Intact Skin is In: Bundling Evidence Based Strategies to Reduce Hospital Acquired Skin Injury while Protecting the Caregiver

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Disclosures for Kathleen Vollman

- Consultant-Michigan Hospital Association Keystone Center
- Consultant/Faculty for CUSP for MVP—AHRQ funded national study
- Subject matter expert CAUTI, CLABSI, HAPU, Sepsis, Safety culture
- Consultant and speaker bureau for Sage Products LLC
- Consultant and speaker bureau for Hill-Rom Inc
- Consultant and speaker bureau for Eloquest Healthcare

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

Protect The Patient From Bad Things Happening on Your Watch

Implement Interventional Patient Hygiene

Interventional Patient Hygiene

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

Hand Hygiene

Catheter Care

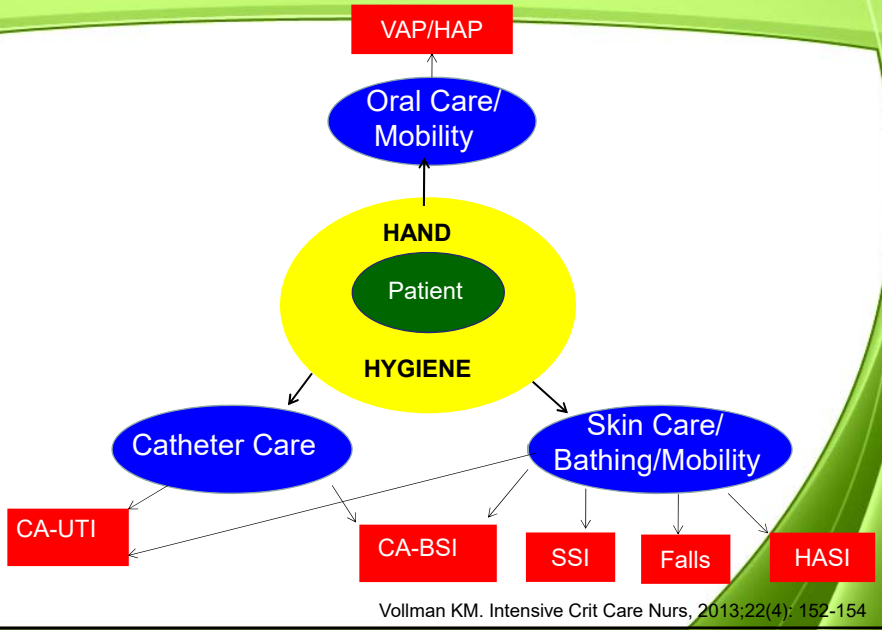
Bathing & Assessment

Comprehensive Oral Care Plan

Incontinence Associated Dermatitis Prevention Program

Pressure Ulcer Prevention

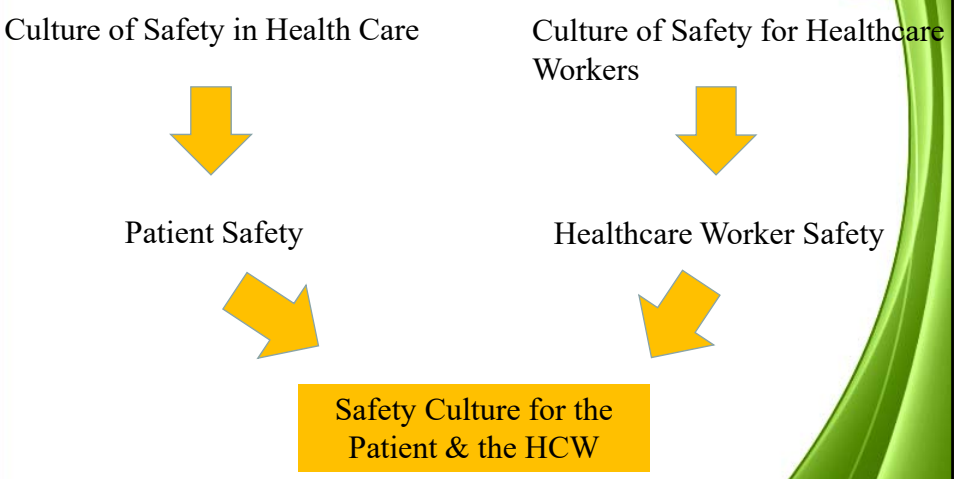
INTERVENTIONAL PATIENT HYGIENE(IPH)



Vollman KM. Intensive Crit Care Nurs, 2013;22(4): 152-154

What Does it Mean to Be in A Safe Culture for You & Your Patient ?

Changing the Paradigm

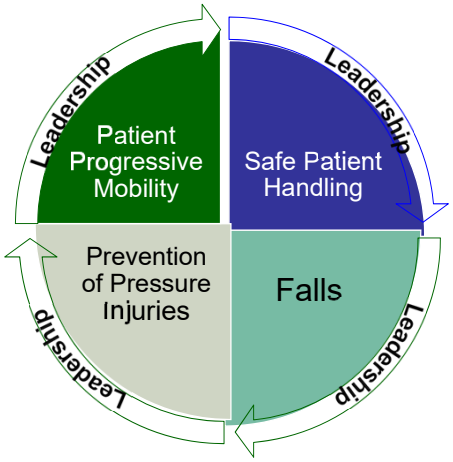


Changing the Perception of Safety on Your Unit

- Safety for the patient and healthcare worker are integrated
- Transcends individual improvement initiatives and departmental walls
- High reliable unit/organization: engaged leadership, culture of safety, organizational processes and infrastructure to support safe practices
- Implement and maintain successful worker and patient safety improvement initiatives within your unit & organization.
- Create measurements that integrate patient safety and healthcare worker safety

The Joint Commission. Improving Patient and Worker Safety: Opportunities for Synergy, Collaboration and Innovation. Oakbrook Terrace, IL: Nov 2012. http://www.jointcommission.org
Castro GM. Am J SPHM, 2015;5(1)34-35
Add ANA-

The Goal: Patient & Caregiver Safety



How Well Are We Doing?

Early Progressive Mobility

Do We Even Achieve the Minimum Mobility Standard…
"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

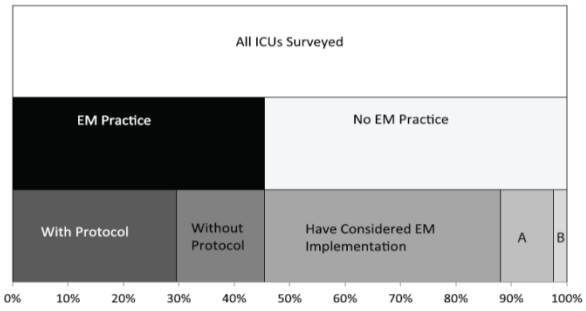
Positioning Prevalence

- 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

Environmental Scan of EM Practices

- 687 randomly selected ICU's stratified by regional density & size- 500 responded (73% response rate)
- Demographics:
  - 51% academic affiliation, mixed medical/surgical (58%) or medical (22%) with a median of 16 beds (12–24)
  - 34% dedicated PT or OT for the ICU
  - Performed a median of 6 days, 52% began on admission



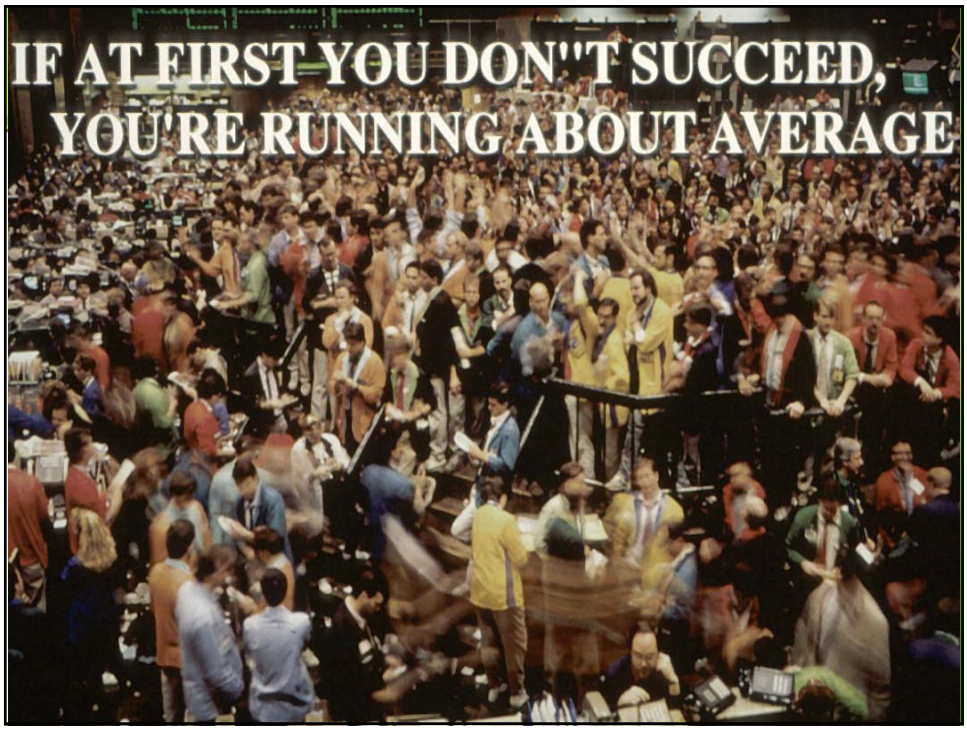
Factors associated with EMP:
- Dedicated PT/OT
- Written sedation protocol
- Daily MDR
- Daily written goals

Bakhru RN, et al. Crit Care Med 2015; 43:2360–2369

Outcomes of Early Mobility Programs

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

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



Pressure Injury

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 billon dollars for 2010

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

Dorner, B., Posthauer, M.E., Thomas, D. (2009), www.npuap.org/pr2newsroom.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 Austrlia;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

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 OWN 2007;34(1):45-53.
Doughty D, et al. JWOCN. 2012;39(3):303-315

