

Strategies to Reduce Skin Injury in Critically Ill Patients



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- Sage Products Speaker Bureau & Consultant
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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

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

Background of the Problem

- ◆ HAPU are the 4th leading preventable medical error in the United States
- ◆ 2.5 million patients are treated 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 yr.
- ◆ National health care cost \$10.5-17.8 billion dollars for 2010

<http://www.ahrq.gov/professionals/systems/hospital/pressureulcertoolkit/putool1.html#11>

Dorner, B., Posthauer, M.E., Thomas, D. (2009), www.npuap.org/newroom.htm

Whittington K, Briones R. *Advances in Skin & Wound Care*. 2004;17:490-4.

Reddy, M, et al. *JAMA*. 2006; 296(8): 974-984

Vanderwee KM, et al., *Eval Clin Pract* 13(2):227-32. 2007

National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury Alliance. Prevention & treatment of pressure ulcers :clinical practice guideline. Emily Haesler (Ed)

Cambridge Media: Osborne Park: Western Australia, 2014.

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

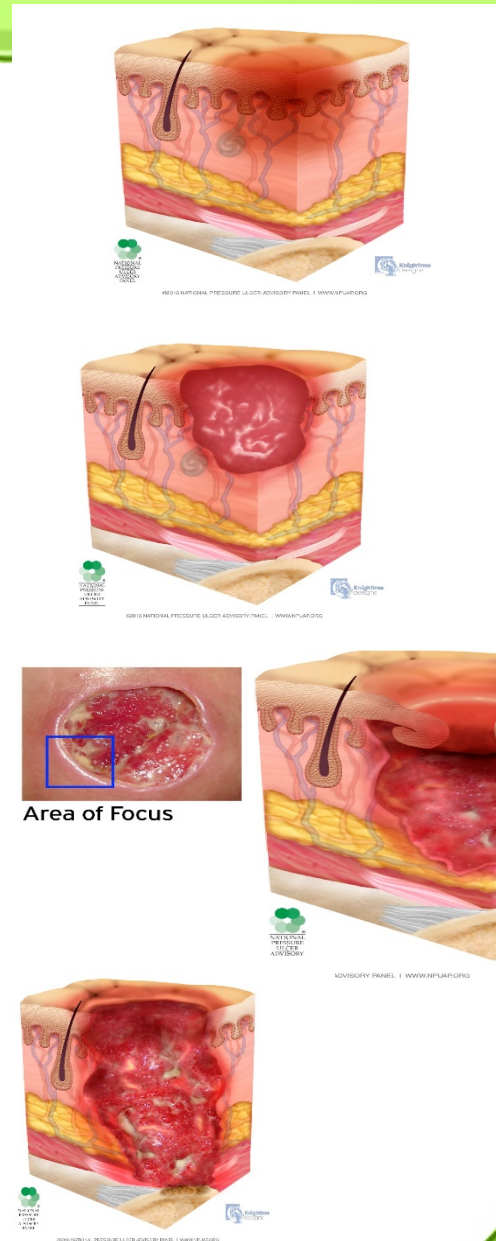
Stage II through IV
describe open
ulcers



PRESSURE INJURY

Label & Definitions of Pressure Injury

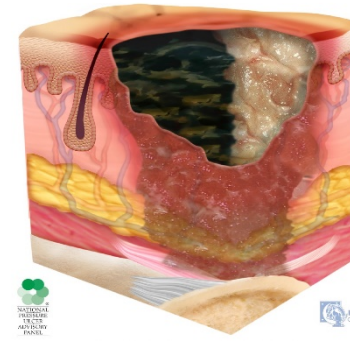
- Stage 1 Pressure Injury: Non-blanchable erythema of intact skin
- Stage 2 Pressure Injury: Partial thickness skin loss with exposed dermis
- Stage 3 Pressure Injury: Full thickness skin loss
- Stage 4 Pressure Injury: Full-thickness skin and tissue loss



<http://www.npuap.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



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<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

Gray M et al OWM 2007;34(1):45-53.

Doughty D, et al. JWOCN. 2012;39(3):303-315

Systematic Review on Impact of Incontinence

Lachenbruch C, et al J Wound, Ostomy Continence Nurs. 2016;43(3):235-241

- 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

Part of the Picture

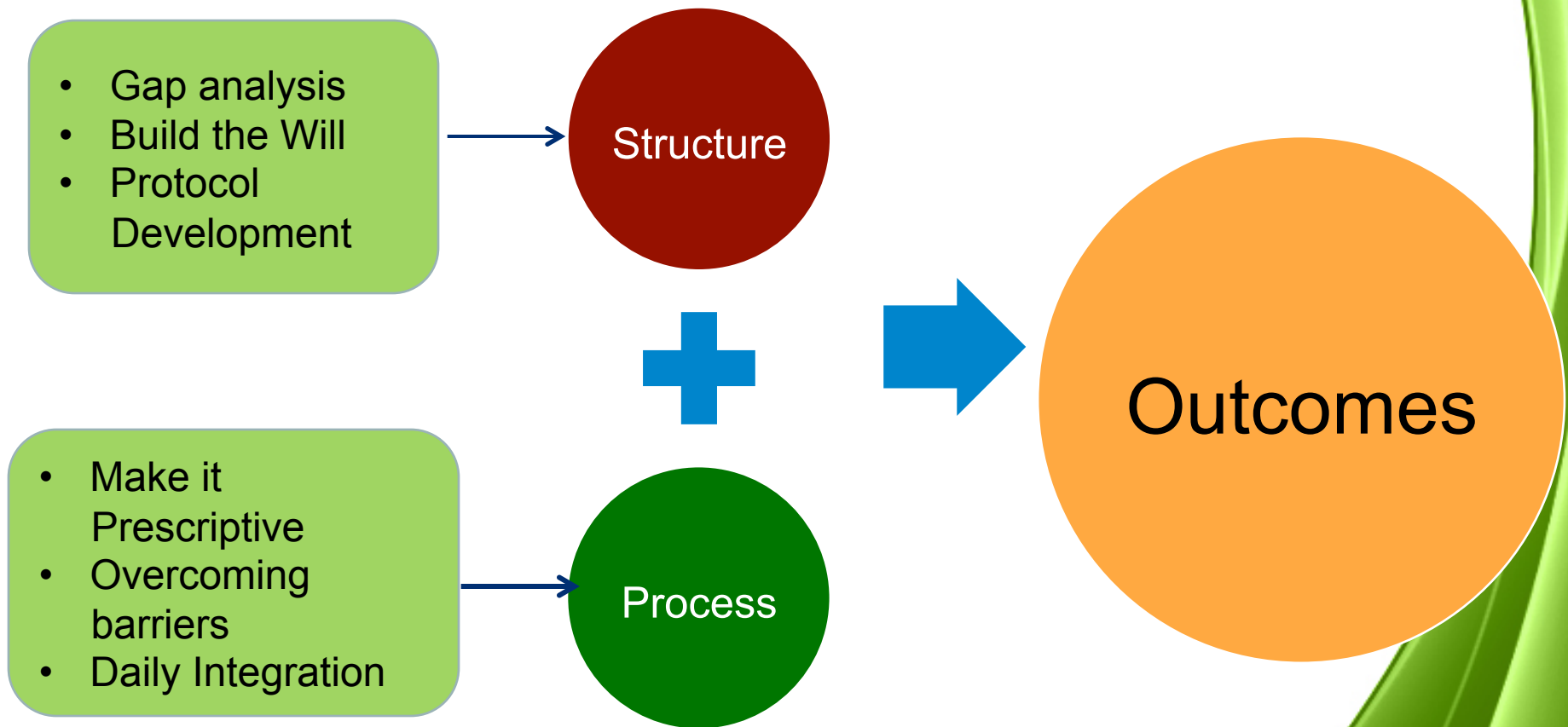
- Medical Adhesive-Related Skin Injury: Single center study shows prevalence rates 3.4% to 25%*
- Skin Tears: 1.5 million skin tears occurring in elderly residents of institutions in the US annually**

