TSN Webinars

Preventing Hospital Events for Trauma Patients:

Finding and Fixing the Root Causes of Pressure Injuries and Other Hospital-Acquired Complications

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Jan Powers

PhD, RN, CCRN, CCNS, NE-BC, EBP-C, FCCM, FAAN
Director of Nursing Research and EBP
Clinical Nurse Specialist
Parkview Health / Fort Wayne, IN
jan.powers@parkview.com

Blake Havers

Key Account Manager
Aspen Medical Products
bhavers@aspenmp.com

Hospital Acquired Complications: Medical Device Related Pressure Injuries and Effective Mitigation Strategies

Objectives

- Overview of complications with trauma patients
- Review pressure injury incidence and risk factors associated with medical devices
- Discuss developing practice changes for preventing complications

Trauma patient complications

- AKI – ATN
- Volume overload – edema, inflammation, compartment syndrome
- Infections
  - SSI
  - Hospital acquired pneumonia
  - CAUTI / CLABSI
  - Sepsis
- DVT
- Pressure injury

MDR-PI incidence

- MDR-PIs are a growing concern due to their social and economic costs; they can lead to increased hospital stays and medical care costs
- Medical devices that can result in MDRPIs:
  - Endotracheal tubes, Nasogastric tubes, Antiembolism stockings, Bedpans, Bite blocks, Cervical collars, Fecal containment devices, Foley catheters, Orthopedic braces and splints
- 19.3 – 30.6% incidence

Jung YK, Hahn HM, Park DH. Factors influencing the severity of medical device-related pressure injuries: Pressure injury staging comparison. Int Wound J. 2023 Sep;20(7):2735-2741.

Temiz, Z., Aydın Sayılan, A., Sayılan, S. Incidence, severity and characteristics of medical device-related pressure injuries in adult intensive care patients: A single-centre, cross-sectional study, Journal of Tissue Viability, 2024; 33(2): 220-224,

Research r/t PI and trauma patients

- Individuals admitted to a trauma unit (n = 342), the incidence of pressure injuries after removal of the extrication collar was 78.4% (95% CI 73.6% to 82.6%)
  - 64.6% (95% CI 59.3% to 69.7%) had indentation marks that matched the extrication collar location
- Another study (n = 254) patients admitted to a trauma unit with a back board, extrication collar and headblocks in situ reported a PI rate of 28.3% (95% CI 22.8% to 34.3%)
  - 90% r/t a medical device and 55.7% (95% CI 44.7% to 66.3%) of those r/t to immobilizing devices, primarily cervical collars; approximately 40% of PIs were full thickness pressure injuries
- A third study found the incidence of c-collar-associated pressure injuries in 484 trauma patients during hospital stay was 6.8%; all patients had extrication collar with an acute care collar within 8 hours of admission
- PIs r/t c-collars occur most often on back, shoulders, chest, chin and occiput

1.Ham WHW, Schoonhoven L, Schuurmans MJ, Leenen LPH. Pressure ulcers, indentation marks and pain from cervical spine immobilization with extrication collars and headblocks: An observational study. Injury, 2016; 47: 1924-1931.
2. Ham WHW, Schoonhoven L, Schuurmans MJ, Leenen LP. Pressure ulcers in trauma patients with suspected spine injury: A prospective cohort study with emphasis on device-related pressure ulcers. Int Wound J, 2016.
3. Patel M, Como J, Haut E. The Devil Is in the Details When Removing Cervical Collars After Blunt Trauma. JAMA Surg, 2018; 153(7): 632-633. 62. Rogers L. Rigid cervical collar in pre-hospital care. Journal of Paramedic Practice, 2017; 9(6): 1-5

Device related skin breakdown

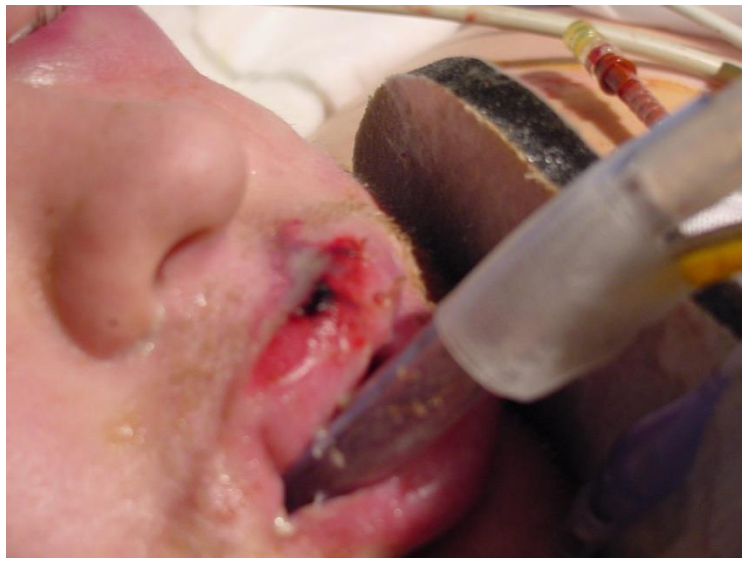
- NG / Feeding tubes
- CPAP / BiPAP
- ETT
- Trach ties
- Cervical collars
- Backboards
- Tape
- TED Hose / SCDs
- Splints
- Tubes / Drains
  - G-tubes
  - Urinary catheters
  - Abdominal drains