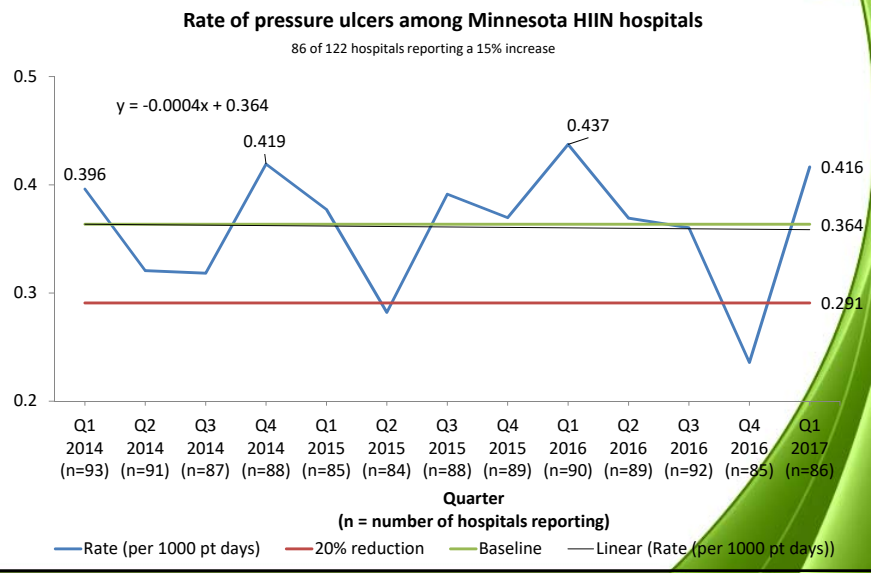
IAD: Multisite Epidemiological Study

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

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

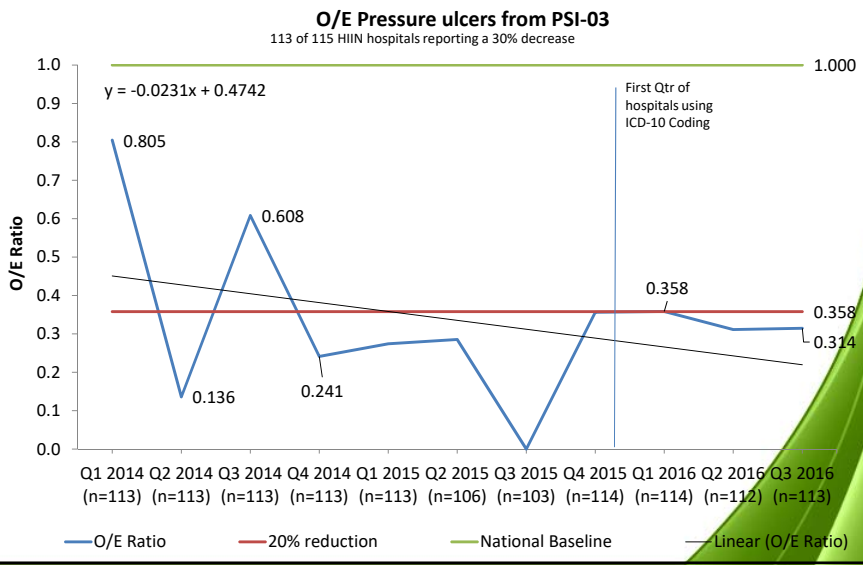
Pressure ulcer incidence rate

(n= # of pts. w/ a PU that developed after admit, includes stage II-IV & unstageable PU using NPUAP staging definitions, does not include stage I or suspected deep tissue injuries)



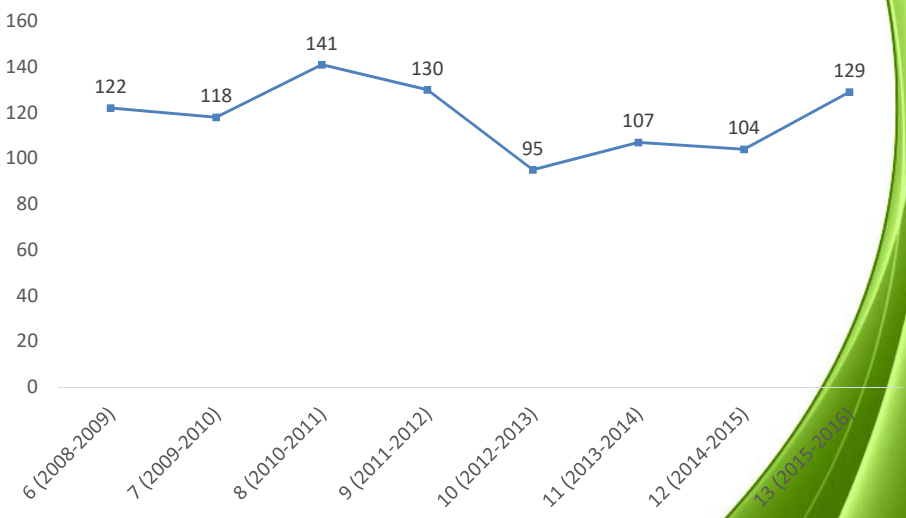
Pressure Ulcer PSI-03

(n= pts with secondary ICD9/10 codes for PU stages II, IV, or unstageable)

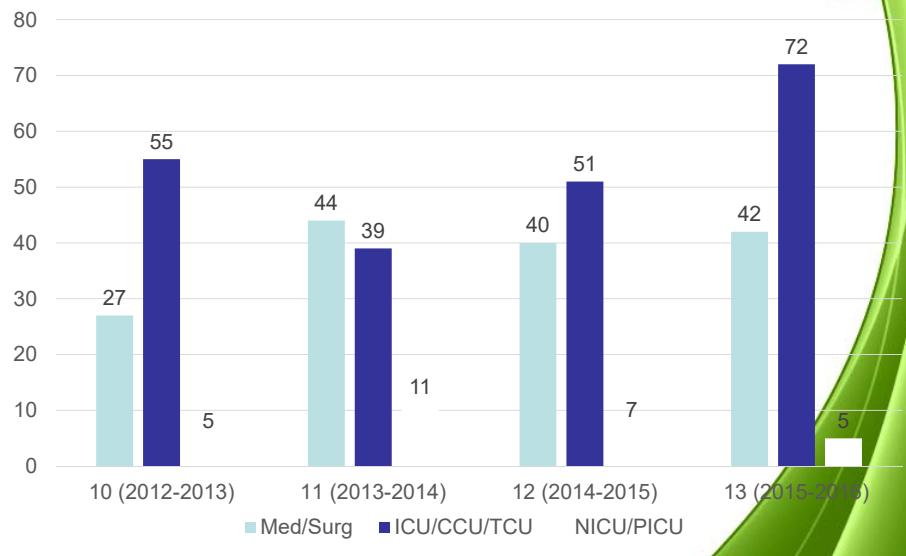


Adverse Health Events Year 13

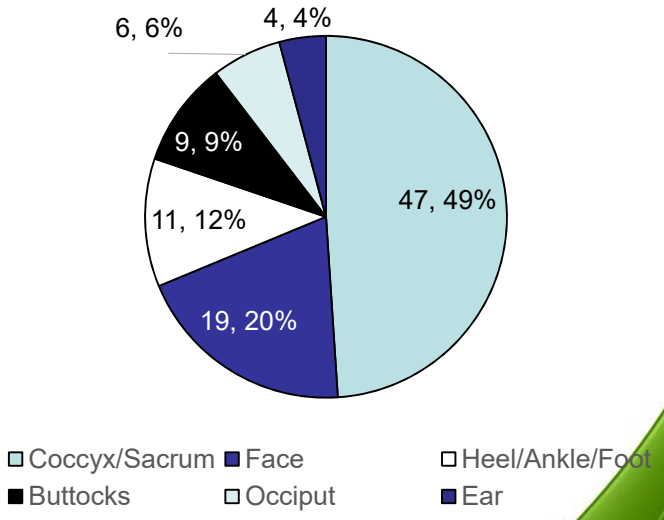
Pressure ulcer overview



Pressure ulcer unit location



Pressure ulcer site



Device Related Pressure Ulcers

Device Related	
Year 10	24 (25%)
Year 11	42 (39%)
Year 12	39 (38%)
Year 13	53 (41%)

Caregiver Harm

Oh, My Aching Back!

Back Pain Incidence in Nursing:

- 8 out of 10 nurses work despite experiencing musculoskeletal pain[1]
- 62% of nurses report concern developing a disabling musculoskeletal injury[1]
- 56% of nurses report musculoskeletal pain is made worse by their job[1]
- Nursing assistants had the 2nd highest and RNs had the 6th highest number of musculoskeletal disorders in the U.S.[2]

American Nurses Association. (2013). ANA Health and Safety Survey. Retrieved from http://www.nursingworld.org/MainMenuCategories/WorkplaceSafety/Healthy-Work-Environment/Work-Environment/2013-HealthSafetySurvey.html

2. U.S. Department of Labor, Bureau of Labor Statistics. (2014). Table 16. Number, incidence rate, and median days away from work for nonfatal occupational injuries and illnesses involving days away from work and musculoskeletal disorders by selected worker occupation and ownership, 2014. Retrieved from http://www.bls.gov/news.release/osh2.t16.htm

Oh, My Aching Back!

2014 - 67%-80% of people in the US were morbidly obese, obese or overweight (Flegal et al., 2014)

- Overweight: Body mass index (BMI) of 25.0 to 29.9
- Obesity: BMI of 30.0 to 39
- Morbid Obesity: BMI 40 or higher

Oh, My Aching Back!

- The nation is facing an impending shortage of nurses, which is expected to peak by 2020
- Average age of nurses in the US is 46
- We must improve our ergonomic environment to accommodate older nurses (Buerhaus, 2004)

What About Staff Harm?

- Health care is the only industry that considers 100 pounds to be a "light" weight

- Other professions use assistive equipment when moving heavy items

- On average, nurses and assistants lift 1.8 tons per shift (ANA, n.d.)

Kelly, 2015)

American Nurses Association. (n.d.). Safe Patient Handling Movement. Retrieved from

Number, Incidence Rate, & Median Days Away From Work for Occupational Injuries RN's with Musculoskeletal Disorders in US, 2003-2004

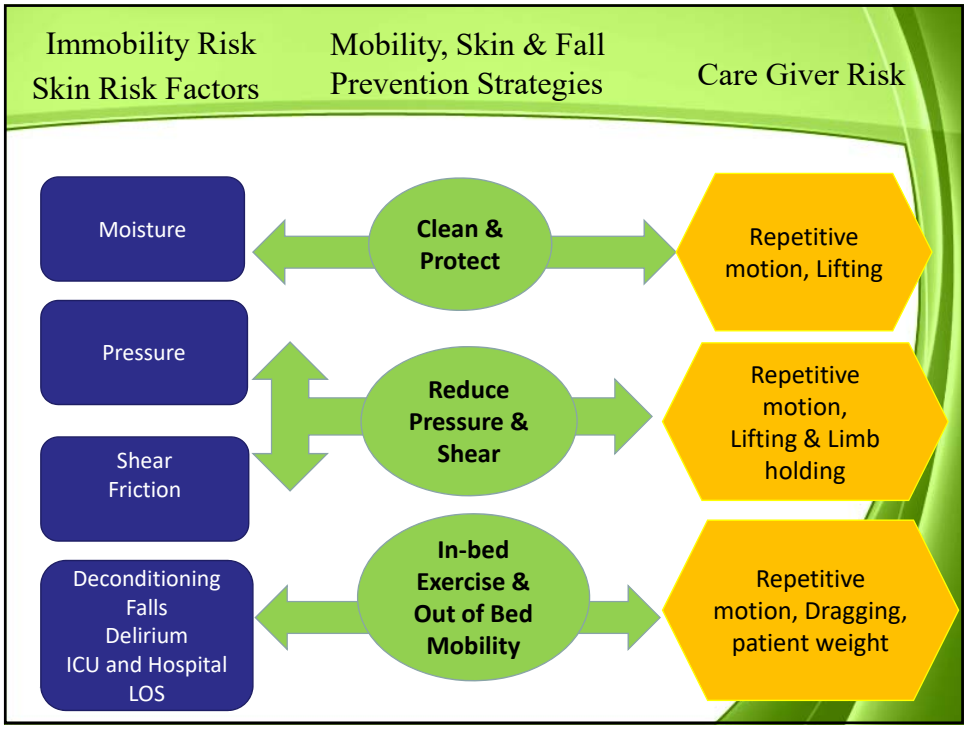
Year	Ownership	;Occupation	Total Cases	Incidence Rate	Medial Days Away From Work
2009	private industry	RNs	8,760	51.6	8
2010	Private industry	RNs	9,260	53.7	6
2011	Private industry	RN's	10,210		8
2012	Private industry	RN's	9900	58.5	8
2013	Private Industry	RN	9820	56.2	7
2014	Private Industry	RN	9820	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

