medication errors
    - Reduced order missed
    - Patient and family satisfaction

*Is this the full measurement of the quality of nursing care we deliver?*

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Behavioral Rationale for Current Environment of Nursing Practice

- **Behavior that is recognized and reinforced continues**
- **Behavior that is ignored or not reinforced does not continue**
HealthGrades Report 2008

- Patient Safety Incidents for Medicare
  - Analysis of 41 million Medicare patients between 2004-2006
  - 5000 hospitals studied
  - 238,337 potential preventable deaths
  - 8.8 billion in preventable costs
  - 249 hospitals top safety performers (5%)
  - Failure to rescue improved by 11%
  - Bed-sores & post op respiratory complications

Bed sores, failure to rescue and post op respiratory failure accounted for 63.4% of all incidents. 

IHI 5 Million Lives Campaign

- Prevent Pressure Ulcers
- Reduce surgical complications
- Reduce MRSA infection
- Prevent harm from high-alert medications
- Deliver reliable evidence-based care for congestive heart failure

Notes on Hospitals: 1859

“It may seem a strange principal to enunciate as the very first requirement in a Hospital that it should do the sick no harm.”

-Florence Nightingale
Critical Care Nurses
Knowledge of Pressure Ulcers

Methodology
- Knowledge assessment tests developed
- Cohort of registered nurses in a tertiary referral hospital in New Zealand had knowledge assessed x3
- Assess before an educational program, within two weeks after the educational program, & 20 weeks later

Results
- Mean scores at baseline 84%, following educational program 89%* and 20 week follow up showed return to baseline at 85%.
- No association was detected between demographic data and test scores
- Content validity and standard-setting were verified by using a variety of methods

*P = .003

Fortifying Host Defense

Strengthening the Natural Barrier to Infection...the Skin Prevention of Injury

Components of Successful Long Lasting Change

- Attitude & Accountability
- Resources & System
- Factors Impacting the ability to Achieve Quality Nursing Outcomes at the Point of Care
- Value

NSO/CPI
Fortifying the Host Defense

Implement Interventional Patient Hygiene

Interventional Patient Hygiene

Hand Hygiene
- Hygiene...the science and practice of the establishment and maintenance of health
- Interventional Patient Hygiene...nursing action plan directly focused on fortifying the patients host defense through proactive use of evidence based hygiene care strategies

Bathing & Assessment

Catheter Care

Pressure Ulcer Prevention

Incontinence Associated Dermatitis Prevention Program

Comprehensive Oral Care Plan

In God We Trust!

Everyone else please bring data
Hospital Acquired Skin Injury

- Injury caused by pressure
- Injury caused by moisture
- Injury caused by devices
- Injury caused during care activities

NPUAP & AHRQ

- National Pressure Ulcer Advisory Panel
  – www.npuap.org
- Agency for Healthcare Research and Quality
  – www.ahrq.gov

New Definitions

- Suspected Deep Tissue Injury:
  – Purple or maroon localized area of discolored intact skin or blood-filled blister due to damage of underlying soft tissue from pressure and/or shear.
  – The area may be preceded by tissue that is painful, firm, mushy, boggy, warmer or cooler as compared to adjacent tissue.

NPUAP 2007
New Definitions

• Stage I:
  – Intact skin with non-blanchable redness of a localized area usually over a bony prominence.
  – Darkly pigmented skin may not have visible blanching; its color may differ from the surrounding area.

NPUAP 2007
New Definition

• Stage II:
  – Partial thickness loss of dermis presenting as a shallow open ulcer with a red pink wound bed, without slough.
  – May also present as an intact or open/ruptured serum-filled blister.

• Further description:
  – Presents as a shiny or dry shallow ulcer without slough or bruising.*
  – This stage should not be used to describe skin tears, tape burns, perineal dermatitis, maceration or excoriation.

NPUAP 2007

Stage III (3) Pressure Ulcer

Full thickness skin loss involving damage or necrosis of subcutaneous tissue which may extend down to, but not through, underlying fascia. The ulcer presents clinically as a deep crater with or without undermining of adjacent tissue.

NPUAP 1989 Consensus Development Conference
New Definitions

• Unstageable:
  – Full thickness tissue loss in which the base of the ulcer is covered by slough (yellow, tan, gray, green or brown) and/or eschar (tan, brown or black) in the wound bed.

• Further description:
  – Until enough slough and/or eschar is removed to expose the base of the wound, the true depth, and therefore stage, cannot be determined. Stable (dry, adherent, intact without erythema or fluctuance) eschar on the heels serves as “the body’s natural (biological) cover” and should not be removed.

NPUAP 2007
Not Everything is a Pressure Ulcer

Skin Tear

Shearing Wound

Maceration

Fungal Infection

Perineal Dermatitis
Searching for an Appropriate Name: Incontinence Associated Dermatitis

• Acknowledges that condition extends beyond perineal skin.
• Clearly identifies UI or FI as primary causative factor.
• Removes negative and unfair association with diapers.
• Broad enough to encompass secondary infections such as candidiasis.
• Usually well beyond boney prominence

What is 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
• Physical signs on the perineum & buttocks
  – Erythema, swelling, oozing, vesiculation, crusting and scaling

Other Types of Skin Injury

• Skin tears from tape
• Shear/friction
• Injury caused by tubes and lines
Pressure Ulcer Prevalence & Incidence Rates in Acute Care