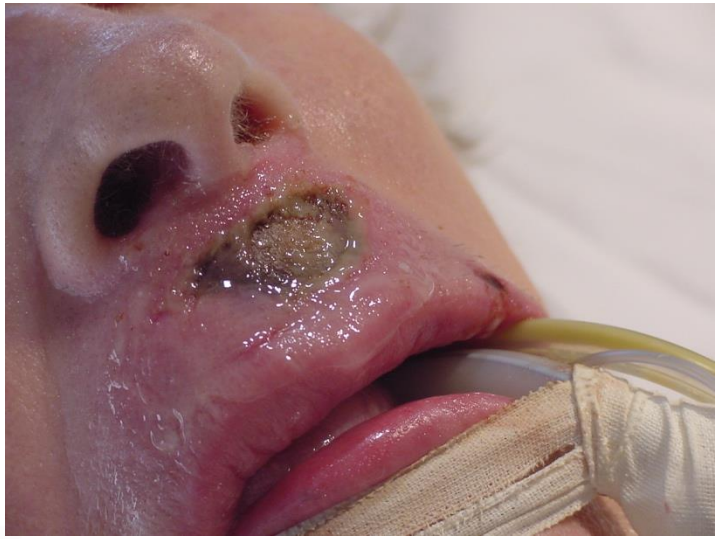
Medical device related pressure injuries

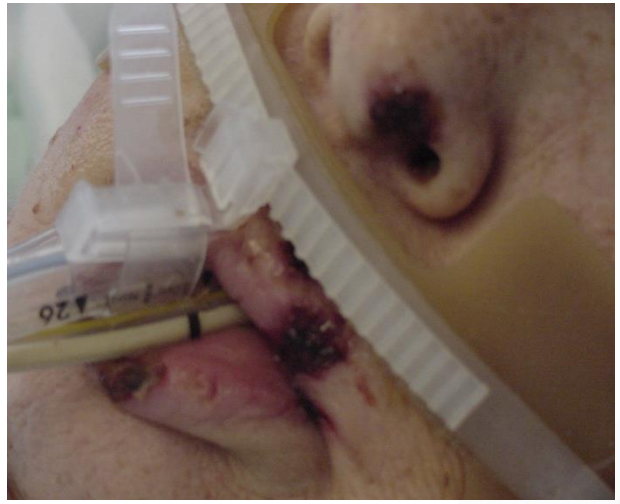
- Prevalence of MDR PIs from a large acute-care data set (N=86,932 patients)
  - 1,631 (9.1%) were described as “device-related”
  - 785 were acquired in the facility and 360 were full-thickness wounds.
- 70.3% of PIs from medical devices were on the head, face, or neck from cervical collars, oxygen tubing, and nasogastric tubes, and 20.3% were on the heel, ankle, or foot from immobilizers, support stockings, and boots (VanGlider et al)
- Devices for oxygen delivery and airway management highest reported PIs

VanGilder et al REF, Black J, Kalowes P Chronic wound care management and research. 2016 Volume 2016:3 Pages 91—99; Ayer et al Apold and Rudrych

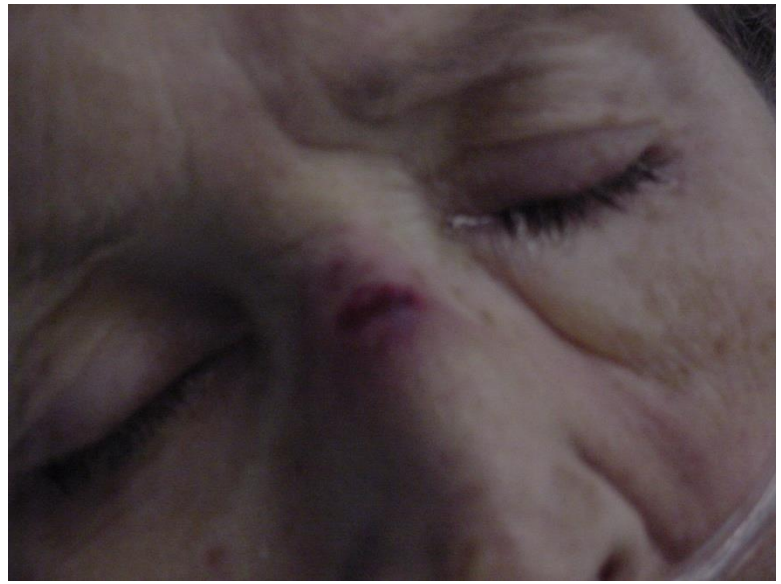
- Avoid pressure on nares
- Diligent assessment
- Reposition frequently
- Securing devices, tape