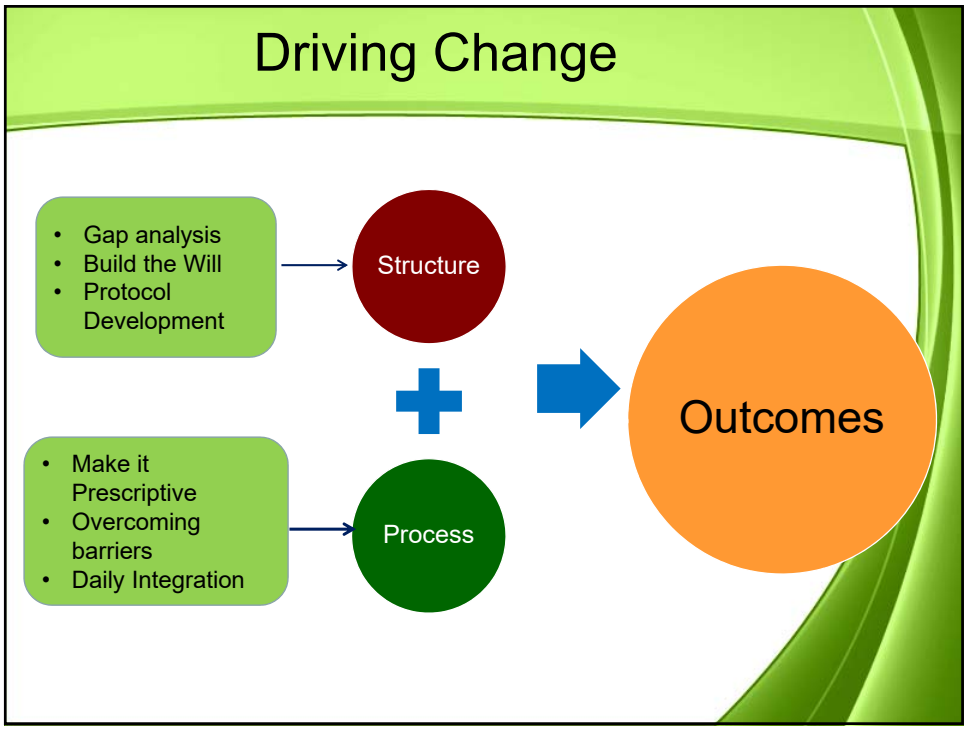
Bureau of Labor Statistics, U.S. Department of Labor, February 14, 2011. Numbers for local and state government Unavailable prior to 2008/Nov 2011, Release 10:00 a.m. (EST) Thursday, November 8, 2012, 2013 data http://www.bls.gov/news.release/pdf/osh2.pdf. Accessed 01/07/2016 http://www.bls.gov/news.release/pdf/osh2.pdf

Patient Falls

Significance of Patient Falls

- Falls are the leading cause of hospital–acquired injury and can frequently prolong or complicate hospital stays (Degelau et al., 2012)
- Between 700,000 and 1 million patients suffer a fall in U.S. hospitals each year (Dupree et al., 2014)
- 30-35% of those patients sustain an injury, and approximately 11,000 falls are fatal (Health Research & Educational Trust. 2016, October)
- Falls have been identified by the Centers for Medicare and Medicaid Services as an acquired condition that should not occur (Dupree et al., 2014)


Immobility Risk
Skin Risk Factors
Mobility, Skin & Fall
Prevention Strategies
Care Giver Risk
Moisture
Pressure
Shear
Friction
Deconditioning
Falls
Delirium
ICU and Hospital
LOS
Clean & Protect
Reduce Pressure & Shear
In-bed Exercise & Out of Bed Mobility
Repetitive motion, Lifting
Repetitive motion, Lifting & Limb holding
Repetitive motion, Dragging, patient weight


Driving Change
Gap analysis
Build the Will
Protocol Development
Structure
Make it Prescriptive
Overcoming barriers
Daily Integration
Process
Outcomes

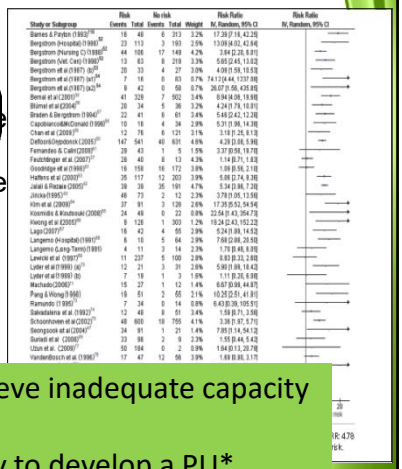
Gap Analysis of Prevention Strategies

- Assessment of Risk
- Pressure Injury/Turn/Shear reduction
- Health Care Worker Safety
- Early Mobility
- Device Related Injuries
- Managing Incontinence & Other Moisture
- Hemodynamic Instability

Identify Patients at High Risk

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

- Use standard BBP risk assessment tool
- Research has shown Risk Assessment Tools are more accurate than RN assessment alone
- Braden [illegible] Pressure Sore Risk
  - 6 subscales
    - Rating
  - 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*

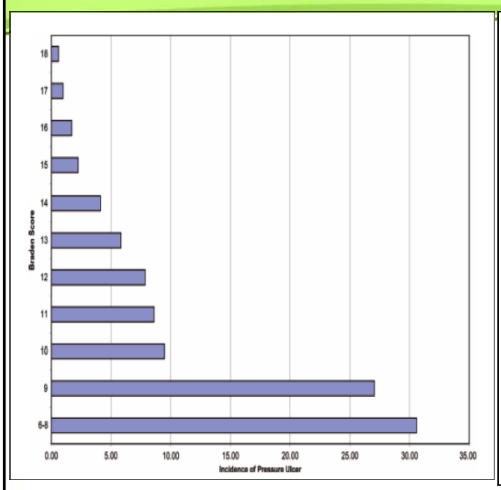
www.ihi.org;
Garcia-Fernandez FP, et al. JWOCN, 2014;41(1):24-34
*Hyun S, et al. Am J of Crit Care. 2014;23(6):494-501

Its About the Sub-Scale's

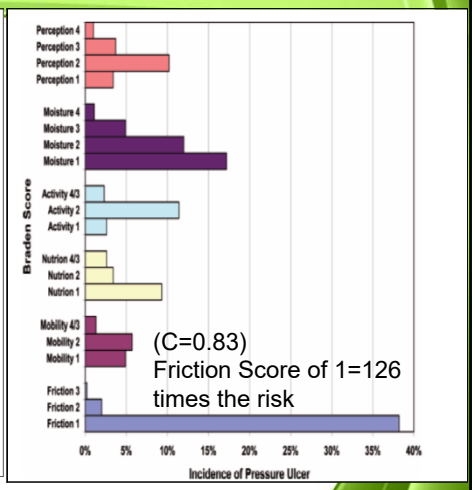
- Retrospective cohort analysis of 12,566 adults patients in progressive & ICU settings for yr. 2007
- Identifying patients with HAPU Stage 2-4
- Data extracted: Demographic, Braden score, Braden subscales on admission, LOS, ICU LOS, presence of Acute respiratory and renal failure
- Calculated time to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

Tescher AN, et al. J WOCN. 2012;39(3):282-291

Braden Score



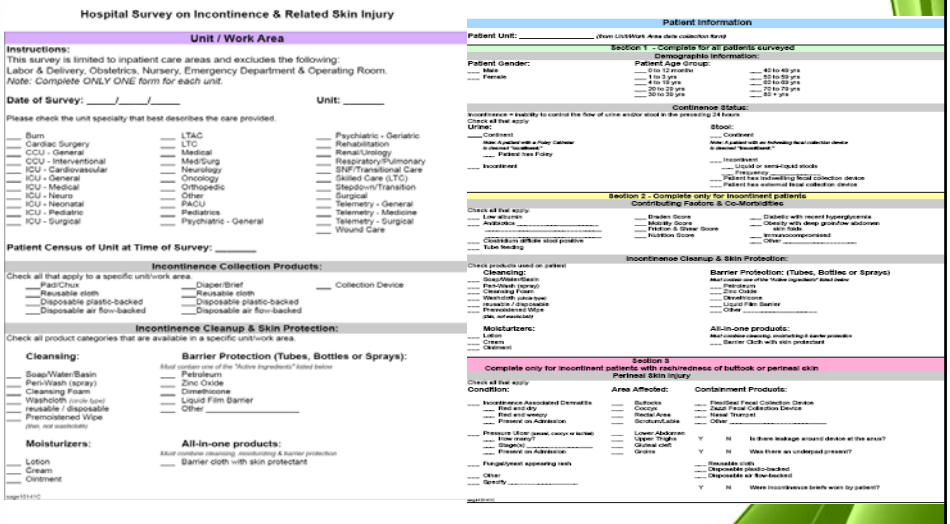
Braden Sub-Scales



(C=0.83)
Friction Score of 1=126 times the risk

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)

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.

Burn
Cardiac Surgery
CCU - General
CCU - Interventional
ICU - Cardiovasvular
ICU - General
ICU - Medical
ICU - Neuro
ICU - Neonatal
ICU - Pediatric
ICU - Surgical
LTAC
LTC
Medical
Med/Surg
Neurology
Oncology
Orthopedic
Other
PACU
Pediatrics
Psychiatric - General
Psychiatric - Geriatric
Rehabilitation
Renal/Urology
Respiratory/Pulmonary
SNF/Transitional Care
Skilled Care (LTC)
Stepdown/Transtion
Surgical
Telemetry - General
Telemetry - Medicine
Telemetry - Surgical
Wound Care

Patient Census of Unit at Time of Survey: _____

Incontinence Collection Products:

Check all that apply to a specific unit/work area.

Pad/Chux
Reusable cloth
Disposable plastic-backed
Disposable air flow-backed
Diaper/Brief
Reusable cloth
Disposable plastic-backed
Disposable air flow-backed
Collection Device

Incontinence Cleanup & Skin Protection:

Check all product categories that are available in a specific unit/work area.

