# A Strategic Plan for Perioperative Pressure Injury Prevention (PPIP)

# Susan Scott BSN, MSN, RN, WOC Nurse

Susan Scott is currently a Medical Educator with the University of Tennessee Health Science Center, Office of Graduate Medical Education in Memphis, TN. She is an independent consultant for Scott Triggers PLLC. She is a notable international operating room (OR) pressure injury (PI) expert, researcher and author from the Veterans Health Administration with 34 years of federal service. She developed the Scott Triggers® a concurrent trigger system to identify at risk individuals for PI in the OR and was named an "Edge Runner" by the American Academy of Nurses.

Web page: <u>www.scotttriggers.com</u> Email: <u>scotttriggers@gmail.com</u>

Scott Triggers ® PLLC



Susan M. "Suzy" Scott MSN, RN WOC Nurse

### **Presentation Disclaimer**

I am a paid consultant for Molnlycke. The information presented herein is provided for educational and informational purposes It is for the attendees' general knowledge and is not a substitute for medical advice. The material provided herein is not comprehensive for all medical developments and may contain errors or omissions. If you need advice regarding a specific medical situation, please consult a medical professional.

# **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 credits: Marie Brown-Etris RN, CWON, CCHP Gendron, F. "Burns" occurring during lengthy surgical procedures. *Irnal of Clinical Engineering*. 1980;*5*:19–26. ndron, F. Unexplained Patient Burns: Investigating latrogenic Injuries. est Publishing Company Inc. Brea, CA. 1988

# Hospital Acquired Pressure Injury (HAPI)



HAPI developed in the US Acute Care

**\$26.8 B** US Cost of HAPI

# **Public Health Crisis**

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

Scott Triggers ® PLLC

**59% of Cost** Stage 3 & 4 Non- reimbursable



# \$500 - \$70,000

Single HAPI episode

# 45% of HAPI

Pressure Injuries attributed to the operating room

\$250,000

Average settlement

#### Scott Triggers ® PLLC

1. 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.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.National Pressure Ulcers: Quick Reference Guide. 2014. Emily Haesler, Ed. Cambridge Media: Perth, Australia

## **Background Operating Room**



# **Declines in Hospital-Acquired Conditions**



\*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: AHRO National Scorecard on Hospital-Acquired Conditions Updated Baseline Rates and Preliminary Results 2014-2017

# Silver Tsunami



1. American Geriatric Society. Optimal Perioperative Management of the Geriatric Patient: Best Practice Guideline from ACS NSQIP ®/ American Geriatric Society 2015. <u>https://www.facs.org/~/media/files/quality%20programs/geriatric/acs%20nsqip%20geriatric%202016%20guidelines.ashx</u> Accessed December 31, 2018.

2. 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

3. 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?

# **Strategic Planning**

- 1. Quality Improvement RCA<sup>2</sup>
- 2. Assessment (Gap Analysis)
- 3. Staff Education & Awareness
- 4. Evidence-based best practice bundles
- 5. Risk Assessment
- 6. Universal Pressure Precautions
- 7. Positioning Competencies
- 8. Product Selection/standardization
- 9. Interprofessional collaboration







**Gap Analysis** 

Current State VS Desired State

- QI Data, Incidence, prevalence, audits
- Root Cause Analysis and Action (RCA<sup>2</sup>)
- Key Drivers Equipment and Device inventory



# **Horizontal Approach**

# **Universal Pressure Precautions**

## Make the right thing to do easy!

Scott S. Perioperative pressure injuries: protocols and evidence-based programs for reducing risk. PSQH. 2016;13(4):20-28.

### **Goals of Patient Positioning**

"The patient is free from signs and symptoms of injury related to positioning."

**AORN 2020** 

### **Eliminate Patient Harm**

Scott Triggers ® PLLC



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



# **Perioperative Pressure Injury (PPI)**

APPI 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.



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

## **Location of PI in Studies**





Occiput 4% Elbow 5% Sacral 22% - 41% Buttocks 11% - 47% Heels 14% - 52%

# **PI rates per Surgery Specialty**





# **Etiology of Pressure Injury**











# Anatomage Images









# **Pressure and Distortion of Tissues**





#### Photos Used with Permission by Joyce M. Black PhD RN FAAN



## **Heel Pressure Injury**



Photos courtesy of <u>www.scotttriggers.com</u> and Marie Brown-Etris

Based on the article by Walter Isaacson. © 2017 Harvard Business School Publishing. All rights reserved.