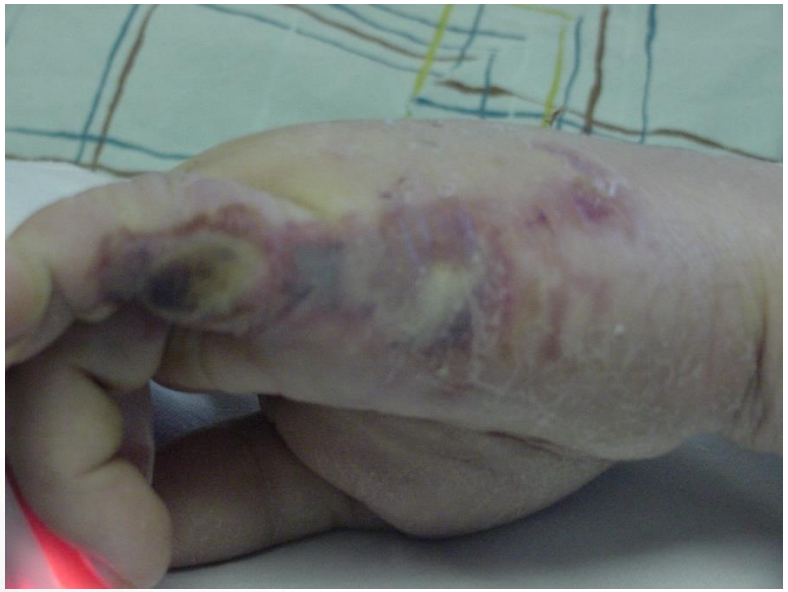






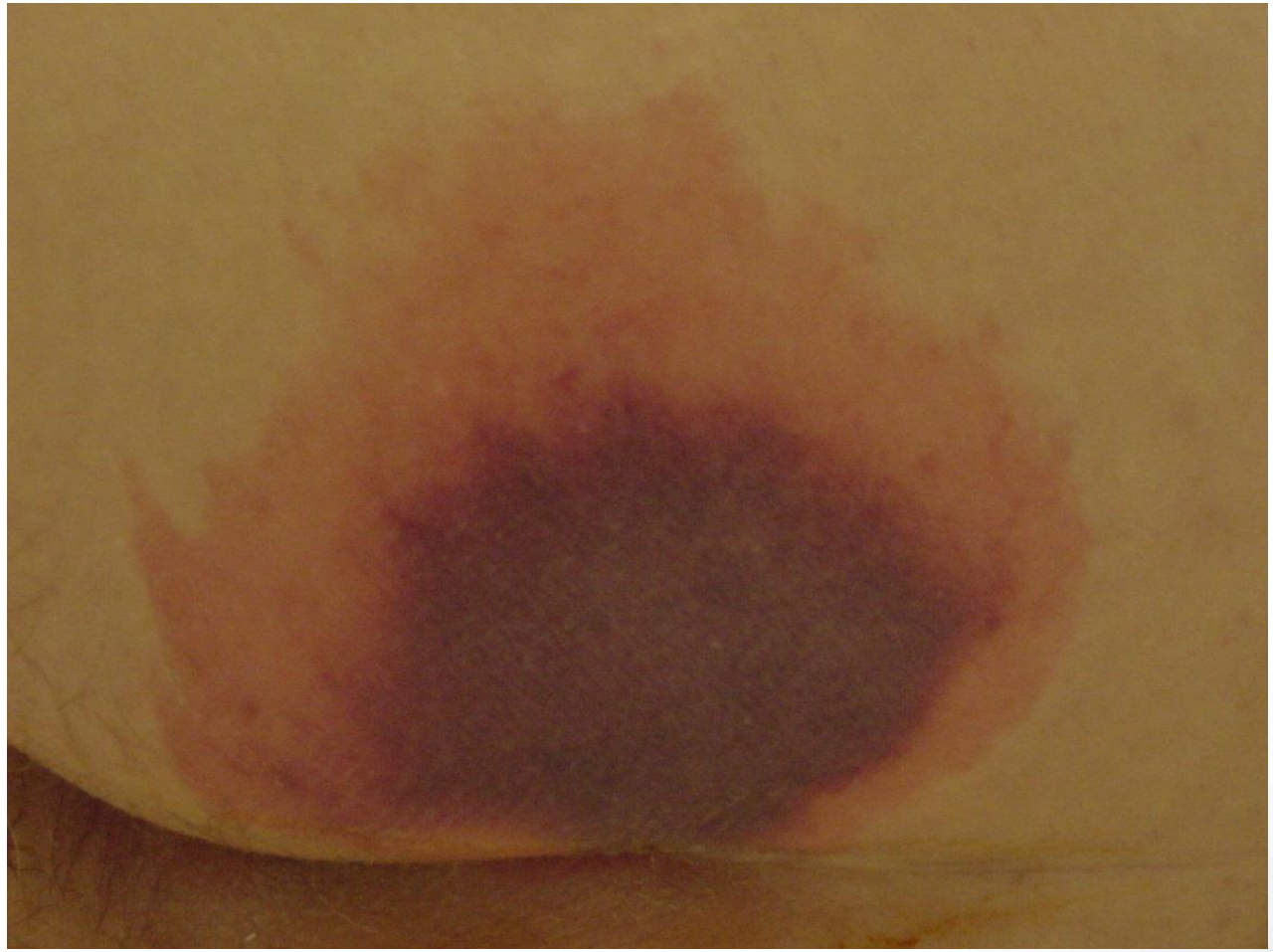
- Padding
- Hydrocolloid
- Reposition frequently
- Topical treatment