Cleansing:
Soap/Water/Basin
Peri-Wash (spray)
Cleansing Foam
Washcloth (circle type)
reusable / disposable
Premoistened Wipe
(thin, not washcloth)

Barrier Protection (Tubes, Bottles or Sprays):
Must contain one of the "Active Ingredients" listed below
Petroleum
Zinc Oxide
Dimethicone
Liquid Film Barrier
Other _____

Moisturizers:
Lotion
Cream
Ointment

All-in-one products:
Must combine cleansing, moisturizing & barrier protection
Barrier cloth with skin protectant

Patient Information

Patient Unit: _____ (from LockWork Area data collection form)

Section 1 - Complete for all patients surveyed

Demographic Information:

Patient Gender:
Male
Female

Patient Age Group:
0 to 12 months
1 to 3 yrs
4 to 18 yrs
20 to 29 yrs
30 to 39 yrs
40 to 49 yrs
50 to 59 yrs
60 to 69 yrs
70 to 79 yrs
80 + yrs

Continence Status:

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

Check all that apply

Urine:
Continent
Note: A patient with a Foley Catheter is charted "Incontinent."
Patient has Foley
Incontinent

Stool:
Continent
Note: A patient with an ileostomy/fecal collector device is charted "Incontinent."
Incontinent
Liquid or semi-liquid stools
Frequency
Patient has indwelling fecal collection device
Patient has external fecal collection device

Section 2 - Complete only for incontinent patients

Contributing Factors & Co-Morbidities

Check all that apply.

Low albumin
Antibiotics _____
Clostridium difficile stool positive
Tube feeding
Braden Score
Mobility Score
Friction & Shear Score
Nutrition Score
Diabetic with recent hyperglycemia
Obesity with deep groin/low abdomen skin folds
Immunocompromised
Other _____

Incontinence Cleanup & Skin Protection:

Check products used on patient

Cleansing:
Soap/Water/Basin
Peri-Wash (spray)
Cleansing Foam
Washcloth (circle type)
reusable / disposable
Premoistened Wipe
(thin, not washcloth)

Barrier Protection: (Tubes, Bottles or Sprays)
Must contain one of the "Active Ingredients" listed below
Petroleum
Zinc Oxide
Dimethicone
Liquid Film Barrier
Other _____

Moisturizers:
Lotion
Cream
Ointment

All-in-one products:
Must combine cleansing, moisturizing & barrier protection
Barrier Cloth with skin protectant

Section 3

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

Perineal Skin Injury

Check all that apply

Condition:
Incontinence Associated Dermatitis
Red and dry
Red and weepy
Present on Admission
Pressure Ulcer (sacral, coccyx or ischial)
How many?
Stage(s) _____
Present on Admission
Fungal/yeast appearing rash
Other
Specify _____

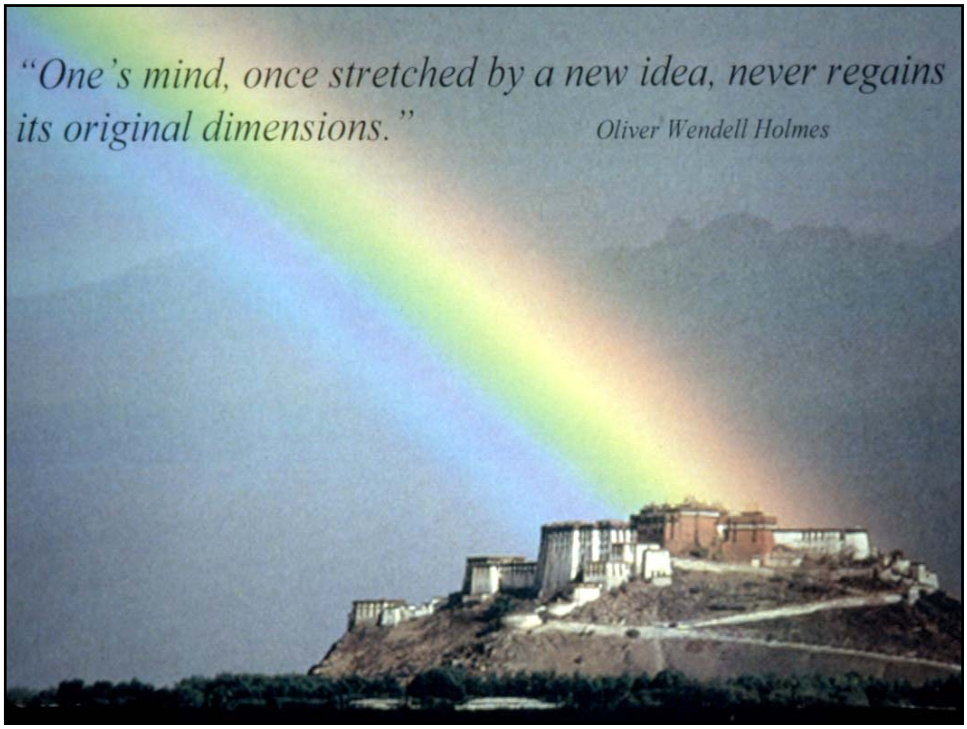
Area Affected:
Buttocks
Perineum
Rectal Area
Scrotum/Labia
Lower Abdomen
Upper Thighs
Gluteal cleft
Groins

Containment Products:
Fecal/Anal Fecal Collection Device
Fecal/Fecal Collection Device
Rectal Tube
Nasal Trumpet
Other _____

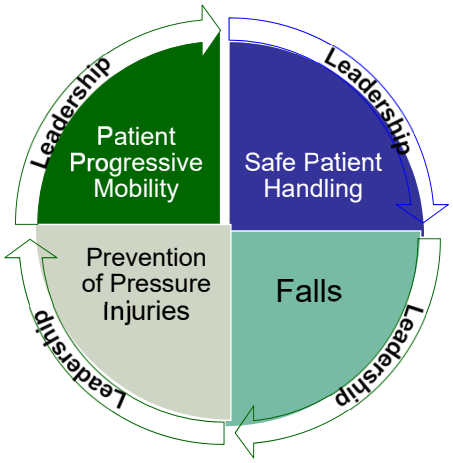
Is there leakage around device at the anus? Y N
Was there an underpad present? Y N
Were incontinence briefs worn by patient? Y N

Reusable cloth
Disposable plastic-backed
Disposable air flow-backed

Junkin J, Selek JL. J WOCN 2007;34(3):260-269

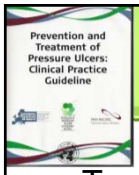


The Goal: Patient & Caregiver Safety



Pressure & Shear as a Risk Factor

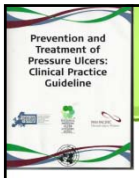
Sacrum & Heels



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.



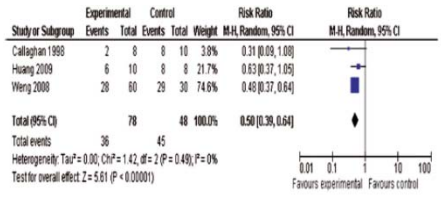
EBP Recommendations to Reduce Shear & Friction

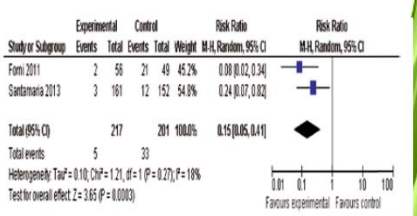
- Loose covers & increased immersion in the support medium increase contact area
- Prophylactic dressings: emerging science
- Use lifting/transfer devices & other aids to reduce shear & friction.
  - Mechanical lifts
  - Transfer sheets
  - 2-4 person lifts
  - Turn & assist features on beds
- Do not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

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 Austrlia;2014.

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

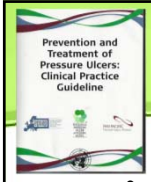




Evaluated nasal bridge device injury prevention

Evaluated sacral pressure ulcer prevention

Clark M, Black J, et al. Int Wound J 2014; 11:460–471



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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

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 Austrlia;2014.

Specialty Bed

Disposable Slide Sheets

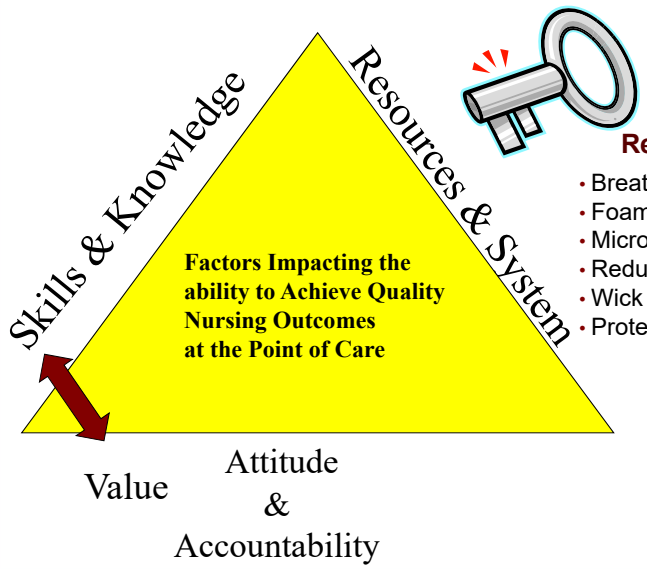
Breathable Glide Sheet

Current Practice: Turn & Reposition

Draw Sheet/Pillows/Layers of Linen

Lift Device

Achieving the Use of the Evidence For Pressure Ulcer Reduction



Resource & System

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

Vollman KM. Intensive Care Nurse.2013;29(5):250-5

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

Powers J, J Wound Ostomy Continence Nur, 2016;43(1):46-50

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

1[a] PU development with 24hrs of admission

Powers J, J Wound Ostomy Continence Nur, 2016;43(1):46-50

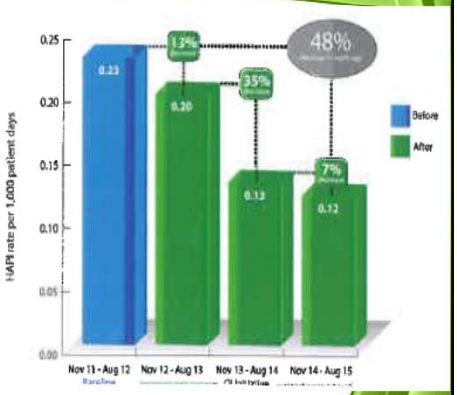
Impact of a Turn & Position Device on PI & Staff Time

- Prospective, QI study (1 SICU & 1MICU)
- 2 phases
  - SOC: pillows, underpads, standard low airloss bed and additional staff if required
  - Interventional: turn and position system, a large wicking pad (part of the product)
- Inclusion criteria: newly admitted, non-ambulatory, required 2 or more to assist with turning/repositioning
- Turning procedures were timed/admitting till ICU discharge
- **Results**
  - No difference in sociodemographic and clinical data between the groups
  - Phase 1: 14 patients (28%) Stage II sacral PI
  - Phase 2: zero sacral PI (p<.0001)
  - Timing:
    - Phase 1: 16.34 mins (range 4-60min) SD= 10.08
    - Phase 2: 3.58 mins (range 1.12-8.48) SD = 2.31 (p=0.0006)