Beyond the Scope of this Talk

*Faris MK, et al WOCN, 2015;42(6):589-598

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

Driving Change



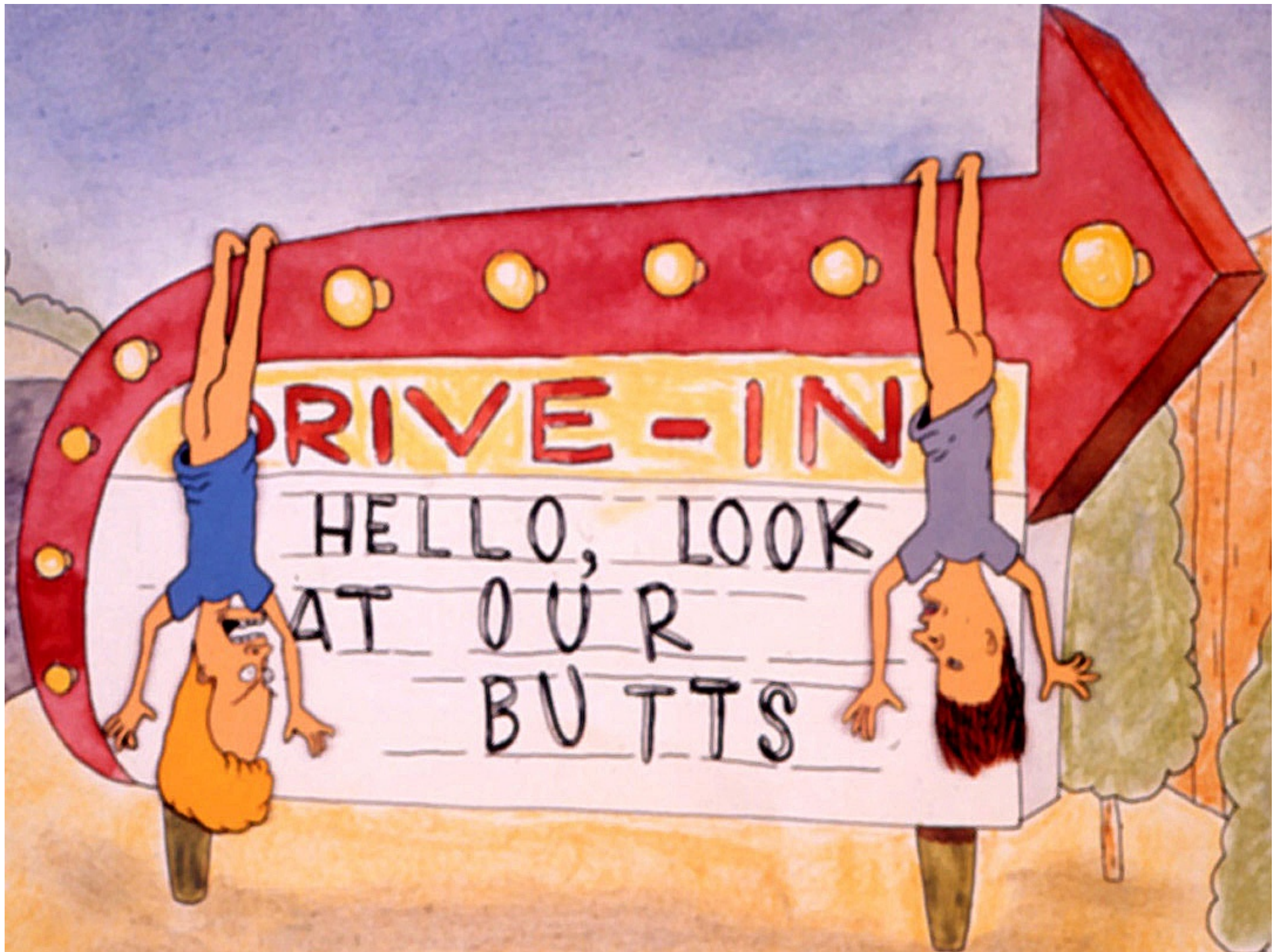
Gap Analysis of Prevention Strategies

- 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





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

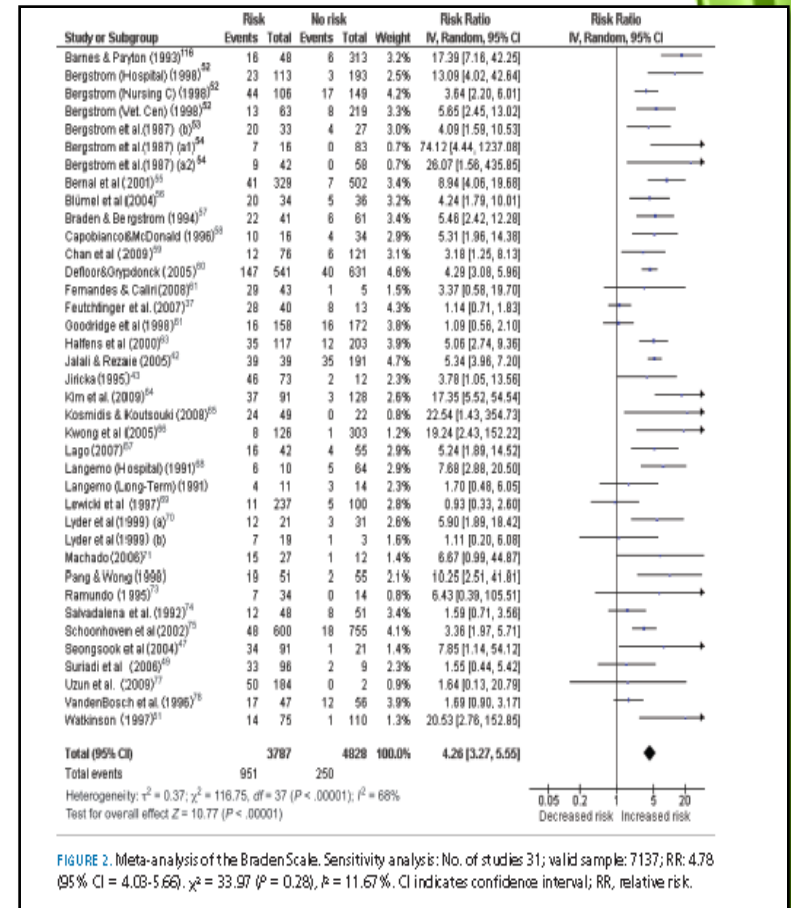
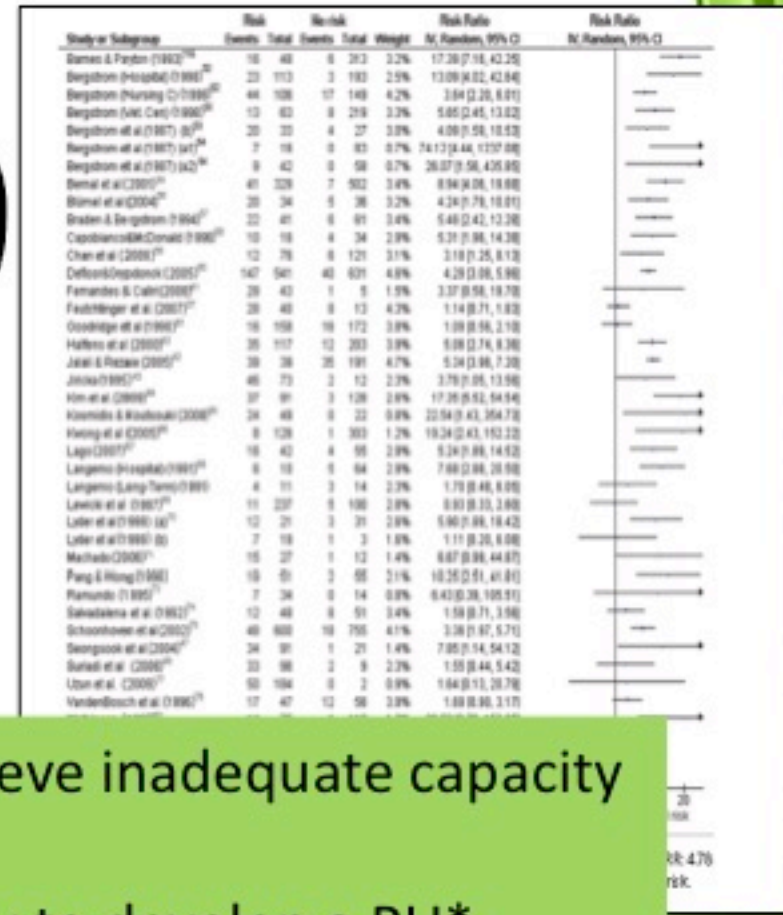
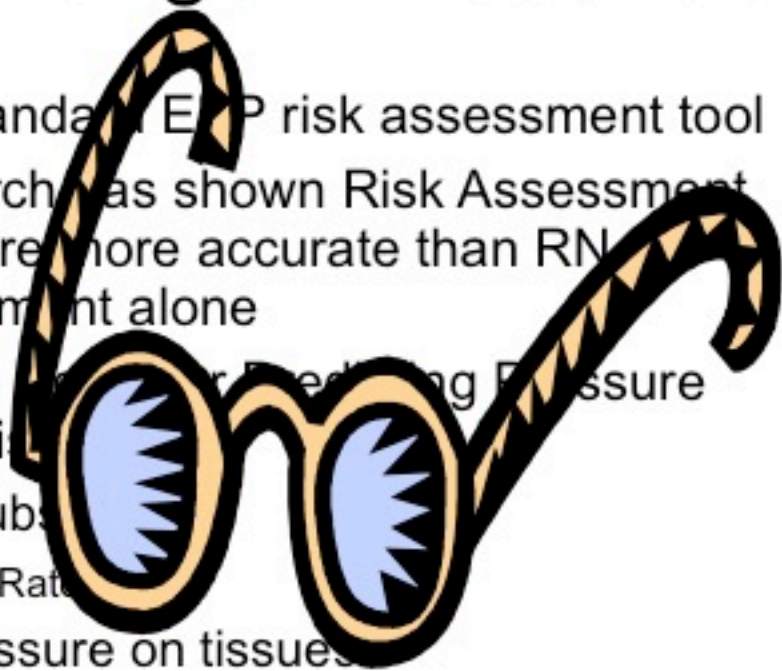


FIGURE 2. Meta-analysis of the Braden Scale. Sensitivity analysis: No. of studies 31; valid sample: 7137; RR: 4.78 (95% CI = 4.03-5.66). $\chi^2 = 33.97$ ($P = 0.28$), $I^2 = 11.67\%$. CI indicates confidence interval; RR, relative risk.

Risk Assessment on Admission, Daily, Change in Patient Condition (B)

- Use standard EPU risk assessment tool
- Research has shown Risk Assessment Tools are more accurate than RN assessment alone
- Braden Scale for Predicting Pressure Sore Risk
 - 6 sub
 - Rate
 - Pressure on tissues
 - Mobility, sensory perception, activity



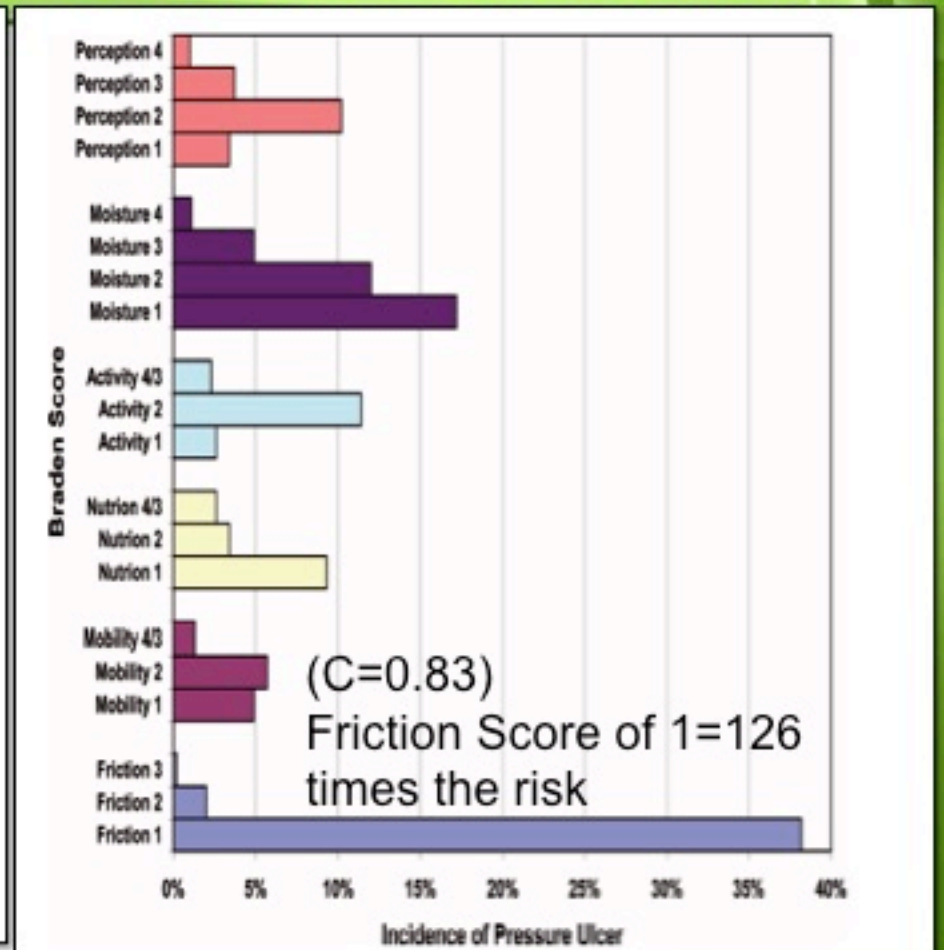
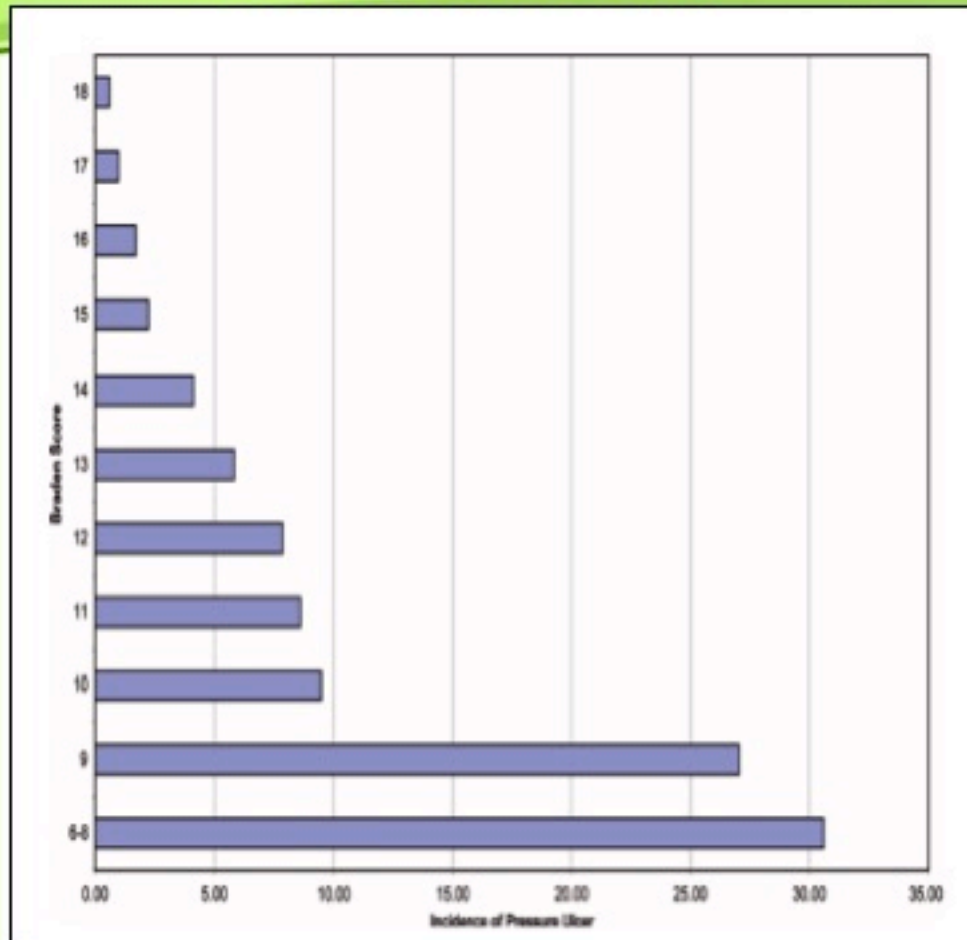
Clinical judgment of nurses alone achieve inadequate capacity to assess PU risk
 Extremely obese patient 2x more likely to develop a PU*