# **OR Skin Protection Programs**

### Skin Bundles

- 1. Risk and Skin assessment pre-op and immediately post-op
- 2. Safe patient handling
- 3. High specification OR positioning systems
- 4. 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.

# **OR Skin Protection Programs**

### Skin Bundles

- 6. Use of approved positioning devices
- 7. Maintain normothermia and microclimate
- 8. Using hand-over communication
- 9. Institute early movement, daily skin assessment and pressure management
- 10. 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.

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

### **Perioperative Plan of Care**







# #1 Risk and Skin Assessment

### **Risk and Skin Assessment**





Scott Triggers ® PLLC

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

# **Scott Triggers Tool**







Scott Triggers®	Does it meet these	If YES, please place
	qualifications?	check here
Age	Age 62 or older	
Serum Albumin	Albumin level	
g/L	<3.5 g/L	
or	or	
BMI	BMI <19 or >40	
ASA Score (Circle)	ASA score 3 or	
123456	greater	
Estimated surgery	Surgery time over	
time	3 hours or 180	
Hours/minutes	minutes	
Two or more	HIGH RISK	
YESES =	SURGICAL	
	PATIENT	

Scott S. Progress and challenges in perioperative pressure ulcer prevention. J Wound Ostomy Continence Nurs. 2015;42(5):480–485 Scott level pressure Ulcer Development. Poster presented at the 2017 Southern Nursing Research Society, February 22-25, 2017.

# **NRF Grant South Korea**



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

Scott Triggers ® PLLC

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 and Bundles**

#### Scott Triggers

#### Scott Triggers Risk Assessment

Age 62 or Older (Current Age: 69) Albumin Level <3.5 g/L (Current Albumin Level: 3.2) BMI <19 or >40 (Current BMI: 46.37) ASA Score 3 or Greater (Current ASA: 4) Surgery Time Over 3 Hours or 180 Minutes (Scheduled Surgery Time: 185 Minutes)

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

Choose Patient's Position

Supine Prone L

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

Scott Triggers ® PLLC

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.





### **Skin Assessment**





# **Risk and Skin Assessment**



Pre-op

Post-op

Daily

**Pressure Points** 

**Medical Device** 

Pain

**Skin Temperature** 

Texture





# #2 Safe Patient Handling



# Impact in an 8 hour shift the average nurse lifts 1.8 tons

# Surgical patients average 6 or more lateral transfers per episode

# **AORN SPH Recommendations "Supine"**

#### Weight < 157 lb.</p>

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



### How many of our patients weigh >157 lbs?


# #3 High Specification OR Table Pads

# How do we measure efficacy of surfaces

Therapeutic weight capacity Thickness 3-4 in Stability for positions Radiolucency Research, standardized testing

#### **Immersion & Envelopment**



### **Device Maintenance**

"Healthcare facilities should regularly inspect mattresses and covers for signs of damage or contamination"

©2018 ECRI Institute. 2019 Top 10 Health Technology Hazards: Executive Brief







# #4 Redistribute Pressure and/or Pad Bony Prominences

# **Common Surgical Positions**







Scott Triggers ® PLLC

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.

# **High Risk Pressure Areas**





Graphic Art by Blaine Miller



# **Supine Position Pressure Points**

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



#### Graphic Art by Rex Neal



## **Occiput PI - Alopecia**





Occiput is most common site in pediatrics

Photos used with permission Amy Green and Autumn Nicole Williams

#### New understanding can lead to better preventive technologies

The donut-shaped gel head support: An example of a wrong solution "Offload pressure from occipital protrusion to protect the patient from pressure injuries"





# **Lithotomy Position Pressure Points**

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



•Heels







# **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

# **Trendelenburg Position**



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



#### Graphic Art by Rex Neal

# **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 (HOLD)



"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."