<table>
<thead>
<tr>
<th></th>
<th>USA</th>
<th>Victoria</th>
<th>Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevalence Rate</td>
<td>15%</td>
<td>26.5%</td>
<td>*5.4-27%</td>
</tr>
<tr>
<td>Incidence Rate</td>
<td>7%</td>
<td>18.2%</td>
<td>~ 5-6%</td>
</tr>
</tbody>
</table>

Pressure ulcers develop within the first 2 weeks of hospitalization & within 72 hours of ICU admission**

Prevalence

- National Pressure Ulcer Advisory Panel, 2001
- Victorian Quality Council Pressure Ulcer Point Prevalence Survey 2003
- Australian Wound Care Association 2001

Incidence

- 7%
- 18.2%
- ~ 5-6%

Facts about Pressure Ulcers

- 2.5 million patients treated for pressure ulcers per year
- Associated with extended LOS
- 60,000 patients are estimated to die each year from complications r/t a hospital-acquired pressure ulcer
- In the US, pressure ulcer rates have increased 63% from 1993 to 2003 while hospitalizations have only increased 11% (Lyder C & Ayello A. 2008. AHRQ)
- Reddy M et al. JAMA 2006;296:974-984
Impact on Cost & Hospital LOS

Methodology

• 286 patients with no breakdown on admission, expected to be confined to bed or wheelchair & remain in the hospital for > 5 days
• Assessed at baseline & weekly as well as the medical record

Results

• $2000.00 per stay & 4 days LOS independent of other patient factors
• Patients who develop pressure ulcers have a 25% greater chance of developing nosocomial infections


Facts about Pressure Ulcers

• Cost per case where pressure ulcer listed as secondary diagnosis $43,180.00
• Cost per stage IV pressure ulcer $61,230
• Federal Minister of health 350 million per year (1997)
• Morbidity estimated to affect 60,000 people per year (1999)
• 11 billion in preventable costs in US


Australian Wound Care Association 2001

Victorian Quality Council Pressure Ulcer Point Prevalence Survey 2003

Pilot Survey of Incontinence and Perineal Skin Injury Prevalence in Acute Care

608 Total Number of Patients Surveyed

120/19.7% Number of Incontinent Patients

20% IAD

21.7% Pressure Ulcers

10% Fungal Infection

Pilot Survey of Incontinence and Perineal Skin Injury Prevalence in Acute Care

33.1% with a Foley Catheter
6.1% Urinary Incontinence
17.6% Fecal Incontinence

Total Number of Patients Surveyed: 608


Suspect Risk Factors for IAD

- Low serum albumin 40x higher risk
- Chronic exposure to moisture
- Fecal & urinary incontinence
- Mobility subscale < 3
- Use of a containment device
- Alkaline pH
- Overgrowth or infection with pathogens
- Friction

Gray M, JWOCN 2004; 31(1 Suppl):S2-S

Pressure Ulcers – Risk Factors

1. Immobility 87.0%
2. Fecal Incontinence 56.7%
3. Malnutrition 54.4%
4. Decreased Mental Status 50.7%
5. Peripheral Vascular Disease 28.1%
6. Urinary Incontinence 27.0%
7. Diabetes 23.7%

So Why Should You Care?

Patient Discomfort - Pain & Suffering

- Extended stay
- Labor Intensive
- Huge Cost 11 Billion
- Family
- Other complications now possible!
- Pain & Suffering
- Lawsuits
- JCAHO
- Recoverable $?

Getting Started: 5 Million Lives Campaign

2-Steps to Preventing Pressure Ulcers

- Reliably implement prevention strategies for all patients who are identified at risk
  - Maintain healthy skin
  - Minimize pressure
  - Manage moisture
  - Nutrition & hydration

Six Essential Elements of Pressure Ulcer Prevention

- Admission Assessment
- Reassess Daily
- Inspect Skin Daily
- Manage Moisture
- Optimize Nutrition and Hydration
- Minimize Pressure
The things included in the measurement becomes relevant, the things omitted are out of sight out of mind

Peter F. Drucker

Identify Patients at High Risk

Assessment of Risk

- Use of a standardized tool to assess risk on admission/once daily (IHI)
- Little evidence to support tool better than clinical judgment (JBI: Level II)
- Use of multiple methods to visually cue staff as to which patients are at risk
  - Stickers of chart or outside patients door
  - Post days since last pressure ulcer data
  - Change documentation tools to ensure admission & daily risk assessment
  - Education of staff

Additional Risk Factors that Scoring Tools May Not Capture

- Age
- Medications
- Low blood flow
- Hx of previous pressure ulcers

Critically Ill Patients Additional Risk Factors

- Low perfusion states and/or receiving catecholamines
- Hemodynamic instability with turning
- Greater number of tubes
- Severe agitation or complete immobility
- Long field/ER/OR times on a non-pressure reducing surface

Norton Scale: Developed for Geriatric Patients

<table>
<thead>
<tr>
<th>Physical condition</th>
<th>Mental condition</th>
<th>Activity</th>
<th>Mobility</th>
<th>Incontinence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>Alert</td>
<td>Ambulant</td>
<td>Full</td>
<td>Not</td>
</tr>
<tr>
<td>Fair</td>
<td>Aesthetic</td>
<td>Walks w/ help</td>
<td>Slightly limited</td>
<td>Occasionally</td>
</tr>
<tr>
<td>Poor</td>
<td>Confused</td>
<td>Chair-bound</td>
<td>Very limited</td>
<td>Usually of urine</td>
</tr>
<tr>
<td>Bad</td>
<td>Stuporose</td>
<td>Bed-bound</td>
<td>Immobile</td>
<td>Doubly</td>
</tr>
</tbody>
</table>