Hall KD, et al. Ostomy Wound Management, Nov 2016:40-44

Reducing HAPI & Patient Handling Injuries

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

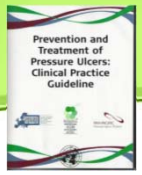


PATIENT HANDLING INJURY AND COSTS

74% reduction

	January 2012 to October 2012 (Before)	November 2012 to August 2013 (After)	November 2013 to August 2014 (After)	November 2014 to August 2015 (After)
Injuries/Cost	19/$427,500	8/$180,000	2/$45,000	5*/$112,500

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

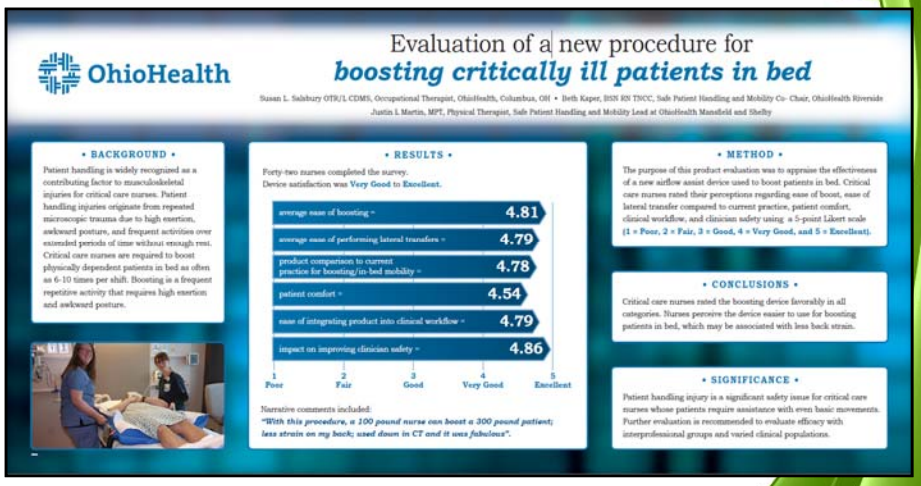


EBP Recommendations to Achieve Offloading & Reduce Pressure

- 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

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 Austrlia;2014

Evidence Based Strategies for Safe Patient Handling



OhioHealth

Evaluation of a new procedure for
boosting critically ill patients in bed

Susan L. Salsbury OTR/L CDMS, Occupational Therapist, OhioHealth, Columbus, OH • Beth Kaper, BSN RN TNCC, Safe Patient Handling and Mobility Co- Chair, OhioHealth Riverside
Justin L Martin, MPT, Physical Therapist, Safe Patient Handling and Mobility Lead at OhioHealth Mansfield and Shelby

• BACKGROUND •

Patient handling is widely recognized as a contributing factor to musculoskeletal injuries for critical care nurses. Patient handling injuries originate from repeated microscopic trauma due to high exertion, awkward posture, and frequent activities over extended periods of time without enough rest. Critical care nurses are required to boost physically dependent patients in bed as often as 6-10 times per shift. Boosting is a frequent repetitive activity that requires high exertion and awkward posture.

• RESULTS •

Forty-two nurses completed the survey.
Device satisfaction was Very Good to Excellent.

average ease of boosting =	4.81
average ease of performing lateral transfers =	4.79
product comparison to current practice for boosting/in-bed mobility =	4.78
patient comfort =	4.54
ease of integrating product into clinical workflow =	4.79
impact on improving clinician safety =	4.86

1 Poor, 2 Fair, 3 Good, 4 Very Good, 5 Excellent

Narrative comments included:
"With this procedure, a 100 pound nurse can boost a 300 pound patient; less strain on my back; used down in CT and it was fabulous".

• METHOD •

The purpose of this product evaluation was to appraise the effectiveness of a new airflow assist device used to boost patients in bed. Critical care nurses rated their perceptions regarding ease of boost, ease of lateral transfer compared to current practice, patient comfort, clinical workflow, and clinician safety using a 5-point Likert scale (1 = Poor, 2 = Fair, 3 = Good, 4 = Very Good, and 5 = Excellent).

• CONCLUSIONS •

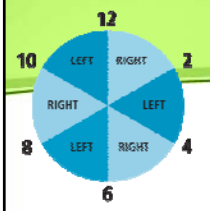
Critical care nurses rated the boosting device favorably in all categories. Nurses perceive the device easier to use for boosting patients in bed, which may be associated with less back strain.

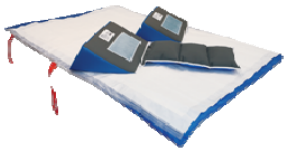
• SIGNIFICANCE •

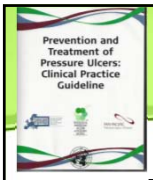
Patient handling injury is a significant safety issue for critical care nurses whose patients require assistance with even basic movements. Further evaluation is recommended to evaluate efficacy with interprofessional groups and varied clinical populations.

Salsbury S. Presented at AACN's National Teaching Institute, May 16th-19th, 2016. New Orleans, LA.

In-Bed Technology

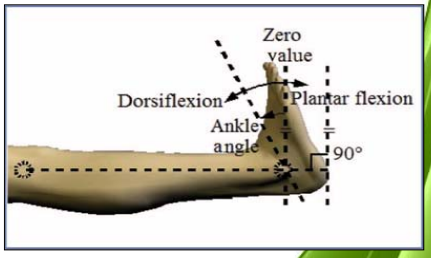






EBP Recommendations to Achieve Offloading & Reduce Pressure

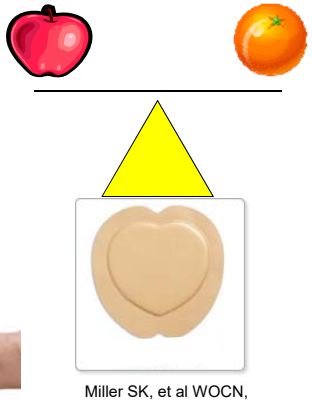
- Ensure the heels are free of the bed surface
  - Heal-protection devices should elevate the heel completely (off-load) in such a way as to distribute weight along the calf
  - The knee would be in slight flexion
  - Remove device periodically to assess the skin



Reger SI et al, OWM, 2007;53(10):50-58, www.?i.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 Austrlia;2014

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

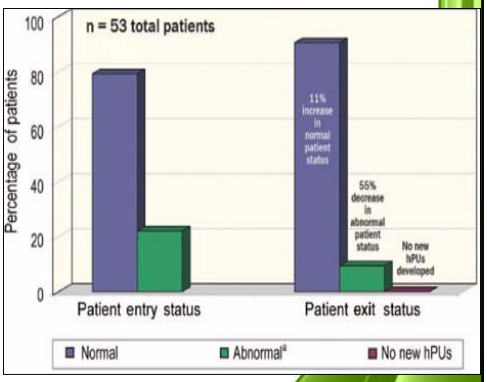
- Sedated patient > 5 days
- May or may not be intubated
- Braden equal to or less than 16

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

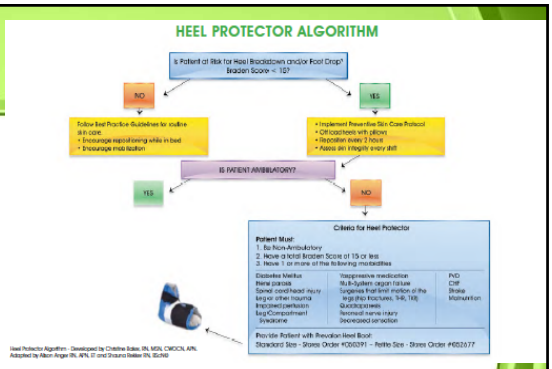
Results

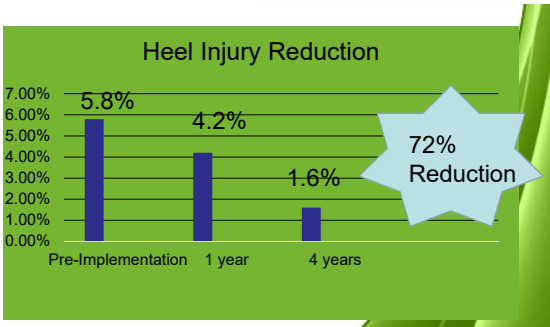


Meyers T. J WOCN 2010;37(4):372-378

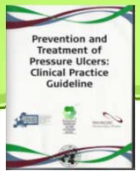
Sustainability of Heel Injury Reduction: QI Project

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





Hanna-Bull D. WOCN, 2016;43(2):129-132



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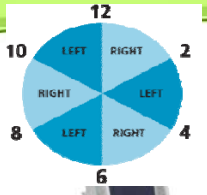
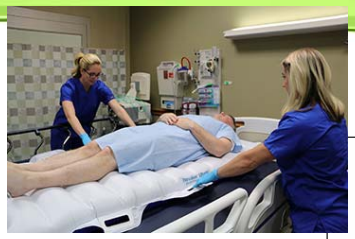
Reger SI et al, OWM, 2007;53(10):50-58, www.ihi.org
National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury Alliance. Prevention & treatment of pressure ulcers :clinical practice guideline. Emily Haesler (Ed) Cambridge Media: Osborne Park: Western Austrlia;2014

Transition: In-Bed to Out of Bed & Back





Out of Bed Technology



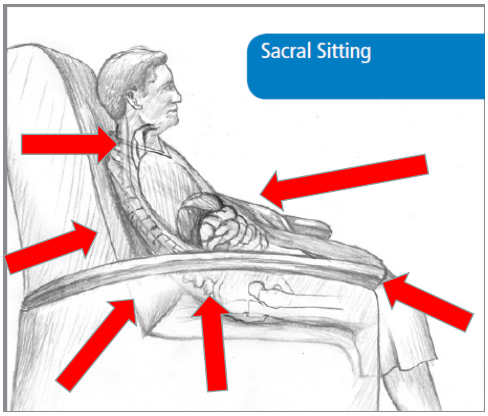


Current Seating Positioning Challenges

Uncomfortable

Airway & Epiglottis compressed

Body Alignment



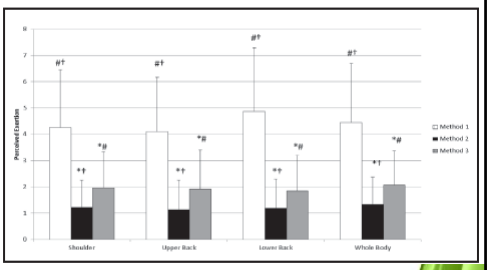
Frequent repositioning & potential caregiver injury

Potential risk of sliding from chair

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

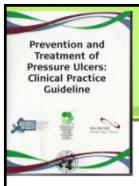
Fragala G, et al. Workplace Health & Safety:61:141-144

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)

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



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

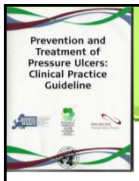
Reusable Incontinence pads

Adult diaper

Current Practice: Moisture Management

Disposable Incontinence Pads

Airflow pads for Specialty Beds



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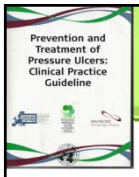
Williamson, R, et al (2008) Linen Usage Impact on Pressure and Microclimate Management. Hill-Rom www.hill-rom
Doughty D, et al. JWOCN. 2012;39(3):303-315

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

Hall K, et al. Ostomy Wound Management, 2015;61(7):26-30



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- < 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.ihi.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 PI
- 175 adults in 5 ICU's
- 27 developed non-device related HAPI (15.4%)
- 70 developed MDR's HAPI (45%)
- 42% were stage 2

Table 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/genito-urinary; 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

HanonuS & Karadag A. OWN, 2016;62(2):12-22

Medical Device Related Pressure Ulcers

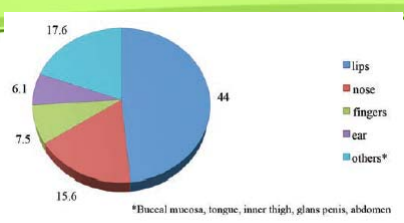


Figure 2. Distribution (percentage) of MDR PU's by anatomical location (n=211).