- Inspect pressure areas frequently
- Edema
- Padding
- Treatment
  - Topical
  - Relieve pressure

- Get off backboard ASAP



Quick poll

For patients wearing cervical collars, the incidence of PIs is:

- <5%
- 10-20%
- 25-45%
- >50%

PI related to c-collars

- Occiput PIs only 1% of all pressure ulcers
- Patients wearing a cervical collar the incidence of PIs ranges from 24 -44%
- Incidence higher for those in c-collar longer
  - Prolonged pressure
  - Excessive moisture

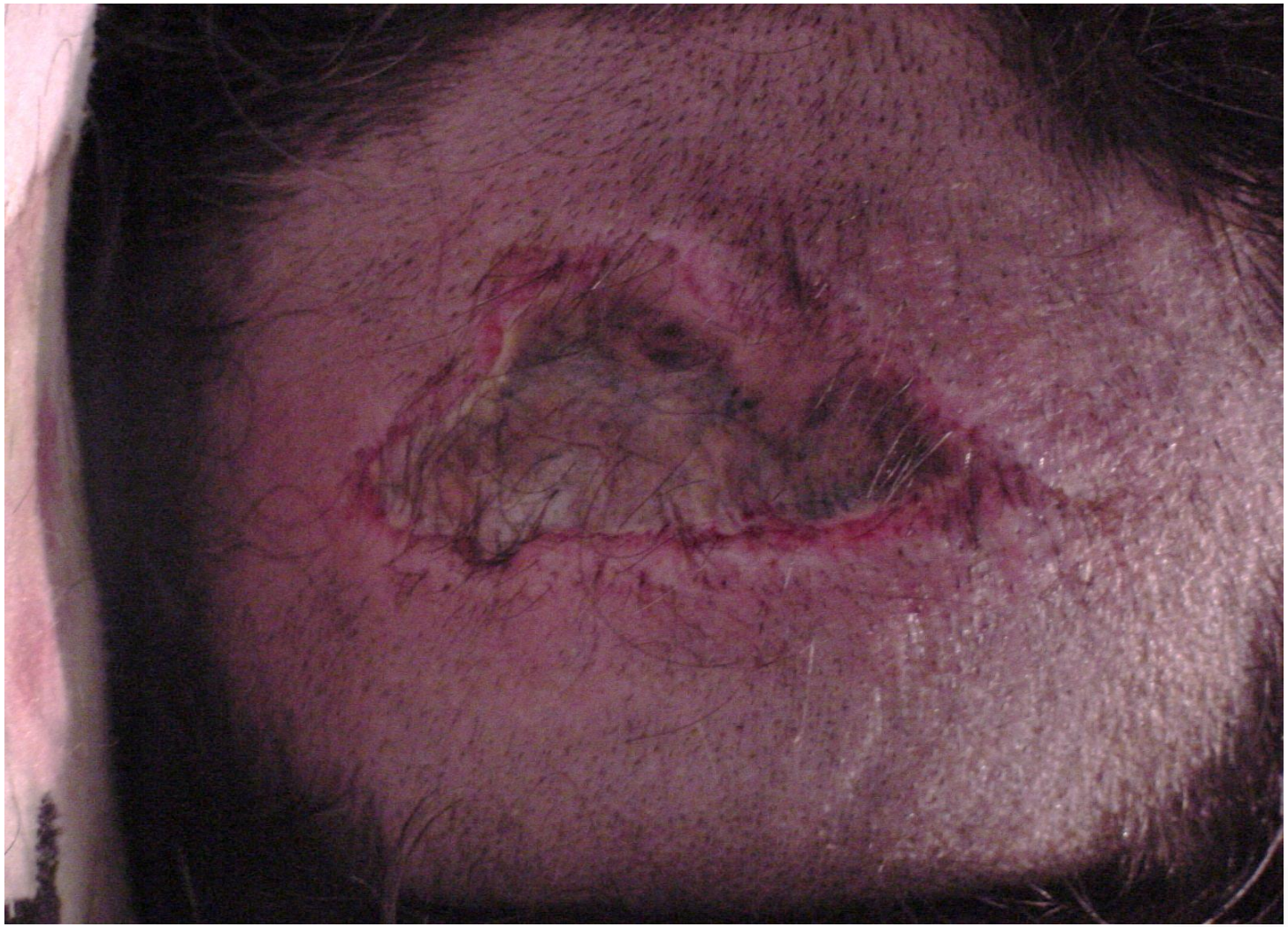
Molano Alvarez, E. et al. Pressure sores secondary to immobilization with cervical collar: a complication of acute cervical injury. Enferm Intensiva, 2004; 15(3): 112-122.