Patient at risk with score of 10 or less

Reliability and Validity established in elderly hospitalized patients. Has a wide range of under and over predictions. (Bridel J. Assessing the risk of pressure sores. Nurs Stand. 1993; 7:32-35.)
Braden Validation Scales

<table>
<thead>
<tr>
<th>Area</th>
<th>Score</th>
<th>SENS</th>
<th>SPEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Med-Surg</td>
<td>16</td>
<td>100</td>
<td>90</td>
</tr>
<tr>
<td>Step-down</td>
<td>16</td>
<td>100</td>
<td>64</td>
</tr>
<tr>
<td>ICU</td>
<td>16</td>
<td>83</td>
<td>64</td>
</tr>
</tbody>
</table>

Levels of Risk:
Mild 15-18, Moderate 13-14, High 10-12, Severe <9

Incidence of Pressure Ulcers in Neuro ICU

- 186 NICU patients
- Assessed within 12 hrs of admission with pictures/Braden and re-examine every 4 days or at d/c from unit
- Measured: risk factors, tested usefulness of the Braden as a predictor
- Results
  - 23/186 patients developed a pressure ulcer (12.4%)
  - Braden scale independent predictor of development
  - >16 Braden score no ulcer
  - Being under weight was a significant, distinct factor
  - Risk of a stage II ulcer significantly increases with a Braden score <13

Fife C, et al. CCM 2001;29:283-290

Looking at the Subscales

- Total number may be classified as no or mild risk
- Single subscale may be at high risk
- Prevention targets focus on subscale

Incontinence Subscale Interventions

- Incontinence level 3

Pressure Ulcer Incidence ↓12% to 2%

Black J, University of Nebraska, Audio conference 10/22/2008
Prevalence & Incidence Assessment for IAD

Components of Initial Skin Assessment Documentation

• Must Address 5 areas;
  – Risk factors, pressure points, nutrition, hydration and moisture (most in the Braden)

• Minimal Skin Assessment Must Include;
  – Skin temperature
  – Color
  – Turgor
  – Moisture status and integrity

Fortifying Host Defense: Preventing Skin Injury

Skin Inspection: Bathing

Manage Moisture: Incontinence Care

Minimize Pressure
The Bath: The First Line Of Defense

What Happens During a Bath in Addition to Cleaning?
Assessments:
• Complete assessment of the skin
• Muscle tone & strength
• Range of motion
• Participation in ADL’s…physical & mental
• Pain assessment with activity
• Opportunity to communicate
• Opportunity to identify coping, feelings of powerlessness, depression, family support etc.
• Fatigue factor

Goal: Improve the effectiveness of communication among caregivers.
• Measure, assess and, if appropriate, take action to improve the timeliness of reporting, and the timeliness of receipt . . .

http://www.jcaho.org/accredited+organizations/patient+safety/05+npsg/05_npsg_hap.htm
Early Identification/Communication & Rapid Intervention

- Implemented a bathing process with a skin check communication tool
- Role of the non-license personnel & role of the RN
- Education & auditing

Bayerl K. et al. IHI 18th Annual National Forum on Quality Improvement, Orlando FA, Dec 2006

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Figure 1: Percentage of Patients with Stage 1 or Greater Pressure Ulcers

Bayerl K. et al. IHI 18th Annual National Forum on Quality Improvement, Orlando FA, Dec 2006

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Getting Started: 5 Million Lives Campaign

2-Steps to Preventing Pressure Ulcers

- Reliably implement prevention strategies for all patients who are identified at risk
  - Maintain healthy skin
  - Minimize pressure
  - Manage moisture
  - Nutrition & hydration

Identify patients at risk

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Strategies from the 5 million Lives Campaign

• Maintain healthy skin
• Manage moisture
• Minimize pressure

Optimal Hygiene

• ph balanced (4-6.8)
  – Stable pH discourages colonization of bacteria & risk of infection
• Excessive washing/use of soap compromises the water holding capacity of the skin
• Non-drying
• Lotion applied


The Impact of Soap on the Skin

• Natural or synthetic surfactants in soap remove the natural lipid layer during cleansing, compromising the natural infection barrier of the top layer of the skin..the epidermis
• Bar soaps may harbor pathogenic bacteria
• Skin pH requires 45 minutes to return to normal following a ordinary washing

pH Balance of Soaps

Impact of Wash Cloth/Soap Cleansing and Towel Drying on Skin

- Methodology
  - 15 healthy volunteers, 6 different W/D techniques
  - 3 W/D techniques on each arm repeated twice with a 2hr rest period
  - Measured: Transepidermal water loss (TEWL), skin hydration, skin pH and erythema

- Results:
  - TEWL increased with each type of W/D episode, further loss with repeated procedures
  - Increase skin pH with all W/D, esp with soap

Washing with soap & water and towel drying significantly disruptive effective on skin barrier function

Voegel D. J WOCN, 2008;35(1):84-90

The Bath: The First Line Of Defense

Nurse!!!
Comparison of Basinless Bath to a Basin Bath

Methodology:
- 60 patients in a progressive & surgical unit in an acute care institution compared basin bath vs. comfort bath
- Served as their own control with the right side of the body bathed with basinless bath/ left side with a basin bath
- Required a partial or complete bath conducted over 3 consecutive days
- Measured: skin condition using SCDF, nurse satisfaction & patient satisfaction

