Under Pressure:
High Reliability in Reducing the Risk of Perioperative Pressure Injuries

Susan M. Scott MSN, RN, WOC Nurse

Objectives

- Identify current trends in incidence, cost, litigation, and regulations for hospital acquired pressure injury (HAPI).
- Identify factors that increase the risk of pressure injuries in the surgical patient and solutions at each stage of perioperative care.
- Illustrate a strategic plan to improve competency and skills in reducing the incidence of hospital-acquired pressure ulcer/injuries in the surgical population.

- “Surgery is one of the few times a normal, healthy individual is placed at risk for pressure sores”
  - **Gendron 1980**

Operating Room Table Circa 1905

Photo used with permission Marie Brown-Etris RN, CWON, CCHP

Gendron, F. “Burns” occurring during lengthy surgical procedures. *Journal of Clinical Engineering*. 1980;*5*:19–26.
Gendron, F. Unexplained Patient Burns: Investigating Iatrogenic Injuries. Quest Publishing Company Inc. Brea, CA. 1988

The Awakening

2.5 M

HAPI developed in the US Acute Care[1]

$26.8 B

US Cost of HAPI[1]

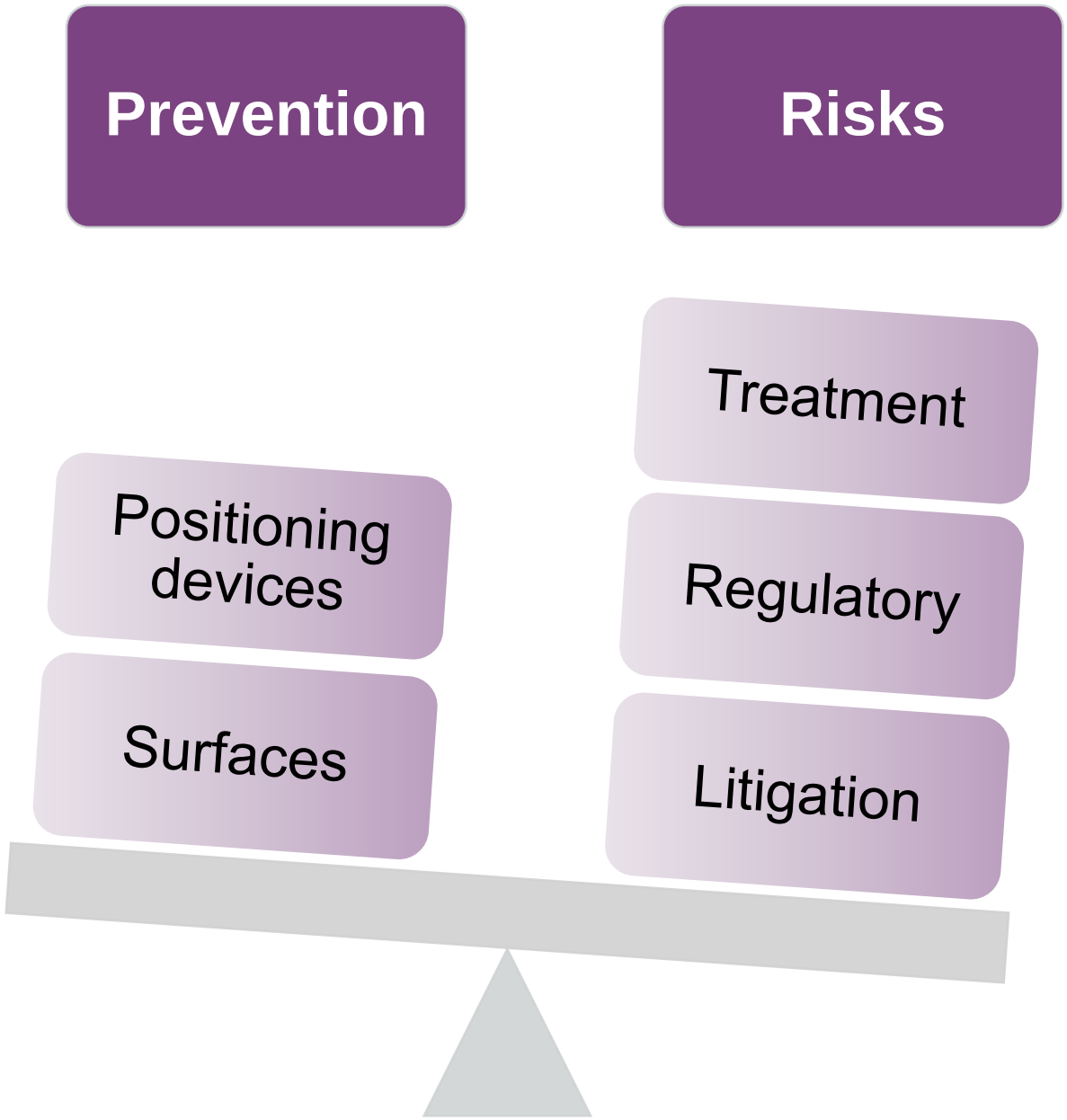
59% of Cost

Stage 3 & 4

Non- reimbursable

Padula WV, Delarmente BA. The national cost of hospital- acquired pressure injuries in the United States. Int Wound J. 2019;1–7. https://doi.org/10.1111/iwj. 13071

National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury Alliance. *Prevention and Treatment of Pressure Ulcers: Quick Reference Guide*. 2014. Emily Haesler, Ed. Cambridge Media: Perth, Australia.



$500 - $70,000

Single HAPI episode

45% of HAPI

Pressure ulcers attributable to the OR[2]

$250,000

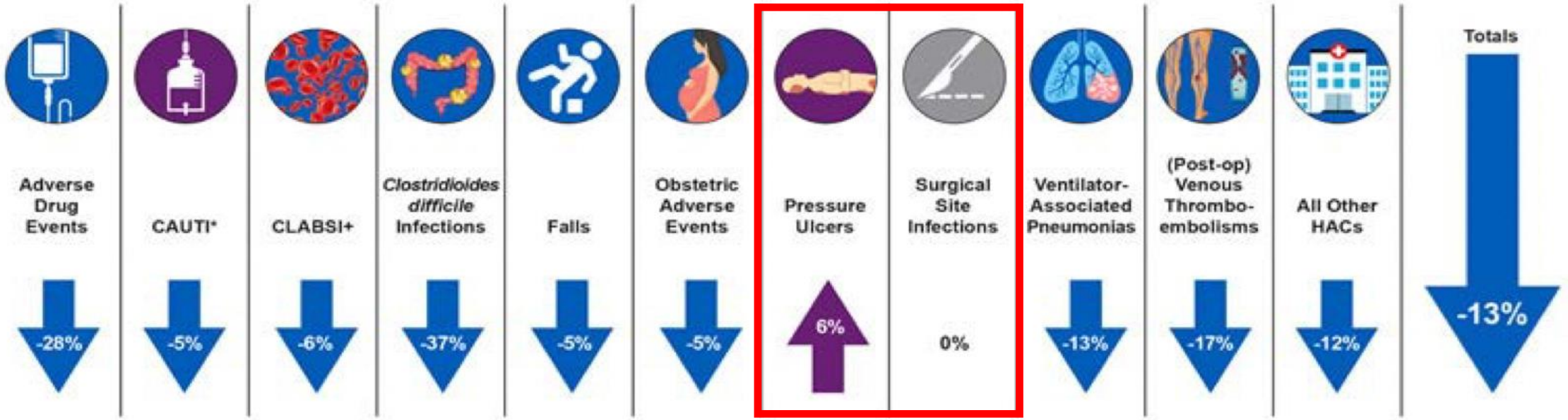
Average settlement

National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury Alliance. *Prevention and Treatment of Pressure Ulcers: Quick Reference Guide*. 2014. Emily Haesler, Ed. Cambridge Media: Perth, Australia

Declines in Hospital-Acquired Conditions

AHRQ
Agency for Healthcare Research and Quality

National efforts to reduce hospital-acquired conditions such as adverse drug events and injuries from falls helped prevent 20,500 deaths and saved $7.7 billion between 2014 and 2017.



*CAUTI - Catheter-Associated Urinary Tract Infections
+CLABSI - Central Line-Associated Bloodstream Infections
**The percent change numbers are compared to the 2014 measured baseline for HACs.