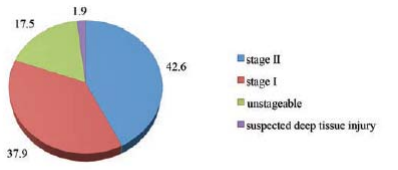


Figure 1. Distribution (percentage) of MDR PU's by stage (n=211).

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

			95% CI for OR	
Risk factors	***P***	**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
[a] mean age 67.4±16.1; [b] P <0.05; [c] mean albumin 2.8±0.7; [d] mean 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

HanonuS & Karadag A. OWN, 2016;62(2):12-22

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

NATIONAL PRESSURE ULCER ADVISORY PANEL

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

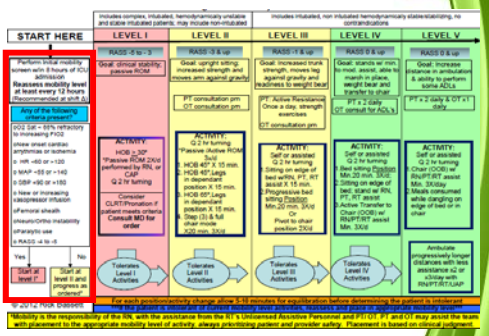
- Choose *the correct size of medical device(s) to fit the individual*
- Cushion *and protect the skin with dressings in high-risk areas (e.g., nasal bridge)*
- Inspect *the skin in contact with device at least daily (if not medically contraindicated)*
- Avoid *placement of device(s) over sites of prior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

Haugen V, Perspectives; 2016 http://www.perspectivesinnursing.org/current.html

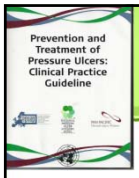
Any Work on Skin Should Be Incorporated into a Progressive Mobility Protocol

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

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 Austrlia;2014

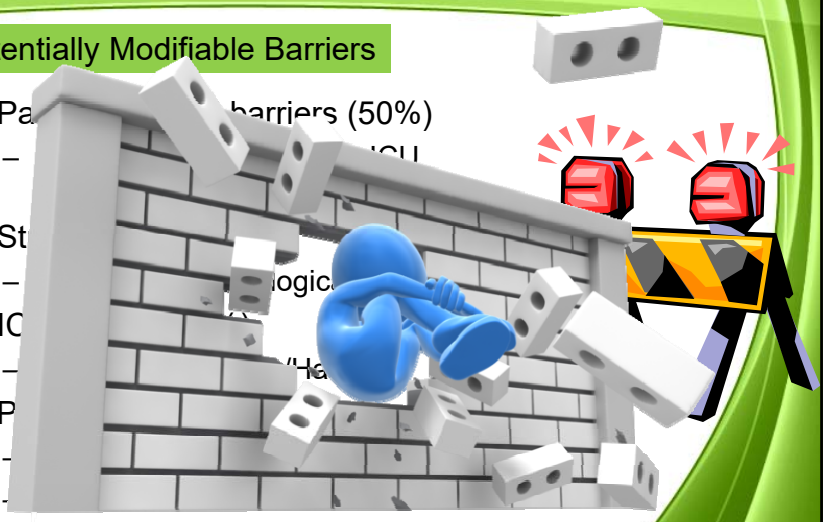
"Even if you are on the right track, you will get run over if you just sit there."

Will Rogers

Challenges to Mobilizing Critically Ill Patients

Potentially Modifiable Barriers

- Pa… barriers (50%)
  - –
- St…
  - – …logica…
- IC…
  - – …/Ha…
- P…
  - –
  - –



Dubb R, et al, Annual ATS, 2016 in press

Hemodynamic Instability

Is it a Barrier to Positioning?

Effects of Immobility on Cardiovascular Function

- Fluid shift
  - Occurs when the body goes from upright to supine position[1,2]
  - 10% of total blood volume is shifted from lower extremities to the rest of the body; 78% of this is taken up in the thorax[3,4]
  - Decreased blood volume (~15% of plasma volume is lost after 4 weeks of bed rest)[2]
- Cardiac effects
  - Increased resting heart rate (an increase of ~10 beats/min is observed after 4 weeks of bed rest)[1,2]
  - Cardiac deconditioning[2]
- Orthostatic intolerance
  - Increased in bedridden patients due to decreased baroreceptor sensitivity, reduced blood volume, cardiac deconditioning, decreased venous return and stroke volume, and venous distensibility[1,2]

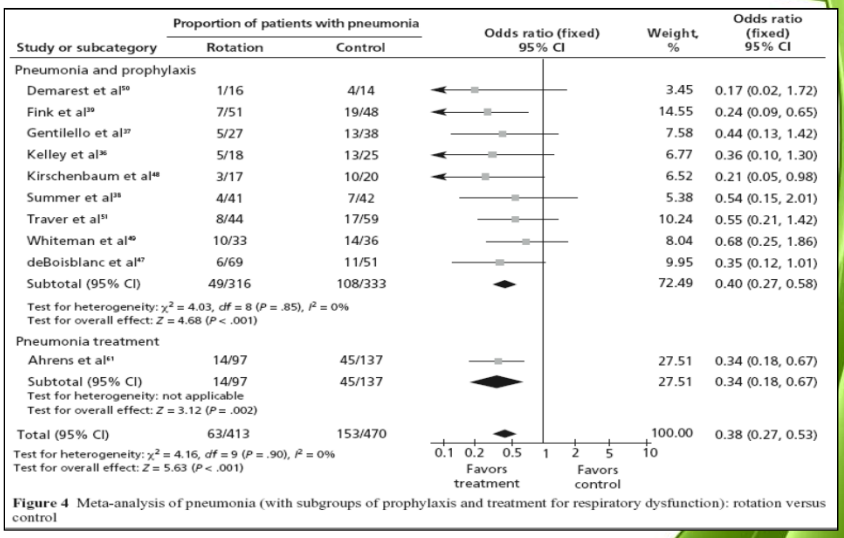
Cardiovascular

1. Winkelman C. *AACN Adv Crit Care*. 2009;20:254-266.
2. Knight J, et al. *Nurs Times*. 2009;105(21):16-20.
3. Harms MP, et al. *Exp Physiol*. 2003;88:611-616.
4. Sjostrand T. *Physiol Rev*. 1953;33:202-228.

Overcoming Intolerance

- Slowing the turn
- Training to turn

Continuous Lateral Rotation Therapy



Study or subcategory	Proportion of patients with pneumonia: Rotation	Control	Odds ratio (fixed) 95% CI	Weight, %	Odds ratio (fixed) 95% CI
Pneumonia and prophylaxis					
Demarest et al[50]	1/16	4/14		3.45	0.17 (0.02, 1.72)
Fink et al[29]	7/51	19/48		14.55	0.24 (0.09, 0.65)
Gentilello et al[27]	5/27	13/38		7.58	0.44 (0.13, 1.42)
Kelley et al[36]	5/18	13/25		6.77	0.36 (0.10, 1.30)
Kirschenbaum et al[48]	3/17	10/20		6.52	0.21 (0.05, 0.98)
Summer et al[28]	4/41	7/42		5.38	0.54 (0.15, 2.01)
Traver et al[51]	8/44	17/59		10.24	0.55 (0.21, 1.42)
Whiteman et al[46]	10/33	14/36		8.04	0.68 (0.25, 1.86)
deBoisblanc et al[47]	6/69	11/51		9.95	0.35 (0.12, 1.01)
Subtotal (95% CI)	49/316	108/333		72.49	0.40 (0.27, 0.58)
Test for heterogeneity: $\chi^2 = 4.03$, $df = 8$ ($P = .85$), $I^2 = 0\%$					
Test for overall effect: $Z = 4.68$ ($P < .001$)					
Pneumonia treatment					
Ahrens et al[41]	14/97	45/137		27.51	0.34 (0.18, 0.67)
Subtotal (95% CI)	14/97	45/137		27.51	0.34 (0.18, 0.67)
Test for heterogeneity: not applicable					
Test for overall effect: $Z = 3.12$ ($P = .002$)					
Total (95% CI)	63/413	153/470		100.00	0.38 (0.27, 0.53)
Test for heterogeneity: $\chi^2 = 4.16$, $df = 9$ ($P = .90$), $I^2 = 0\%$					
Test for overall effect: $Z = 5.63$ ($P < .001$)					

Figure 4 Meta-analysis of pneumonia (with subgroups of prophylaxis and treatment for respiratory dysfunction): rotation versus control

Goldhill DR et al. Amer J Crit Care, 2007;16:50-62

CLRT to Prevent VAP: Controlling the Variables[1]

- **Methodology**
  - Prospective randomized controlled trial, 3 medical ICUs at a single center
  - Eligible if ventilated <48 hours and free from pneumonia, ALI, or in ARDS
  - 150 patients with 75 in each group
  - 35 patients with CLRT allocated to undergo percussion before suctioning
  - Measures to prevent VAP were standardized for both groups including head of bed
- **Results:** CLRT vs control
  - VAP: 11% vs 23% *P*=0.048
  - Ventilation duration: 8 ± 5 days vs 14 ± 23 days, *P*=0.02
  - LOS: 25 ± 22 vs 39 ± 45 days, *P*=0.01
  - Mortality: no difference

ALI=acute lung injury; ARDS=acute respiratory distress syndrome;
CLRT=continuous lateral rotation therapy; VAP=ventilator-associated pneumonia.
Staudinger T, et al. *Crit Care Med*. 2010;38:486-490.

Introducing CLRT Into Patient Care

- Introduction of CLRT into patient care can provide an efficient way of providing early mobility to those critically ill patients whose condition or instability prevents implementation of other forms of mobility[1,2]

Systematic method of approaching placement and removal of CLRT therapy… a protocol

CLRT=continuous lateral rotation therapy.
1. Swadener-Culpepper L, et al. *Crit Care Nurs Q*. 2008;31:270-279.
2. Basham KA, et al. *Respir Care Clin N Am*. 1997;3:109-134.