Kron-Chalupa J et al. Iowa City Veterans Medical Center

<table>
<thead>
<tr>
<th>Questions</th>
<th>Basinless Bath</th>
<th>Basin Bath</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall preference</td>
<td>97%</td>
<td>3%</td>
</tr>
<tr>
<td>Nurse satisfaction</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Time</td>
<td>10 minutes</td>
<td>21 minutes</td>
</tr>
<tr>
<td>SCDF (skin condition)</td>
<td>Significantly improved</td>
<td>Improved</td>
</tr>
</tbody>
</table>

Kron-Chalupa J et al. Iowa City Veterans Medical Center

Traditional vs. Disposable Bath in Critically Ill Patients

Methodology:
- 40 patients in Surgical, Medical and CT ICU received both baths on different days
- Compare basin bath vs. disposable
- Measure: time, quality of bath, microbial counts on skin (periumbilicus & groin, nurse satisfaction & costs

Larson E. et al. AJCC. 2004; 13(3):235-41
Traditional vs. Disposable Bath in Critically Ill Patients

Results:
• No difference in quality or microbial scores between the two bathing procedures
• Fewer products used*, lower costs, less time and higher nurse satisfaction with disposable bath*

p < .001

Larson E. et al. AJCC. 2004; 13(3):235-41

The Bath: The First Line Of Defense

Nurse!!!

Early Detection of Skin Injury

SOURCE CONTROL

Reducing the Patients Risk of Infection
Guidelines for Hand Hygiene in Health Care Settings

- When hands visibly soiled, wash with either a non-antimicrobial or antimicrobial soap & water (Cat 1A)
- If hands are not visibly soiled, use an alcohol-based hand rub for routinely decontaminating hands in all other clinical situations (Cat 1A)
- Decontaminate hands after removing gloves
- When washing with soap & water, wet hands first, apply soap, rub vigorously for 15 seconds, rinse and dry. Use towel to turn off faucet.
- Provide HCW with hand lotions & creams to minimize occurrence of irritant contact dermatitis
- Use multidimensional strategies to improve hand hygiene practice

CDC. Hand Hygiene Guidelines: MMWR 2002; 51(No. RR-16)[1-45]

Bath Water: A Source of Health Care Acquired Microbiological Contamination

- Compared normal bath water with chlorhexidine bath water on 3 wards
- Without Chlorhexidine: All samples + for bacterial growth (14/23 > 10^5 cfu/ml)
- With Chlorhexidine: 5/32 grew bacteria with growth 240 to 1900 cfu/ml
- Gloved hands/bathing: objects touch grew significant numbers of bacteria


Dry Basin Study: Level of Bacterial Growth

- 25 basins (children's hospital)
- 52% + for organisms
- 62% of those + had multiple organism present
- > multiple organisms present in the CCU

O'Flynn, J. APIC Meeting June 2007
Kosair children's Hospital
Waterborne Infections Study

- Hospital tap water is the most overlooked source for Health Care Acquired pathogens
- 29 evidenced-based studies present solid evidence of waterborne Health Care Acquired infections
- Transmission occurs via drinking, bathing, items rinsed with tap water and contaminated environmental surfaces


Waterborne Infections Study

- Conservative estimates suggest significant morbidity and mortality from waterborne pathogens
- Immunocompromised patients are at the greatest risk
- Recommendation I: Minimize patient exposure to hospital tap water via bottled water and pre-packaged, disposable bathing sponges


Bacterial Biofilm
Guidelines for Environmental Infection Control

- Practice hand hygiene to prevent the hand transfer of water borne pathogens and use barrier precautions (Cat 1A)
- Eliminate contaminated water or fluid environmental reservoirs wherever possible (Cat 1B)
- Clean and disinfect sinks & wash basins on a regular basis using an EPA-registered product (Cat 2)
- Evaluate for possible environmental sources ie colonization after use of tap water in patient care (Cat 1B)

CDC. MMWR June 6th, 2003, 52:No. RR-10

P. aeruginosa Outbreak: Tap Water the Culprit

- Single genotype
- 59 burn patients (hydrotherapy tank)
- 19 adult ICU patients (wash basins & water taps)
- 13/31 ICU patients (tap water)
- 5/14 surgical unit patients (tap water)


Bathing with CHG Basinless Cloths

- Prospective sequential group single arm clinical trial
- 1787 patients bathed
  - Period 1: soap & water
  - Period 2: CHG cloth cleansing
  - Period 3: non-medicated basinless cloth bath

Veron MO et al. Archives Internal Med 2006;166:306-312
Multicenter Trail: Daily Bathing with CHG cloths

- Evaluated before and after implementation of daily bathing with CHG cloth
  - 32% decrease in new acquisition MRSA colonization (p < 0.05)
  - 30% decrease in new acquisition VRE (p < 0.01)
  - CA-BSI’s decreased by 21% (p < 0.05)

Climo MW, et al. SHEA 2007; Abs 297
Milstone AM et al. Clinical Infectious Disease, 2008;46:274-281

CHG Bathing Reduces CLA-BSI

- 52 week, 2 arm, cross-over design clinical trial
- 22 bed MICU with 11 beds in 2 geographically separate areas
- 836 MICU patients
  - 1st 28 weeks: 1 hospital randomize to bathe with (Sage 2%) CHG cloths & the other unit bathe with soap & water
  - 2 week wash out period
  - 2nd 24 weeks: methods were crossed over
- Measured: Primary outcomes: incidence of CA-BSI’s & clinical sepsis. Secondary: other infections