Source: AHRQ National Scorecard on Hospital-Acquired Conditions Updated Baseline Rates and Preliminary Results 2014-2017

Silver Tsunami

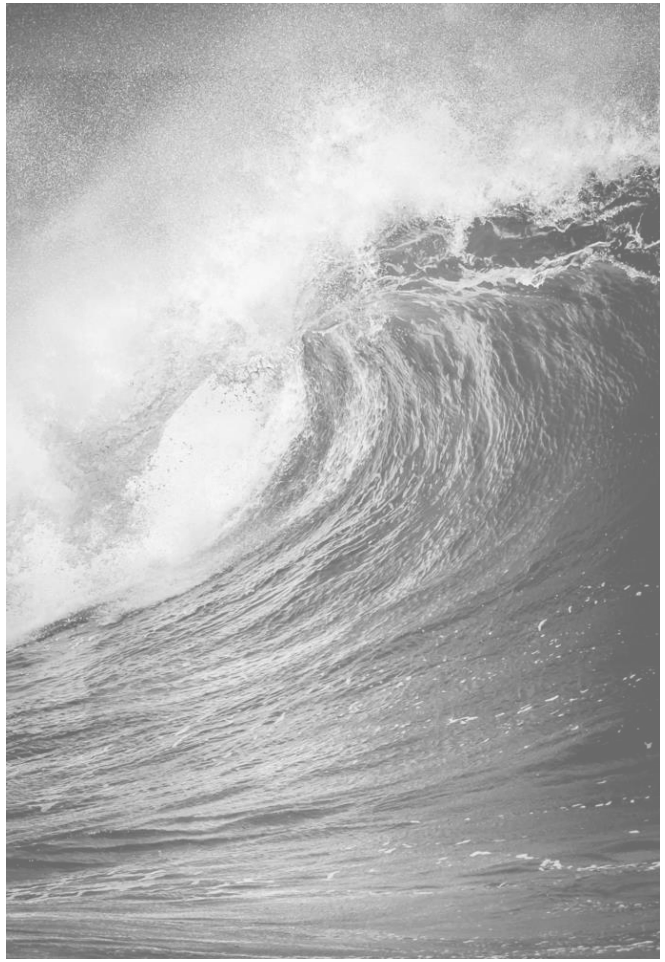
High Risk Population

37 M > 65 by 2030

89 M > 65 by 2050

Obesity 74.1%

Surgery growth



American Geriatric Society. Optimal Perioperative Management of the Geriatric Patient: Best Practice Guideline from ACS NSQIP ®/ American Geriatric Society 2015. https://www.facs.org/~/media/files/quality%20programs/geriatric/acs%20nsqip%20geriatric%202016%20guidelines.ashx Accessed December 31, 2018.
NCHS Data Brief Hospitalization for Total Hip Replacement Among Inpatients Age 45 and Over: United States, 2000-2010 Retrieved 12-07-2016 from http://www.cdc.gov/nchs/data/databriefs/db186.pdf
Dall TM, Gallo PD, Chakrabarti R, West T, Semilla AP, Storm MV. An aging population and growing disease burden will require a large and specialized health care workforce by 2025. *Health Aff. (Millwood).* Nov 2013;32(11):2013-2020.

Set the vision

How do we provide safe care across the continuum?

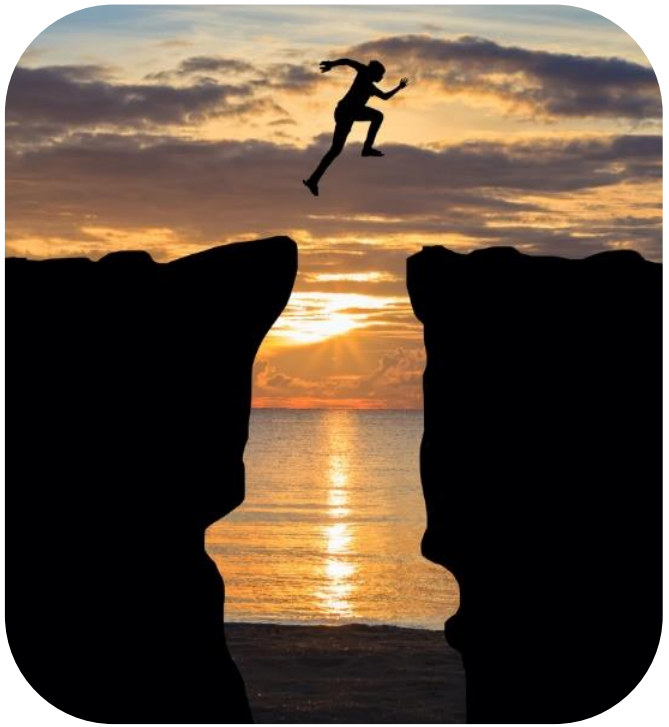
Strategy

- Keys to Success
  - Administration
  - Bundles and Toolkits
  - Culture, Change and Communication
  - Documentation and Artificial Intelligence
  - Education and Competency
  - (Knowledge, Skills and Attitude)

Lyder CH, Ayello EA October 2009 annual Checkup. The CMS pressure ulcer present on admission indicator. Advances in skin and wound care 22 (10):476-84

Gap Analysis

- Current State VS Desired State
  - QI Data, Incidence, Prevalence, Audits
  - Root Cause Analysis and Action (RCA^2)
  - Key Drivers - Planning Process
  - Equipment and Device inventory



Health Research & Educational Trust (2017, April). *Hospital Acquired Pressure Ulcers/ Injuries (HAPU/I): 2017.* Chicago, IL: Health Research & Educational Trust. Accessed at http://www.hret-hiin.org/
Scott Triggers Gap Analysis. http://www.scotttriggers.com/gap-analysis.html Accessed March 23, 2019.
Scott SM, Bennett J. Avoiding pressure injuries with root cause analysis and action. *AORN J.* 2018:108(5):15-16.

Where Does Immobility Occur?

Emergency Department

Surgery

ICU
Acute Care

Procedural Area

Operating Room

OR Skin Bundle

- Risk and skin assessment pre-op and immediately post-op
- Safe patient handling
- High specification OR positioning systems
- Redistribute pressure or padding bony prominences
- Offloading pressure on heels while maintaining knees in slight flexion

Scott S. Use of an OR skin bundle to prevent pressure injury. *AORN Journal* 2017;106(4):P18-19.
Association of PeriOperative Registered Nurses. (2017) Guideline for Positioning the Patient. In AORN(Ed). *2017 AORN Guidelines for Perioperative Practice*. Philadelphia, Wolters Kluwer.
Scott, S. Perioperative Pressure Injuries: Protocols and Evidence-Based Programs for Reducing Risk. *PSQH,* 2016;13(4), 20-28. Available at https://www.psqh.com/analysis/perioperative-pressure-injuries-protocols-and-evidence-based-programs-for-reducing-risk/4/

OR Skin Bundle

- Consider prophylactic dressings
- Use of approved positioning devices
- Maintain normothermia and microclimate
- Using hand-over communication
- Institute early movement, daily skin assessment and pressure management
- Report PIs that develop within 72 hours after the procedure

Scott S. Use of an OR skin bundle to prevent pressure injury. *AORN Journal* 2017;106(4):P18-19.
Association of PeriOperative Registered Nurses. (2017) Guideline for Positioning the Patient. In AORN(Ed). *2017 AORN Guidelines for Perioperative Practice*. Philadelphia, Wolters Kluwer.
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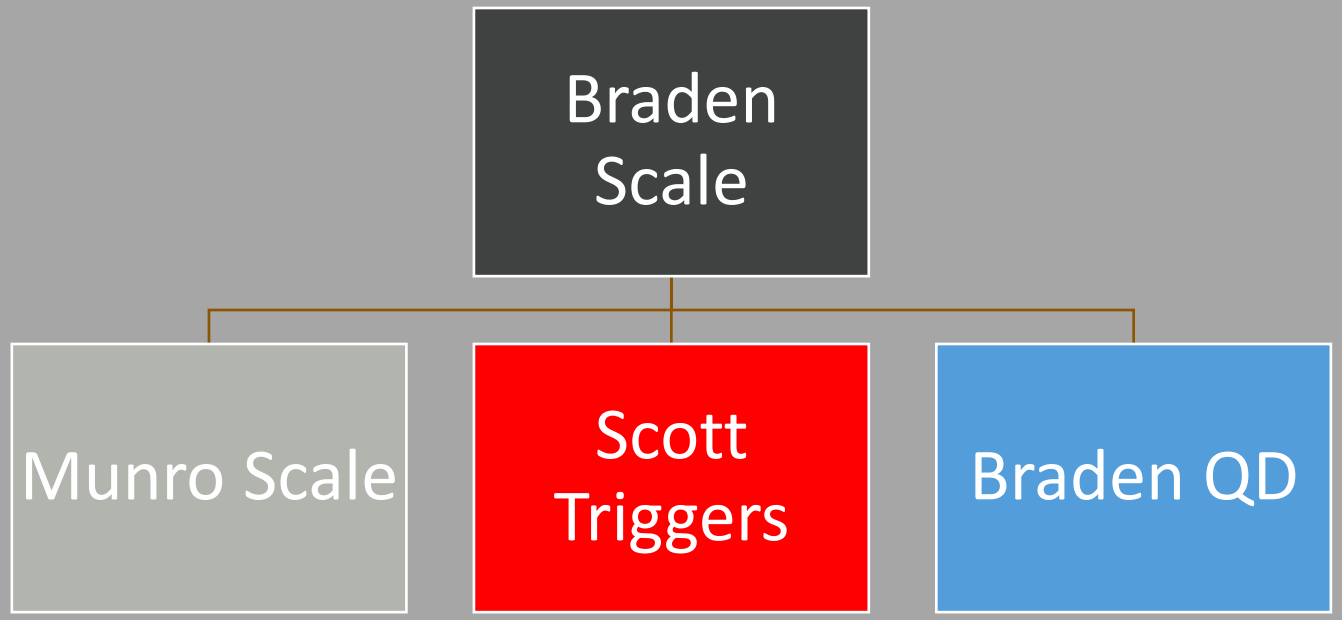
1