#### Scott Triggers ® PLLC

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. Photos used with permission Sage Product LLC, now part of Stryker and DA Surgical



# #6 Consider Prophylactic Dressings for Bony Prominences or Under Medical Devices

# **Prophylactic Dressings**





Molnbycke Molnbycke Depilex Border Flex Defradherent soft silicone foam dressing Company of the soft silicone foam dressing

- AORN guidelines: "High evidence to support use of prophylactic dressings for bony prominence and under medical devices."
- Prone kits effective in case studies

# **NOT** a substitute for offloading, or positioning interventions!

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

# #7 Use Positioning Devices Correctly



Follow Manufacturer Instructions for Use (IFU)









Scott Triggers ® PLLC

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



# #8 Microclimate and Normothermia

# **Microclimate and Normothermia**



 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 Hypothermia



# **Key Drivers in OR**



- Warming blankets forced air
- Cooled/warmed IV solutions
- Mechanical ventilation
- Room temperature
- Sheets or drapes that wick moisture away from the skin may help manage microclimate.
- Prophylactic Dressings



Photo Used with permission Connie Garrett CNOR

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

# **Communication Tools "IPASS"**



### **·Illness Severity**

#### Patient Summary: Surgical Procedure

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

### •Action List: Consult WOC Nurse

# Situational Awareness and Contingency Plan Synthesis by Receiver

Scott Triggers ® PLLC

Spector N, Starner A, Allen A, et al. I-PASS handoff curriculum: core resident workshop. *MedEdPORTAL*. 2013;9:9311. https://doi.org/10.15766/mep\_2374-8265.9311 Minnich L, Bennett J, Mercer, J. (2014) Partnering for Perioperative Skin Assessment: A time to change a Practice Culture. Journal of PeriAnesthesia Nursing, 29(5):361-3. AORN Patient Hand-Off/Over Toolkit. Available at https://www.aorn.org/guidelines/clinical-resources/tool-kits/patient-hand-off-tool-kit



# #10 Institute early movement, daily skin assessment and pressure management



# #11 Reporting PIs that develop within 72 hours after the procedure

# Cause and Effect Diagram "FISHBONE" or THE 6Ms of Six Sigma





Scott Triggers ® PLLC

Privileged & Confidential: Subject to Peer Review and Medical Review Protections, O.C.G.A. § 31-7-130 et seq. and § 31-7-140 et seq.

# **Thank You Very Much!**



#### Susan M. Scott

### **BSN, MSN, RN, WOC Nurse**

Twitter @scotttriggers www.scotttriggers.com

Email:

scotttriggers@gmail.com

LinkedIn: Susan M. Scott



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

Gendron, F. Unexplained Patient Burns: Investigating latrogenic Injuries. Quest Publishing Company Inc. Brea, CA. 1988

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.

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.

Brem H, Maggi J, Nierman D. et al. High cost of stage IV pressure ulcers. Am J Surg. 2010;200(4):473-477.

The Financial Impact of Pressure Ulcers. Available at <a href="http://www.leafhealthcare.com/pdfs/LH\_WP\_FinancialOverview\_1563AA\_PDF\_100514.pdf">http://www.leafhealthcare.com/pdfs/LH\_WP\_FinancialOverview\_1563AA\_PDF\_100514.pdf</a> Accessed December 31, 2018.

Bundle Payment for Care Improvement Advanced (BPCI). https://innovation.cms.gov/initiatives/bpci-advanced Accessed December 31, 2018.

AHRQ National Scorecard on Hospital Acquired Conditions report. Accessed December 24, 2019 at: <u>https://www.ahrq.gov/sites/default/files/wysiwyg/professionals/quality-patient-safety/pfp/hacreport-2019.pdf</u>

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

NCHS 2010 National Hospital Discharge Survey http://www.cdc.gov/nchs/data/nhds/4procedures/2010p+ro4\_numberprocedureage.pdf

Chiari, P., Forni, C., Guberti, M., Gazineo, D., Ronzoni, S., & D'Alessandro, F. Predictive factors for pressure ulcers in an older adult population hospitalized for hip fractures: A prognostic cohort study. *PLoS One*, 2017;12(1) doi:http://dx.doi.org.contentproxy.phoenix.edu/10.1371/journal.pone.0169909

American Geriatric Society. Optimal Perioperative Management of the Geriatric Patient: Best Practice Guideline from ACS NSQIP ®/ American Geriatric Society 2015. Accessed at <a href="https://www.facs.org/~/media/files/quality%20programs/nsqip/acsnsqipagsgeriatric2012guidelines.ashx">https://www.facs.org/~/media/files/quality%20programs/nsqip/acsnsqipagsgeriatric2012guidelines.ashx</a>

Hall MJ, DeFrances CJ, Williams SN, Golosinskiy A, Schwartzman A. National Hospital Discharge Survey 2007 Summary. National health statistics reports; no 29. Hyattsville, MD: National Center for Health Statistics. 2010. <u>https://www.cdc.gov/nchs/data/nhsr/nhsr029.pdf</u> Accessed December 31, 2018.

