

# **Risk of pressure injury (PI) in operative and procedure areas**

Susan Scott  
MSN, RN, WOC Nurse

# Disclaimers

- This presentation was developed with Stryker's Sage business.
- The activities described in this presentation will be provided by an employee/consultant of Stryker.
- This presentation may cover clinical topics for which Sage product offerings do not align.
- Do not distribute, copy, or otherwise utilize without permission.
- The information provided may include evidence-based clinical education and/or Stryker product information.
- No off-label information will be presented.

# Objectives

- Identify trends in risk assessment, prevention, incidence, cost, and litigation for Perioperative Pressure Injuries (PPI).
- Illustrate components of a Perioperative Pressure Injury Prevention Program (PPIPP) to reduce risk of PI in the surgical and procedure areas.
- Describe the commonly used surgical positions, medical devices and associated pressure points, with the impact on tissue deformation as a risk factors for positioning injuries.

# Surgery is a high-risk environment for PI

“Surgery is one of the few times a normal, healthy individual is placed at risk for pressure sores.” <sup>1</sup>

“ The OR is known to be one of the most high-risk environments” <sup>2</sup>

1. Gendron, F. “Burns” occurring during lengthy surgical procedures. *Journal of Clinical Engineering*. 1980;5:19–26.

2. Guideline for prevention of perioperative pressure injury. In: *Guidelines for Perioperative Practice*. Denver, CO: AORN, Inc; 2023:751-776.



# Pressure injury definition (NPIAP, 2019)<sup>3</sup>

- A pressure injury is localized damage to the skin and underlying soft tissue usually over a bony prominence or related to a medical or other device.
- The injury can present as intact skin or an open ulcer and may be painful. The injury occurs as a result of intense and/or prolonged pressure or pressure in combination with shear.
- The tolerance of soft tissue for pressure and shear may also be affected by microclimate, nutrition, perfusion, co-morbidities and condition of the soft tissue.

# Problem: perioperative pressure injury (PPI)

- PPI is associated with the surgical position or medical device.<sup>4</sup>
- A PPI is detected through visual skin assessment (VSA) within 1-4 days<sup>5,6</sup>
- Deep tissue injury may take up to 7 days<sup>5,6</sup>
- Pain is a common complaint<sup>3</sup>



CABG 48 hrs post-op

## Situation & strategy

# Prevention Programs

Price

People

Process

Product

- 2. Guideline for prevention of perioperative pressure injury. In: Guidelines for Perioperative Practice. Denver, CO: AORN, Inc; 2023
- 7. AORN Position Statement on Prevention of Perioperative Pressure Injury. *AORN J*, 2022;115(5):458-461.
- 8. Scott, S. Perioperative Pressure Injuries: Protocols and Evidence-Based Programs for Reducing Risk. *PSQH*, 2016;13(4), 20-28.

# AORN position statement on prevention of perioperative pressure injury<sup>7</sup>

- Health care organizations should define in a policy and procedure a method to determine how perioperative-acquired pressure injuries (PPI) are identified.
- Consult with WOC nurse with suspected PI
- Monitor monthly incidence of PPI and use as a quality indicator
- Report PPI incidence rates in standard method
- Use RCA to investigate reported and confirmed PPI
- Report PPI rates and RCA to perioperative staff
- Review RCAs of PPI for trends and to create QI initiatives

# Incidence & prevalence

- Surgeries in US<sup>9</sup>
  - 7.3 Million - Inpatient
  - 9.9 Million - Ambulatory
  - 57.1% Medicare/Medicaid
- Exact incidence of Perioperative PI is unknown<sup>10</sup>
- NDNQI<sup>11</sup>
- Incidence & Prevalence
  - Chen - Range 0.3%-57% mean 15%<sup>12</sup>
  - Shafipour - almost 19%<sup>13</sup>
  - Surgery >3 hrs 8.5%<sup>5</sup>

5. Gefen A, Creehan S, Black J. Critical biomechanical and clinical insights concerning tissue protection when positioning patients in the operating room: A scoping review. *Int Wound J*. 2020;1-19.

9. Agency for Healthcare Research and Quality. Surgeries in Hospital-Based Ambulatory Surgery and Hospital Inpatient Settings (H-CUP statistical brief #223). Washington DC: AHRQ; 2014.

10. Creehan S, Black J. Defining Practices to Avoid Hospital-Acquired Pressure Injuries in the Operating Room. *J Wound, Ostomy and Continence Nurs*. 2022;49(1):89-96. doi: 10.1097/WON.0000000000000835.

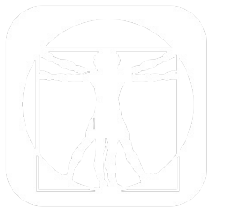
11. NDNQI The National Data Base of Nursing Quality Indicators (NDNQI) Guidelines for Data Collection and Submission on Pressure Injury Indicator. 2021. Accessed July 24, 2022 at Microsoft Word - Guidelines - Pressure Injury\_2021128 (nursingquality.org)

12. Chen H, Chen X, Wu J. The incidence of pressure ulcers in surgical patients of the last 5 years: a systematic review. *Wounds*. 2012;24(9):234-241.

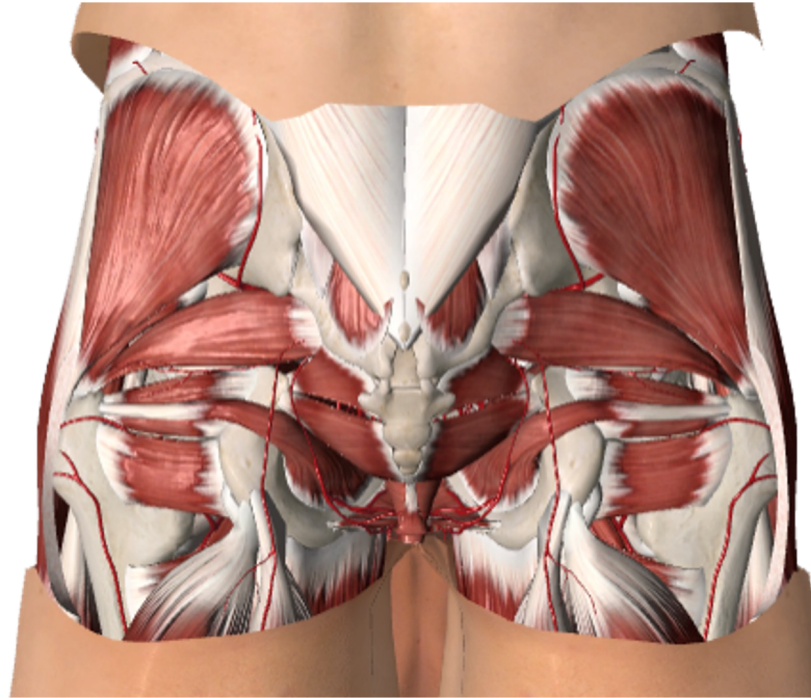
13. Shafipour V, Ramezanzpour E, Gorji, MAH, Moosadadeh M, Prevalence of postoperative pressure ulcer: A systematic review and meta-analysis. *Electronic Physician* Nov 2016;8(11):3170-3176. <http://www.ephysician.ir/2016/3170.pdf> Accessed March 23, 2019.