Risk and Skin Assessment



SCOTT TRIGGERS®

Scott Triggers®	Does it meet these qualifications?	If YES, please place check here
Age	Age 62 or older	
Serum Albumin ____g/L or BMI	Albumin level <3.5 g/L or BMI <19 or >40	
ASA Score (Circle) 1 2 3 4 5 6	ASA score 3 or greater	
Estimated surgery time Hours/minutes	Surgery time over 3 hours or 180 minutes	
Two or more YESES =	**HIGH RISK SURGICAL PATIENT**	

Scott S. Progress and challenges in perioperative pressure ulcer prevention. J Wound Ostomy Continence Nurs. 2015;42(5):480–485
Postlewaite C. Exploration of the Accuracy and Precision of the Scott Triggers TM Instrument in Predicting Postoperative Pressure Ulcer Development. Poster presented at the 2017 Southern Nursing Research Society, February 22-25, 2017.

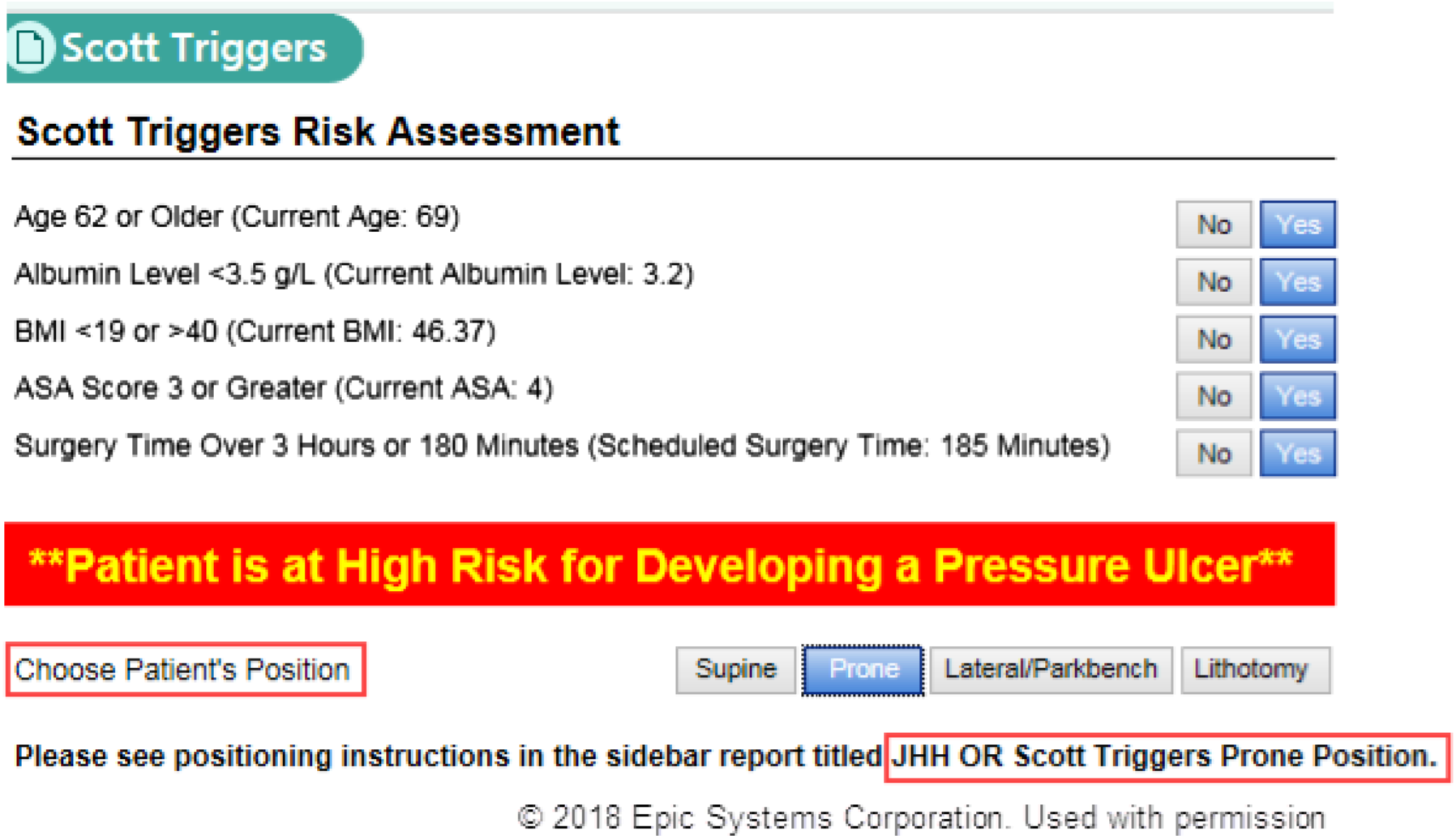
National Research Foundation (NRF) South Korea

- Braden 1
-  Scott Triggers #2
- Scott Triggers #3

- N = 400
- Model #2
- Highest sensitivity 84.4%
- Highest negative predictive value of 94.6%
- Lowest Akaike information criterion (302.03)

Park SK, Park HA, Hwang H. Development and Comparison of Predictive Models for Pressure Injuries in Surgical Patients. *J Wound Ostomy Continence Nurs.* 2019;46(4)291-297.

Artificial Intelligence & Bundles



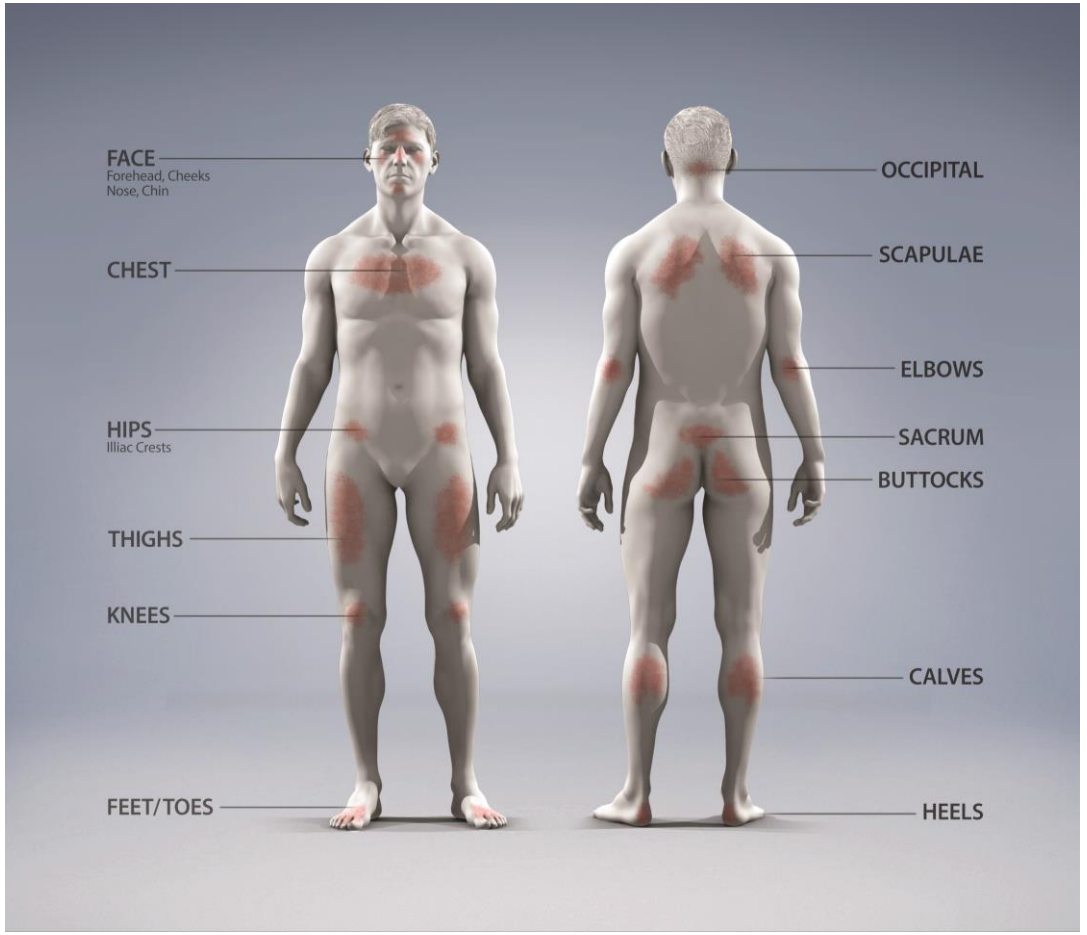
Emerson T. Preventing pressure injuries in patients placed on a spinal table *AORN Journal* 2019;109(5):P11-13. Screenshot used with permission Terry Emerson Johns Hopkins Hospital.