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)

Braden Score

Braden Sub-Scales



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

Cox J, et al Am J Crit Care, 2015;24(8):501-510

- 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

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

Addition
of a
second
agent

IAD Assessment Tool

Hospital Survey on Incontinence & Related Skin Injury

Unit / Work Area

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.

<input type="checkbox"/> Burn	<input type="checkbox"/> LTC	<input type="checkbox"/> Psychiatric - Geriatric
<input type="checkbox"/> Cardiac Surgery	<input type="checkbox"/> LTC	<input type="checkbox"/> Rehabilitation
<input type="checkbox"/> CCU - General	<input type="checkbox"/> Medical	<input type="checkbox"/> Renal/Urology
<input type="checkbox"/> CCU - Interventional	<input type="checkbox"/> Med/Surg	<input type="checkbox"/> Respiratory/Pulmonary
<input type="checkbox"/> ICU - Cardiovascular	<input type="checkbox"/> Neurology	<input type="checkbox"/> SNF/Transitional Care
<input type="checkbox"/> ICU - General	<input type="checkbox"/> Oncology	<input type="checkbox"/> Skilled Care (LTC)
<input type="checkbox"/> ICU - Medical	<input type="checkbox"/> Orthopedic	<input type="checkbox"/> Stepdown/Transition
<input type="checkbox"/> ICU - Neuro	<input type="checkbox"/> Other	<input type="checkbox"/> Surgical
<input type="checkbox"/> ICU - Neonatal	<input type="checkbox"/> PACU	<input type="checkbox"/> Telemetry - General
<input type="checkbox"/> ICU - Pediatric	<input type="checkbox"/> Pediatrics	<input type="checkbox"/> Telemetry - Medicine
<input type="checkbox"/> ICU - Surgical	<input type="checkbox"/> Psychiatric - General	<input type="checkbox"/> Telemetry - Surgical
		<input type="checkbox"/> Wound Care

Patient Census of Unit at Time of Survey: _____

Incontinence Collection Products:
Check all that apply to a specific unit/work area.

<input type="checkbox"/> Pad/Chux	<input type="checkbox"/> Diaper/Brief	<input type="checkbox"/> Collection Device
<input type="checkbox"/> Reusable cloth	<input type="checkbox"/> Reusable cloth	
<input type="checkbox"/> Disposable plastic-backed	<input type="checkbox"/> Disposable plastic-backed	
<input type="checkbox"/> Disposable air flow-backed	<input type="checkbox"/> Disposable air flow-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):
<input type="checkbox"/> Soap/Water/Basin	<i>Must contain one of the "Active Ingredients" listed below</i>
<input type="checkbox"/> Peri-Wash (spray)	<input type="checkbox"/> Petroleum
<input type="checkbox"/> Cleansing Foam	<input type="checkbox"/> Zinc Oxide
<input type="checkbox"/> Washcloth (circle type)	<input type="checkbox"/> Dimethicone
<input type="checkbox"/> reusable / disposable	<input type="checkbox"/> Liquid Film Barrier
<input type="checkbox"/> Pre-moistened Wipe	<input type="checkbox"/> Other _____
<i>(thin, not washcloth)</i>	
Moisturizers:	All-in-one products:
<input type="checkbox"/> Lotion	<i>Must combine cleansing, moisturizing & barrier protection</i>
<input type="checkbox"/> Cream	<input type="checkbox"/> Barrier cloth with skin protectant
<input type="checkbox"/> Ointment	

sage10141C

Patient Information

Patient Unit: _____ (from Unit/Work Area data collection form)

Section 1 - Complete for all patients surveyed

Demographic Information:

Patient Gender: ___ Male ___ Female

Patient Age Group:

<input type="checkbox"/> 0 to 12 months	<input type="checkbox"/> 40 to 49 yrs
<input type="checkbox"/> 1 to 3 yrs	<input type="checkbox"/> 50 to 59 yrs
<input type="checkbox"/> 4 to 19 yrs	<input type="checkbox"/> 60 to 69 yrs
<input type="checkbox"/> 20 to 29 yrs	<input type="checkbox"/> 70 to 79 yrs
<input type="checkbox"/> 30 to 39 yrs	<input type="checkbox"/> 80 + yrs

Continence Status:
Incontinence = inability to control the flow of urine and/or stool in the preceding 24 hours

Urine: ___ Continent ___ Incontinent

Note: A patient with a Foley Catheter is deemed "continent."

Note: Patient has Foley

Stool: ___ Continent ___ Incontinent

Note: A patient with an indwelling fecal collection device is deemed "continent."

Note: Patient has indwelling fecal collection device

Note: Patient has external fecal collection device

Section 2 - Complete only for incontinent patients

Contributing Factors & Co-Morbidities

Check all that apply:

<input type="checkbox"/> Low albumin	<input type="checkbox"/> Braden Score	<input type="checkbox"/> Diabetic with recent hyperglycemia
<input type="checkbox"/> Anemia	<input type="checkbox"/> Mobility Score	<input type="checkbox"/> Obesity with deep groin/low abdomen skin folds
<input type="checkbox"/> Clostridium difficile stool positive	<input type="checkbox"/> Friction & Shear Score	<input type="checkbox"/> Immunosuppressed
<input type="checkbox"/> Tube feeding	<input type="checkbox"/> Nutrition Score	<input type="checkbox"/> Other _____

Incontinence Cleanup & Skin Protection:

Check products used on patient:

Cleansing:

<input type="checkbox"/> Soap/Water/Basin	<input type="checkbox"/> Petroleum
<input type="checkbox"/> Peri-Wash (spray)	<input type="checkbox"/> Zinc Oxide
<input type="checkbox"/> Cleansing Foam	<input type="checkbox"/> Dimethicone
<input type="checkbox"/> Washcloth (circle type)	<input type="checkbox"/> Liquid Film Barrier
<input type="checkbox"/> reusable / disposable	<input type="checkbox"/> Other _____
<input type="checkbox"/> Pre-moistened Wipe	
<i>(thin, not washcloth)</i>	

Moisturizers:

<input type="checkbox"/> Lotion	<input type="checkbox"/> All-in-one products:
<input type="checkbox"/> Cream	<i>Must combine cleansing, moisturizing & barrier protection</i>
<input type="checkbox"/> Ointment	<input type="checkbox"/> Barrier Cloth with skin protectant