Moving Those Who Cannot Move Themselves: Which Patients Should Receive CLRT?

- Target high-risk patient populations
  - Pulmonary-hemodynamic instability with manual turning
  - FiO_2 50% or more
  - Positive end-expiratory pressure (PEEP) 8 or more
  - Existing pulmonary complications
  - FiO_2 increases by 20% (20 points) or PEEP >3 cm H_2O from baseline within 2 calendar days
- Which patients should NOT receive CLRT?
  - Those with unstable spines
  - Those with long bone fractures or patients requiring traction
  - Those with unstable intracranial pressure
  - Marked agitation without therapeutic management
  - Those with severe, uncontrolled diarrhea and patients that weigh more than 300lbs

CLRT=continuous lateral rotation therapy.
Swadener-Culpepper L, et al. *Crit Care Nurs Q*. 2008;31:270-279.
Basham KA, et al. *Respir Care Clin N Am*. 1997;3:109-134.

Ongoing Monitoring/Evaluation and Documentation

- Assess for potential complications frequently
  - Malposition of endotracheal tube
  - Positional transient desaturation
  - Positional hemodynamic instability
- Every 2 hours check to see if patient is in optimal position to promote effective turn
- Every 2 hours manually turn patient and evaluate skin and lungs, then resume
  rotational therapy
- Document in medical record: degree of rotation, pause time settings, hours of rotation, turn for skin check and lung evaluation every 2 hours
- Discontinue CLRT when the patient:
  - May be mobilized safely using other means (head of bed, chair position, out-of-bed chair, and/or ambulation)
  - Shows improvement in respiratory status
  - Has agitation that is not therapeutically managed

CLRT=continuous lateral rotation therapy.

Balancing Oxygen Supply and Demand

O_2 Supply Debt

Activities That Increase VO_2

• Dressing change	10%
• Physical exam	20%
• Agitation	18%
• Bath	23%
• Chest X-ray	25%
• Suctioning	27%
• Increased work of breathing	40%
• Weigh on sling scale	36%
• Position change	31%
• Linen change – occupied bed	22%
• Chest physiotherapy	35%

White, KM. AACN Clin Issues Crit Care Nurs. 1993 Feb;4(1):134-47

Strategies to Optimize Patient's Tolerance to Activities

- Space activities
- Monitor for signs of intolerance
- Pre/post hyperoxygenate
- Determine if the intervention is essential
- Control variables that increase consumption
  - Pain management
  - Agitation management
  - Partial temp regulation
  - Shivering

Lateral Positon & Dangling

- Lateral turn results in a 3%-9% decrease in SVO_2, which takes 5-10 minutes to return to baseline
- Appears the act of turning has the greatest impact on any instability seen
- Studies show similar impact with dangling
- Mechanical ventilation impact within chest wall

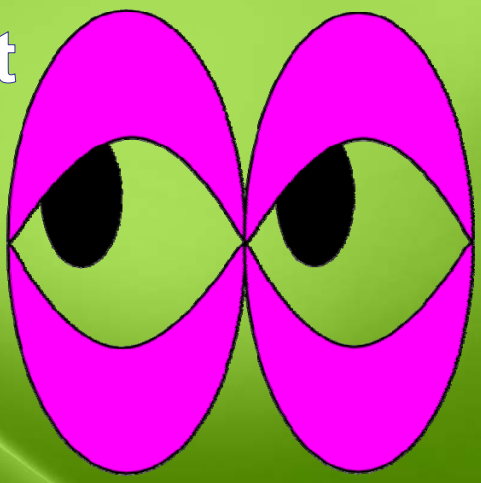
Winslow EH, et al. *Heart Lung*. 1990;19:557-561.
Price P. *Dynamics*. 2006;17:12-19.

Balance the Risk & Benefit

- Determining the timing of the mobility session in relation to other care activities
- Monitoring for tolerance 5 to 10 minutes after the mobilization
- If using the left lateral position
  - potential for greater cardiovascular compromise
  - may necessitate a temporary decision to use supine (head-of-bed elevation) and the right lateral position until able to tolerate

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

Assessment



Determining Readiness

- Perform Initial mobility screen w/in 8 hours of ICU admission & daily

- PaO2/FiO2 ≥ 250
- Peep <10
- O2 Sat ≥ 90%
- RR 10-30
- No new onset cardiac arrhythmias or ischemia
- HR >60 <120
- MAP >55 <140
- SBP >90 <180
- No new or increasing vasopressor infusion
- RASS ≥ -3

Patient Stable, Start at Level II & progress

Patient is unstable, start at Level I & progress

Consensus on Safe Criteria for Active Mobilization

- Systematic review performed than 23 international experts gather to reach consensus

	Low risk of an adverse event. Proceed as usual according to each ICU's protocols and procedures.
	Potential risk and consequences of an adverse event are higher than green, but may be outweighed by the potential benefits of mobilization. The precautions or contraindications should be clarified prior to any mobilization episode. If mobilized, consideration should be given to doing so gradually and cautiously.
	Significant potential risk or consequences of an adverse event. Active mobilization should not occur unless specifically authorized by the treating intensive care specialist in consultation with the senior physical therapist and senior nursing staff.

Categories

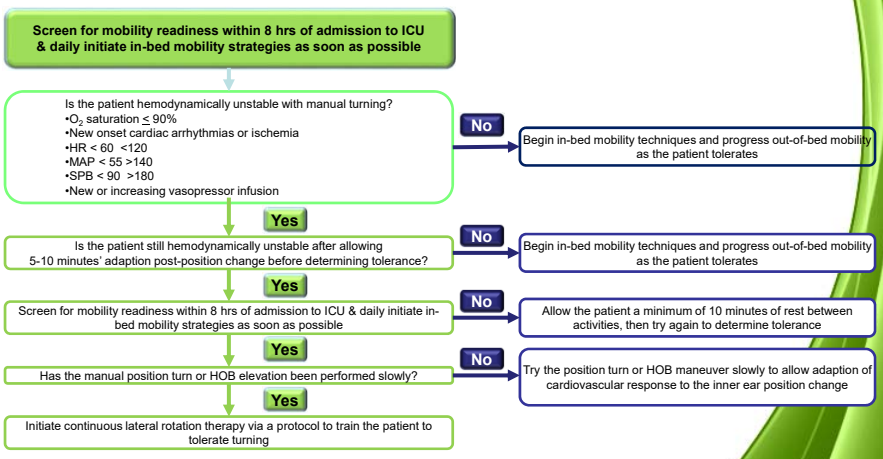
- Respiratory
- Cardiovascular
- Neurological
- Other Considerations

Consensus reach on all criteria. If no other contraindications; vasoactives, endotracheal tube, FIO2 < 60% with SaO2 90% & RR < 30/min were considered safe criteria

Hodgson CL, et. al Critical Care, 2014;18:658

O4

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.

VCU Hemodynamic Instability Guideline

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 loateral 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.**

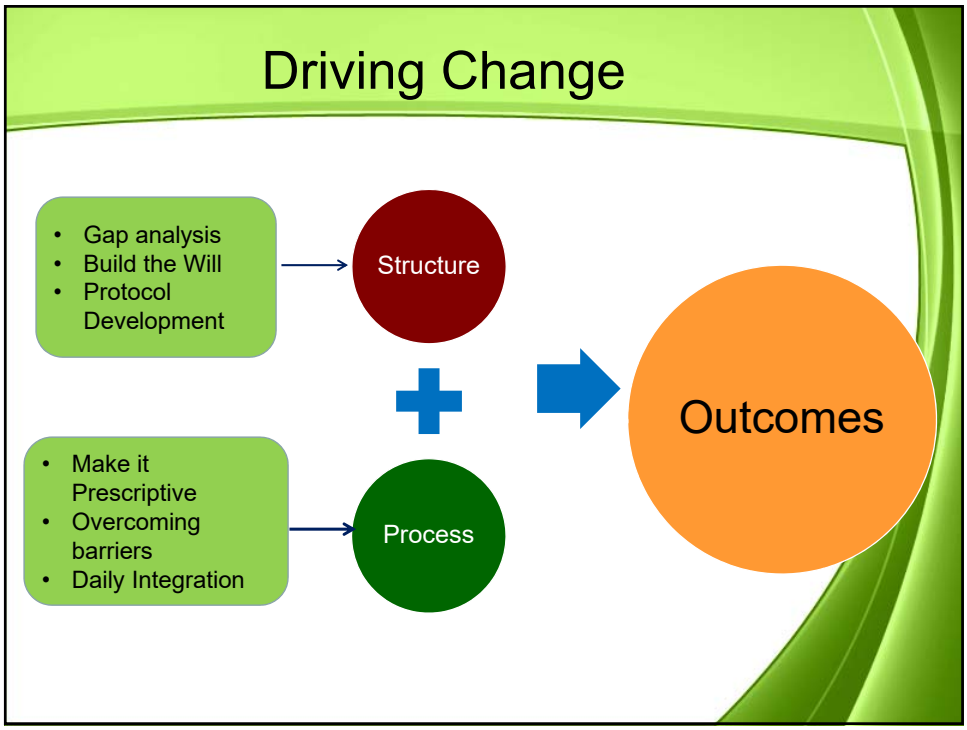
Brindle TC, et al. WOCN, 2013;40(3): 254-267

Slide 105

O4 Added a referernce
Owner, 5/10/2015

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

Anderson M, et al, J of Wound Ostomy Continence. 2015;42(3):217-225

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)