Skin Assessment

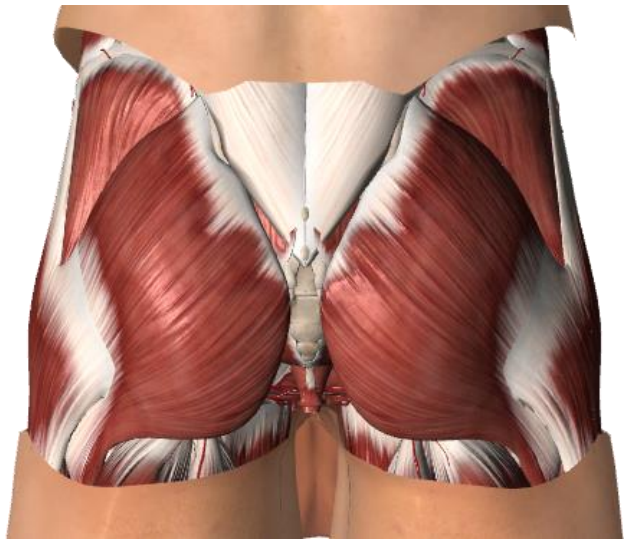
- Timing
- Skill
- Accuracy
- Documentation

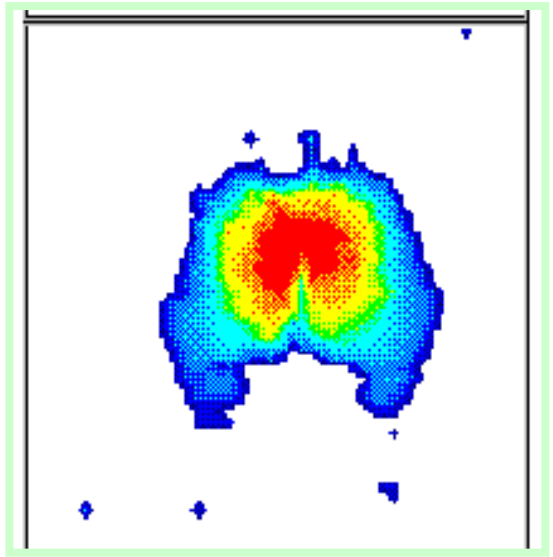
Risk and Skin Assessment

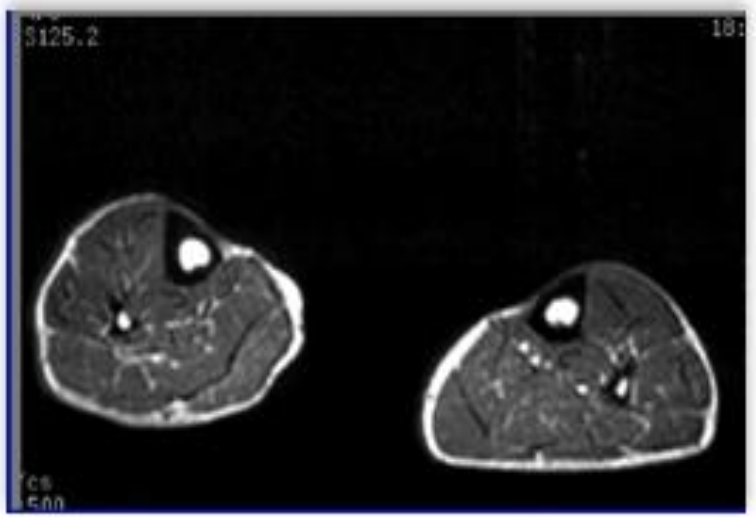
- Pre-op
- Post-op
- Daily
- Pressure Points
- Medical Device
- Observe for:
  - Pain
  - Skin Temperature
  - Texture



Etiology of Pressure Injury







Bony Prominence → Sustained Pressure → Tissue Distortion → Cell Death → Pressure Injury

Perioperative Pressure Injury (PPI)

A PPI is any pressure-related tissue injury that presents as (non- blanchable erythema, purple discoloration or blistering) within 48-72 hours postoperatively and is associated with the surgical position or medical device, and up to 7 days for deep tissue injury.

CABG 48 hrs post op

Scott S. Progress and Challenges in Perioperative Pressure Ulcer Prevention. *J Wound Ostomy Continence Nurs. 2015;*42 (5);480-485.

2

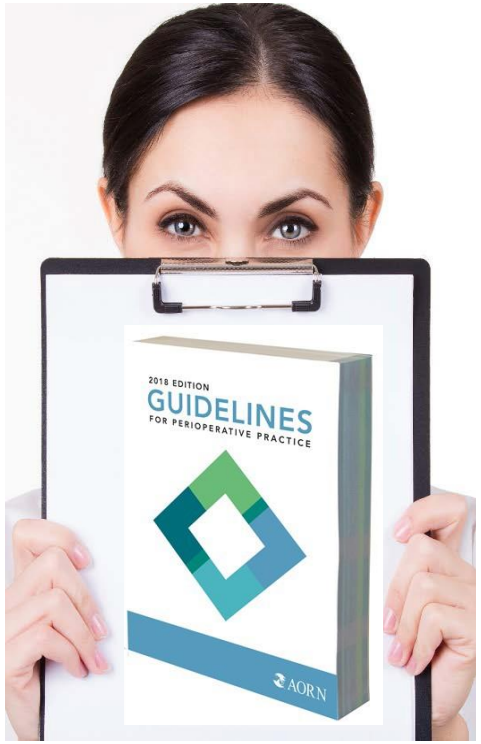
Safe Patient Handling

Nursing Impact

Safe Patient Handling/Tool Kit. AORN. https://www.aorn.org/guidelines/clinical-resources/tool-kits/safe-patient-handling-tool-kit Published December 1, 2014. Accessed April 17, 2017

AORN SPH Recommendations “Supine”

- Weight < 157 lb.
  - Use lateral transfer device & 4 caregivers
- Weight > 157 lb.
  - Use mechanical lift with supine sling, mechanical lateral transfer device, or air- assisted lateral transfer device & 3 to 4 caregivers



How many of our patients weigh >157 lbs?