Section 3

Complete only for incontinent patients with redness of buttock or perineal skin

Perineal Skin Injury

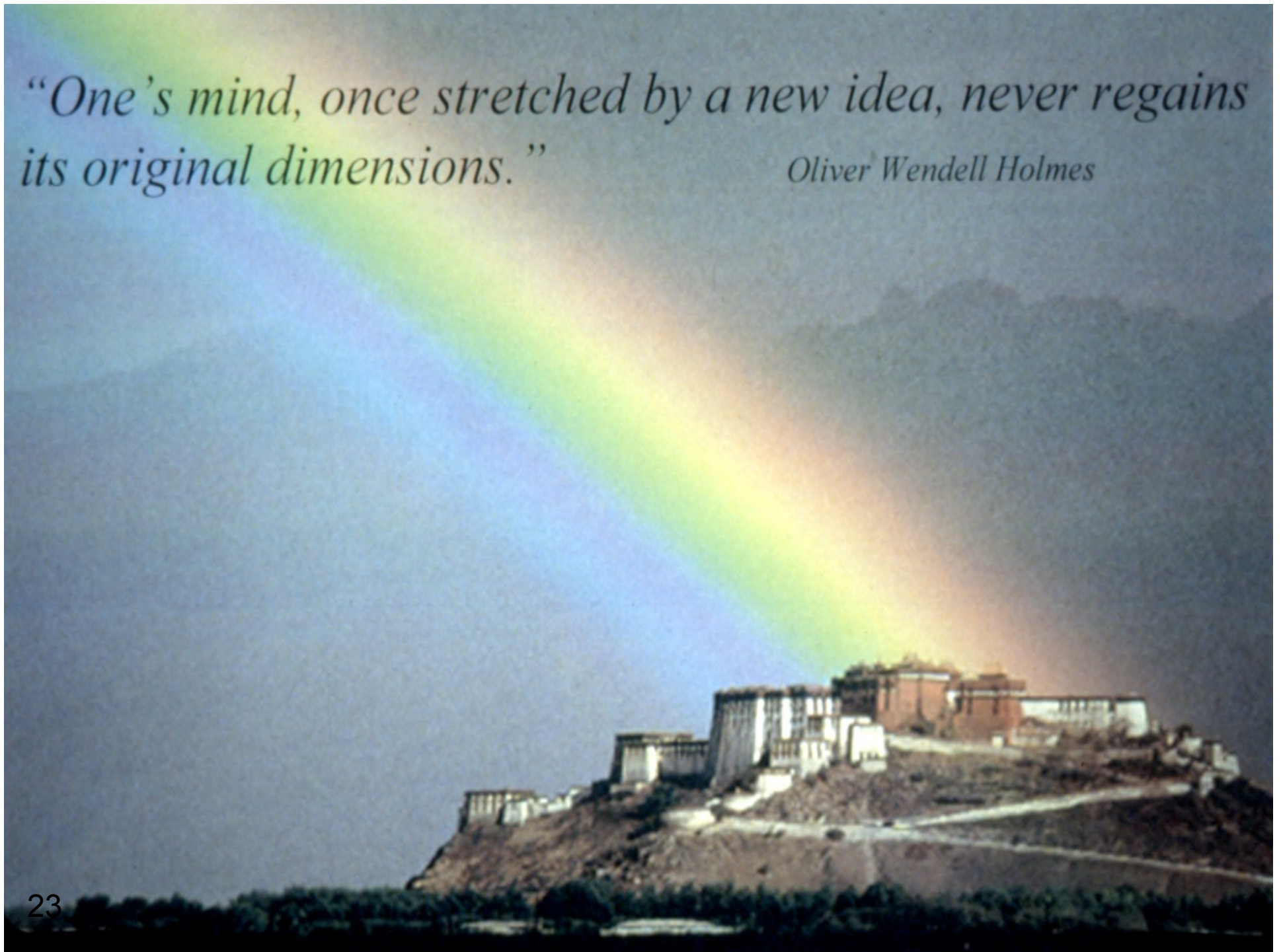
Check all that apply

Condition:	Area Affected:	Containment Products:
<input type="checkbox"/> Incontinence Associated Dermatitis	<input type="checkbox"/> Buttocks	<input type="checkbox"/> Fecal/Fecal Collection Device
<input type="checkbox"/> Red and dry	<input type="checkbox"/> Coccyx	<input type="checkbox"/> Zappi Fecal Collection Device
<input type="checkbox"/> Red and weepy	<input type="checkbox"/> Rectal Area	<input type="checkbox"/> Nasal Trumpet
<input type="checkbox"/> Present on Admission	<input type="checkbox"/> Scrotum/Vulva	<input type="checkbox"/> Other _____
<input type="checkbox"/> Pressure Ulcer (sore, scab, or lacer)	<input type="checkbox"/> Lower Abdomen	
<input type="checkbox"/> How many?	<input type="checkbox"/> Upper Thighs	Y N Is there leakage around device at the anus?
<input type="checkbox"/> Stage(s)	<input type="checkbox"/> Gluteal cleft	Y N Was there an underpad present?
<input type="checkbox"/> Present on Admission	<input type="checkbox"/> Groins	
<input type="checkbox"/> Fungal/yeast appearing rash		<input type="checkbox"/> Reusable cloth
<input type="checkbox"/> Other _____		<input type="checkbox"/> Disposable plastic-backed
<input type="checkbox"/> Spredly _____		<input type="checkbox"/> Disposable air flow-backed
		Y N Were incontinence briefs worn by patient?

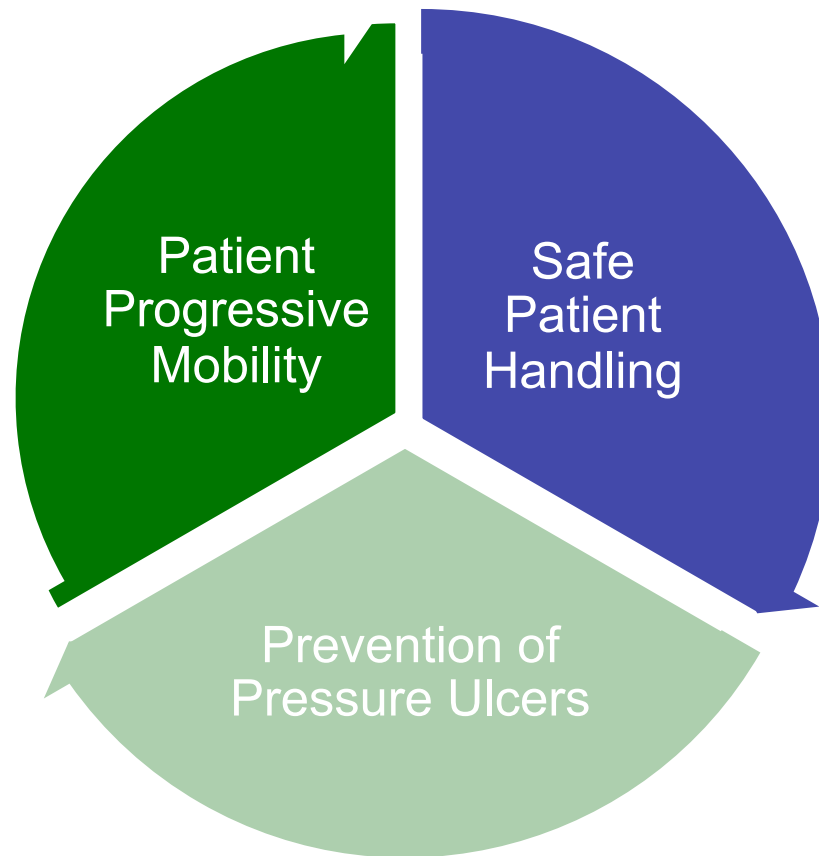
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“One’s mind, once stretched by a new idea, never regains its original dimensions.”

Oliver Wendell Holmes

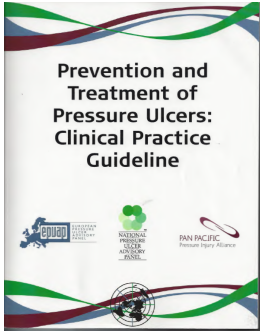


The Goal: Patient & Caregiver Safety



Pressure & Shear as a Risk Factor

Sacrum & Heels



EBP Recommendations to Achieve Offloading & Reduce Pressure (A)

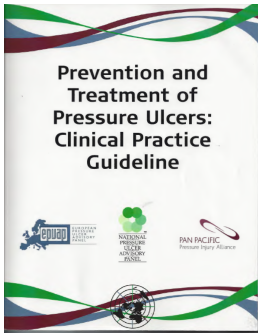
- Turn & reposition every (2) hours (avoid positioning patients on a pressure ulcer)
 - Repositioning should be undertaken to reduce the duration & magnitude of pressure over vulnerable areas
 - Consider right surface with right frequency*
 - Cushioning devices to maintain alignment /30 ° side-lying & 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

Reger SI et al, OWM, 2007;53(10):50-58, www.ihi.org

National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury Alliance. Prevention & treatment of pressure ulcers :clinical practice guideline. Emily

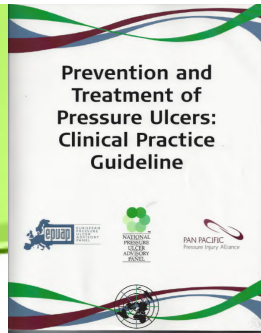
Haesler (Ed) Cambridge Media: Osborne Park: Western Australia;2014

*McNichol L, et al. J Wound Ostomy Continence Nurse, 2015;42(1):19-37.



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

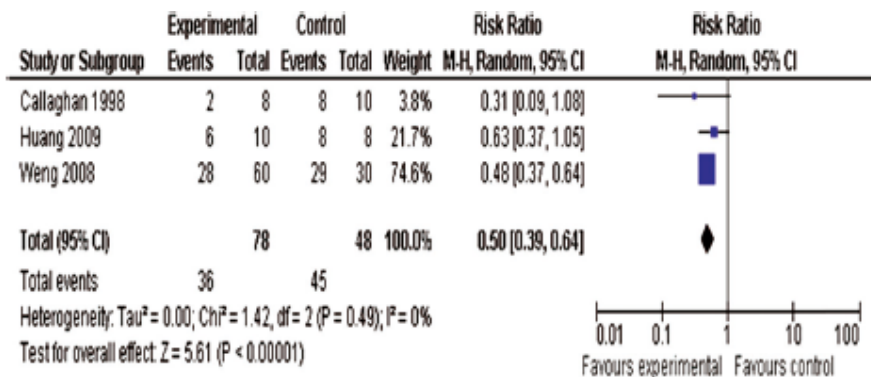


Prophylactic Dressings: Emerging Therapies

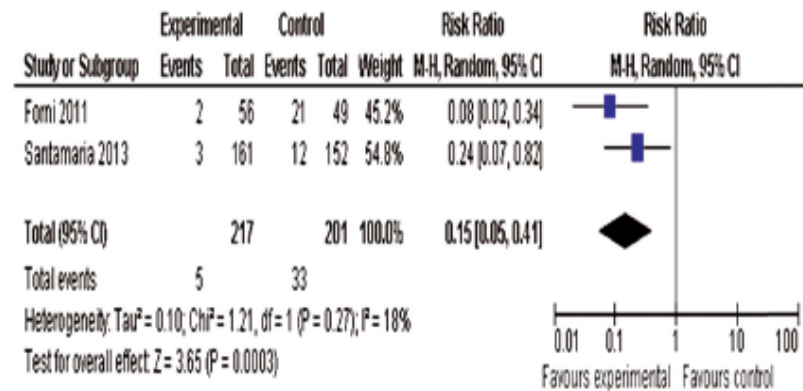
- Consider applying a polyurethane foam dressing to bony prominences in the areas frequently subjected to friction and shear (B)
- Consider placement prior to prolonged procedures or continuous head elevation (B)
- Consider ease of application and removal and the ability to reassess the skin.
- Continue to use all of other preventative measures necessary when using prophylactic dressings (C)

Systematic Review: Use of Prophylactic Dressing in Pressure Injury Prevention

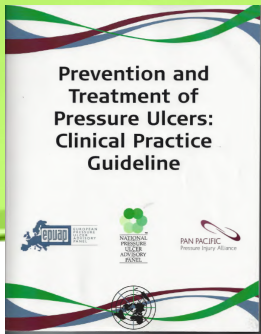
- 21 studies met the criteria for review
- 2 RCTs, 9 had a comparator arm, five cohort studies, 1 within-subject design where prophylactic dressings were applied to one trochanter with the other trochanter dressing free



Evaluated nasal bridge device injury prevention



Evaluated sacral pressure ulcer prevention



EBP Recommendations to Reduce Shear & Friction

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- 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