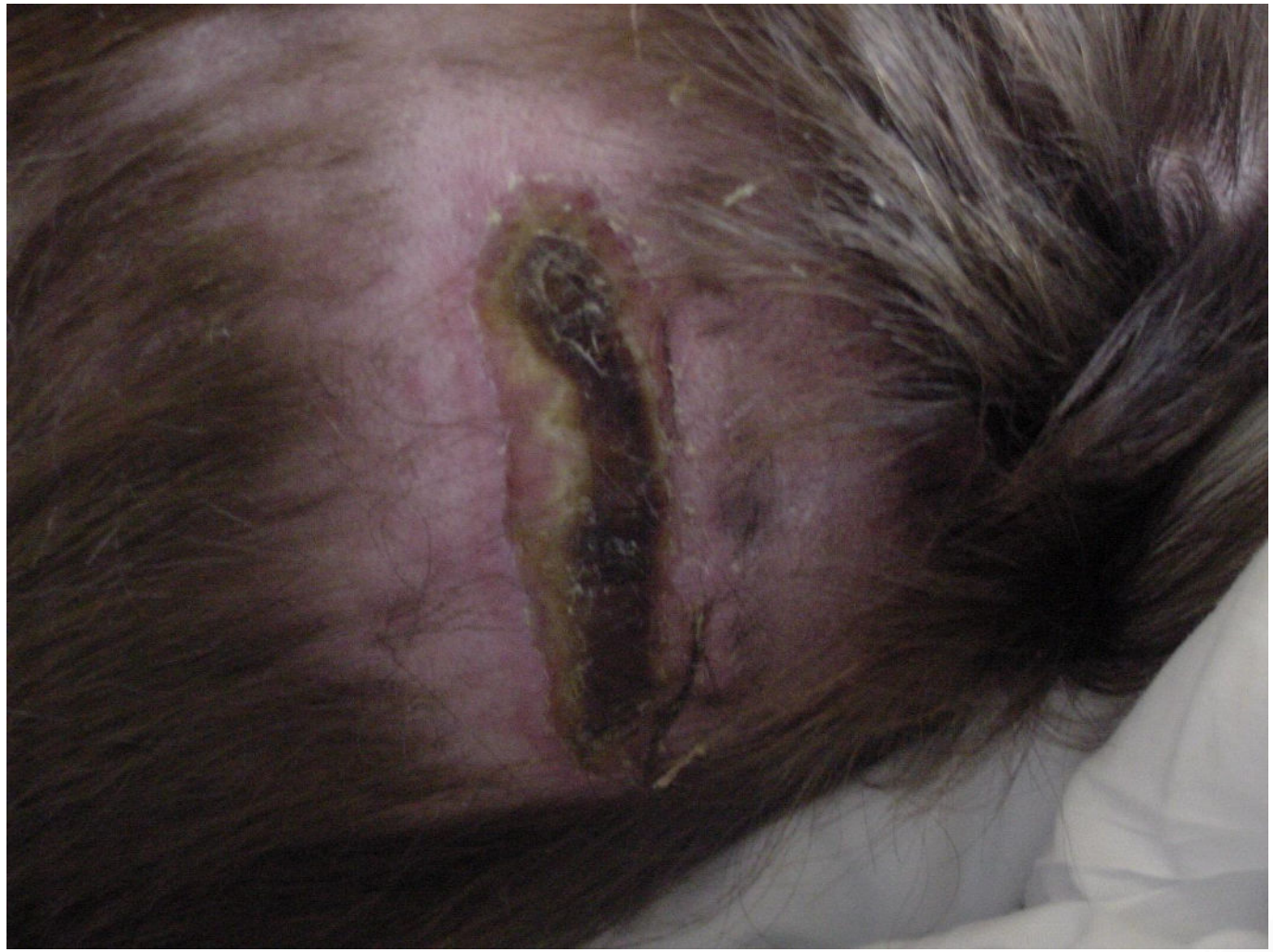
Chendrasekhar, A. et al. An evaluation of the effects of semirigid cervical collars in patients with severe closed head injury. Am Surg. 1998; 64(7): 604-606.
Jacobsen 2008
Ham 2014