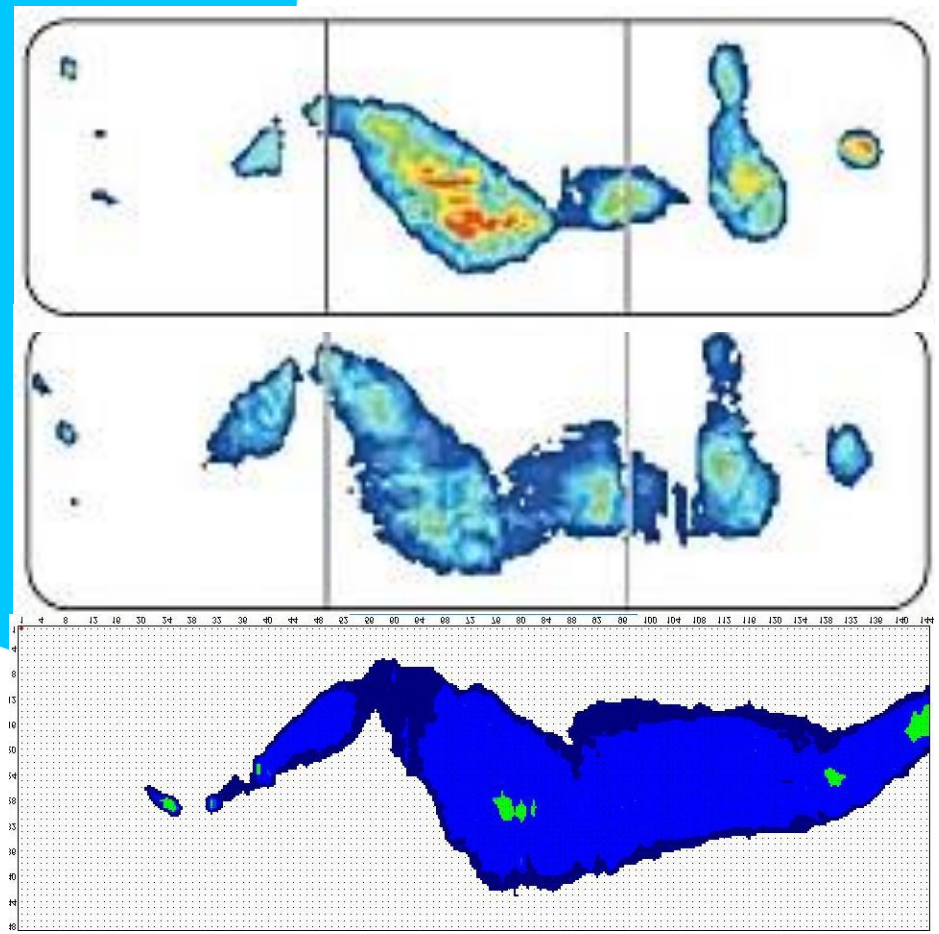
Safe Patient Handling/Tool Kit. AORN. https://www.aorn.org/guidelines/clinical-resources/tool-kits/safe-patient-handling-tool-kit Published December 1, 2014. Accessed April 17, 2017

3

Pressure Redistribution Support Surfaces

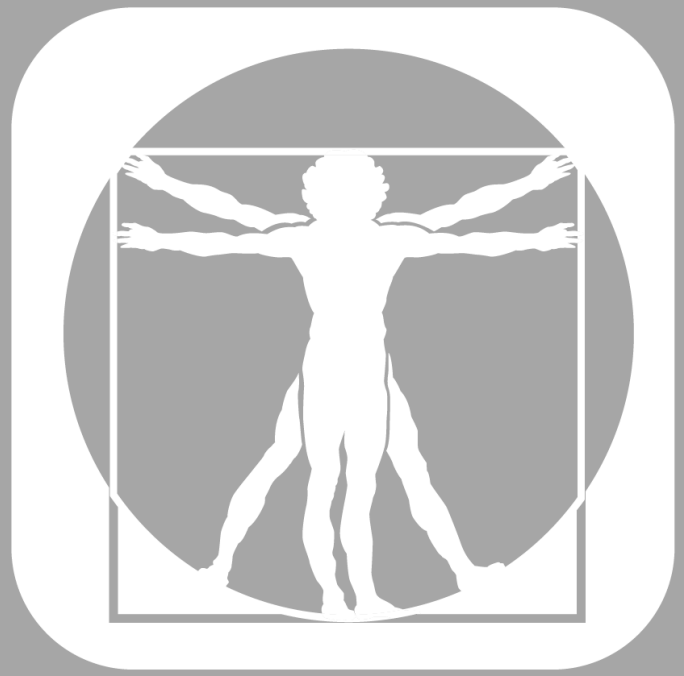
- **How do we measure efficacy of surfaces?**

Tissue Interface Pressure
Thermography
Ultrasound
Subepidermal Moisture (SEM)
CT Scan
MRI, PET Scans



Surfaces must provide Immersion & Envelopment

4



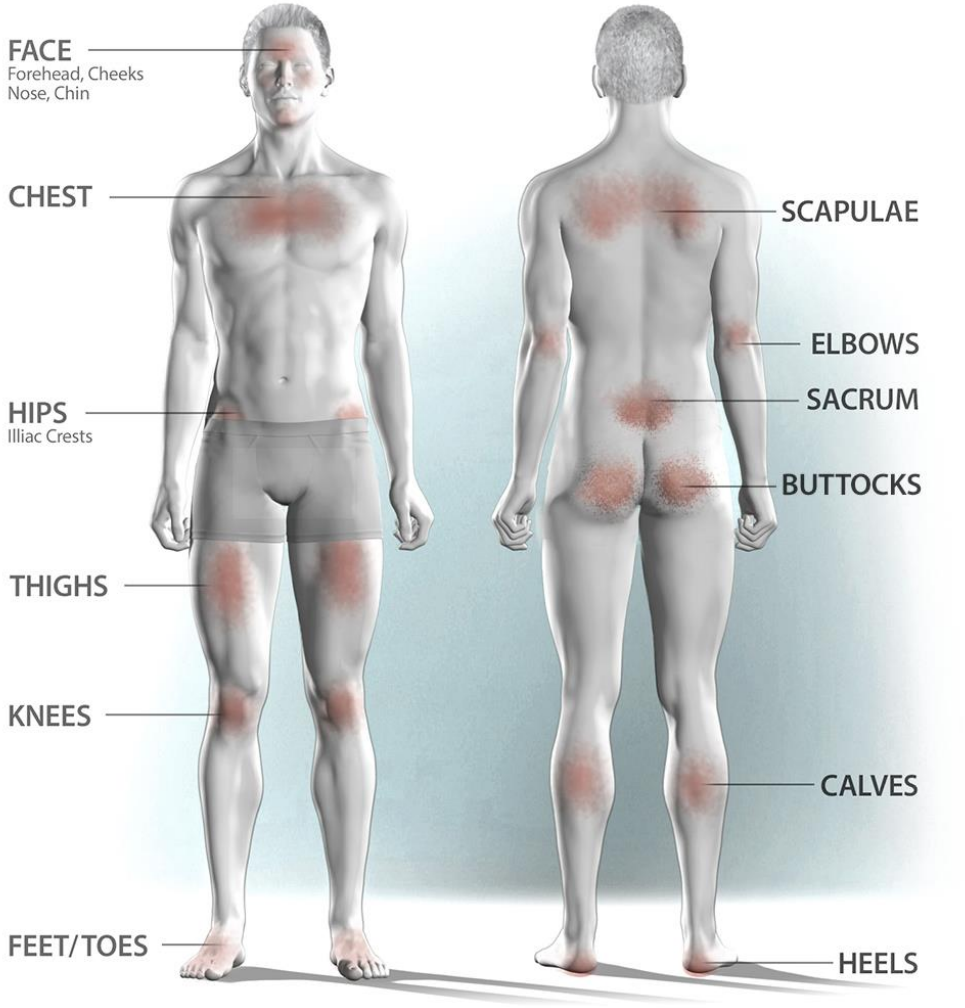
Redistribute Pressure and/or Pad Bony Prominences