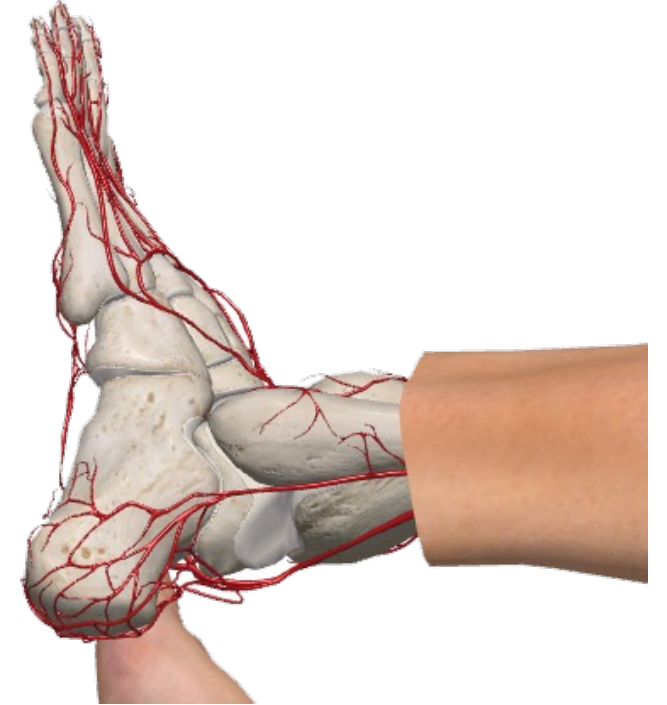
# OR Pressure injury locations<sup>2</sup>



Occiput



Sacral Buttocks



Heels

# Challenges: cost & quality

- Cost<sup>14</sup>
  - 26.8 billion
  - 59% non-reimbursed by CMS
- Hospital acquired conditions<sup>15,16</sup>
  - PSI-90 - 48,700 (2016)
  - \$ 2 Billion
- Litigation<sup>17</sup>
  - \$250,000



HAPIs  
exclusively  
increasing  
since 2015<sup>16</sup>

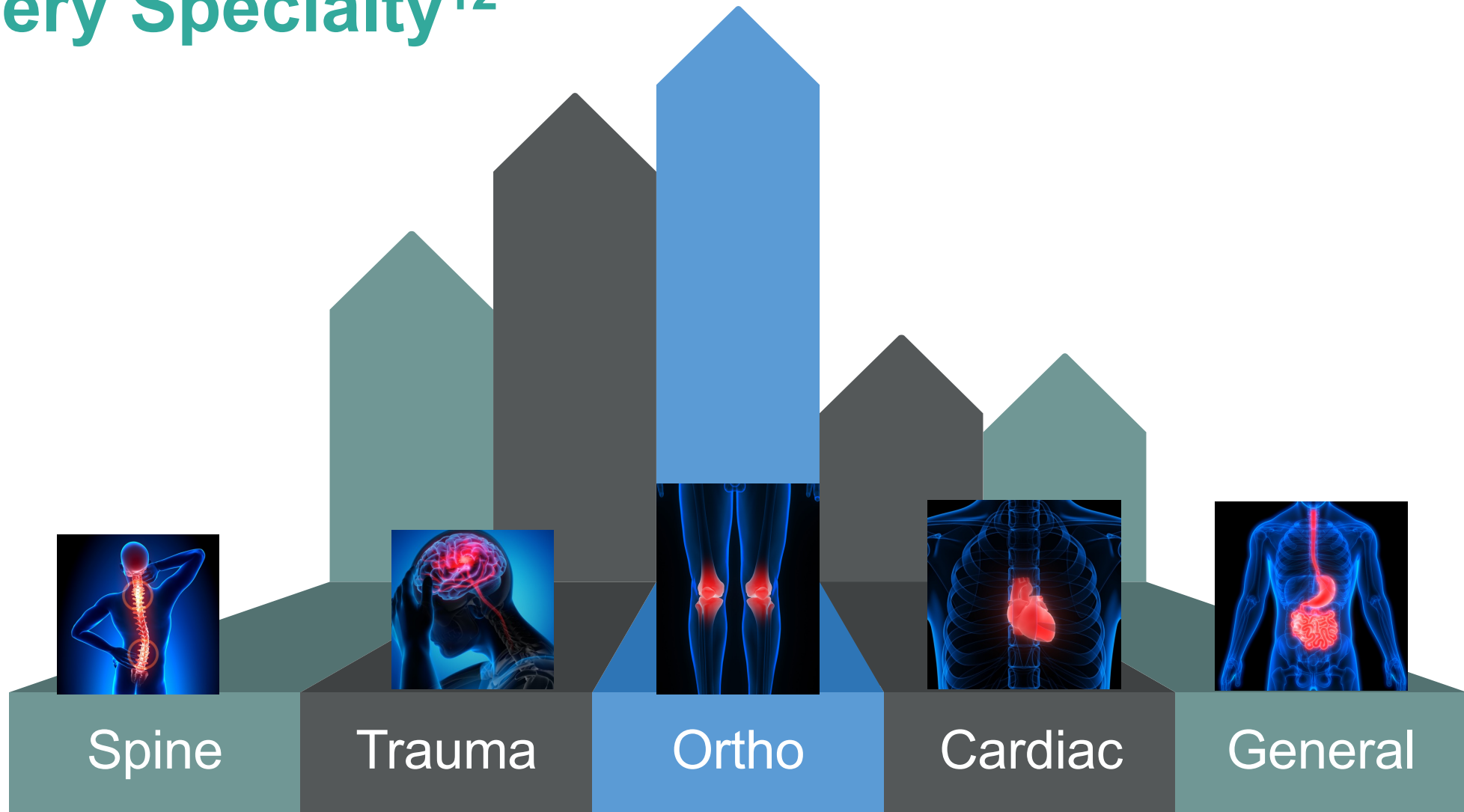
14. Padula WV, Delarmente BA. The national cost of hospital-acquired pressure injuries in the United States. *Int Wound J*. 2019;1–7.

15. IBM Watson Health, Research Brief Hospital-Acquired Conditions lead to avoidable cost and excess deaths (2018). Available at <https://www.ibm.com/downloads/cas/X97QXLER> Retrieved January 31, 2023.

16. Padula WV, Black JM, Davidson PM, Kang SY, Pronovost PJ. Adverse Effects of the Medicare PSI-90 Hospital Penalty System on Revenue-Neutral Hospital-Acquired Conditions. *J Patient Saf*. 2020 Jun;16(2):e97-e102. doi: 10.1097/PTS.0000000000000517. PMID: 30110019.

17. Bennett R, O'Sullivan J, DeVito E, Remsburg R. The increasing medical malpractice risk related to pressure ulcers in the United States. *J Am Geriatr Soc*. 2000;48(1):73-81.

# Surgery Specialty<sup>12</sup>



12. Chen H, Chen X, Wu J. The incidence of pressure ulcers in surgical patients of the last 5 years: a systematic review. *Wounds*. 2012;24(9):234–241.



# Strategy

## Prevention Programs

Price

People

Process

Product

2. Guideline for prevention of perioperative pressure injury. In: Guidelines for Perioperative Practice. Denver, CO: AORN, Inc; 2023
7. AORN Position Statement on Prevention of Perioperative Pressure Injury. *AORN J*, 2022;115(5):458-461.
8. Scott, S. Perioperative Pressure Injuries: Protocols and Evidence-Based Programs for Reducing Risk. *PSQH*, 2016;13(4), 20-28

# People : Interprofessional Team

- Leadership<sup>2</sup>
- Team Collaboration<sup>2,3</sup>
  - OR Staff, WOC nurse, QI
  - Anesthesia & Surgery
  - PACU
- Knowledge, Skills, Attitude (KSA)<sup>18-22</sup>
  - Competency
  - Education - enduring
- Handoff Communication



2. Guideline for prevention of perioperative pressure injury. In: *Guidelines for Perioperative Practice*. Denver, CO: AORN, Inc; 2023:751-776.

7. AORN Position Statement on Prevention of Perioperative Pressure Injury. *AORN J*. 2022;115(5):458-461.

18. Creehan S, Black J. Defining Practices to Avoid Hospital-Acquired Pressure Injuries in the Operating Room. *J Wound, Ostomy and Continence Nurs*. 2022;49(1):89-96. doi: 10.1097/WON.0000000000000835.