C-collar PI

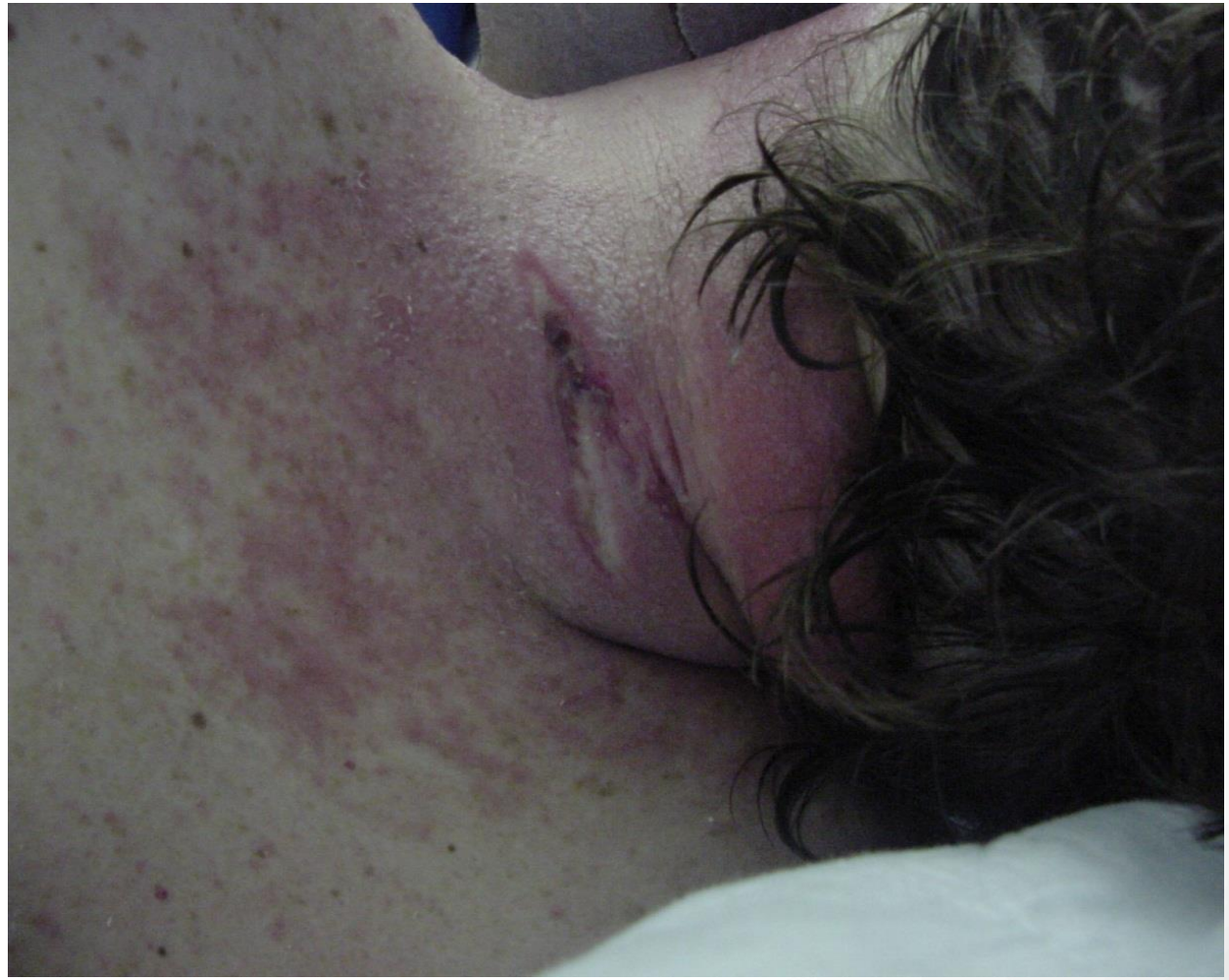
- Pressure injury development directly associated with a C-collar
  - Increased by 33% with each repositioning episode (odds ratio 1.328, 95% confidence interval 1.024-1.723, P = .033).
  - Time in the C-collar (10.4 to 2.5 days, P = .002) and length of stay in intensive care unit (ICU) (20.1 to 16.1 days, P < .001) were associated with pressure injury development
- Patients with C-collar devices are a vulnerable group at risk for pressure injury development because of their immobility and length of ICU stay

Wang HN, Campbell J, Doubrovsky A, Singh V, Collins J, Coyer F. Pressure injury development in critically ill patients with a cervical collar in situ: A retrospective longitudinal study. Int Wound J. 2020 Aug;17(4):944-956.





- Trach ties, patient with increasing edema
- Yeast under collar
- Frequent assessment, changes, cleaning



JBI scoping review of literature

- Purpose: to identify preventative interventions, protocols or guidelines for trauma patients at risk of cervical collar-related pressure ulcers
- Cervical collars used to stabilize cervical spine injuries in trauma patients; the longer a patient wears a c- collar, the more likely to develop a PI
- Trauma patients of all ages who presented to the ED or ICU with an extrication or field collar in place were included in this study
- 6 of 7 studies identified 28 risk factors associated with the development of c-collar-related PI
  - 2 studies reported elimination of cervical collar-related pressure ulcers
  - 3 studies reported reduced incidence in cervical collar-related pressure ulcers
  - 1 study reported a reduction in cervical collar wear time from 14 days to 7.7 days

Lacey, L., Palokas, M., Walker, J. Preventative interventions, protocols or guidelines for trauma patients at risk of cervical collar-related pressure ulcers: a scoping review. JBI Database of Systematic Reviews and Implementation Reports, 2019; 17(12): 2452-2475.

Study	Method	Population	Location
Blaylock[16]	Descriptive, continuous quality improvement study	Trauma patients	Northwest Ohio level 1 trauma center
Powers[10]	Quality improvement project taskforce	Trauma patients	Wishard Memorial Hospital, Indianapolis, Indiana
Powers *et al.*[2]	Cohort prospective descriptive study	Trauma patients	Neuro-ICU, adult critical care, pediatric ICU at a large level 1 trauma center and tertiary referral center
Ackland *et al.*[7]	Cohort, retrospective	Major trauma patients	Emergency department, ICU, trauma ward, Alfred Hospital, Melbourne, Australia
Jacobson *et al.*[5]	Quality improvement study	Trauma patients	Surgical trauma critical care Unit in a level 1 trauma center
Ham *et al.*[17]	Cohort, retrospective study	Critical, surgical, and trauma patients	12-bed surgical trauma ICU at a level 1 trauma center in Queens, New York, USA
Ham *et al.*[12]	Systematic review 13 total studies: 9 experimental studies, 4 descriptive studies	Trauma patients in spinal immobilization and healthy volunteers in spinal immobilization	Varied