Common Surgical Positions

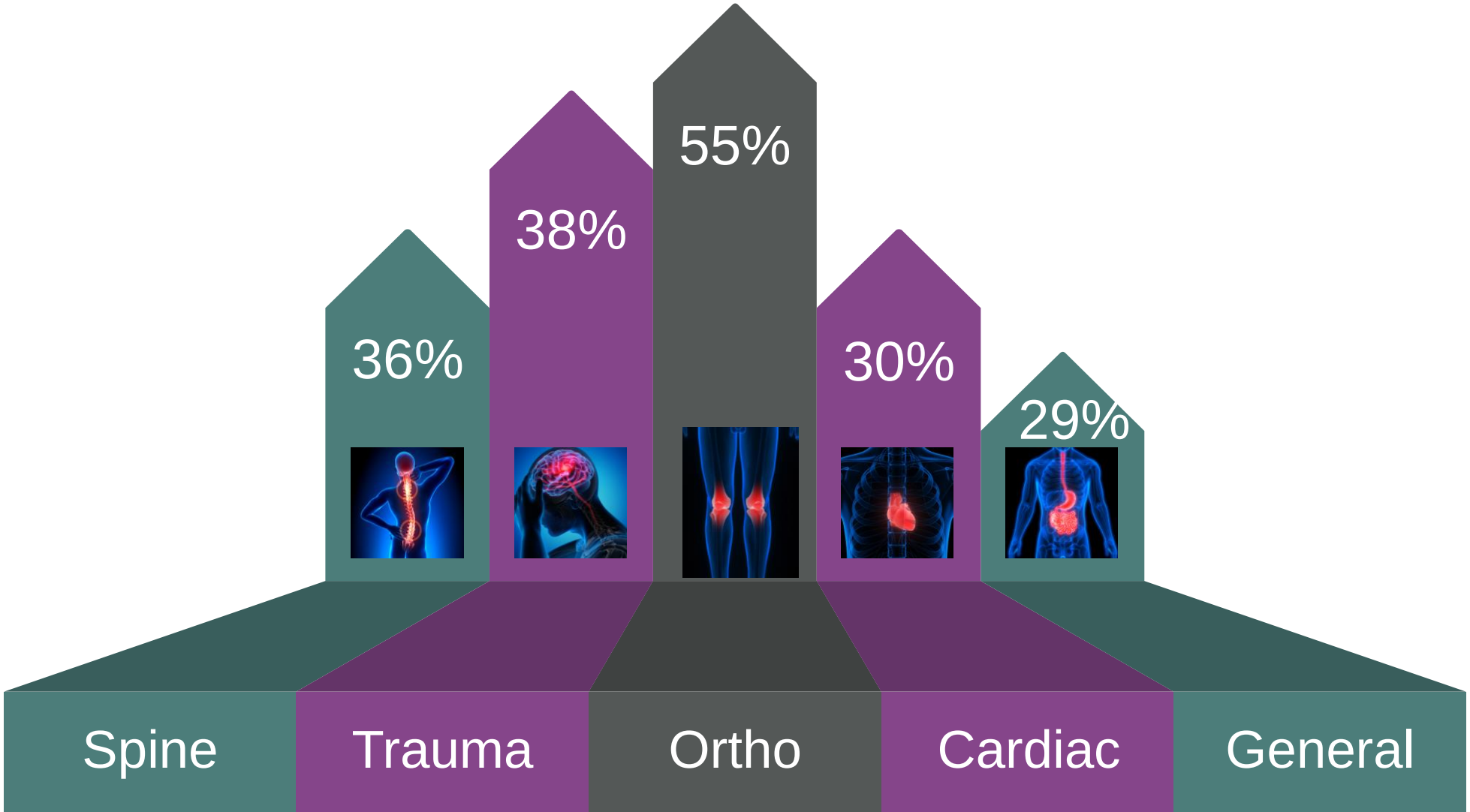
- Supine
- Lithotomy
- Prone
- Trendelenburg
- Lateral/Jack Knife

Association of PeriOperative Registered Nurses. (2017) Guideline for Positioning the Patient. In AORN(Ed). *2017 AORN Guidelines for Perioperative Practice*. Philadelphia, Wolters Kluwer.

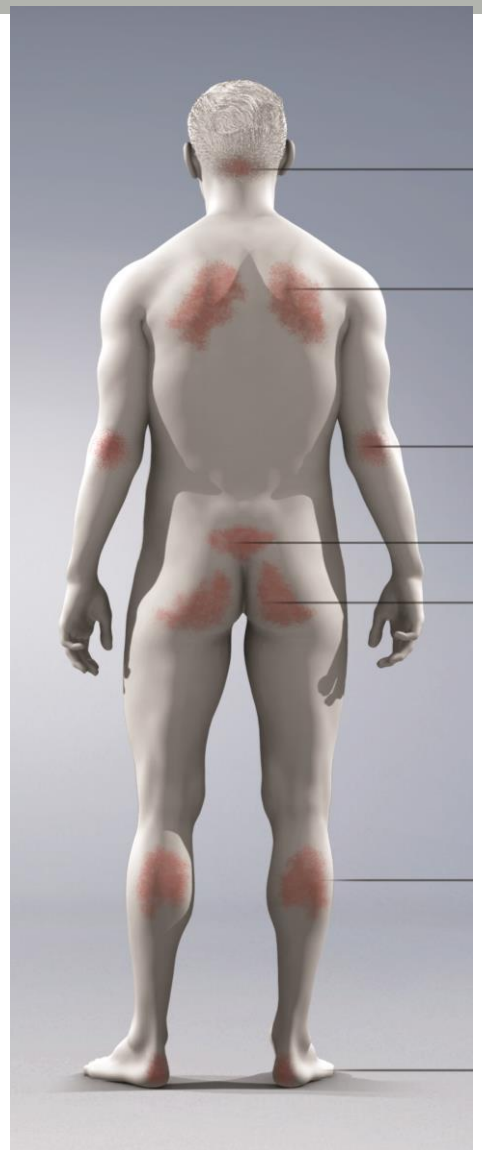
High Risk Pressure Areas



PI rates per Surgery Specialty



Location of PI in Studies



Occiput 4%

Elbow 5%

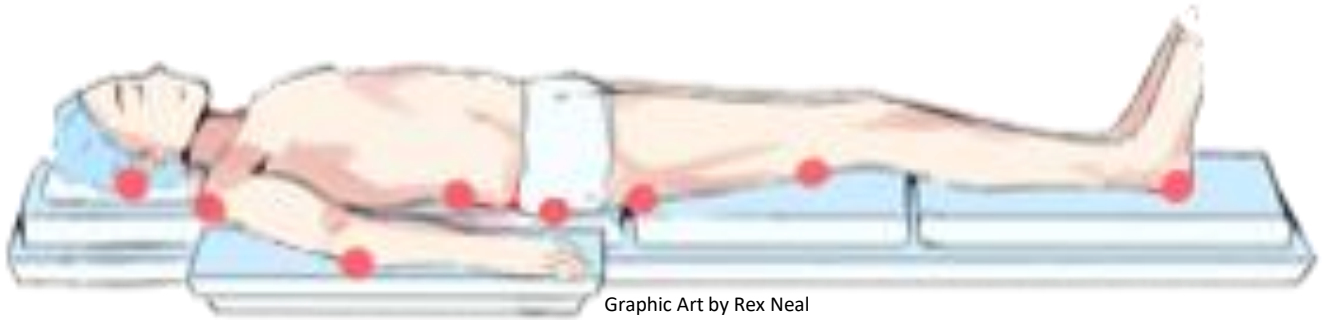
Sacral 22% - 41%

Buttocks 11% - 47%

Heels 14% - 52%

Supine Position Pressure Points

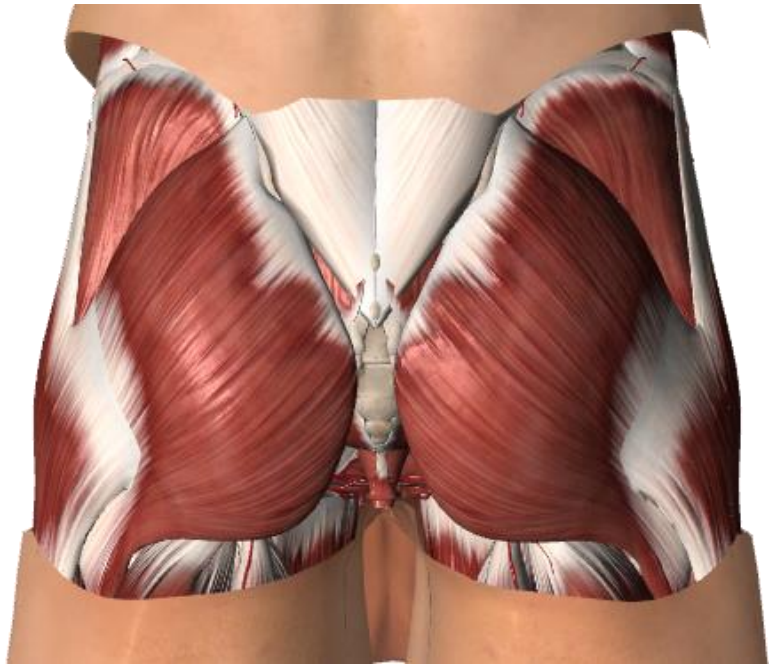
- Occiput
- Scapulae
- Arms
- Elbows
- Thoracic vertebrae
- Lumbar area
- Sacrum/coccyx
- Buttocks
- Heels