CHG Bathing Reduces CLA-BSI

Results:
- CHG arm were significantly less likely to acquire a CLA-BSI 6.4 vs. 16.8 infections per 1000 catheter days
- Benefit against primary CLA-BSI's by CHG cleansing after 5 days in MICU
- No difference in clinical sepsis or other infections


Table 3. Percentage of Environmental Surface Culture Specimens That Were Positive for Vancomycin-Resistant Enterococci During the 3 Study Periods

<table>
<thead>
<tr>
<th>Site Where Culture Specimen Was Obtained</th>
<th>Study Period</th>
<th>Soap and Water (n = 311)</th>
<th>Chlorhexidine (n = 307)</th>
<th>Nonmedicated Cloth (n = 140)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table</td>
<td></td>
<td>10 (3)</td>
<td>4 (1)</td>
<td>12 (9)</td>
</tr>
<tr>
<td>Bed rail</td>
<td></td>
<td>33 (11)</td>
<td>12 (4)</td>
<td>22 (16)</td>
</tr>
<tr>
<td>Full sheet</td>
<td></td>
<td>63 (20)</td>
<td>17 (6)</td>
<td>45 (31)</td>
</tr>
</tbody>
</table>

Veron MO et al. Archives Intern Med 2006;166:306-312

Strategies for Bathing to Reduce Source Control & Improve Skin Defense

Basin Bath
- ↑ transmission of organisms
- ↑ time & effort
- ↑ # of supplies
- Harmful soaps
- Rough washcloths
- Cold/tepid water
- Scrubbing technique
Strategies for Bathing to Reduce Source Control & Improve Skin Defense

- All ICU patients receive the CHG basinless bath
- All Patients in the ICU with a + swab for VRE, MRSA receive CHG basinless bath
- All ICU patients admitted from a high risk location* receive CHG basinless bath
- All other patients receive the non-medicated basinless bath unless admitted from a high risk location*

High Risk Location: LTC, Chronic dialysis, past hospitalization within 30 days

Six Essential Elements of Pressure Ulcer Prevention

1. Admission Assessment
2. Reassess Daily
3. Inspect Skin Daily
4. Minimize Pressure
5. Manage Moisture
6. Optimize Nutrition and Hydration

Pressure Ulcers – Risk Factors

1. Immobility 87.0%
2. Fecal Incontinence 56.7%
3. Malnutrition 54.4%
4. Decreased Mental Status 50.7%
5. Peripheral Vascular Disease 28.1%
6. Urinary Incontinence 27.0%
7. Diabetes 23.7%

Anatomic Locations of Pressure Ulcers

1. Sacrum 36.9%
2. Heel 30.3%
3. Ischium (sit bone) 8.0%
4. Elbow 6.9%
5. Malleolus (ankle bone) 6.1%
6. Trochanter (hip bone) 5.1%
7. Knee 3.0%
8. Scapula (shoulder blade) 2.4%
9. Occiput (back of head) 1.3%


Pressure Forces

• Surface
• Time
• Tubes
• Ties

Capillary Pressure/Interface Pressure

• The amount of pressure exerted in a certain area that occludes the capillaries vessels, leading to pain and tissue induration (swelling) and necrosis
PRESSURE

Amount vs. Duration

↑Pressure  ↓Pressure
↓Time       ↑Time

Minimize Pressure

• Turn & reposition every 2 hours (avoid positioning patients on a pressure ulcer)
  – Pillows and cushioning devices to maintain alignment & prevent pressure on boney prominences
  – Use lifting device or draw shifts to move patients to prevent shear (loose covers & increased immersion in the support medium increase contact area)
  – Use pressure-relieving surfaces (in all areas)
• Changes to sustain the gain
  – Tools inside the patients room (turn clock)
  – Unit or hospital wide musical cues
  – Use products that makes it easier to prevent pressure

www.ihi.org
Rager SL et al. OWM. 2007;53(10):50-58
Combination of Turning and Pressure Reduction Devices on Incidence of Pressure Ulcer

Methodology
- 838 geriatric nursing home patients/4 week duration, Braden score < 17/Norton < 12
- Alternating semi-fowlers (HOB 30°) with lateral 30°
- 4 different turning schemes
  - 2 hrs on a standard institutional mattress (n=65)
  - 3 hrs on a standard institutional mattress (n=65)
  - 4 hrs on a viscoelastic foam mattress (n=65)
  - 6 hrs on a viscoelastic foam mattress (n=65)
- Out of bed sitting time was not standardized (prevention surface was standardized & patients stood q 1hr)
- Measured the incidence


Results
- Demographics: age: 84.4 (SD 8.33) mostly female, Braden score: 13.2 (SD 2.36), Norton: 10.0 (SD 1.96)

<table>
<thead>
<tr>
<th>Injury</th>
<th>Q 2hr</th>
<th>Q 3hr</th>
<th>Q 4hrs*</th>
<th>Q 6hrs</th>
<th>Standard</th>
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<tbody>
<tr>
<td>Non-blanchable Erythema</td>
<td>47.6%</td>
<td>44.8%</td>
<td>46%</td>
<td>46%</td>
<td>43%</td>
</tr>
<tr>
<td>Grade II or higher</td>
<td>14.3%</td>
<td>24.1%</td>
<td>3%**</td>
<td>15.9%</td>
<td>20%</td>
</tr>
</tbody>
</table>