Gallagher SM. Childhood obesity looms large. Nurs Management. 2009; 40(2):25-32.

NIDDK. Overweight and obesity statistics. Available at: https://www.niddk.nih.gov/health- information/health-statistics/overweight-obesity.

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

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. <u>http://www.scotttriggers.com/gap-analysis.html</u> Accessed March 23, 2019.

Association of PeriOperative Registered Nurses (2019) Guideline Essentials: Positioning the Patient. <u>https://www.aorn.org/essentials/positioning-the-patient</u> Accessed December 28, 2019.

Spruce, L. Continuing Education: Back to Basics: Preventing Perioperative Pressure Injury. AORN Journal 2017;105(1):92-99.

Engels, D., Austin, M., McNichol, L., Fencl, J., Gupta, S., & Kazi, H. (2016). Pressure ulcers: Factors contributing to their development in the OR. Association of Operating Room Nurses. AORN Journal, 103(3), 271-281. doi:http://dx.doi.org/10.1016/j.aorn.2016.01.008

Bergstrom N, Braden B, Kemp M, Champagne M, Ruby E. Predicting pressure ulcer risk: a multisite study of the predictive validity of the Braden Scale. *Nurs Res.* 1998;47:261-269.

He W, Liu P, Chen H. The Braden Scale cannot be used alone for assessing pressure ulcer risk in surgical patients: A meta-analysis. Ostomy Wound Manage. 2012;58(2):34-40

Scott S. Progress and challenges in perioperative pressure ulcer prevention. J Wound Ostomy Continence Nurs. 2015;42(5):480-485

ASA Physical Status Classification System. <u>ASAHQ.com</u> <u>https://www.asahq.org/resources/clinical-information/asa-physical-status-classification-system</u>. Accessed May 15, 2018

Agency for Healthcare Research and Quality. Triggers and Targeted Injury Detection Systems (TIDS) Expert Panel Meeting: Conference Summary. Rockville, MD. AHRQ Pub. No. 090003. Feb. 2009

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.

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.

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

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. <u>http://www.ephysician.ir/2016/3170.pdf</u> Accessed March 23, 2019.

Gefen A. The future of pressure ulcer prevention is here: Detecting and targeting inflammation early EWMA Journal. 2018;19(2):7-13.

Gefen A. The Sub-Epidermal Moisture Scanner: the principles of pressure injury prevention using novel early detection technology. *Wounds International.* 2018;9(3):10-15.

Wound Ostomy and Continence Nurses Society. (2016) Bottom-Up (Pressure Shear) Injuries. In D. Doughty, and L. McNichol (Ed). *Core Curriculum Wound Management*. (pp. 313-332). Philadelphia, Wolters Kluwer. 23.

Edsberg, L. E., Black, J. M., Goldberg, M., McNichol, L., Moore, L., & Sieggreen, M. (2016). Revised National Pressure Ulcer Advisory Panel Pressure Injury Staging System: Revised Pressure Injury Staging System. *J Wound Ostomy Continence Nurs, 43*(6), 585-597. doi:10.1097/won.00000000000281

European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel, and Pan Pacific Pressure Injury Alliance. *Prevention and Treatment of Pressure Ulcers/Injuries: Clinical Practice Guideline.* Emily Haesler (Ed.). Cambridge Media: Perth, Australia; 2019.

Bulfone G, Bressan V, Morandini A, Stevanin SPerioperative Pressure Injuries. Advances in Skin & Wound Care. 2018;31(12):556–564. doi: 10.1097/01.ASW.0000544613.10878.ed.

Bass, WJ. Death's Acre. New York, NY. Berkley Books, 2003

Farid K. Applying observations from forensics to understanding the development of pressure ulcers. Ostomy Wound Manage. 2007;53(4):26–32.

Farid KJ, Winkelman C, Rizkala A, Jones K. Using temperature of pressure- related intact discolored areas of skin to detect deep tissue injury: an observational, retrospective, correlational study. *Ostomy Wound Manage*. 2012;58(8):20–31

Prevention of Perioperative Pressure Ulcers /Tool Kit. AORN. <u>https://www.aorn.org/guidelines/clinical-resources/tool-kits/prevention-of-perioperative-pressure-injury-tool-kit</u> Published December 31, 2015. Accessed January 2, 2019.

Scott S. Use of an OR skin bundle to prevent pressure injury. *AORN Journal* 2017;106(4):P18-19.