19. Stanton C. Guideline for Prevention of Perioperative Pressure Injury. *AORN J*. 2022;115(5):8-10.

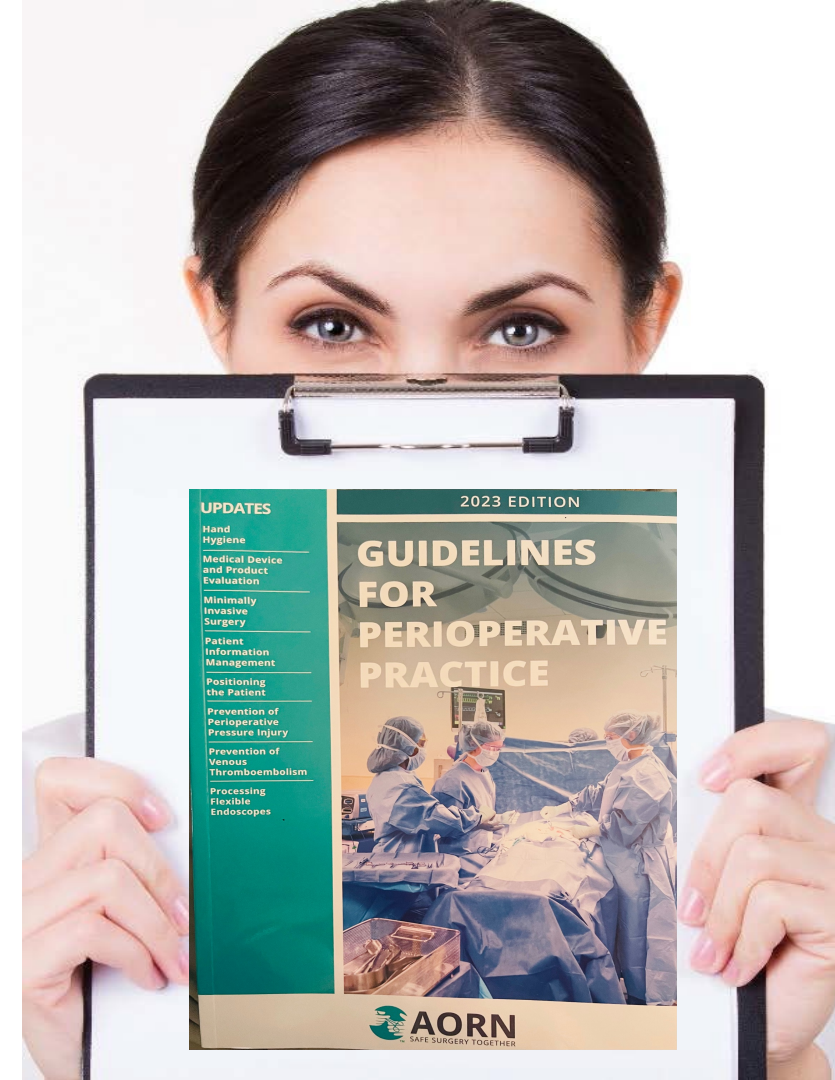
20. Cebeci F, Senol Celik S. Knowledge and practices of operating room nurses in the prevention of pressure injury. *Journal of Tissue Viability*. 2022;31(1):38-45 Available at: <https://www.sciencedirect.com/science/article/pii/S0965206X2100092>.

21. Khong BPC, Goh BC, Phang LY, David T. Operating room nurses' self-reported knowledge and attitude on perioperative pressure injury. *Int Wound J*. 2020;17:455-465.

22. Lupear SK, Overstreet M, Krau SD. Perioperative nurses' knowledge of indicators for pressure ulcer development in the surgical patient population. *Nurse Clin N Am*. 2015; 50:411-435.

# Process: Standards of Care

- Strategic Plan<sup>2,23</sup>
- Policy and Procedure<sup>2</sup>
- Risk Assessment<sup>2,7,8</sup>
- Skin Bundles<sup>2,24</sup>
- Standardize equipment & devices<sup>26</sup>
- QI work, RCA & Action<sup>7,8,25</sup>
- Data management
- EHR Documentation



2. Guideline for prevention of perioperative pressure injury. In: *Guidelines for Perioperative Practice*. Denver, CO: AORN, Inc; 2023:751-776.

7. AORN Position Statement on Prevention of Perioperative Pressure Injury. *AORN J*, 2022;115(5):458-461.

8. Scott, S. Perioperative Pressure Injuries: Protocols and Evidence-Based Programs for Reducing Risk. *PSQH*, 2016;13(4), 20-28.

23. Scott SM. Creating a strategic plan for perioperative pressure ulcer prevention. *AORN J*. 2016;103(4):13-14.

24. Scott S. Use of an OR skin bundle to prevent pressure injury. *AORN J*. 2017;106(4):18-19.

25. Scott SM, Bennett J. Avoiding pressure injuries with root cause analysis and action. *AORN J*. 2018;108(5):15-16.

26. Scott Triggers Gap Assessment Template in AORN Prevention of Perioperative Pressure Injury Tool Kit. Available at <https://scotttriggers.com/resources>



# Perioperative Plan of Care



Pre-op

Intra-op

Post-op

2. Guideline for prevention of perioperative pressure injury. In: *Guidelines for Perioperative Practice*. Denver, CO: AORN, Inc; 2023:751-776.  
33. Guideline for positioning the patient. In: *Guidelines for Perioperative Practice*. Denver, CO: AORN, Inc; 2023:701-750.  
34. Guideline for safe patient handling and movement. In: *Guidelines for Perioperative Practice*. Denver, CO: AORN, Inc; 2023:895-944.

# Risk Factors

## Intrinsic - Extrinsic

2. Guideline for prevention of perioperative pressure injury. In: *Guidelines for Perioperative Practice*. Denver, CO: AORN, Inc; 2023:751-776.

# Patient specific risk factors

- Type of Procedure <sup>2</sup>
- Time on the table and immobility before surgery. <sup>3</sup>
- Obesity <sup>33</sup>
- Pregnant <sup>33</sup>
- Disabilities <sup>33</sup>
- Critically Ill, Spinal Cord Injury (SCI), Palliative Care <sup>3</sup>
- **Critical devices catheters and drainage tubes** <sup>2</sup>
- Vascular perfusion and effects of inotropes/vasopressors <sup>3,33</sup>
- Anesthesia type and ASA score <sup>2,3</sup>

2. Guideline for prevention of perioperative pressure injury. In: *Guidelines for Perioperative Practice*. Denver, CO: AORN, Inc; 2023:751-776.

3. Prevention and Treatment of Pressure Ulcers/Injuries: Clinical Practice Guideline. The International Guideline. 3<sup>rd</sup> ed. European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel (NPIAP), and Pan Pacific Pressure Injury Alliance; 2019.

33. Guideline for positioning the patient. In: *Guidelines for Perioperative Practice*. Denver, CO: AORN, Inc; 2023:701-750.

# AORN statement on risk assessment<sup>2</sup>

- “Preoperative PI risk assessments should
  - be visual,
  - be comprehensive, and
  - incorporate a structured risk assessment tool for use in perioperative patients that is specific to the age of the patient and that has been validated (e.g., Munro Scale, ELPO, PRAMS) or
  - demonstrated to be reliable (e.g., Scott Triggers).”

## Preoperative risk assessment <sup>2</sup>

- “High Quality Evidence to support the use of a Risk Assessment Tool.”
  - Munro Scale
  - ELPO
  - PRAMS
  - Scott Triggers
- “Risk assessment tools **DO NOT** replace the need comprehensive patient assessment”





# Scott Triggers©



- OR Specific risk assessment tool<sup>4</sup>
- Validity/Reliability studies:
- Park et al. 2019, N=400 Higher Sensitivity ST > Braden<sup>28</sup>
- Emerson 2020, N=11,241 – PI reduction. P=0.015<sup>29,30</sup>
- Dai Yang & Wu 2021 N=447 “Good reliability, validity, and predictive validity.”<sup>31</sup>

SCOTT TRIGGERS ASSESSMENT	Does it meet these qualifications?	If YES please place check here
Age _____	Age 62 or older	
Serum Albumin g/dL or BMI	Albumin level < 3.5g/dL or BMI <19 or > 40	
ASA score (circle) 1   2   3   4   5	ASA score 3 or greater	
Estimated surgery time in hours/minutes	Surgery time over 3 hours or 180 minutes	
Two or more YESSES =	<b>HIGH RISK SURGICAL PATIENT</b>	Implement OR skin bundle

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

28. 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.