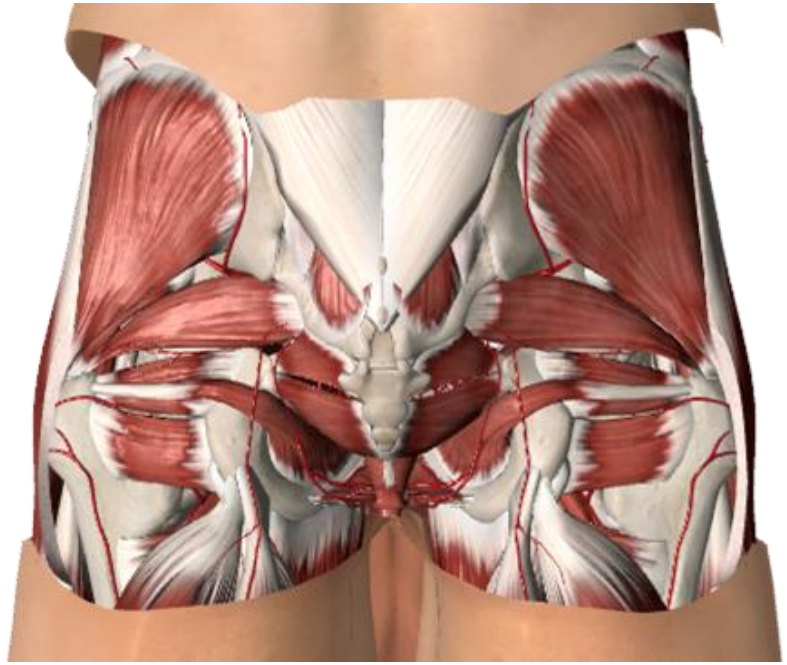


Graphic Art by Rex Neal

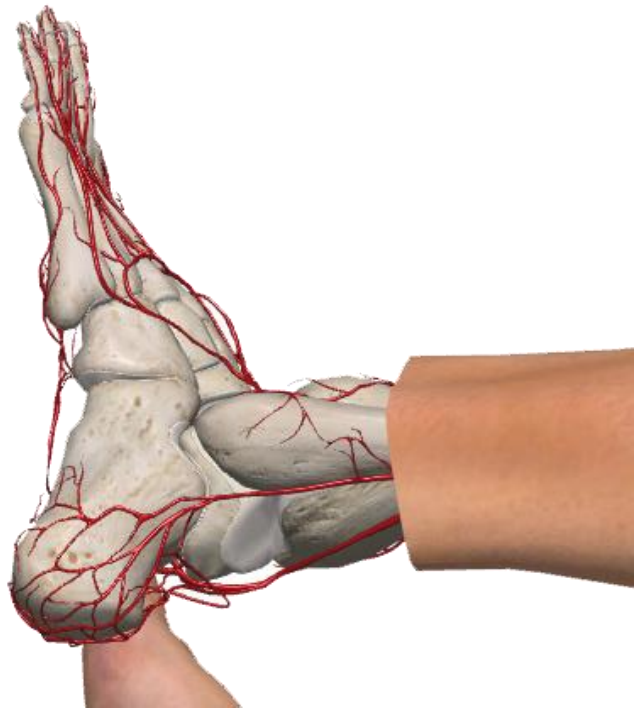
Walton-Greer, P. (2009). Prevention of pressure ulcers in the surgical patient. AORN Journal, (89)3. 538-548.c

Anatomage Images





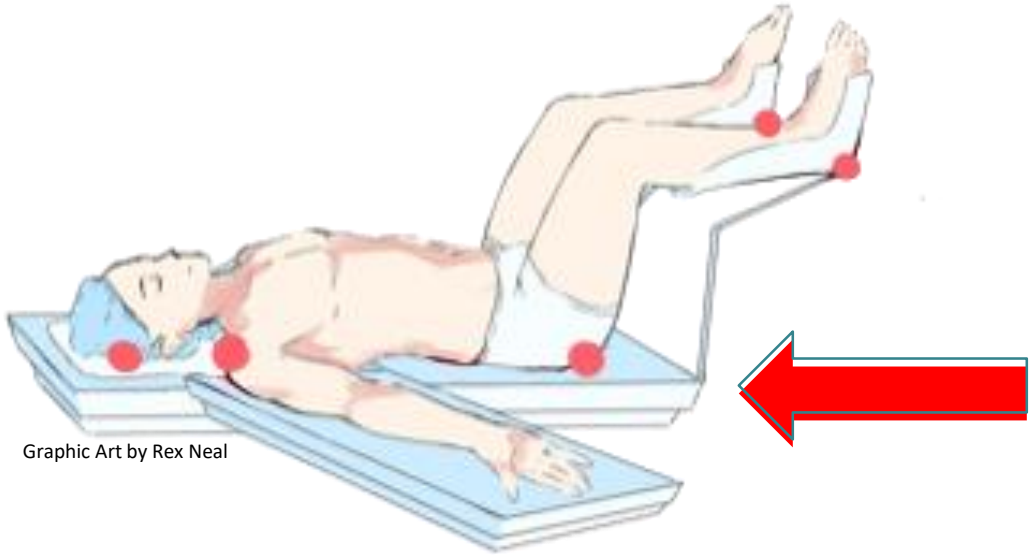
Heel Pressure Injury



Photos courtesy of www.scotttriggers.com and Marie Brown-Etris

Lithotomy Position Pressure Points

- Occiput
- Shoulders
- Scapulae
- Arms
- Elbows
- Thoracic vertebrae
- Lumbar area
- Sacrum/coccyx
- Lateral aspect of the legs
- Heels

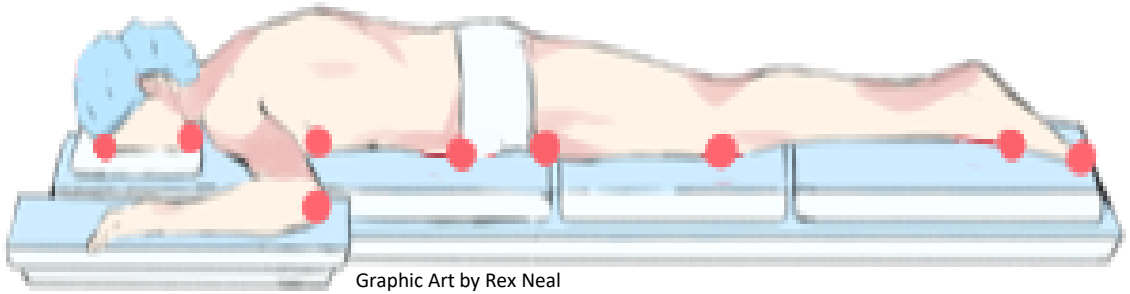


Graphic Art by Rex Neal

Walton-Greer, P. (2009). Prevention of pressure ulcers in the surgical patient. AORN Journal, (89)3. 538-548.c

Prone Position Pressure Points

- Forehead, eyes, ears, and chin
- Anterior shoulders
- Breast/chest (implants, ports)
- Lower costal margins
- Iliac crest
- Genitalia (7.7%)
- Knees
- Shins
- Dorsum of the feet
- Toes



Graphic Art by Rex Neal

Walton-Greer, P. (2009). Prevention of pressure ulcers in the surgical patient. AORN Journal, (89)3. 538-548.c

Trendelenburg Position

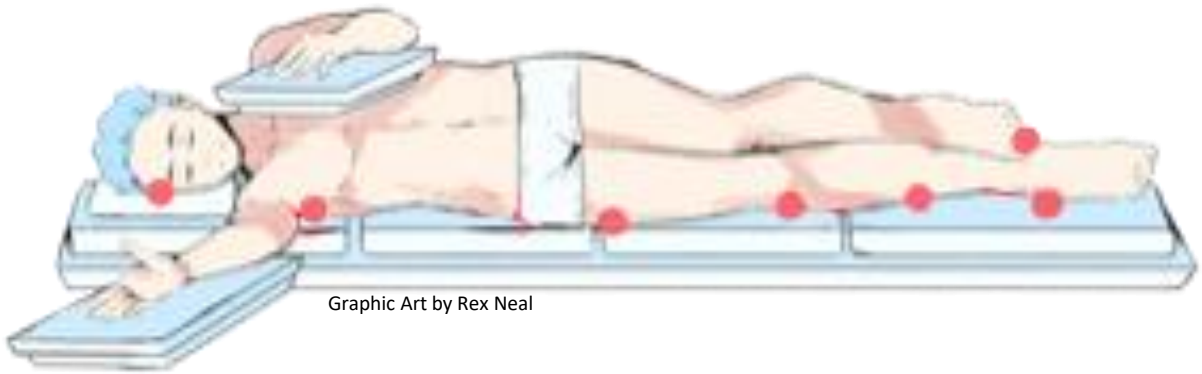
- Occiput
- Scapula
- Arms
- Elbows
- Vertebrae
- Lumbar
- Sacrum/coccyx
- Buttocks
- Heels

Graphic Art by Rex Neal

Walton-Greer, P. (2009). Prevention of pressure ulcers in the surgical patient. AORN Journal, (89)3. 538-548.c

Lateral Position Pressure Points

- Side of face and ear
- Shoulder
- Arms
- Dependent axilla
- Dependent hip/trochanter
- Legs
- Dependent knee
- Ankles
- Feet



Graphic Art by Rex Neal

Walton-Greer, P. (2009). Prevention of pressure ulcers in the surgical patient. AORN Journal, (89)3. 538-548.c

5

Offload pressure on heels while maintaining knees in slight flexion

Heels are Vulnerable in Supine and Lithotomy Positions

OR Heel Pressure Injury

52.9% and 52 %

Schoonhoven and Scott respectively

Use Heel Off Loading Devices (HOLDs)

“Offload the heel & distribute the weight of the leg along the calf without putting all the pressure on the achilles tendon. Hyperextension of knee can lead to popliteal vein compression and increase risk of DVT."