Specialty Bed



Disposable Slide Sheets



Breathable Glide Sheet

Current Practice: Turn & Reposition

Draw Sheet/Pillows/Layers of Linen



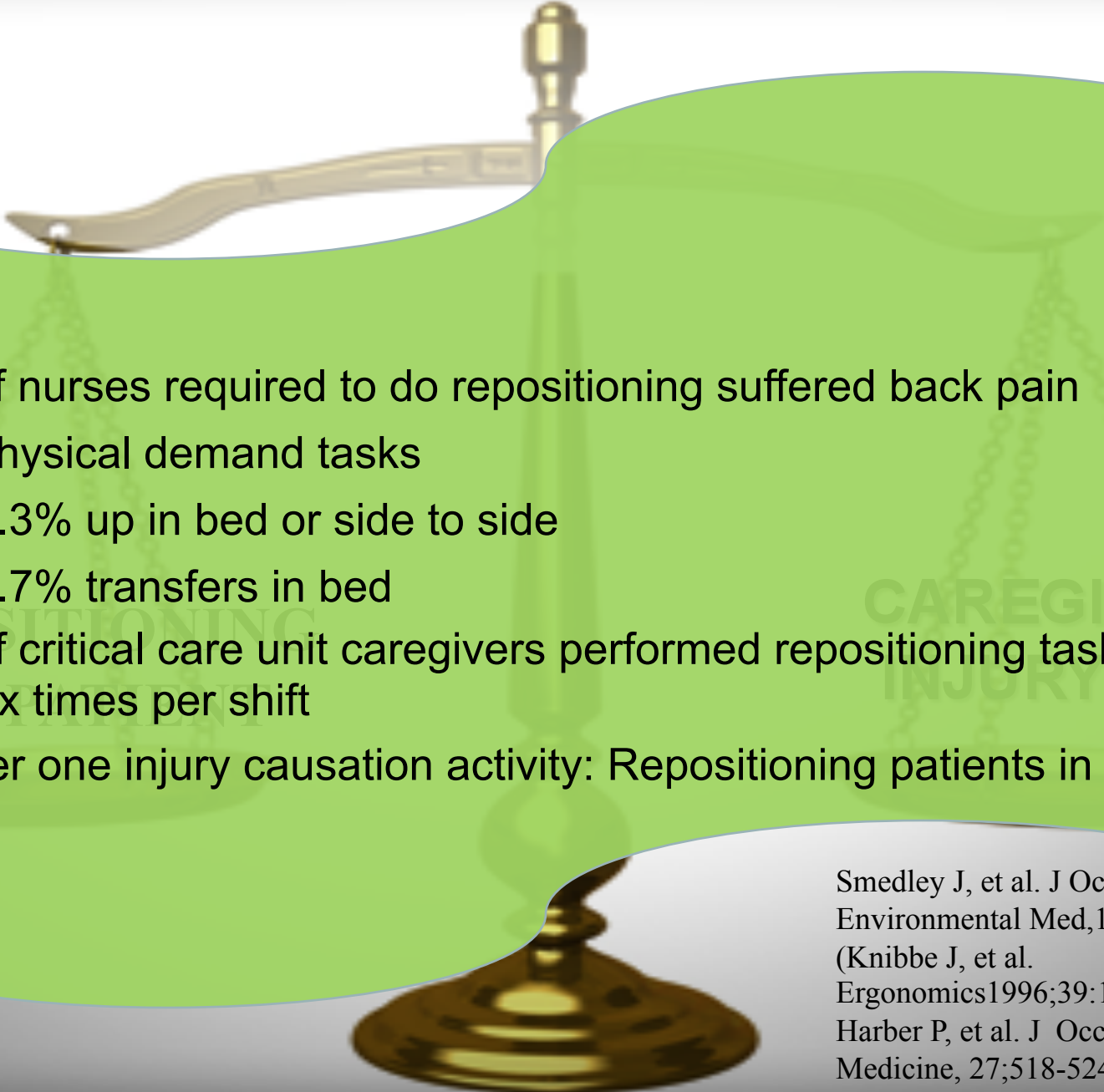
Lift Device





**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

Smedley J, et al. J Occupation & Environmental Med,1995;51:160-163)
(Knibbe J, et al. Ergonomics1996;39:186-198)
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

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

Year	Ownership	Occupation	Total Cases	Incidence Rate	Medial Days Away From Work
2009	private industry	RNs	8,760	51.6	8
	local government	RNs	1,060	55.0	7
	state government	RNs	660	56.1	14
2008	private industry	RNs	8,120	48.4	6
	local government	RNs	960	-	5
	state government	RNs	540	-	9
2007	private industry	RNs	8,580	53.4	6
2006	private industry	RNs	9,200	59.1	6
2005	private industry	RNs	9,060	-	7
2004	private industry	RNs	8,810	-	7
2003	private industry	RNs	10,050	-	6

* Incidence rate per 10,000 FTE

Bureau of Labor Statistics, U.S. Department of Labor, February 14, 2011. Numbers for local and state government Unavailable prior to 2008/Nov 2011, Release 10:00 a.m. (EST) Thursday, November 8, 2012, 2013 data <http://www.bls.gov/news.release/pdf/osh2.pdf>. Accessed 01/07/2016 <http://www.bls.gov/news.release/pdf/osh2.pdf>

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Year	Ownership	Occupation	Total Cases	Incidence Rate *	Medial Days Away From Work
2009	private industry	RNs	8,760	51.6	8
2010	Private industry	RNs	9,260	53.7	6
2011	Private industry	RN's	10,210		8
2012	Private industry	RN's	9900	58.5	8
2013	Private Industry	RN	9820	56.2	7
2014	Private Industry	RN	9820	55.3	9
2014	Private Industry	NA	18,510		6
2005	private industry	RNs	9,060	-	7
2004	private industry	RNs	8,810	-	7
2003	private industry	RNs	10,050	-	6

* Incidence rate per 10,000 FTE

Bureau of Labor Statistics, U.S. Department of Labor, February 14, 2011. Numbers for local and state government Unavailable prior to 2008/Nov 2011, Release 10:00 a.m. (EST) Thursday, November 8, 2012, 2013 data <http://www.bls.gov/news.release/pdf/osh2.pdf>. Accessed 01/07/2016 <http://www.bls.gov/news.release/pdf/osh2.pdf>

Achieving the Use of the Evidence For Pressure Ulcer Reduction



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

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

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)

	SOC	PPS	P
PU development	6	1 ^a	.04
# of times patients pulled up in bed	3.28	2.58	.03
# of staff required to turn patient	1.97	1.35	<.0001

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

SAFE PATIENT HANDLING INITIATIVE PROTOCOL

- 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?
- 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
 - Para/Quad paresis
 - Unconscious/Comatose
- 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

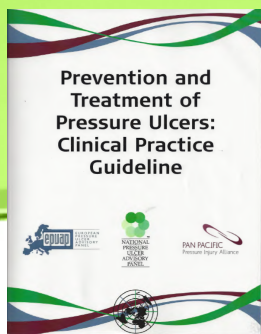
- When patient is able to independently perform a turn.
- No longer at risk for potential moisture injury.
- Braden mobility score of 3 and/or moisture score of 3.

PRECAUTIONS:

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

RESULTS



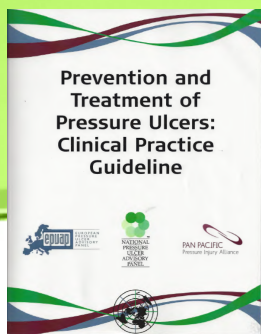


EBP Recommendations to Achieve Offloading & Reduce Pressure

- 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 limit mobility when sitting in a chair

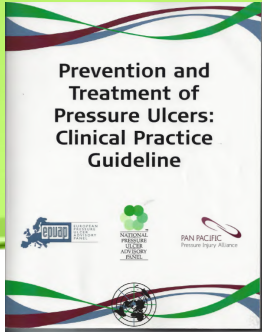
Support Surfaces In Critically Ill Patients

- 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)



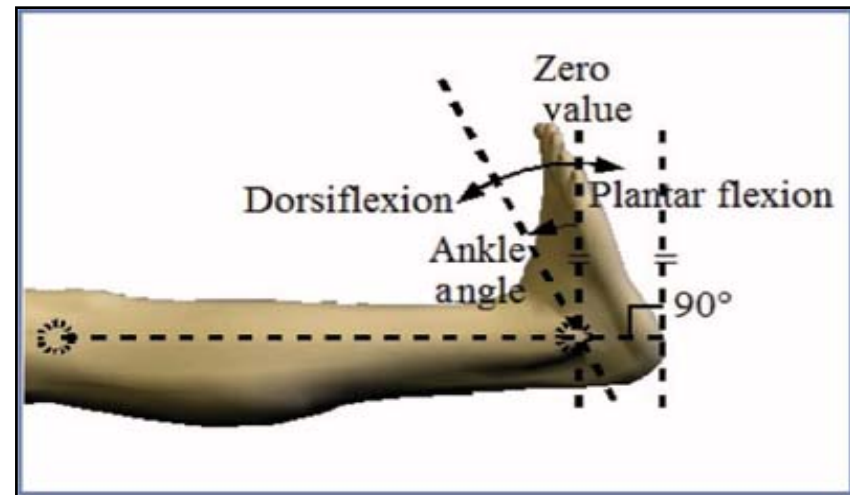
EBP Recommendations to Achieve Offloading & Reduce Pressure

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 - Microclimate management
 - Early Mobility programs
 - Heel Protection
 - Seated support surfaces for patients with limit 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



Heel Protectors



Heel Pads



Miller SK, et al WOCN, 2015;42(4):346-351

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

Study Inclusion Criteria

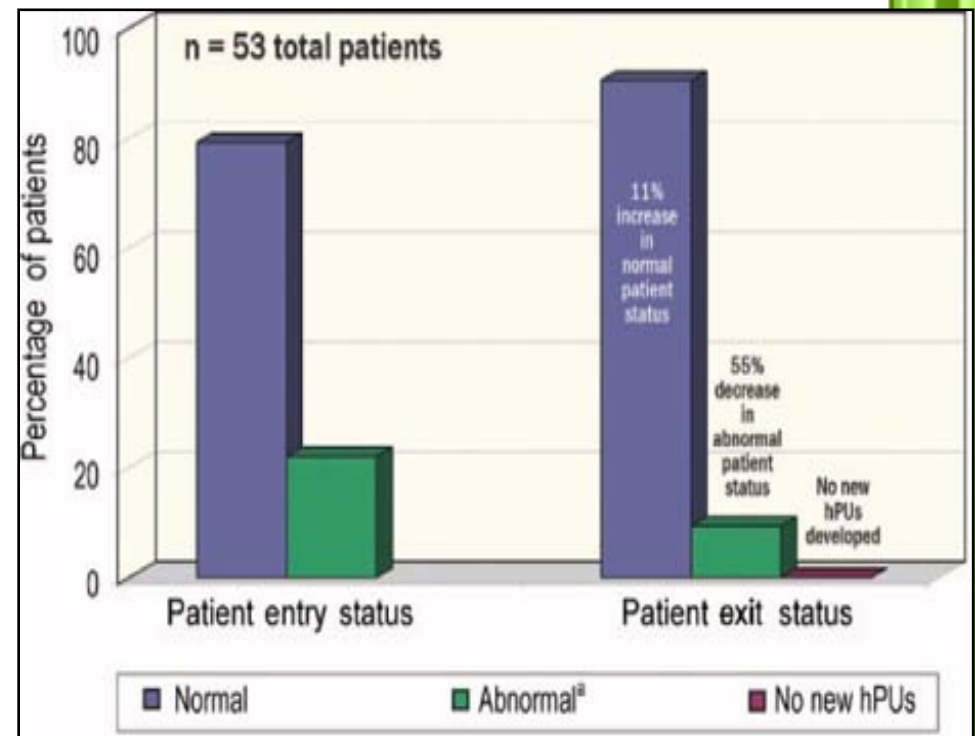
- Sedated patient > 5 days
- May or may not be intubated
- Braden equal to or less than 16