Putnam K, (2016). Minimizing pressure ulcer risk for surgical patients. AORN Journal. 2016;103(4):7-9.

Safe Patient Plandling/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

Association of PeriOperative Registered Nurses. (2016) Safe Patient Handling. In AORN(Ed). 2016 AORN Guidelines for Perioperative Practice. Philadelphia, Wolters Kluwer

Baptiste, Andrea & Boda, Sruthi & L Nelson, Audrey & Lloyd, John & E Lee, William. (2006). Friction-Reducing Devices for Lateral Patient Transfers: A Clinical Evaluation. AAOHN journal 54;173-80.

Kirkland-Walsh H, Teleten O, Wilson M, Raingruber B. Pressure Mapping Comparison of Four OR Surfaces. *AORN J.* 2015:102(1):61.e1-61.e9. Available at <a href="http://dx.doi.org/10.1016/j.aorn.2015.05.012">http://dx.doi.org/10.1016/j.aorn.2015.05.012</a>

Capasso V, O'Connor C, Silvestri S, Tenney D, Coakley A, Gryglik C, Donahue V et al. Effect of Fluid Immersion Simulation ® OR table pads on pressure ulcer prevention in cardiac surgery patients: Early results

Chan B, Ieraci L, Mitsakakis N, Pham B, Krahm M. Net cost of hospital-acquired and pre-admission PUs among older people hospitalized in Ontario. *J Wound Care*. 2013:22(7):341-6

ECRI Institute. 2019 Top 10 Health Technology Hazards: Executive Brief. Available at <a href="https://www.ecri.org/Resources/Whitepapers\_and\_reports/Haz\_19.pdf">https://www.ecri.org/Resources/Whitepapers\_and\_reports/Haz\_19.pdf</a>

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

Allen, D Positioning and the Surgical Robot. Surgical Products (2013) Retrieved at <u>http://www.surgicalproductsmag.com/article/2013/02/positioning-and-surgical-robot</u>

Talab, S. S., Elmi, A., Sarma, J., Barrisford, G. W., & Tabatabaei, S. (2016). Safety and Effectiveness of SAF-R, a Novel Patient Positioning Device for Robot-Assisted Pelvic Surgery in Trendelenburg Position. *Journal Of Endourology*, *30*(3), 286-292. doi:10.1089/end.2015.0601

McMichael JC, Place HM, Face tissue pressures in prone positioning: a comparison of 3 pillows. J Spinal Disorder Tech <u>J Spinal Disord Tech.</u> 2008 Oct;21(7):508-13

Santamaria N, Gerdtz M, Sage S, McCann J, Freeman A, Vassiliou T, DeVincentis S, Ng AW, Manias E, Liu W, Knott J. A randomised controlled trial of the effectiveness of soft silicone multi-layered foam dressings in the prevention of sacral and heel pressure ulcers in trauma and critically ill patients: the border trial. Int Wound J, 2013; doi: 10.1111/iwj.12101

Jackson S, Womack K. Reduction of pressure injury due to prone position in the OR. Poster presented at the AORN Global Conference and Expo 2018, New Orleans, LA.

American Society of Anesthesiologists Task Force on Prevention of Perioperative Peripheral Neuropathies. Practice advisory for the prevention of perioperative peripheral neuropathies: an updated report by the American Society of Anesthesiologists Task Force on prevention of perioperative peripheral neuropathies. Anesthesiology. 2011;114(4):741-754. doi: 10.1097/ALN.0b013e3181fcbff3.

Lumbley et al. Retrospective review of predisposing factors for intraoperative pressure ulcer development. Journal of Clinical Anesthesia. 2014; 26:368-374.

Fred, C., Ford, S., Wagner, D., & VanBrackle, L. (2012). Intraoperatively acquired pressure ulcers and perioperative normothermia: A look at relationships. *Association of Operating Room Nurses. AORN Journal, 96*(3), 251-60. doi:<u>http://dx.doi.org/10.1016/j.aorn.2012.06.014</u>

Yoshimura M, lizaka S, Kohno M, Nagata O, Yamasaki T, Mae T, Haruyama N, Sanada H. Risk factors associated with intraoperatively acquired pressure ulcers in the park-bench position: a retrospective study. Int Wound J 2015; doi: 10.1111/iwj.12445

Akhavan a, Gainsburg, and Stock J. Complications association with patient positioning in urologic surgery. Urology. 2010;76(6):1309-16.