* Significantly greater time to pressure ulcer lesion (p = 0.0001)
** Significantly less pressure ulcer lesions (odds ratio 0.12 (95% CI = 0.03-0.48)


Do We Achieve Q2 Hours?
Body Position: Clinical Practice vs. Standard

- Methodology
  - 74 patients/566 total hours of observation
  - 3 tertiary hospitals
  - Change in body position recorded every 15 minutes
  - Average observation time 7.7 hours
  - Online MD survey
- Results
  - 49.3% of observed time no body position change
  - 2.7% had a q 2 hour body position change
  - 80-90% believed q 2 hour position change should occur but only 57% believed it happened in their ICU

Krishnagopalan S. Crit Care Med 2002;30:2588-2592

Positioning Prevalence

Methodology
- Prospectively recorded, 2 days, 40 ICU’s in the UK
- Analysis on 393 sets of observations
- Turn defined as supine position to a right or left side lying

Results:
- 5 patients prone at any time, 3 .8% (day 1) & 5% (day 2) rotating beds
- Patients on back 46% of observation
- Left 28.4%
- Right 25%
- Head up 97.4%
- Average time between turns 4.85 hrs (3.3 SD)
- No significant association between time and age, wt, ht, resp dx, intubation, sedation score, day of wk, nurse/patient ratio, hospital

Goldhill DR et al. Anaesthesia 2008;63:509-515

Preventing pressure ulcers

- The prevention practices that have received the most attention are those that involve specific beds or mattresses.
- There are at least 115 different pressure-relieving support surfaces.
- AHRQ utilized a systematic review of pressure-relieving devices that included 37 randomized controlled trials.
- Only 5 studies included the critically ill patient in the ICU

Jastrzemski,C 2007 SCCM
Preventing Pressure Ulcers

Findings
- Many specialty beds appear to be effective in reducing the development of pressure ulcers when compared to "standard" mattresses.
- Low pressure devices did not yield clear conclusions
- Alternating pressure devices showed no significant difference in reducing pressure compared to static air mattress and foam overlays
- Alternate pressure supports compared to standard foam mattresses did demonstrate lower pressure ulcer development
- The only devices that consistently relieve pressure are low air loss and air fluidized beds.

Jastremski C. 2007 SCCM

Support Surface Interface Pressure: Does it Help Prevent Pressure Ulcers

A reduction in tissue interface pressure may not translate into reduced pressure ulcer incidence. Surfaces should be looked at in relation to all the pressure ulcer risk factors…shear, friction, temperature, moisture and pressure

No direct or positive relationship exists between interface pressures and the distribution of pressure ulcers at various locations

Reger SJ et al. OWM, 2007;53(10):50-58

Linking Risk Assessment to Prevention Strategies

Methodology:
- 112 medical/surgical ICU patients from 3 hospitals (urban, acute and community)
- Assessed Braden score, development of ulcers and number of prevention strategies
- Measured relationship of Braden score to actual development of skin breakdown, Braden score to prevention strategies chosen and Braden score & prevention strategies to actual skin breakdown

Linking Risk Assessment to Prevention Strategies cont’d

Results:
- 9 patients experienced skin breakdown
- No relation to any demographics
- Not related to total Braden score or any of the 5 subscales (3 no risk/4 low risk/2 moderate risk)
- Mobility predictive of risk for breakdown
- No relationship between risk of breakdown & choice of product
- Numbers of layers of material between patient and mattress found to be significant (4-6 layers)


Anatomic Locations of Pressure Ulcers

1. Sacrum 36.9%
2. Heel 30.3%
3. Ischium (sit bone) 8.0%
4. Elbow 6.9%
5. Malleolus (ankle bone) 6.1%
6. Trochanter (hip bone) 5.1%
7. Knee 3.0%
8. Scapula (shoulder blade) 2.4%
9. Occiput (back of head) 1.3%

Keeping Heels Intact: Evaluation of a Protocol for Preventing Facility-Acquired Heel Ulcers

- 53 patients on intervention unit that used the prevent-pressure relieving product did not develop heel ulcers
- Product trial demonstrated higher scores in comfort, temperature, comparability with DVT prevention devices, no sharp or rough edges and total floatation of the heel achieved
- Zero heel ulcers for 3 month pilot
Heel Ulcer Reduction

- 550 bed nursing home
- Pre-intervention period 39 occurrences of heel ulcer
- Comprehensive educational program, protocol and a new product (Prevalon™) for Braden’s < 16 & additional co-morbidities

Successful Prevention of Heel Ulcers and Plantar Contracture in the High Risk Ventilated Patients

53 sedated patients over a 7 month period

**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

**Results**

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Heel ulcer</th>
<th>Plantar Contracture</th>
</tr>
</thead>
<tbody>
<tr>
<td>100% prevention of heel ulcers</td>
<td>100% prevention of Plantar Contracture</td>
<td>5 patients improved</td>
</tr>
</tbody>
</table>

Meyers T, et al. 2007 Poster WOCN

Six Essential Elements of Pressure Ulcer Prevention

1. Admission Assessment
2. Reassess Daily
3. Inspect Skin Daily
4. Minimize Pressure
5. Manage Moisture
6. Optimize Nutrition and Hydration
Pressure Ulcers – Risk Factors

1. Immobility 87.0%
2. Fecal Incontinence 56.7%
3. Malnutrition 54.4%
4. Decreased Mental Status 50.7%
5. Peripheral Vascular Disease 28.1%
6. Urinary Incontinence 27.0%
7. Diabetes 23.7%


“Patients with fecal incontinence were 22 times more likely to have pressure ulcers than patients without fecal incontinence.”