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

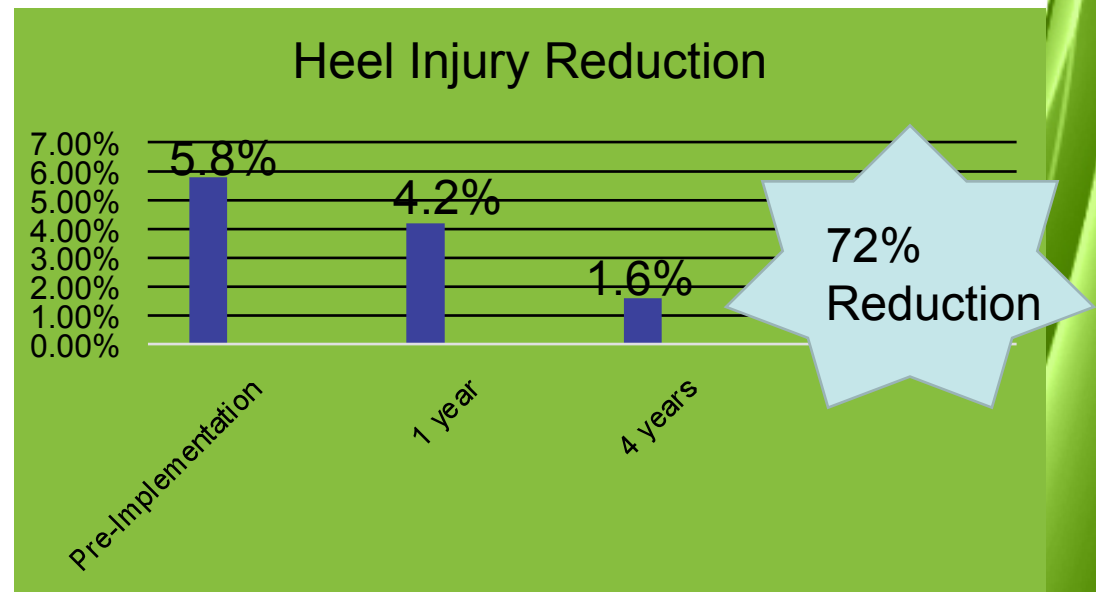
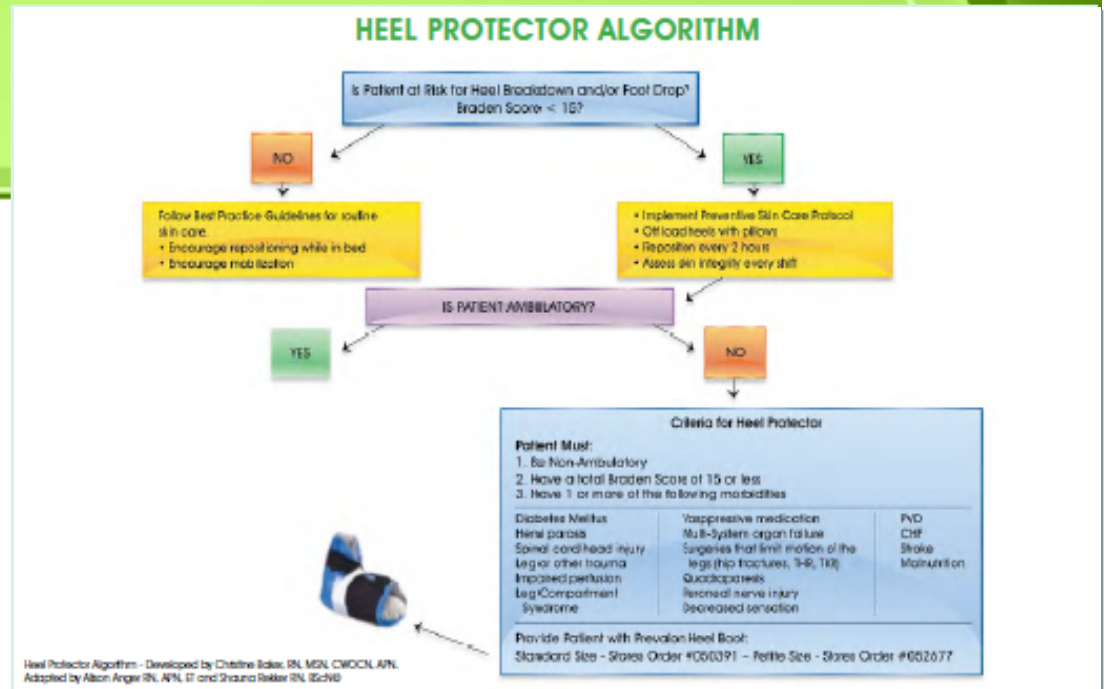
53 sedated patients over a 7 month period

Results

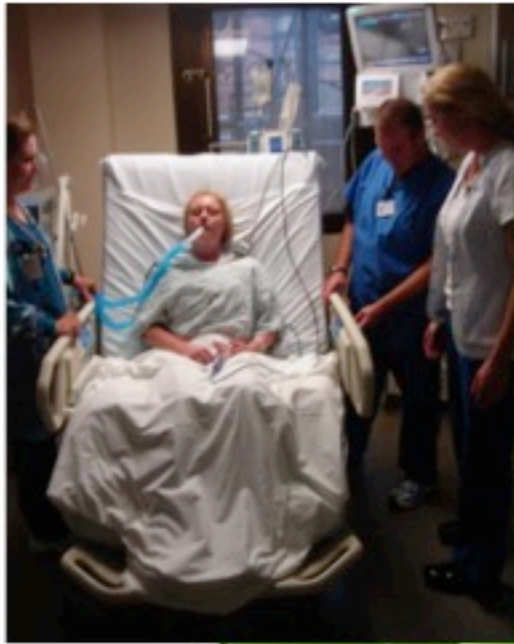
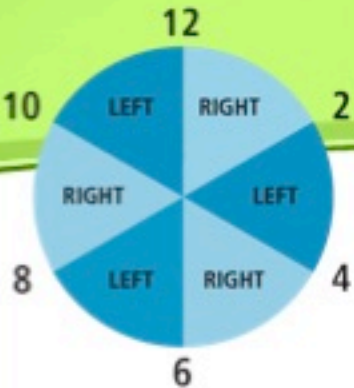


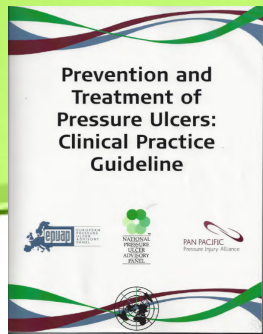
Sustainability of Heel Injury Reduction: QI Project

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




In-Bed Technology





EBP Recommendations to Achieve Offloading & Reduce Pressure

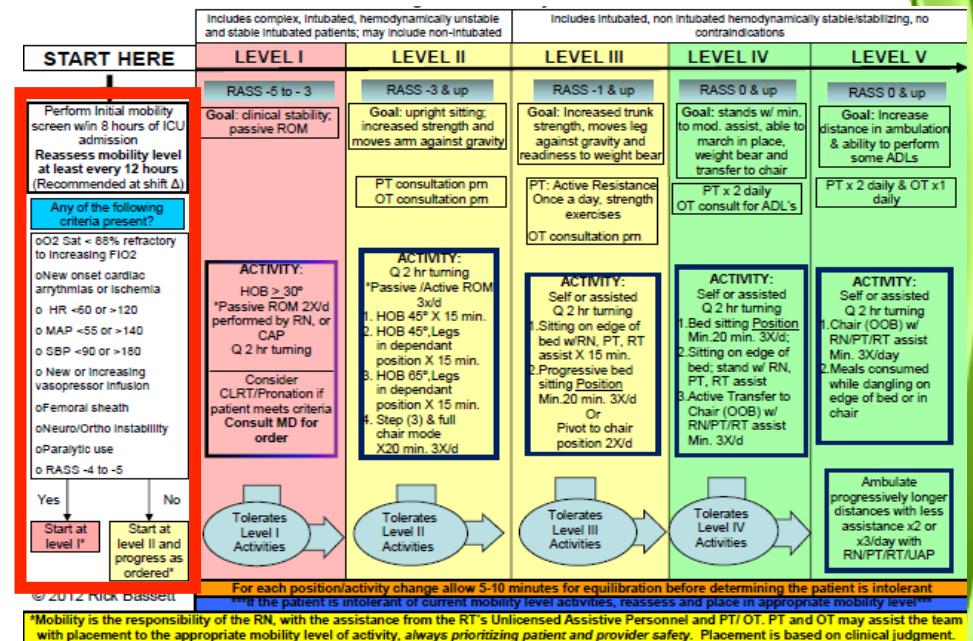
- Turn & reposition every 2 hours (avoid positioning patients on a pressure ulcer)
 - Use active support surfaces for patients at higher risk of development where frequent manual turning may be difficult
 - Microclimate management
 - Early Mobility programs
 - Seated support surfaces for patients with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

The background is a vibrant green with several overlapping, curved, semi-transparent bands that create a sense of motion and depth. The text is centered in a bold, black, sans-serif font.

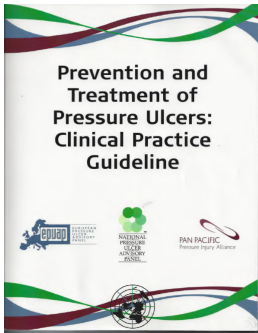
**Any Work on Skin Should Be
Incorporated into a Progressive
Mobility Protocol**

Outcomes of Early Mobility Program

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



Bassett R, et al. Intensive & Crit Care Nurs, 2012;28:88-97
 Staudinger t, et al. Crit Care Med, 2010;38.
 Abroung F, et al. Critical Care, 2011;15:R6
 Morris PE, et al. Crit Care Med, 2008;36:2238-2243
 Pohlman MC, et al. Crit Care Med, 2010;38:2089-2094
 Schweickert WD, et al. Lancet, 373(9678):1874-82.
 Thomsen GE, et al. CCM 2008;36;1119-1124
 Winkelman C et al, CCN,2010;30:36-60
 Dickinson S et al. Crit Care Nurs Q, 2013;36:127-140



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
 - Safe handling for out of bed & chair positioning