Kwee M, Ho Y, and Roxzen W. The prone position during surgery and its complications: a systematic review and evidence based guidelines. Int Surgery. 2015;100(2):292-303

Anema J, Morey A, Mcaninch J, Mario L, and Wessels H. Complications related to the high lithotomy positon during urethral reconstruction (2000) The Journal of Urglogy 164(2); 360-363. Retrieved from <u>http://www.sciencedirect.com/science/article/pii/S0022534705673600?via%3Dihub</u>

Spector N, Starner A, Allen A, et al. I-PASS handoff curriculum: core resident workshop. *MedEdPORTAL*. 2013;9:9311. <u>https://doi.org/10.15766/mep\_2374-8265.9311</u>

Health Research & Educational Trust (2017, April). Hospital Acquired Pressure Ulcers/ Injuries (HAPU/I): 2017. Chicago, IL: Health Research & Educational Trust. Accessed at <a href="http://www.hret-hin.org/">http://www.hret-hin.org/</a>

Minnich L, Bennett J, Mercer, J. (2014) Partnering for Perioperative Skin Assessment: A time to change a Practice Culture. Journal of PeriAnesthesia Nursing, 29(5):361-366.

Spector N, Starner A, Allen A, et al. I-PASS handoff curriculum: core resident workshop. MedEdPORTAL. 2013;9:9311. https://doi.org/10.15766/mep\_2374-8265.9311

AORN Patient Hand-Off/Over Toolkit. Available at https://www.aorn.org/guidelines/clinical-resources/tool-kits/patient-hand-off-tool-kit

The Up Campaign: Brief. Health Research & Educational Trust. <u>http://www.hret-hiin.org/ Resources/up\_campaign/17/up\_campaign\_brief.pdf</u>. Accessed August 29, 2017.

Swensen S, Pugh M, McMullan C, Kabcenell A. *High-Impact Leadership: Improve Care, Improve the Health of Populations, and Reduce Costs.* IHI White Paper. Cambridge, Massachusetts: Institute for Healthcare Improvement; 2013. (Available at ihi.org)

Agency for Healthcare Quality and Research. High Reliability (2017) Retrieved from <u>https://psnet.ahrq.gov/primers/primer/31/high-reliability</u>.

Scott S. Creating a strategic plan for perioperative pressure ulcer prevention. AORN Journal 2016;103(4):13-14.

Scott, S (2016) Perioperative Pressure Injuries: Protocols and Evidence-Based Programs for Reducing Risk. *PSQH*, 13(4), 20-28. Available at <a href="https://www.psqh.com/analysis/perioperative-pressure-injuries-protocols-and-evidence-based-programs-for-reducing-risk/4/">https://www.psqh.com/analysis/perioperative-pressure-injuries-protocols-and-evidence-based-programs-for-reducing-risk/4/</a>

Charles R, Hood B, DeRosier J, et al. Root cause analysis and actions for the prevention of medical errors: Quality improvement and resident education. *Orthopedics*. 2017;40(4):e628-e635.

National Patient Safety Foundation. RCA2: Improving Root Cause Analyses and Actions to Prevent Harm. <u>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 December 31, 2018.</u>
## References

National Pressure Ulcer Advisory Panel. Root Cause Analysis Toolkit. <u>https://www.npuap.org/resources/educational-and-clinical-resources/rca-template-2019/</u>. Published January 3, 2019. Accessed April 8, 2019.

Hessing T, 2019. 6 M's in Six Sigma. https://sixsigmastudyguide.com/six-ms-6ms-or-5ms-and-one-p-5m1p/ Accessed December 26, 2019

Martinez S, Braxton C, Helmick R, Awad S, Lara-Smalling, A, Baylor College of Medicine. Sustainability of a hospital acquired pressure ulcer prevention bundle in surgical patients. Paper presented at Surgical Infection Society 34<sup>th</sup> Annual Meeting 2014 Baltimore, MD May 1-3, 2-14.

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

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.