29. Emerson T. Preventing pressure injuries in patients placed on a spinal table *AORN J* 2019;109(5):11-13.

30. Emerson T, Myers KBJ, Fernandez, JC, Burkett S, Quion S, Bangud CC, and Shuman, MLH The Perioperative Journey: An Approach to Decreasing Hospital Acquired Pressure Injury Associated with the Intraoperative Phase of Care. Poster presented at the AORN Global Conference and Expo, 2020.

31. Dai J, Yang Z, Wu C. The reliability and validity of the Scott Triggers for patients in China undergoing gastrointestinal surgery. *Asian J Surg* 2021;44(10):1343-1344.

# Artificial intelligence & bundles 29,30

 Scott Triggers

## Scott Triggers Risk Assessment

Age 62 or Older (Current Age: 69)	<input type="button" value="No"/>	<input type="button" value="Yes"/>
Albumin Level <3.5 g/L (Current Albumin Level: 3.2)	<input type="button" value="No"/>	<input type="button" value="Yes"/>
BMI <19 or >40 (Current BMI: 46.37)	<input type="button" value="No"/>	<input type="button" value="Yes"/>
ASA Score 3 or Greater (Current ASA: 4)	<input type="button" value="No"/>	<input type="button" value="Yes"/>
Surgery Time Over 3 Hours or 180 Minutes (Scheduled Surgery Time: 185 Minutes)	<input type="button" value="No"/>	<input type="button" value="Yes"/>

**\*\*Patient is at High Risk for Developing a Pressure Ulcer\*\***

Choose Patient's Position

Supine

**Prone**

Lateral/Parkbench

Lithotomy

Please see positioning instructions in the sidebar report titled **JHH OR Scott Triggers Prone Position.**

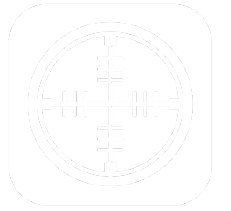
© 2018 Epic Systems Corporation. Used with permission

Used with permission. Terry Emerson, MSN, RN, CNOR, NEA-BC, Nurse Manager, Neurosurgery/Orthopedic/Otology and Trauma/Transplant Services, Zayed/Bloomberg Operating Rooms. The Johns Hopkins Hospital.

29. Emerson T. Preventing pressure injuries in patients placed on a spinal table *AORN J* 2019;109(5):11-13.

30. Emerson T, Myers KBJ, Fernandez, JC, Burkett S, Quion S, Bangud CC, and Shuman, MLH The Perioperative Journey: An Approach to Decreasing Hospital Acquired Pressure Injury Associated with the Intraoperative Phase of Care. Poster presented at the AORN Global Conference and Expo, 2020.

# Skin Assessment



Timing

Skill

Accuracy

Documentation

2. Guideline for prevention of perioperative pressure injury. In: *Guidelines for Perioperative Practice*. Denver, CO: AORN, Inc; 2023:751-776.

3. *Prevention and Treatment of Pressure Ulcers/Injuries: Clinical Practice Guideline. The International Guideline*. 3<sup>rd</sup> ed. European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel (NPIAP), and Pan Pacific Pressure Injury Alliance; 2019.

25. Scott SM, Bennett J. Avoiding pressure injuries with root cause analysis and action. *AORN J*. 2018;108(5):15-16.

# OR skin bundle

- Pre-op risk and skin assessment<sup>2,7-8</sup>
- Safe Patient Handling Movement<sup>34</sup>
- Reduce, Relieve, or Redistribute Pressure
  - OR table support surfaces<sup>2,33</sup>
  - Approved positioning devices<sup>2,33</sup>
  - Padding bony prominence<sup>2</sup>
  - Heel offloading devices<sup>2,8,24</sup>
  - Prophylactic dressings<sup>2,18,32</sup>
- Communication and documentation<sup>2</sup>



2. Guideline for prevention of perioperative pressure injury. In: *Guidelines for Perioperative Practice*. Denver, CO: AORN, Inc; 2023:751-776.

7. AORN Position Statement on Prevention of Perioperative Pressure Injury. *AORN J*. 2022;115(5):458-461.

8. Scott, S. Perioperative Pressure Injuries: Protocols and Evidence-Based Programs for Reducing Risk. *PSQH*, 2016;13(4), 20-28.

18. Creehan S, Black J. Defining Practices to Avoid Hospital-Acquired Pressure Injuries in the Operating Room. *J Wound, Ostomy and Continence Nurs*.2022;49(1):89-96. doi: 10.1097/WON.0000000000000835.

23. Scott SM. Creating a strategic plan for perioperative pressure ulcer prevention. *AORN J*. 2016;103(4):13-14.

24. Scott S. Use of an OR skin bundle to prevent pressure injury. *AORN J*. 2017;106(4):18-19.

25. Scott SM, Bennett J. Avoiding pressure injuries with root cause analysis and action. *AORN J*. 2018;108(5):15-16.

26. Scott Triggers Gap Assessment Template in AORN Prevention of Perioperative Pressure Injury Tool Kit. Available at <https://scotttriggers.com/resources>

32. Betts H, Scott D, Makic MBF. Using Evidence to Prevent Risk Associated with Perioperative Pressure Injuries. *J Perianesth Nurs*. 2022 Jun;37(3):308-311. doi: 10.1016/j.jopan.2021.08.010. Epub 2022 Mar 4. PMID: 35256249.

33. Guideline for positioning the patient. In: *Guidelines for Perioperative Practice*. Denver, CO: AORN, Inc; 2023:701-750.

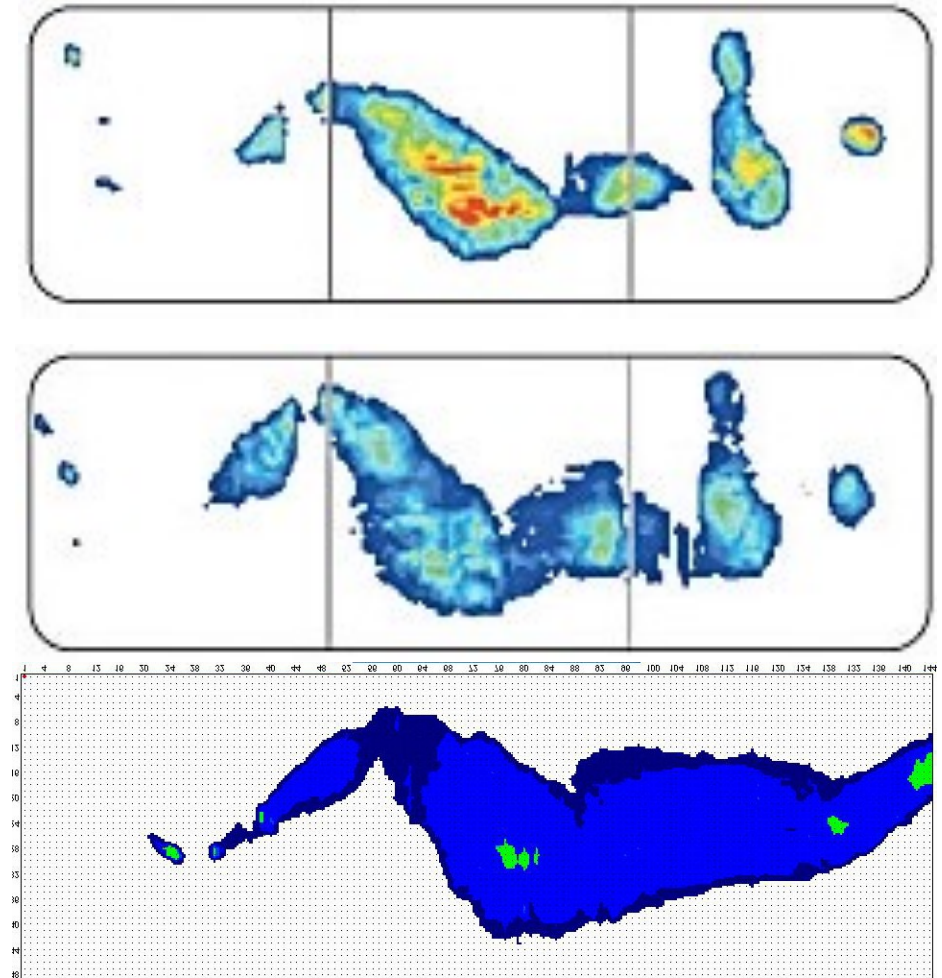
34. Guideline for safe patient handling and movement. In: *Guidelines for Perioperative Practice*. Denver, CO: AORN, Inc; 2023:895-944.