Out of Bed Technology

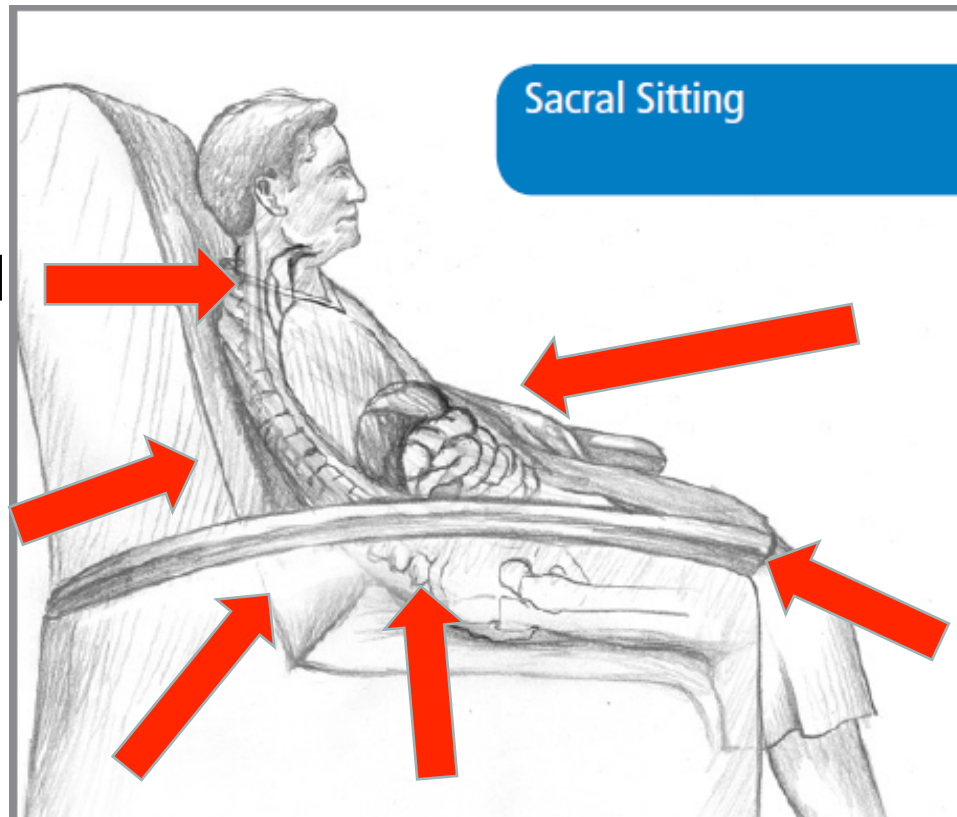


Current Seating Positioning Challenges

Uncomfortable

Airway & Epiglottis compressed

Body Alignment



Frequent repositioning & potential caregiver injury

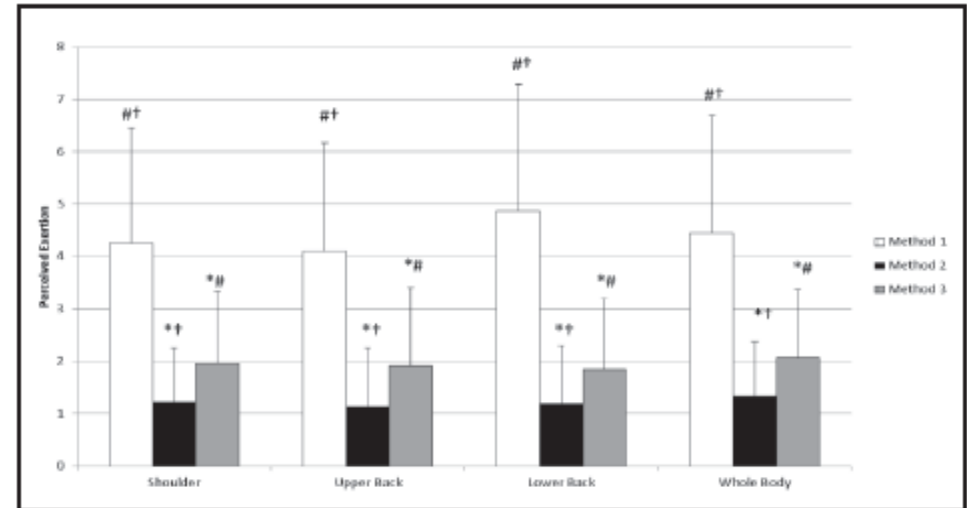
Potential fall risk

Shear/Friction

Sacral Pressure

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

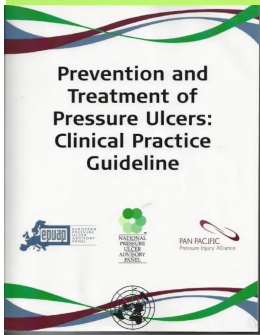
52% greater exertion than method 2

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
- 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

National Pressure Ulcer Advisory Panel and European Pressure Ulcer Advisory Panel. Pressure ulcer prevention & treatment :clinical practice guideline. Washington, DC: National Pressure Ulcer Advisory Panel; 2009.

Williamson, R, et al (2008) Linen Usage Impact on Pressure and Microclimate Management. Hill-Rom

www.ihl.org



Reusable Incontinence pads



Adult diaper

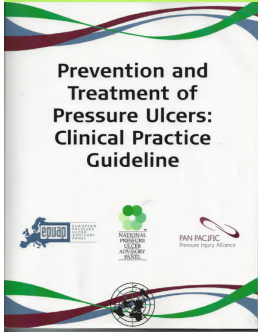
Current Practice: Moisture Management



59 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.
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- Support or retraction of the adipose tissue (i.e. KanguruWeb)
- Pouching device or a bowel management system

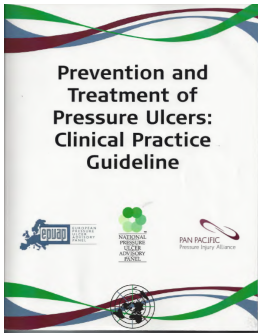
National Pressure Ulcer Advisory Panel and European Pressure Ulcer Advisory Panel. Pressure ulcer prevention & treatment :clinical practice guideline. Washington, DC: National Pressure Ulcer Advisory Panel; 2009.
Williamson, R, et al (2008) Linen Usage Impact on Pressure and Microclimate Management. Hill-Rom

www.ihi.org

Doughty D, et al. JWOCN. 2012;39(3):303-315

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
- 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

National Pressure Ulcer Advisory Panel and European Pressure Ulcer Advisory Panel. Pressure ulcer prevention & treatment :clinical practice guideline. Washington, DC: National Pressure Ulcer Advisory Panel; 2009.

Williamson, R, et al (2008) Linen Usage Impact on Pressure and Microclimate Management. Hill-Rom

www.ihl.org

Doughty D, et al. JWOCN. 2012;39(3):303-315

Medical Device Related Pressure Ulcers

- Prospective descriptive study to determine, prevalence, risk factors and characteristics of MDR's PU
- 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 3. Type of attached medical devices and rate of MDR HAPUs

	Medical devices rate (n=175 patients)		Ulcer rate by medical device type (n=211 devices)	
	n ^a	%	n ^b	%
Monitoring				
ECG leads	173	98.8	7	3.3
ECG electrodes	172	98.2	2	0.9
BP cuff	171	97.7	2	0.9
SpO ₂ probe	170	97.1	17	8.0
GI/GU				
Nasogastric	43	24.5	10	4.7
Orogastric	15	8.5	-	-
PEG	1	0.5	-	-
Foley	162	92.5	6	2.8
Vascular lines				
Central	72	41.1	1	0.4
Arterial	118	67.4	1	0.4
Peripheral	89	50.8	1	0.4
Respiratory				
ET tube	67	38.2	95	45.0
Nasal cannula	54	30.8	14	6.6
CPAP mask	20	11.4	22	10.4
Oxygen mask	40	22.8	15	7.1
Preventive devices				
TED	38	21.7	5	2.3
Cervical collar	4	2.2	-	-
Splint	2	1.1	-	-
Other devices ^c	18	10.2	13	6.1
Total			211	100.0

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

^a n > 175 due to >1 medical device per patient; ^b n > 211 due to >1 MDR PU per device; ^c Airway, endotracheal tube holder, and plaster

Medical Device Related Pressure Ulcers

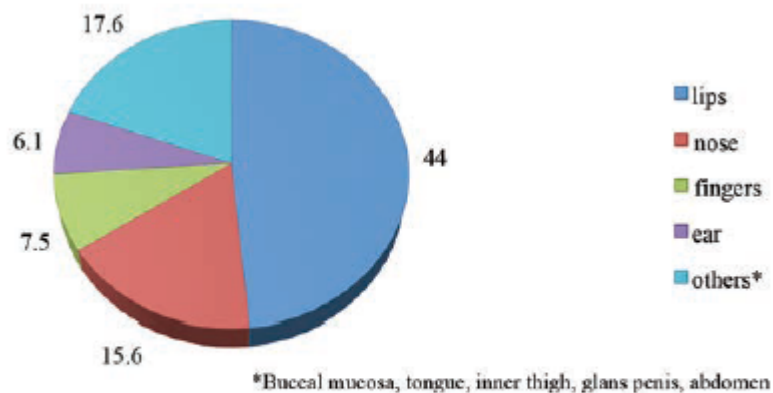


Figure 2. Distribution (percentage) of MDR PU's by anatomical location (n=211).

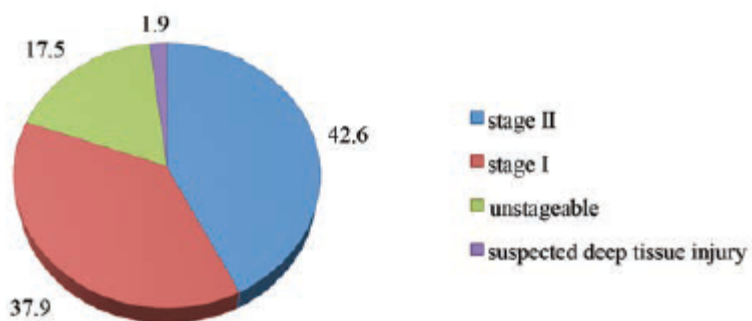


Figure 1. Distribution (percentage) of MDR PU's by stage (n=211).

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

Risk factors	P	OR	95% CI for OR	
			Lower	Upper
Advanced age ^a	.095	1.023	.996	1.050
Enteral feeding	.045 ^b	2.12	0.785	3.125
With traditional HAPUs	.001 ^b	6.600	1.210	15.120
Medical ICU	.001 ^b	7.041	2.144	23.126
Neurosurgical ICU	.011 ^b	6.221	1.520	25.454
Chest diseases ICU	.009 ^b	6.014	1.557	23.228
Anesthesia-Resuscitation ICU	.078	3.478	.870	13.898
High risk Braden Scale score	.040 ^b	1.815	1.029	3.205
Mechanical ventilation	.147	2.075	.773	5.568
Use of steroids	.649	.806	.318	2.042
Use of anticoagulants	.138	2.079	.791	5.466
Use of sedatives	.088	2.565	.868	7.578
Low albumin g/dl ^c	.056	.527	.280	.990
Low hemoglobin g/dl ^d	.104	1.170	.968	1.413

HAPUs = hospital-acquired pressure ulcers; ICUs = intensive care units; MDR PU = medical-device related pressure ulcers; CI= confidence interval; OR = odds ratio
^amean 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>
 Apoid J, et al. J of Nurs Care Quality, 2012;27:28-34



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*



“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 SVO₂, 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}