When impaired mobility is combined with fecal incontinence those odds rise to 37.5 times more likely.


Pressure Ulcer Prevention Guidelines for Incontinence Care

- Clean your skin as soon as it becomes soiled.
- Use a protective cream or ointment on the skin to protect it from wetness.
- Use an incontinence pad and/or briefs to absorb wetness away from the skin.

NPUAP (National Pressure Ulcer Advisory Panel) 1992

AHRQ (Agency for Health Care Research and Quality) – formerly AHCPR – 1990

NIH (National Institutes of Health) Standards of Practice 2001

WOCN (Wound, Ostomy, Continence Nurses Society) 2003
Challenges of Incontinence Care

- Individually packaged products are not always within reach during incontinence clean up
- Risk of unprotected skin is high
- Cleaning and protection usually done as separate activities
- Washcloths often become disposable when soiled
- Increased risk for contamination
- Not all products have a chemical barrier

Process Variation

Your incontinence care products don't work either - if they aren't being used!

32 State Survey on Perineal Skin Care Protocols

Methodology:
- 76 protocols form Acute and LTC facilities
- Analyzed to determine correlation with evidence-based practices per the literature
- HPIS (Healthcare Products Information Services) data used to evaluated amount sold to each facility
- HPIS data compared to urinary & fecal incontinence prevalence data

Results:
- All 76 protocols lack 1 or more interventions considered important in perineal care
- 75% included use of skin protectants
- Analysis against HPIS data and incontinence data suggests under utilization of skin protectants (< 10 cents per day vs. $1.35)

Evaluating the Efficacy of a Uniquely Delivered Skin Protectant and Its Effect on the Formation of Sacral/Buttock Pressure Ulcers

**Methodology:**
- Retrospective/prospective quasi-experimental study
- 57 bed LTC
- Data collected 3 months before use & 3 months following conversion
- Demographics comparable between groups
  - Age, LOS, mobility in bed, transfer between surfaces, incontinence of bowel/bladder, BMI, albumin and concurrent disease scale
- Pre-data revealed 12 residents with incontinence developed 15 sacral stage 1 & 2 ulcers.
- Monthly incidence rates over 9 months 4.7%

*Clever K. OWM. 2002;48(12): 60-67*

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**Clever et al. “Pressure Ulcer” Study**

Evaluating the Efficacy of a Uniquely Delivered Skin Protectant and Its Effect on the Formation of Sacral/Buttock Pressure Ulcers

Average Monthly Incidence of Sacral/Buttock Pressure Ulcers

Old standard of care compared to use of Comfort Shield® as preventative*

<table>
<thead>
<tr>
<th>Old Standard of Care</th>
<th>New Standard of Care</th>
<th>Reduction in Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 2000 to March 2001</td>
<td>May to July 2001</td>
<td>Feb to April 2002</td>
</tr>
<tr>
<td>4.7%</td>
<td>0.5%</td>
<td>89% Reduction in Incidence</td>
</tr>
</tbody>
</table>

*No significant differences in impact variables between groups*

*Clever K. OWM. 2002;48(12): 60-67*

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Reducing IAD in the Critical Care Area

**Methodology:**
- Adult patients admitted to the ICU without skin breakdown were included
- Sample size of 100 for each of the 2 study arms
- Measured how often appropriate prevention measures for IAD are used
- Measured rate of skin breakdown in patients with fecal incontinence who were managed with interventional protocol
- 1st phase examine current practice: skin cleanser and separate barrier and frequency of use
- 2nd phase introduced an all in one incontinence management system

*Driver D. Critical Care Nurse, 2007;27(4):42-46*
Reducing IAD in the Critical Care Area

Results:
- Collected data on 131 patients
  - 50% (8/16 incontinent) patients developed perineal dermatitis (skin breakdown)
  - Non-compliance with incontinence skin care protocol
- Reasons for non-compliance
  - Not easy to apply/not easy to remove
- Collected data on 177 patients post incontinence product change
  - 19% (3/16 incontinent) patients developed perineal dermatitis (skin breakdown)

Driver D. Critical Care Nurse, 2007;27(4):42-46

Bard® FCD™ Fecal Containment Device

- Provides a method for managing fecal incontinence.
- Remains securely attached to ambulatory patients
- Kit contains collection bag, closure clip, drainage bag adapter, powder adhesive and adhesive remover.

Fecal Management System

- Use not indicated for solid or semi formed stool
- Small amount of leakage may occur, recommend to use skin barrier
- Can irrigate if blockage present
- Not intended for use beyond 29 days

www.convatec.com accessed 08/11/07
Journey to Excellence:
Unit Story of Eliminating Skin Injury

Tina Meyers, CWOCN, ACHRN
Certified Wound, Ostomy and Continence
Advanced Certified Hyperbaric Nurse
Specialist/Education/Consultant
Tina.meyers@hchd.tmc.edu
Houston, Texas

Journey to Excellence

• Defining the problem:
  – 35 bed ICU/CCU Community Teaching Hospital/Cardiac Specialty
  – Critical Care patients were developing Incontinence Associated Dermatitis and Pressure Ulcers to the sacral/coccyx and heel regions
  – Teams were created to monitor interventions and provide units with skin care champions
  – After conducting a prevalence study on pressure and IAD, moisture, pressure and knowledge deficit were considered to play a significant role with the problem

Journey to Excellence
The Facts are………

– Prevalence of PU was at 15%
– Incidence of PU was at 9%
– Moisture was significant with > 60% of patient
– Skin was not viewed as an important part of assessment
– Pt were kept supine majority of day
– IAD was not understood and no fecal collective devices were being used
Analysis of Problem for Pressure

Before
• Skin barriers - limited
• Linens - many layers
• Skin Protocol - none
• Nutrition Orders - none
• Support Surface Algorithm - none
• Mattresses - > 7 years old
• Pts remained in supine position most of the day

After
• pH appropriate barrier
• Changed to pads
• Developed with team
• Developed w/ dietitians
• Bed surface education to develop algorithm
• 3 strikes and you’re out fecal pouch or BMS
• Upgrade
• Turned every 2 hours and continuous rotation was implemented

Were Our Efforts Worth It?
Yes!!!