# OR table pads check specifications

- Therapeutic weight capacity <sup>2</sup>
- Thickness 3-4 in. <sup>2,4</sup>
- Stability for positions <sup>2</sup>
- Radiolucency
- Research, standardized testing <sup>4</sup>

## Immersion & Envelopment <sup>2,3</sup>



2. Guideline for prevention of perioperative pressure injury. In: *Guidelines for Perioperative Practice*. Denver, CO: AORN, Inc; 2023:751-776.

3. *Prevention and Treatment of Pressure Ulcers/Injuries: Clinical Practice Guideline. The International Guideline*. 3<sup>rd</sup> ed. European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel (NPIAP), and Pan Pacific Pressure Injury Alliance; 2019.

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



# Intraoperative interventions

# Product selection, care, and maintenance

- Support surfaces <sup>2,4</sup>
- Positioning devices <sup>2,33</sup>
- Prophylactic dressings <sup>2</sup>
- SPHM devices <sup>34</sup>
- Stretchers <sup>34</sup>
- Selected by team <sup>2,33</sup>
- Evidence-based<sup>4</sup>
- Efficacy evaluations<sup>4</sup>
- Equipment standardization <sup>4</sup>
- Availability<sup>2</sup>
- Maintenance <sup>33</sup>
- Budget <sup>4</sup>

2. Guideline for prevention of perioperative pressure injury. In: *Guidelines for Perioperative Practice*. Denver, CO: AORN, Inc; 2023:751-776.

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

33. Guideline for positioning the patient. In: *Guidelines for Perioperative Practice*. Denver, CO: AORN, Inc; 2023:701-750.

34. Guideline for safe patient handling and movement. In: *Guidelines for Perioperative Practice*. Denver, CO: AORN, Inc; 2023;895-944.

# Safe patient handling movement (SPHM)<sup>39</sup>

- Culture of Safety
- Formal systemized SPHM Program
- Ergonomic design principles
- Technology solutions
- Education, training, and staff competency
- Equipment, devices
- QI to evaluate SPHM program





# AORN SPHM recommendations “supine”<sup>39</sup>

- Weight < 157 lb.
  - Use lateral transfer device & 2-4 perioperative team members
- Weight > 157 lb.
  - Use assistive technology (eg, air-assisted transfer systems, a mechanical patient lift with a supine sling) to move the patient.
  - The number of team members is dependent of the type of technology used.

**How many of our patients weigh >157 lbs.?**



# Dos and Don'ts of Positioning <sup>2,33</sup>

## DO NOT

- Position on critical devices implants
- Use multiple layers between patient and surface

## DO NOT USE

- Towel Rolls
- Sheets
- IV Bags
- Shoulder braces
- Horseshoe shaped headrest

## DO

- Reposition during procedure eg. Micro-shifts
- Elevate heels
- Flex knees 5-10°
- Use pillows

2. Guideline for prevention of perioperative pressure injury. In: *Guidelines for Perioperative Practice*. Denver, CO: AORN, Inc; 2023:751-776.

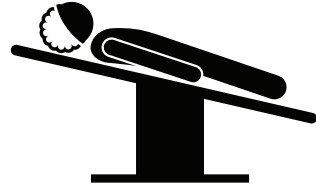
33. Guideline for positioning the patient. In: *Guidelines for Perioperative Practice*. Denver, CO: AORN, Inc; 2023:701-750.

# Surgical Positions & Skin Bundles<sup>3,33</sup>

## *SURGICAL POSITIONS*



*Supine Position*



*Trendelenburg Position*



*Reverse Trendelenburg Position*



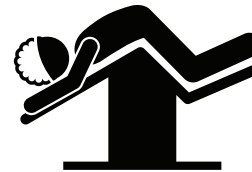
*Fracture Table Position*



*Lithotomy Position*



*Prone Position*



*Jackknife Position*



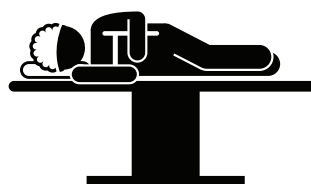
*Fowler's Position*



*Knee-Chest Position*



*Kidney Position*



*Lateral Position*

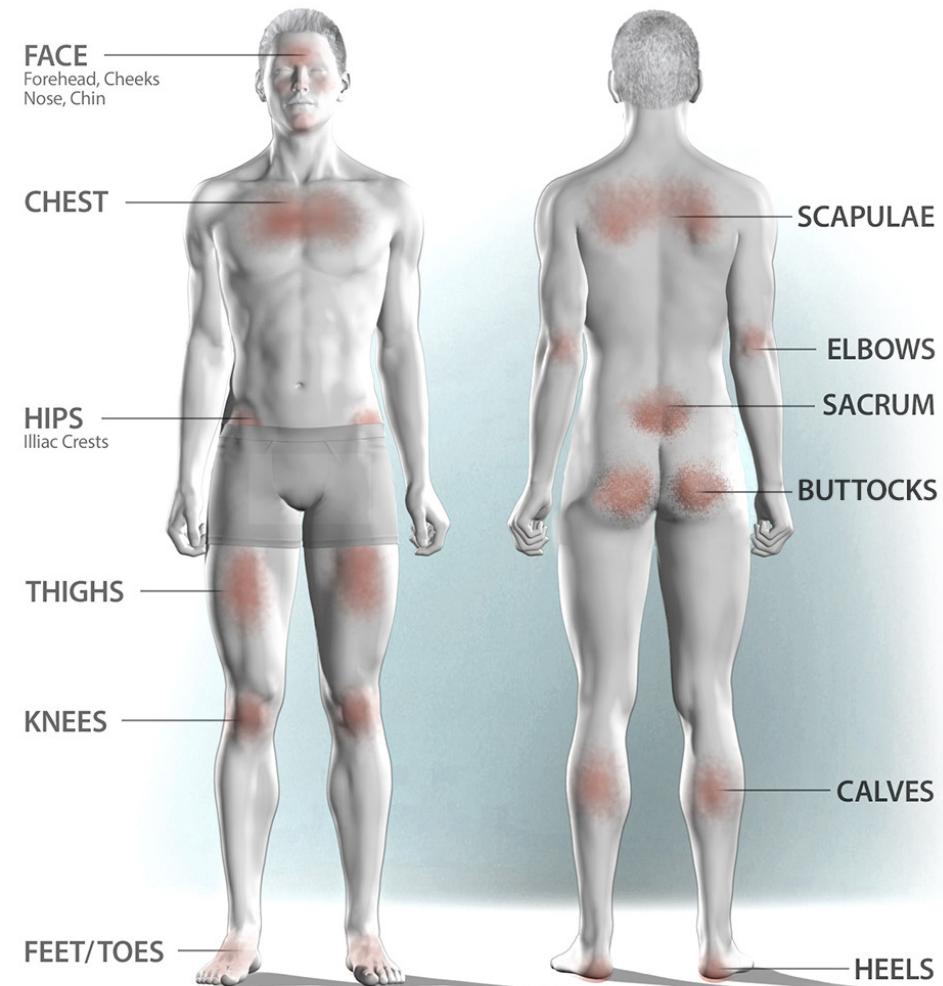
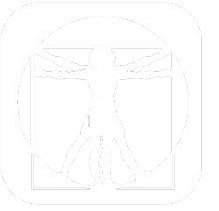


*Wilson Frame Position*

3. *Prevention and Treatment of Pressure Ulcers/Injuries: Clinical Practice Guideline. The International Guideline.* 3<sup>rd</sup> ed. European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel (NPIAP), and Pan Pacific Pressure Injury Alliance; 2019.

33. Guideline for positioning the patient. In: *Guidelines for Perioperative Practice.* Denver, CO: AORN, Inc; 2023:701-750.