## **Product Information**



Scott Triggers ® PLLC

#### PREVENTION

## **Our lead brands**

# 88%

reduced risk of pressure ulcers with Mepilex<sup>®</sup> Border Sacrum<sup>1</sup>



Mepilex Border Heel and Mepilex Border Sacrum



Mölnlycke<sup>®</sup> Z-flex<sup>™</sup> Fluidized boots



## Mölnlycke<sup>®</sup> Z-flo<sup>™</sup> fluidized positioners



Mölnlycke<sup>®</sup> Tortoise<sup>™</sup> Turning & Positioning system

# Mepilex<sup>®</sup> Border The PROVEN 5-layer foam prevention dressing.<sup>1</sup>

#### **Pressure Injury Prevention Dressings Evidence Pyramid**



Mepilex Border is the **only** dressing that has **multiple RCTs** demonstrating the **isolated** effect of dressings in preventing pressure ulcers.<sup>1,2,3</sup>

- Santamaria et al RCT<sup>1</sup> 76% reduction\* in sacrum and heel pressure ulcers
  - HAPU rates decreased from 13.1% to 3.1%
  - Statistically significant results at p=0.001
- Kalowes et al RCT<sup>2</sup> 88% reduction in sacrum pressure ulcers
  - HAPU rates decreased from 3.8% to 0.5%
  - Statistically significant results at p=0.001

**No other sacrum or heel dressing** has evidence demonstrating its isolated effectiveness in pressure ulcer prevention.<sup>4</sup>

- 1. Mölnlycke Health Care report GMAS-2020-037 Bordered foam dressings for pressure ulcer prevention: a review of the pre-clinical, clinical 5. and economic evidence (April 2020) Data on file.
- Qiuli, B., Qiongyu, J. [Observation on effect of Mepilex on the prevention and treatment of pressure sores. Chinese Journal of Medical 6. Nursing 2010.
- Santamaria, N., Gerdtz, M., Sage, S. et al. A randomised controlled trial of the effectiveness of soft silicone multi-layered foam dressings in the prevention of sacral and heel pressure ulcers in trauma and critically ill patients: the border trial. Int Wound J 2015; 12: 3, 302–308.
   T.
- 4. Kalowes P., Messina V. et al. Five-layered soft silicone foam dressing to prevent pressure ulcers in the intensive care unit. Am J of Critical Care 2016; 25: 6, 108-119.

Aloweni, F., Lim, M.L., Chua, T.L., Tan, S.B., Lian, S.B., Ang, S.Y. A randomised controlled trial to evaluate the incremental effectiveness of a prophylactic dressing and fatty acids oil in the prevention of pressure injuries. Wound Practice and Research 2017;25(1):24-34. Santamaria, N., Gerdtz, M., Kapp, S., Wilson, L., Gefen, A. A randomised controlled trial of the clinical effectiveness of multi-layer silicone foam dressings for the prevention of pressure injuries in high-risk aged care residents: The Border III Trial. International Wound Journal 2018 DOI: 10.1111/iwj.12891.

Hahnel, E., El Genedy, M., Tomova-Simitchieva, T., Hauß, A., Stroux, A., Lechner, A., Richter, C., Akdeniz, M., Blume-Peytavi, U., Löber, N., & Kottner, J. The effectiveness of two silicone dressings for sacral and heel pressure ulcer prevention compared with no dressings in high-risk intensive care unit patients: a randomized controlled parallel-group trial. Br J Dermatol. 2019 Oct 19. doi: 10.1111/bjd.18621

MHC-2020-78700 MHC-2018-T00017

#### PREVENTION

### Mepilex<sup>®</sup> Border Sacrum and Mepilex Border Heel - unique construction

#### Some dressings are stiff in all directions<sup>1</sup>

May lead to lack of conformability and over-constraining soft tissues





Optifoam® Gentle Sacrum

#### Some dressing are flexible in all directions<sup>1</sup>

May not protect against tissue deformation



Unlike other dressings, the proprietary Mepilex Border Sacrum is the ONLY dressing with **Deep Defense technology**, providing an optimal balance of strength and flexibility. This not only allows the dressing to provide optimal protection against shear in combination with other extrinsic factors, but also maintain its protective properties throughout its wear time.<sup>1</sup>

#### **Proprietary Mepilex Border Sacrum**



Strength in the patient sliding/shearing direction protects from extrinsic forces and maintains dressing structural integrity with absorption of sweat<sup>1</sup>

Flexibility in the horizontal direction can enhance conformability and allow slight lateral movement of tissues that occurs naturally when a patient is lying in supine position<sup>1</sup>



1. Alten. Finite element analysis studying the effect of different prevention dressings on protecting soft tissues from high stresses and deformation. Ref No. 001. Data on file. 2017.