Scoping review key points

- Protocols with a multidisciplinary approach are available and serve as guidance for proper treatment and care of trauma patients' wearing of cervical collars
- Standardized cervical collar protocols should highlight the importance of early identification of trauma patients who may be at risk
- Risk factors identified in this review should be assessed and addressed to prevent c-collar related PIs from developing in trauma patients
- Preventative interventions identified in the protocols in this scoping review can be used to create a standardized approach to care for patients in cervical collars

Risk factors

General

- ICU admission
- MV and Ventilation time
- Shock / Vasopressors
- Fluid overload
- Agitation
- Excessive moisture
- Braden scale score 16 or less
- Pressure, friction and shear
- Nutritional status
- General health status
- Skin perfusion
- Deviant body temperature
- Oxygenation
- Advanced age
- Sensory perception
- Level of consciousness

C-collar related

- Length of prehospital transport / Time in extrication collar
- Length of c-collar application / Number of days in c-collar
- Time to c-spine clearance
- Necessity for cervical MRI
- Improper collar fit
- Edema
- High ISS
- LOS
- ICP monitoring
- Immobility
- Excess moisture

Prevention strategies

Preventative interventions found in the 7 studies included in the review were:

- Removal of the extrication collar
- Cervical spine clearance
- Nursing education
- Routine nursing care
- Use of products such as air mattresses
- Multidisciplinary approach to care

Quick poll

How often should skin under c-collar be assessed and skin care be performed?

- Daily
- Every 8 hours
- Every 12 hours
- PRN

Cervical Collar Best Practices for Prevention of Pressure Injuries

Cervical collar prevention MDR-PI

- Rigid cervical collars intended to maintain alignment short term and should be removed and changed to … collar ASAP
- Appropriate sizing is essential for preventing spinal cord injury as well as decrease skin complications
- Fit should be assessed routinely
- Monitor edema and patient position changes
- Skin assessment every 12 hours for redness, irritation, breakdown and moisture; focus on potential pressure areas (occiput, ears, shoulders, chin, clavicle, chest)
- Skin care includes cleaning under collar, assess for areas of redness and fit – assure fit and padding as needed
- C-collars with removal pads: Pads should be changed every 24-48 hours (clean and reuse pads)

**Always maintain cervical spinal cord alignment when removing or repositioning c-collar (i.e., during assessment and pad changes).

Appropriate fit

- Maintain neutral alignment
- Prevent undue occipital pressure
- Prevent chin and shoulder pressure

Cervical collars

- Remove from backboard ASAP – ideally within 20-30 minutes
- If c-collar anticipated for longer than 12 hours – change to hard collar with pressure-reducing pads
- Philadelphia collars and extrication collars – increased pressure and should be removed ASAP
- Use collars with low pressure
- Skin care q12hrs. Diligent assessment
  - Skin should be assessed and documented at least once a shift per hospital policy
- Change pads with cervical collars, or clean
  - Pads should all be changed and washed at least once a day; moist pads should be changed as frequently as possible to prevent skin breakdown

Patient education and home self-care

- May have great practices in hospital, but these must also translate to improved care after discharge
- Discharge education including understanding and hands-on demonstration is essential (patient and caregiver)
  - Skin care (Care and Assessment), Wearing, Posture, Activities
- DME and resources should be provided to the patient upon discharge
- Showering
  - Philadelphia collar for showering, have someone help change the collar, dry skin thoroughly after shower; change collar back to hard collar with pressure-reducing pads
- Skin care assessment and care

Identification of solution

- Problem identification
  - Identify etiology and risk factors
  - Clearly delineate true problem
  - Gaps in care that lead to complications
- People
  - Training, skills, knowledge, accountability
- Product
  - Right product
- Process
  - Evidence based
  - Standardization
  - Look at processes that don't rely as much on 'humans' - nudges

Summary

- Many complications with trauma patients
  - Most are easily preventable with diligent conscientious nursing care
  - MDRPIs can be a significant complication affecting long-term outcomes, reimbursement and cost of care and quality for patients.
  - Cervical collar related PIs are a devastating complication to patients but are easily preventable
- Protocols should be multidisciplinary and include strategies for c-spine clearance, care of cervical collars and early removal

References

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Larson, S., Delnat, AU, Moore, J. The use of clinical cervical spine clearance in trauma patients: a literature review. J of Emergency Nursing, 2018; 44(4): 368-374.

Plaisier, B., Gabram, SGA, Schwartz, RJ, Jacobs, LM. Prospective evaluation of craniofacial pressure in four different cervical orthoses. J Trauma, 1994; 37(5): 714-720.