# High risk pressure points <sup>3</sup>



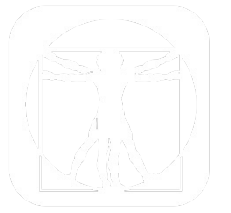
# Supine position<sup>2</sup>

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



# Prone position<sup>2</sup>

- Forehead, eyes, ears, and chin
- Chest/breasts, ports, implants
- Lower costal margins
- Iliac crest
- Genitalia
- Knees
- Shins
- Dorsum of the feet
- Toes



# Prone position risks<sup>33</sup>

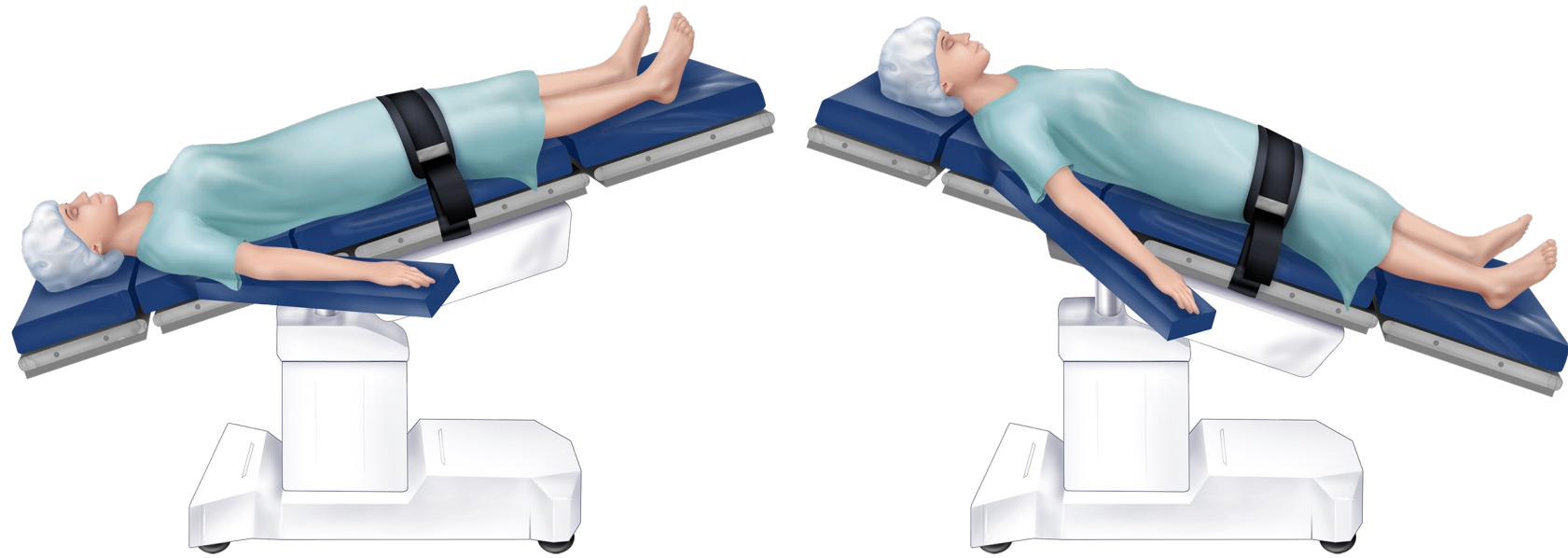
- Pressure injury
  - Increased intraocular pressure - Blindness
  - Increased intra-abdominal pressure
  - Cardiovascular changes
  - Venous air embolism
  - Respiratory changes
  - Injury to the caregiver
- Do not use Wilson Frame
  - Face, chin and forehead highest risk





# Trendelenburg and reverse Trendelenburg position<sup>2</sup>

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





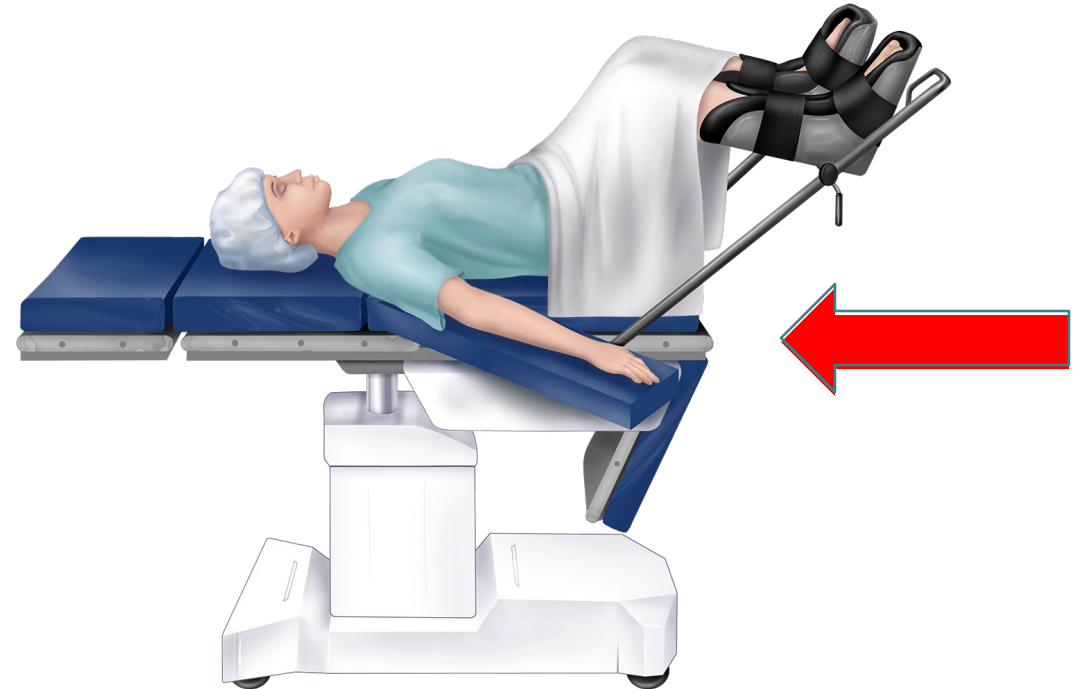
# Trendelenburg position – risks<sup>33</sup>



- Pressure Injury
- Brachial Plexus Nerve Injury
- Cephalad sliding “toward the head”
- Hemodynamic changes
- Altered pulmonary function
- Retinal detachment – Blindness
- Patient Falls
  - Patient harm, brain damage, paralysis and death
  - Malpractice claims
  - CMS lost reimbursement
  - Reasonably preventable!

# Lithotomy position<sup>2</sup>

- Occiput
- Shoulders
- Scapulae
- Elbows
- Arms
- Thoracic vertebrae
- Lumbar spine
- Buttocks
- Sacrum/coccyx
- Lateral aspect of thighs
- Heels



# Lateral position<sup>2</sup>

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



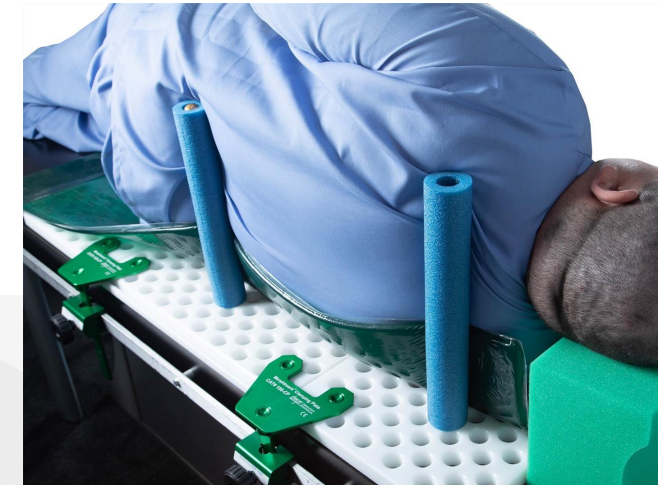
# Sitting position pressure points<sup>2</sup>

- Occiput
- Scapulae
- Ischial tuberosities
- Back of knees
- Heels



# High risk medical devices

- Anesthesia devices<sup>33</sup>
- Face plates in prone position<sup>33</sup>
- External fixators
- Urinary catheters & tubing<sup>2,3</sup>
- Vacuum-packed positioning device<sup>2</sup>
- Peg Boards<sup>3</sup>
- Mayo stands on the toes<sup>33</sup>
- Safety straps<sup>33</sup>
- Compression stockings