# Minimizing the risk of pressure ulcers with positioners to redistribute pressure

#### **ISSUE**:

The difficulty of maintaining neutral body alignment while preventing pressure ulcers

#### SOLUTION:

Positioners that conform to the body parts and remain in place

#### EFFECT:

Fluidized positioners help achieve body alignment while redistributing pressure by increasing surface area

### Mölnlycke<sup>®</sup> Z-Flo™ Fluidized positioners





#### PREVENTION

# The Mölnlycke<sup>®</sup> Tortoise<sup>™</sup> Turning and Positioning System is designed to address safety issues for both the patient and the caregiver.

#### ISSUE:

How to help caregivers turn and position patients ergonomically to reduce back injury while decreasing pressure ulcer risks for patients

#### SOLUTION:

A support surface providing easy patient manipulation by caregivers & pressure redistribution for the patient

#### EFFECT:

The unique combination of positive air displacement, fluidized conformational positioning<sup>®</sup> and handle set helps position patients in a neutral body alignment, redistributes pressure & promote better caregiver ergonomics when turning/boosting patients

### Mölnlycke Tortoise Turning and Positioning System





#### What We Do... **Provide Solutions to Top Health Care Challenges**

Problem / Challenge	People Impact	Financial Impact	Clinical Impact	Mölnlycke Solutions
Managing Chronic Wounds <i>Value Based Purchasing</i> (VBP)	<ul> <li>~ 6.5M patients annually<sup>1</sup></li> </ul>	<ul> <li>~ \$25B spent annually<sup>1</sup></li> <li>2% Penalty (VBP)<sup>2</sup></li> </ul>		Mepilex <sup>®</sup> Border Hepilex <sup>®</sup> Border Hepilex <sup>®</sup> XT Hepilex <sup>®</sup> Border Ag+
Preventing Surgical Site Infections Hospital Acquired Conditions (HAC) VBP	<ul> <li>~ 160K to 300K patients annually<sup>3</sup></li> <li>2% to 5% of patients undergoing inpatient surgery<sup>3</sup></li> </ul>	<ul> <li>\$3.5B - \$10B annually<sup>4</sup></li> <li>1% Penalty (HAC)<sup>5</sup></li> <li>2% Penalty (VBP)<sup>2</sup></li> </ul>	THE PARTY	Biogel®     Image: Biogel®
Preventing Hospital Acquired Pressure Ulcers HAC Hospital Readmission Reduction Program (HRR) IMPACT Act	<ul> <li>~ 2.5M patients annually<sup>6</sup></li> <li>~ 60K patient deaths annually<sup>6</sup></li> <li>3.5 - 4.5% of all hospitalized patients (and rising)</li> </ul>	<ul> <li>\$9.1B - \$11.6B annually<sup>6</sup></li> <li>1% Penalty (HAC)<sup>5</sup></li> <li>3% Penalty (HRR)<sup>7</sup></li> <li>2% Reduction for non-reporting Skilled Nursing Facility - FY 2018 - IMPACT Act<sup>8</sup></li> </ul>		Image: Weight of the second
Preventing Caregiver Injury Sharps Injury Prevention	<ul> <li>48 percent of injuries often relate to patient handling<sup>9</sup></li> <li>385,000 needlestick injuries per year <sup>10</sup></li> </ul>	<ul> <li>Total annual Workmen's Comp.</li> <li>~ \$2B annually<sup>9</sup></li> <li>Average \$22.3K for claims involving lost time<sup>9</sup></li> </ul>		Biogel® PI Indicator® Underglove Turning & Positioning System

#### Sources:

- Järbrink et al. Systematic Reviews (2016) 5:152
- https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/downloads/Hospital\_VBPurchasing\_Fact\_Sheet\_ICN907664.pdf 2
- Infect Control Hosp Epidemiol. 2014 June ; 35(6): 605-627 3.
- 4
- https://www.sciencedai.ly.com/releases/2017/01/170119161551.htm https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/HAC-Reduction-Program.html 5
- https://www.ahrq.gov/professionals/systems/hospital/pressureulcertoolkit/putool1.html 6. https://www.qualitynet.org/dcs/ContentServer?c=Page&pagename=QnetPublic%2FPage%2FQnetTier2&cid=1228772412458 7
- 8
- https://www.ahcancal.org/advocacy/issue\_briefs/Issue%20Briefs/IMPACT-IB.pdf
- 9. Bureau of Labor Statistics, 2011 Data
- 10. https://www.cdc.gov/sharpssafety/pdf/sharpsworkbook\_2008.pdf



MHC-2018-36565 FEB 2018