1. Winslow EH, et al. *Heart Lung*. 1990;19:557-561.

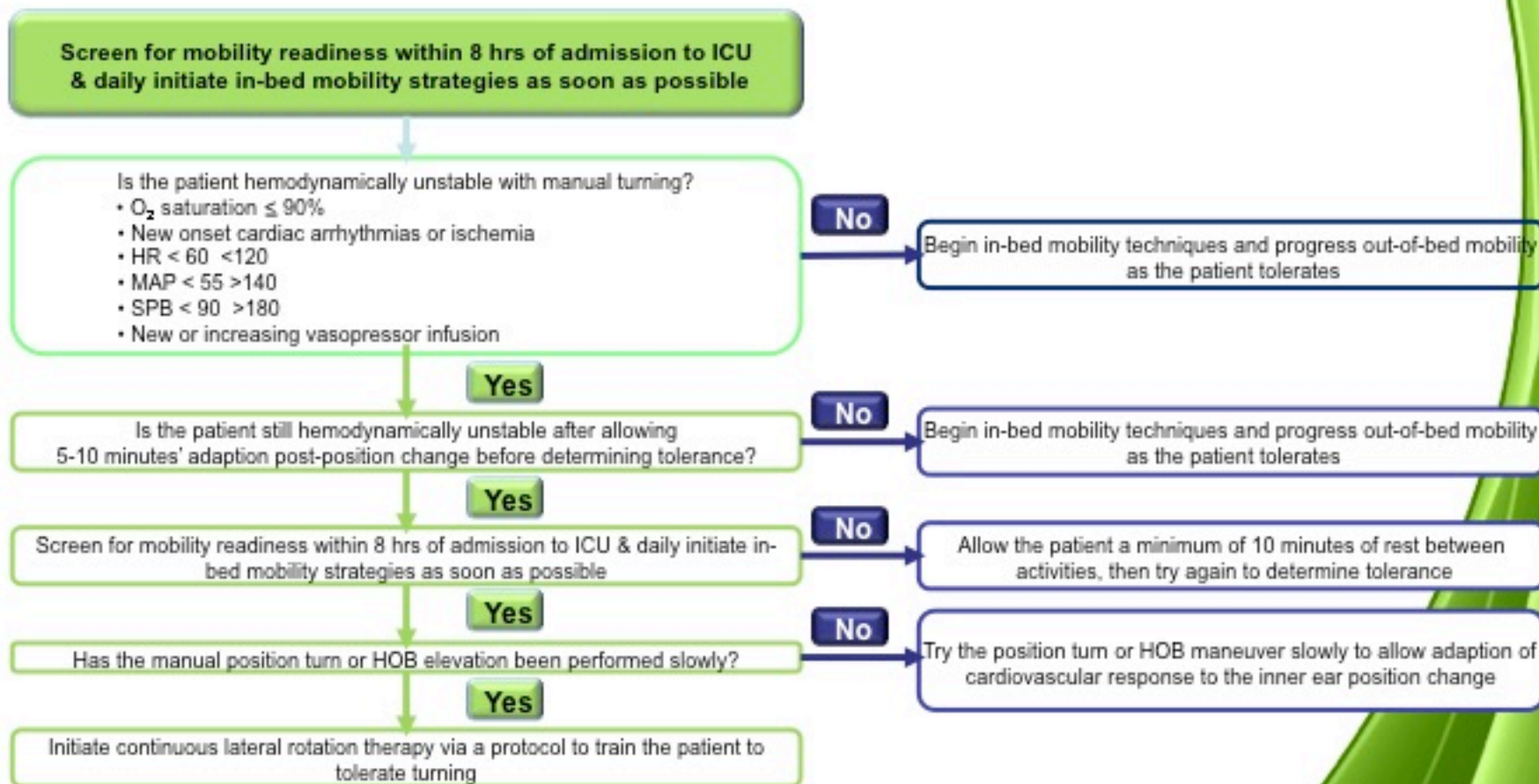
2. Price P. *Dynamics*. 2006;17:12-19.

3. Vollman KM. *Crit Care Nurs Q*. 2013;36:17-27

4. Vollman KM. *Crit Care Nurs Clin of North Amer*, 2004;16(3):319-336

5. Vollman KM. *Crit Care Nurs Q*. 2013 Jan;36(1):17-27

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



HOB=head of bed; HR=heart rate; MAP=mean arterial pressure; SPB=systolic blood pressure.

Vollman KM. *Crit Care Nurse*. 2012;32:70-75.

Vollman KM. *Crit Care Nurs Q*. 2013;36:17-27

Hamlin SK, et al. *Amer J of Crit Care*, 2015;24:131-140.



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 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

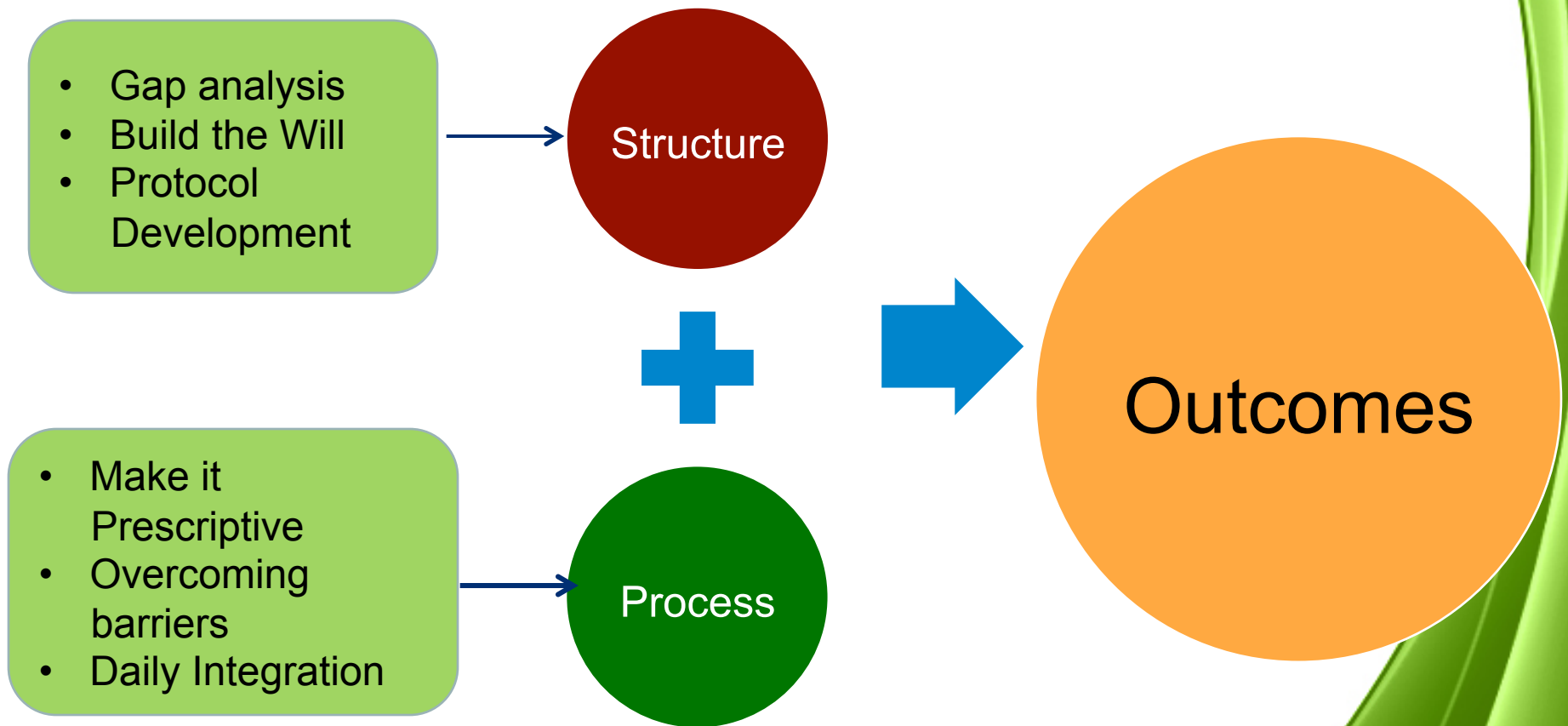
1. Patient's with unstable pelvis injuries LOG ROLL PATIENT ONLY with approval of Attending MD. Consider wedges or pillows placed between the legs to maintain proper alignment.
2. DO NOT use continuous lateral rotation therapy (CLRT) with unstable spinal fractures: these patients should be positioned 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 al.
WOCN,
2013;40(3):
254-267

The background is a vibrant green with several overlapping, curved, semi-transparent bands that create a sense of motion and depth. The text is centered and rendered in a bold, white, sans-serif font with a blue drop shadow.

**How Do We Make It
Happen?**

Driving Change



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



Patient Skin Integrity Bundle (InSPIRE)

Coyer F, et al. American J Crit Care. 2015;24(3):199-209

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

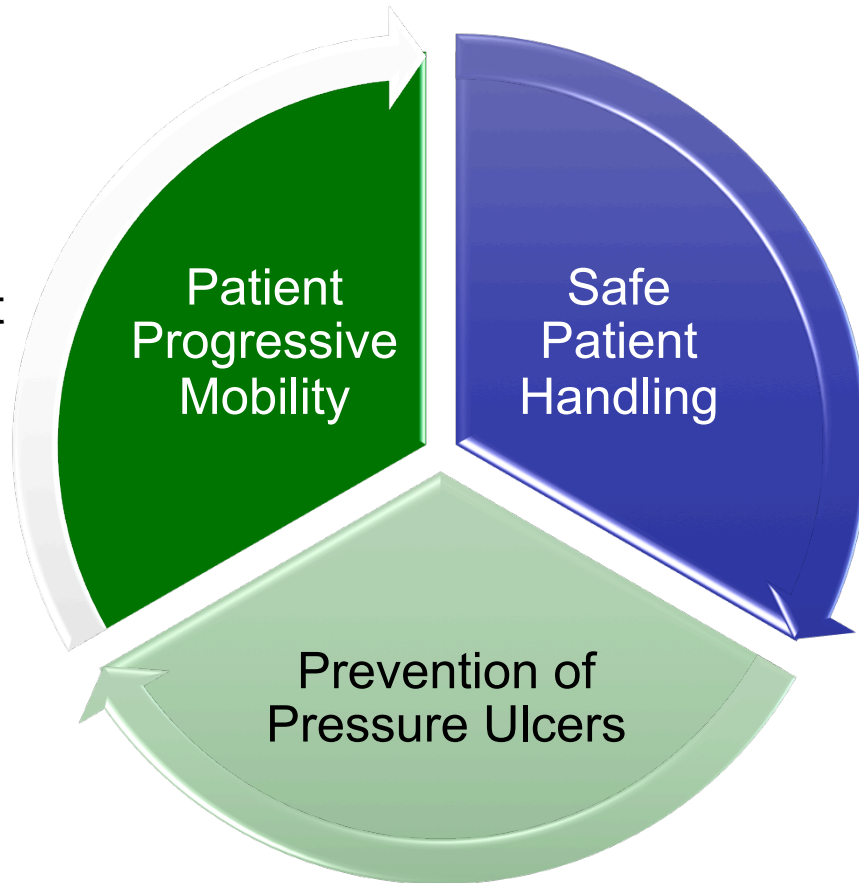
- Advocacy
- Braden subscales
- Skin rounds/time frequency
- Hand-off communication
- The right products and processes-pressure/shear/moisture/prevent skin tear and medical adhesive related injuries
- Quarterly prevalence/incidence of PU & IAD
- Skin liaison/champion nurses
- Creative strategies to reinforce 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



- ↓ 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
kvollman@comcast.net
www.Vollman.com



Coming Soon

- 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)*
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