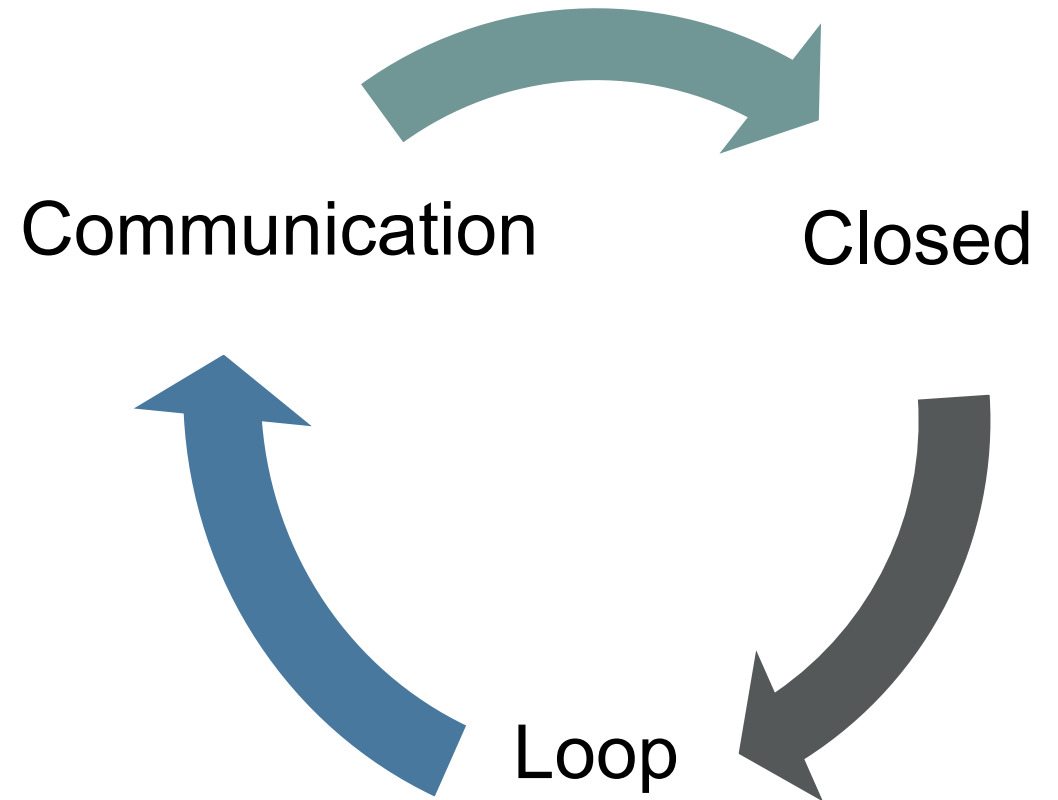
2. Guideline for prevention of perioperative pressure injury. In: *Guidelines for Perioperative Practice*. Denver, CO: AORN, Inc; 2023:751-776.

3. Prevention and Treatment of Pressure Ulcers/Injuries: Clinical Practice Guideline. The International Guideline. 3<sup>rd</sup> ed. European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel (NPIAP), and Pan Pacific Pressure Injury Alliance; 2019.

33. Guideline for positioning the patient. In: *Guidelines for Perioperative Practice*. Denver, CO: AORN, Inc; 2023:701-750.

# Hand-over communication<sup>39</sup>

- Standardized hand-over tools, checklists, protocols
- Briefing
- Time Out
- Debriefing
- Education eg. Team Training





# Communication tools “I-PASS”<sup>36</sup>



## Illness Severity

### **Patient Summary:** Surgical Procedure<sup>35</sup>

- Risk and skin assessments
- Type of surgery, position, time on table

**Action List:** Consult WOC Nurse, Recheck sacral area in 1 hour

### **Situational Awareness and Contingency Plan**

### **Synthesis by Receiver**

35. Guideline for team communication. In: *Guidelines for Perioperative Practice*. Denver, CO: AORN, Inc; 2023:1155-1183.

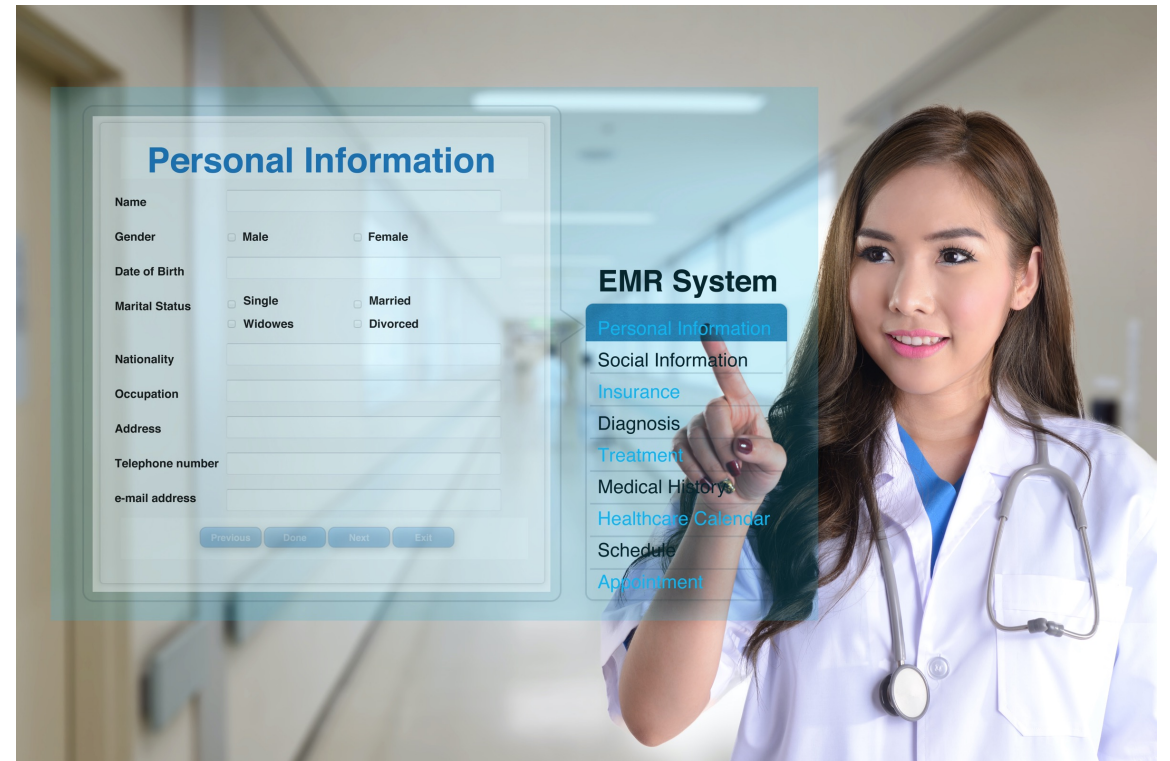
36. Starmer A, Schnock K, Lyons A, et al Effects of the I-PASS Nursing Handoff Bundle on communication quality and workflow *BMJ Quality & Safety* 2017;26:949-957.

# **Post-op assessment**

---

# Document the following

- Pre and postoperative skin and risk assessments<sup>2</sup>
- Team members<sup>33</sup>
- Patient position<sup>33</sup>
- Extremity position<sup>33</sup>
- Specific actions to prevent injury<sup>2,33</sup>
- Type and location of devices<sup>33</sup>



2. Guideline for prevention of perioperative pressure injury. In: *Guidelines for Perioperative Practice*. Denver, CO: AORN, Inc; 2023:751-776.

33. Guideline for positioning the patient. In: *Guidelines for Perioperative Practice*. Denver, CO: AORN, Inc; 2023:701-750.

# Pediatric patients<sup>2</sup>



- Pediatric risk assessment tool
- Skin assessment
- PI prevention bundle
- Support surfaces
- Reposition head Q2Hr



# **Quality initiatives**

---

# Root cause analysis and action (RCA<sup>2</sup>)<sup>37</sup>



What  
happened?