• Nurses witnessed healing of the skin with use of barriers and pressure relieving devices
• Staff ownership developed and protocols were followed
• Acquired heel ulcers were at 0%
• Documented pressure ulcers on admission @95%
• Skin Care Interventions = 98%
• Skin Care Initiatives for patients with Braden < 16 or less = 100%

<table>
<thead>
<tr>
<th>Year</th>
<th>%&gt;FAt</th>
<th>#FA</th>
<th>FA % Prev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>15.8</td>
<td>6</td>
<td>3.6</td>
</tr>
<tr>
<td>2007</td>
<td>0.6</td>
<td>&lt;1</td>
<td>&lt;1</td>
</tr>
</tbody>
</table>

Assessment of Risk Factors for IAD

• Bathing
  – Soap for cleanser with pH of 10
  – Perineum left moist
  – Use of baby powder created clumps
• Barriers
  – Not considered important to use
• Incontinent Pads
  – Not effective against moisture development

• Briefs
  – Quality was “poor”
• Frequency of change and assessment for incontinence
  – No schedule
• Moisture
  – Urine and Feces
  – Diaphoresis not considered risk factor
Analysis of Problem for IAD

Before
• No fecal collection device
• No skin barriers
• Briefs were a standard
• Incontinent pads were not effective and multiple layers used
• Mistaken for Pressure Ulcers

After
• Protocol - Fecal pouch and BMS developed
• Cloth barrier and cream
• No briefs (unless ambulating)
• Absorbent pad obtained to eliminate multiple layers
• Wound reference booklet with pictures to help determine difference

Outcomes
• Incidence of hospital acquired pressure ulcers went from 15% to 0.6%.
• IAD complications decreased significantly – >50%
• Staff took ownership of maintaining skin integrity
• Study was completed to evaluate a product targeted to prevent heel ulcers and reduce the complications of plantar flexion contracture
  – Item was brought in for use in the critical care units

Lessons Learned
• Protocols must be set and followed
  – Nursing leadership to hold staff accountable
• Education is continuous
  – Recognize knowledge deficit
  – Encourage staff to take ownership for skin care
• Use what you have!
  – Wedge for holding patient in position
  – Progressive Bed Mobility
    • Use of surface for bed mobility
Additional Successful Programs

“Save Our Skin: Initiative Cuts Pressure Ulcer Incidence In Half”

- OSF St Francis – 710 beds, Level 1 Trauma, Magnet, 25,000 admits.
- SOS Program: OR Skin Assessment; new skin prevention protocol including a 1-step cleanser barrier cloths (Shield Barrier Cloth)


Save Our Skin: Six Sigma Project

New Jersey Hospital Association Collaborative: No Ulcers©

- Nutrition and fluid status
- Observation of skin
- Up and walking or turn & position
- Lift, don’t drag skin
- Clean skin & continence care
- Elevate heels
- Risk assessment
- Support surfaces for pressure redistribution

Post 20 months: 70% reduction in pressure ulcer incidence

Ayello EA, Lyder CH. Nursing 2007: October

SKIN: Ascension Hospitals

- S = Surface selection
- K = Keep Turning
- I = Incontinence management
- N = Nutrition

Post SKIN Bundle Implementation:
1.4 per 1000 patient days system wide. 6 of the facilities had no acquired pressure ulcers for over 1 year. No new Stage III & IV acquired btwn 08/04 & 02/06

Ayello EA, Lyder CH. Nursing 2007: October

How to Get Started in Your Unit!!!!
Tips To Get Started

• Perform an initial assessment of the current state of the union on care practices within your environment that impact skin injury (pressure ulcers and IAD)
• Build the valuing of changing of those care practices through sharing of the scientific literature with your peers
• Select a product line that allows the nurse to “do the right thing in an efficient manner”

Tips To Get Started

• Develop processes that enhance efficiency and communication to help move evidence into practice.
• Implement Interventional Patient Hygiene
• Measure the results (use standardized definitions to capture & compile data)
• Compare against the benchmarks
• Celebrate & reward your success and growth as a team
• Check on a quarterly basis continued compliance with the new program

Florence Nightingale on: SKIN INTEGRITY

➢ “It may be worth while to remark, that where there is any danger of bed-sores a blanket should never be placed under the patient. It retains damp and acts like a poultice.”
➢ “If a patient is feverish, if a patient is faint, if he is sick after taking food, if he has a bed-sore, it is generally the fault NOT OF THE DISEASE, BUT OF THE NURSING.”
➢ “Poisoning by the skin is no less certain than poisoning by the mouth—only it is slower in its operation.”

Notes on Nursing (1860/1969)
Seize the Opportunity

Be the Change Agent

For Further Clinical Information

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www.vollman.com