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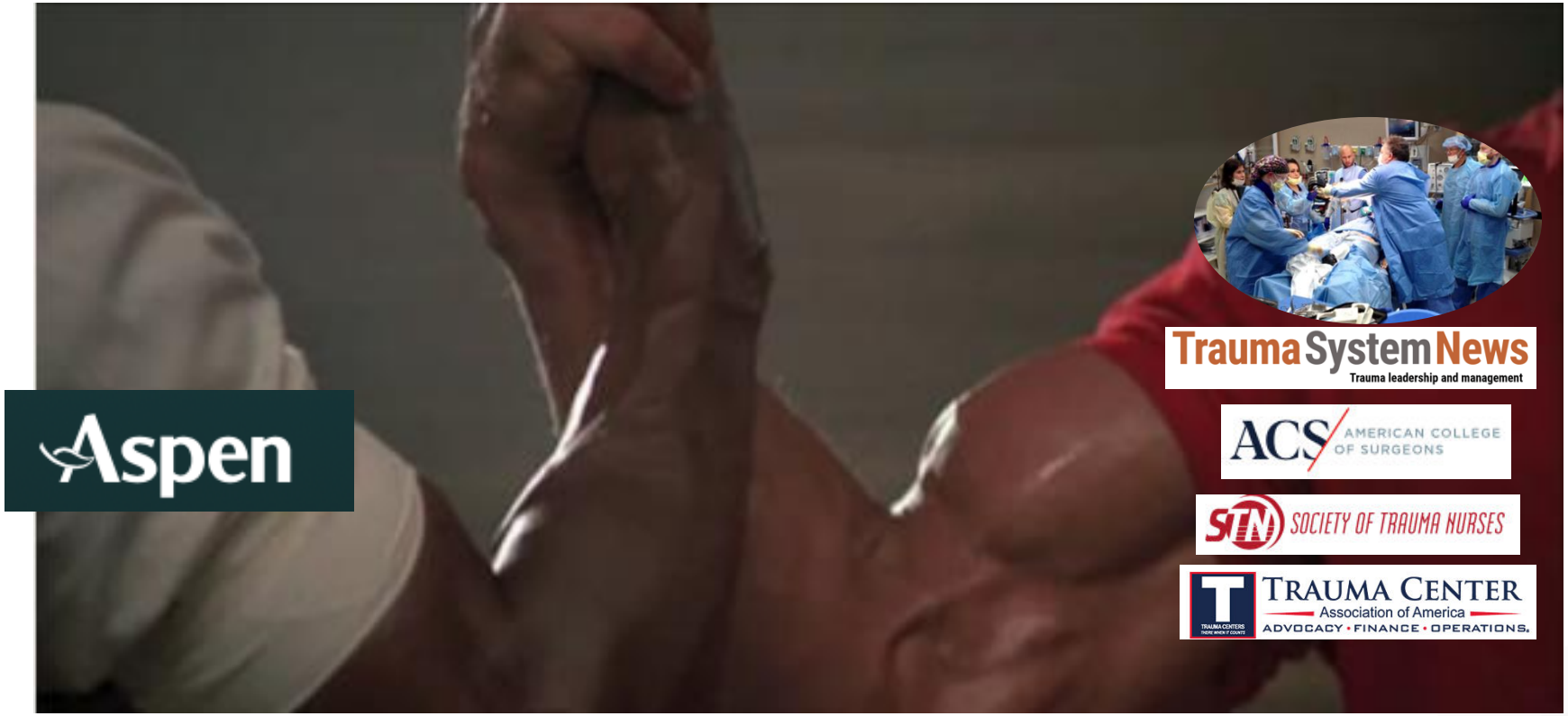
Working with Aspen to prevent cervical collar related tissue injury

Topics

- Overview of Aspen's role as your vendor partner
- Steps to changing collars and protocols
- Education is key: What types does Aspen offer?

Aspen's role as your vendor partner



What does a product/protocol change entail?

- Needs identification
- Clinical and supply chain validation
- Process/protocol identification
- Implementation

Needs identification

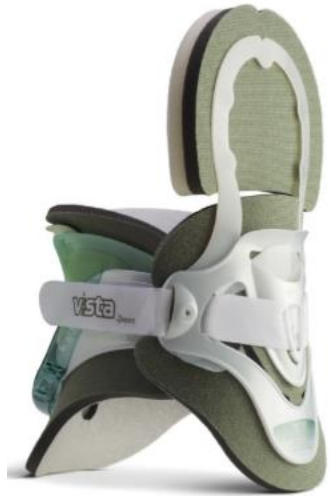
- What's cuing the change?
  - Action plan?
  - Administration change?
  - Item consolidation?
- What are the goals and how can we measure success?
  - Provider competency target (% of staff)
  - Reduction of collar DRPI?
  - Protocol development

Clinical and purchasing validation

- Clinical validation
  - Neurosurgery ➡ Trauma leadership ➡ SL leadership
- Supply chain cost benefit analysis
  - Cross reference
  - Contract evaluation (refer to previous webinar)

Process and protocol identification

- The big 3:
  - Extrication/field collar removal: Pre or post imaging?
  - Pad changing protocol: As needed vs. every shift/day?
  - Identifying and training fitters
- Polytrauma care: ICU back panel
- Lippincott/training resources



Implementation

- Epic/Cerner/EMR updates
- Target go-live date
- Work with education on comp forms/validation tools
- Create education schedule and align resources

Education menu

- Roving in-services with peer-to-peer RN trainers
- Super-user courses
- Resident engagements
- Skills day
- QR codes on collars

Thank You