Why did it  
happen?

How to prevent  
it from  
happening  
again?



# High reliability principles<sup>38</sup>

- Deference to expertise
  - Team member insight
- Reluctance to simplify
  - A-3
- Sensitivity to operations
  - Cost/Inventory
  - Computer based interventions
- Commitment to resilience
  - Continued support and education
- Preoccupation with failure
  - Constant re-evaluation





# References

1. Gendron, F. "Burns" occurring during lengthy surgical procedures. *Journal of Clinical Engineering*. 1980;5:19–26.
2. Guideline for prevention of perioperative pressure injury. In: *Guidelines for Perioperative Practice*. Denver, CO: AORN, Inc; 2023:751-776.
3. *Prevention and Treatment of Pressure Ulcers/Injuries: Clinical Practice Guideline. The International Guideline*. 3<sup>rd</sup> ed. European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel (NPIAP), and Pan Pacific Pressure Injury Alliance; 2019.
4. Scott S. Progress and Challenges in Perioperative Pressure Ulcer Prevention. *J Wound Ostomy Continence Nurs*. 2015;42 (5);480-485
5. Gefen A, Creehan S, Black J. Critical biomechanical and clinical insights concerning tissue protection when positioning patients in the operating room: A scoping review. *Int Wound J*. 2020;1-19.
6. Hayes RM, Spear ME, Lee SI, et al. Relationship between time in the operating room and incident pressure ulcers: a matched case-control study. *Am J Med Qual*. 2015;30(6):591-597.
7. AORN Position Statement on Prevention of Perioperative Pressure Injury. *AORN J*, 2022;115(5):458-461.
8. Scott, S. Perioperative Pressure Injuries: Protocols and Evidence-Based Programs for Reducing Risk. *PSQH*, 2016;13(4), 20-28.
9. Agency for Healthcare Research and Quality. Surgeries in Hospital-Based Ambulatory Surgery and Hospital Inpatient Settings (H-CUP statistical brief #223). Washington DC: AHRQ; 2014.
10. Creehan S, Black J. Defining Practices to Avoid Hospital-Acquired Pressure Injuries in the Operating Room. *J Wound, Ostomy and Continence Nurs*. 2022;49(1):89-96. doi: 10.1097/WON.0000000000000835.
11. NDNQI The National Data Base of Nursing Quality Indicators (NDNQI) Guidelines for Data Collection and Submission on Pressure Injury Indicator. 2021. Accessed July 24, 2022 at Microsoft Word - Guidelines - Pressure Injury\_2021128 (nursingquality.org)
12. Chen H, Chen X, Wu J. The incidence of pressure ulcers in surgical patients of the last 5 years: a systematic review. *Wounds*. 2012;24(9):234–241.
13. Shafipour V, Ramezanpour E, Gorji, MAH, Moosadadeh M, Prevalence of postoperative pressure ulcer: A systematic review and meta-analysis. *Electronic Physician* Nov 2016;8(11):3170-3176. <http://www.ephysician.ir/2016/3170.pdf> Accessed March 23, 2019.

# References

14. Padula WV, Delarmente BA. The national cost of hospital-acquired pressure injuries in the United States. *Int Wound J*. 2019;1–7.
15. IBM Watson Health, Research Brief Hospital-Acquired Conditions lead to avoidable cost and excess deaths (2018). Available at <https://www.ibm.com/downloads/cas/X97QXLER> Retrieved January 31, 2023.
16. Padula WV, Black JM, Davidson PM, Kang SY, Pronovost PJ. Adverse Effects of the Medicare PSI-90 Hospital Penalty System on Revenue-Neutral Hospital-Acquired Conditions. *J Patient Saf*. 2020 Jun;16(2):e97-e102. doi: 10.1097/PTS.0000000000000517. PMID: 30110019.
17. Bennett R, O’Sullivan J, DeVito E, Remsburg R. The increasing medical malpractice risk related to pressure ulcers in the United States. *J Am Geriatr Soc*. 2000;48(1):73-81.
18. Creehan S, Black J. Defining Practices to Avoid Hospital-Acquired Pressure Injuries in the Operating Room. *J Wound, Ostomy and Continence Nurs*. 2022;49(1):89-96. doi: 10.1097/WON.0000000000000835.
19. Stanton C. Guideline for Prevention of Perioperative Pressure Injury. *AORN J*. 2022;115(5):8-10.
20. Cebeci F, Senol Celik S, Knowledge and practices of operating room nurses in the prevention of pressure injury. *Journal of Tissue Viability*. 2022;31(1):38-45 Available at: <https://www.sciencedirect.com/science/article/pii/S0965206X2100092>.
21. Khong BPC, Goh BC, Phang LY, David T. Operating room nurses’ self-reported knowledge and attitude on perioperative pressure injury. *Int Wound J*. 2020;17:455-465.
22. Lupear SK, Overstreet M, Krau SD. Perioperative nurses’ knowledge of indicators for pressure ulcer development in the surgical patient population. *Nurse Clin N Am*. 2015; 50:411-435.
23. Scott SM. Creating a strategic plan for perioperative pressure ulcer prevention. *AORN J*. 2016;103(4):13-14.
24. Scott S. Use of an OR skin bundle to prevent pressure injury. *AORN J*. 2017;106(4):18-19.
25. Scott SM, Bennett J. Avoiding pressure injuries with root cause analysis and action. *AORN J*. 2018;108(5):15-16.



# References

26. Scott Triggers Gap Assessment Template in AORN Prevention of Perioperative Pressure Injury Tool Kit. Available at <https://scotttriggers.com/resources>
27. AORN Prevention of Perioperative Pressure Injury Tool Kit. Available at <https://www.aorn.org/guidelines-resources/tool-kits/prevention-of-perioperative-pressure-injury/tool-kit>.
28. 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.
29. Emerson T. Preventing pressure injuries in patients placed on a spinal table *AORN J* 2019;109(5):11-13.
30. Emerson T, Myers KBJ, Fernandez, JC, Burkett S, Quion S, Bangud CC, and Shuman, MLH The Perioperative Journey: An Approach to Decreasing Hospital Acquired Pressure Injury Associated with the Intraoperative Phase of Care. Poster presented at the AORN Global Conference and Expo, 2020.
31. Dai J, Yang Z, Wu C. The reliability and validity of the Scott Triggers for patients in China undergoing gastrointestinal surgery. *Asian J Surg* 2021;44(10):1343-1344.
32. Betts H, Scott D, Makic MBF. Using Evidence to Prevent Risk Associated with Perioperative Pressure Injuries. *J Perianesth Nurs*. 2022 Jun;37(3):308-311. doi: 10.1016/j.jopan.2021.08.010. Epub 2022 Mar 4. PMID: 35256249.
33. Guideline for positioning the patient. In: *Guidelines for Perioperative Practice*. Denver, CO: AORN, Inc; 2023:701-750.
34. Guideline for safe patient handling and movement. In: *Guidelines for Perioperative Practice*. Denver, CO: AORN, Inc; 2023:895-944.
35. Guideline for team communication. In: *Guidelines for Perioperative Practice*. Denver, CO: AORN, Inc; 2023:1155-1183.
36. Starmer A, Schnock K, Lyons A, et al Effects of the I-PASS Nursing Handoff Bundle on communication quality and workflow *BMJ Quality & Safety* 2017;26:949-957.
37. National Patient Safety Foundation. RCA2: Improving Root Cause Analyses and Actions to Prevent Harm. <https://www.ashp.org/-/media/assets/policy-guidelines/docs/endorsed-documents/endorsed-documents-improving-root-cause-analyses-actions-prevent-harm.ashx?la=en&hash=65A4C5C79395296F8CA816716CCB9B7AC20C7C6E> Accessed 2-14-23
38. Agency for Health Care Research and Quality High Reliability (2017) Available at <https://psnet.ahrq.gov/primer/high-reliability>
39. Guideline for team communication. In: *Guidelines for Perioperative Practice*. Denver, CO: AORN, Inc; 2023:1065-1096.