National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury Alliance. Prevention and Treatment of Pressure Ulcers: Clinical Practice Guideline. Emily Haesler (Ed.). Cambridge Media: Osborne Park, Western Australia; 2014. Association of PeriOperative Registered Nurses. (2017) Guideline for Positioning the Patient. In AORN(Ed). *2017 AORN Guidelines for Perioperative Practice*. Philadelphia, Wolters Kluwer.

6

Consider Prophylactic Dressings for Bony Prominences or Under Medical Devices

7

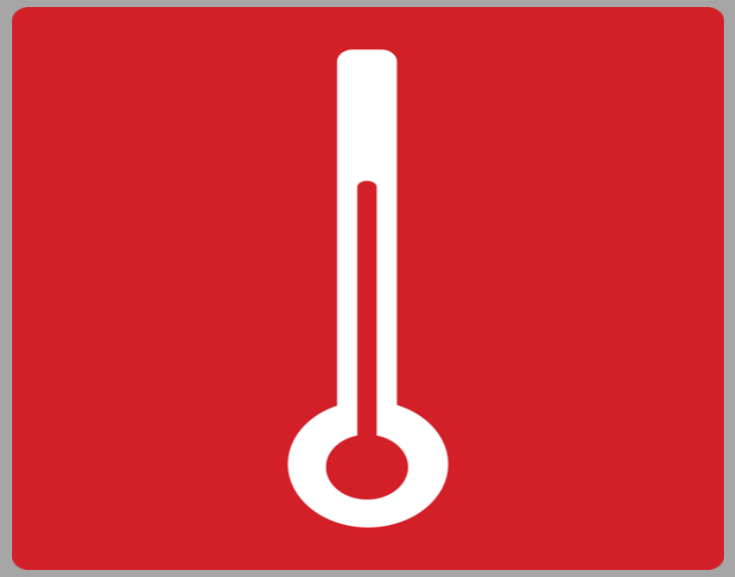
Avoid Use of Unapproved Positioning Devices

Follow Manufacturer Instructions for Use

Association of PeriOperative Registered Nurses. (2017) Guideline for Positioning the Patient. In AORN(Ed).
2017 AORN Guidelines for Perioperative Practice. Philadelphia, Wolters Kluwer.

8

Maintain Microclimate and Normothermia



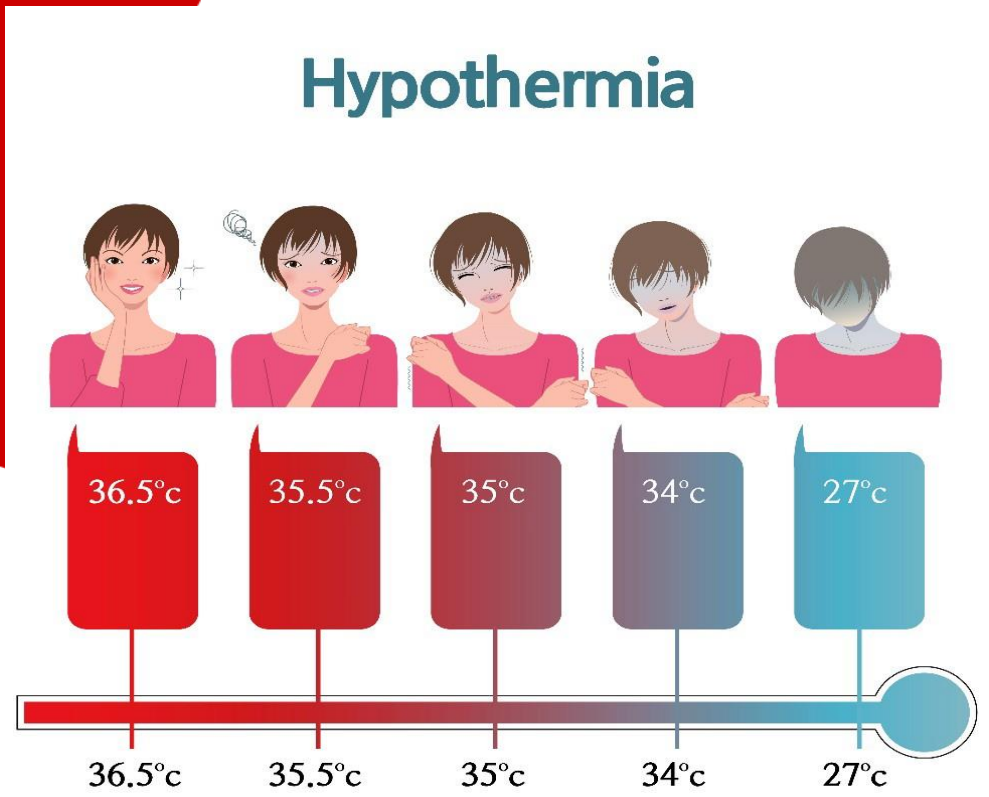
Microclimate

Temperature

- Sweat & Perspiration
- Moisture & Maceration
- Weaken Epidermis

Yoshimura indicated excessive perspiration and body temp greater than 100.6 F (38 C) were risk factors in the park bench position.

- **Fred et al. 1 degree F (1.8 degree C) body temperature decrease was linked with a higher rate of PI.**
- Hypothermia is associated with increases in SSI, PI, LOS, and mortality



Maintain Normothermia
Forced-Air warming devices
fluid warmers and protocols

Key Drivers

- Warming blankets forced air
- Cooled/warmed IV solutions
- Mechanical ventilation
- Room temperature
- Moisture wicking drapes for OR table
- Prophylactic dressings - Sacral
- External female urine collection

Association of PeriOperative Registered Nurses. (2017) Guideline for Positioning the Patient. In AORN(Ed).
2017 AORN Guidelines for Perioperative Practice. Philadelphia, Wolters Kluwer.

9

Hand-over Communication

10

Institute early movement, daily skin assessment, and pressure management

Horizontal Approaches

Make the right thing to do easy!

Management of Pressure & Tissue Distortion

11

Reporting PIs that develop within 72 hours after the procedure

Quality Improvement

Root Cause Analysis and Action RCA2

What happened?

Why did it happen?

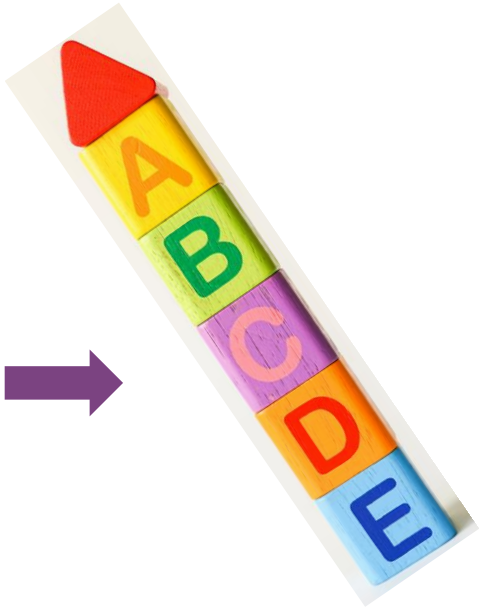
How to prevent it from happening again?

Charles R, Hood B, DeRosier J, Gosbee J, Bagian J, Li Y, Caird M, Biermann S, and Hake M. Root Cause Analysis and Actions for the Prevention of Medical Errors: Quality Improvement and Resident Education. Orthopedics. 2017;40(4):e628-e635.

High Reliability

Conclusion


HIGH
RISK
LOW


A
B
C
D
E


HOSPITAL
EMERGENCY


PSQH
PATIENT SAFETY & QUALITY HEALTHCARE
Reducing the Risk of Perioperative Pressure Injuries

Thank You Very Much!

- Susan M. Scott
- BSN, MSN, RN, WOC Nurse
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- Webpage www.scotttriggers.com
- Email: scotttriggers@gmail.com
- LinkedIn: Susan M. Scott

References

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- NCHS Data Brief Hospitalization for Total Hip Replacement Among Inpatients Age 45 and Over: United States, 2000-2010 Retrieved 12-07-2016 from http://www.cdc.gov/nchs/data/databriefs/db186.pdf
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