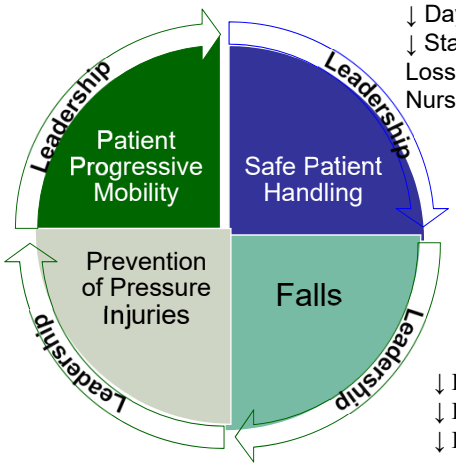
Intact Skin Is In: Making it Happen

- 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

The Goal: Patient & Caregiver Safety

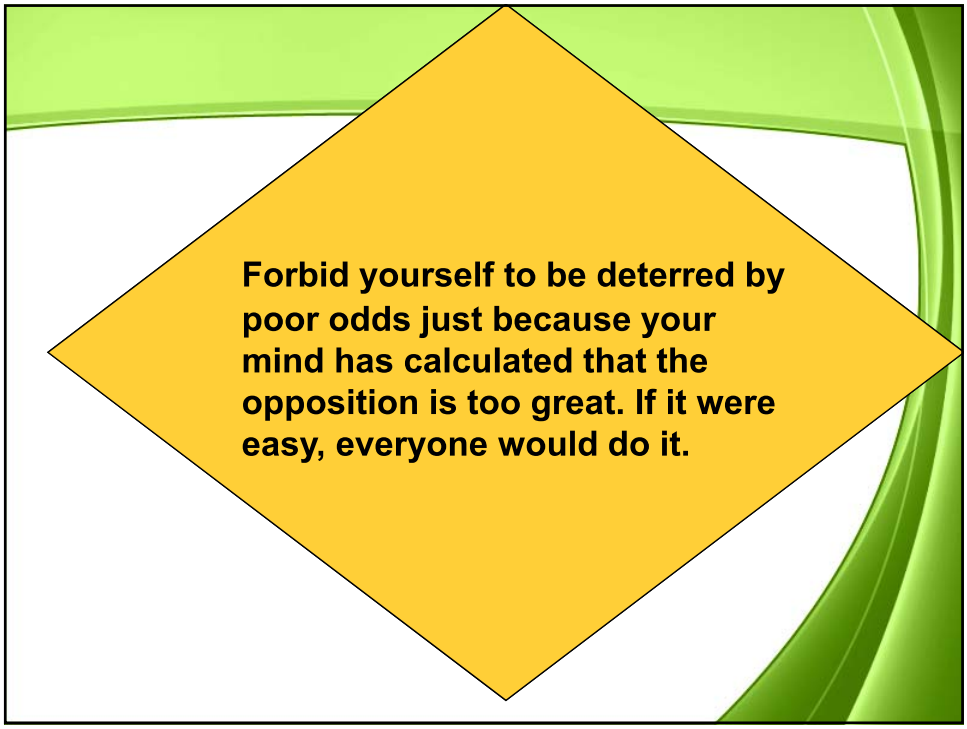
↓ Hospital LOS
↓ ICU LOS
↓ Skin Injury
↓ CAUTI
↓ Delirium
↓ Time on the vent

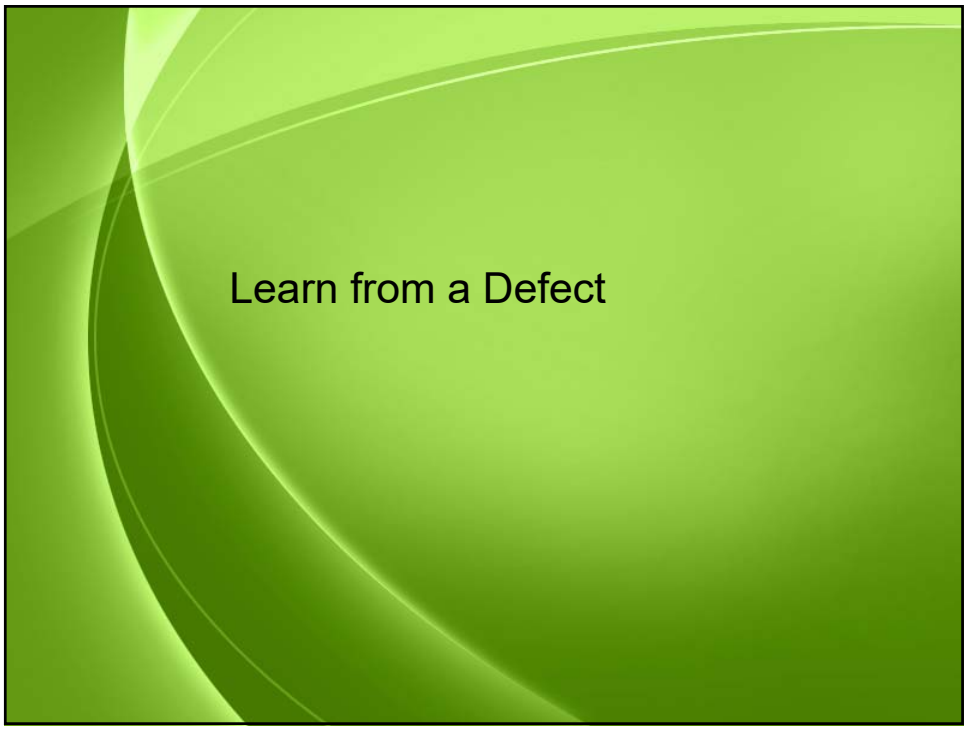
↓ Repetitive motion injury
↓ Musculoskeletal injury
↓ Days away from work
↓ Staffing challenges
Loss of experienced staff
Nursing shortage



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

↓ Falls
↓ Falls with injury
↓ Hospital 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.


Learn from a Defect

What Is a Defect?

- Anything that you do not want to happen again.

Errors Provide Useful Information

- We can learn more from our failures than from success
- Our processes can be improved when studied

"*Give me a fruitful error anytime, full of seeds, bursting with its own corrections. You can keep your sterile truth to yourself*."
Vilfred Pareto

116

Learn from a Defect

- Designed to rigorously analyze the various components and conditions that contributed to an adverse event and is likely to be successful in the elimination of future occurrences.
- Tool can serve to organize factors that may have contributed to the defect and provides a logical approach to breaking down faulty system issues
  - Patient, team, task, caregiver factors
  - Training, education, technology factors
  - Local or institutional environment

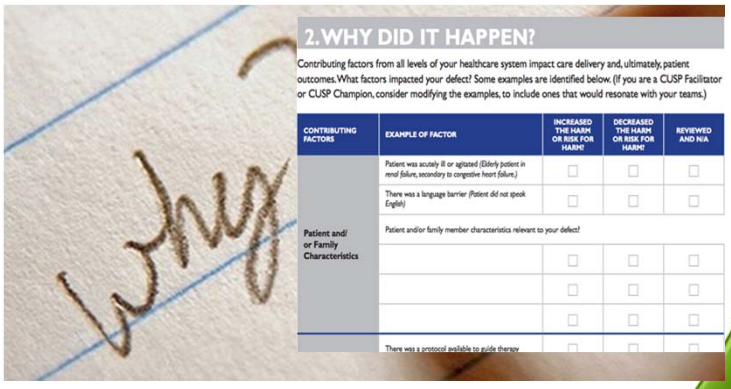
117

Learning From Defects

1. What happened?
   From view of person involved
2. Why did it happen?
3. How will you reduce it happening again?
4. How will you know the risk is reduced?
5. With whom will I share the learnings

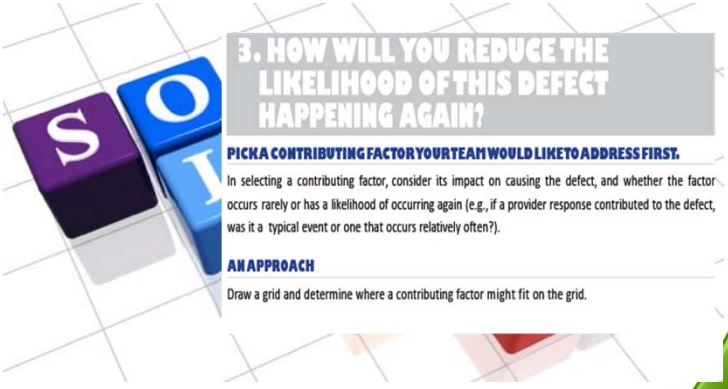
Brainstorm #1

Brainstorm # 2
Why Did It Happen?

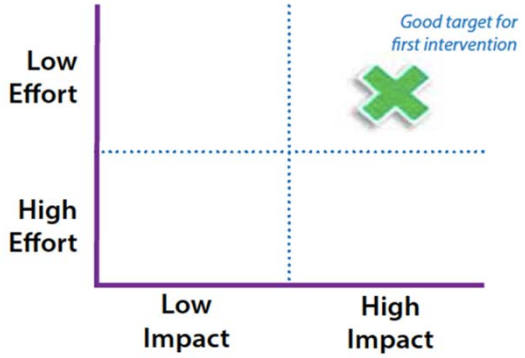


Brainstorm # 3

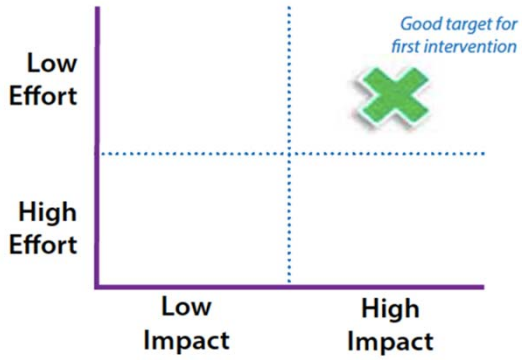
Solution Finding….All ideas are ~~Welcome~~ Necessary



Start with Low Hanging Fruit



Start with Low Hanging Fruit



A Good Solution Must Be…

- Clear in how we measure the success
- Trialable and easy to test
- Compatible with or improve exist lows
- Low cost, low fidelity

Building Resiliency Into Interventions

- Forcing functions and constraints
- Automation and computerization
- Standardization and protocols
- Checklists and independent check systems
- Rules and policies
- Education and information
- Vague warnings – Be more careful!

PDSA and Test of Change

Introducing Tests of Change

- Goal
  - Test potential improvements to the unit's care processes that have the potential to transform care in large and small ways
- Why It's Important
  - Small-scale tests of change can help determine whether an idea could result in sustainable improvement
  - Used for action-oriented learning

Principles for Tests of Change

- Test to evaluate if a new idea or innovation will work
  - Adopt
  - Adapt
  - Abandon
- Test small (N = 1)
  - One nurse
  - One shift
  - One patient

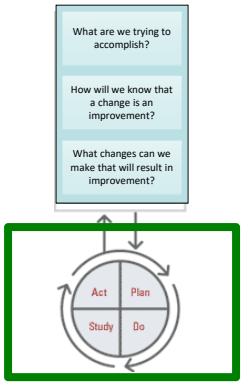
  } one change-of-shift report
- Engage those interested in testing
  - "Nurse friendly"
  - "Curious Team Member"

Principles for Tests of Change

- Don't wait for a committee approval
- Go to the committee after you have tested and have some data to support the new changes
- Form a hypothesis and collect some data (quantitative and qualitative)
- Revise - it takes many tests to build innovations

How to Do It:
Plan-Do-Study-Act (PDSA)

PDSA is at the core of the Institute for Healthcare Improvement's Model for Improvement



Your Turn, Try a Test of Change
Planning Worksheet

SMALL TEST OF CHANGE	WHAT do you need to test this idea?	WHO will be involved in the tests?	HOW will you inform participants ?	WHERE will the test occur?	WHEN will the test occur?	HOW will you know it is successful?

When will you compare what happened to your prediction?

When will you decide what to do next?

SMALL TEST OF CHANGE	What did you predict will happen?	What happened?	What did you learn?	What are the next steps?

Table Exercise: Develop a Small Test of Change

- Look at your data: HAPI & IAD
- Gap Analysis: what evidence based interventions are you not doing?
- Process data: how well are you implementing all of the prevention strategies
- Information from LFDs at your hospital
- Review evidence based practices

- Identify one small test of change you would like to implement to decrease your infection rates
- Complete Test of Change worksheet
- Share with group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