Best Practices in SCI Care to Maximize Patient Outcomes

Diane Ulmer, OTR/L
dulmer@madonna.org

Disclosure

- No potential and/or actual conflict of interest has been identified for the planners and presenters of this educational event.

Objectives

Learners will be able to identify 2 key prehospital practices in care of the SCI patient

Learners will review clinical practice guidelines available for early management of the SCI patient

Spoiler Alert

https://youtu.be/Auf4CQ5AYUA

TRAUMATIC SPINAL CORD INJURY
Demographics at a Glance 2025

NSCISC
National Spinal Cord Injury Statistical Center
Spinal Cord Injury Model System

308,620
(Range from 259,374 to 393,913)
ESTIMATED PERSONS CURRENTLY LIVING WITH SPINAL CORD INJURY

18,421
ESTIMATED NEW INJURIES EACH YEAR IN THE UNITED STATES

SEX AT TIME OF INJURY
SINCE 2015

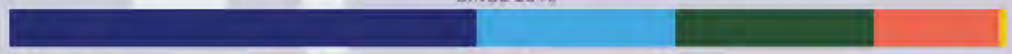
55.1%	White Not-Hispanic or Latino
25.1%	Black Not-Hispanic or Latino
14.6%	Hispanic or Latino
2.7%	Asian
1.9%	Other
.6%	Native American

CAUSES OF INJURY
SINCE 2015

37.3% Vehicular
32.0% Falls
15.5% Violence

7.7% Sports
3.7% Medical
3.8% Other

NEUROLOGICAL LEVEL AND EXTENT OF INJURY
SINCE 2015



47.6%	20.3%	19.6%	12.1%	.5%
Incomplete Tetraplegia	Incomplete Paraplegia	Complete Paraplegia	Complete Tetraplegia	Normal

AVERAGE TRENDS OVER TIME	1970s	SINCE 2015
Age at Injury	29 Years Old	44 Years Old
Acute Hospital Lengths of Stay	30 Days	19 Days
Rehabilitation Lengths of Stay	110 Days	37 Days

Citation: National Spinal Cord Injury Statistical Center, Traumatic Spinal Cord Injury Demographics at a Glance 2025. Birmingham, AL: University of Alabama at Birmingham, 2025.

Everyone matters to the final outcome

- First Responders
- Emergency Department
- Trauma team
- Acute care
- LTACH
- Rehab team
- Community
- Insurance providers
- Vendors
- YOU!

Prehospital Practices Matter- Shout out!

- New Trauma and Community Members

Every decision made,
every technique learned
not only impacts tomorrow,
but life 20 years from now.

Complete a Gap Analysis

Table 11. *ACS TQIP Spine Injury Best Practices Guidelines* gap analysis

Management Guidelines	Met	Partially Met	Not Met	Priority	Comments
Trauma activation criteria and the inclusion of potential spinal injuries					
Spinal Injury Classification Systems is utilized in the documentation standards					
Pre-hospital care integration and spinal motion restriction indications					
Resuscitation guidelines and specific emphasis on hypovolemic, neurogenic, and spinal shock					
Transfer priorities related to spine injury(ies)					
C-spine clearance process, removal of the cervical collar, and documentation					
Concomitant injuries and their priority of coordination with spinal injuries					
Measures to prevent hypoperfusion and hypothermia					
Measures to maintain a MAP between 85 and 90 mmHg					
Coordination of patient monitoring during diagnostic imaging (CT and MRI)					
Specific imaging recommendations for suspected spinal injuries (SCI and vertebral fractures) and concomitant BCVI					
Management recommendations for injuries to specific regions: cervical, thoracolumbar, and sacral					
Operative indications for spinal injury management					
Critical care management of spinal injuries					
Recommendations for early tracheostomy					
Bradycardia and potential causes, treatment modalities					
Pharmacologic management of spinal injuries					
Respiratory therapist role in spine injury management					
Rehabilitation's team role in the ICU and management of spine injuries					
Coordination of early mobilization					
Analgesia management					
Management of co-morbidities and prevention of hospital events associated with spinal injuries					
Discussion of the goals of care with the patient and family					
Care coordination and handoff during transitions of care					
Discharge planning coordination and patient's/ family's understanding of follow-up care and follow-up appointments					
Coordination of discharge from acute care to inpatient rehabilitation facility					
Expected long-term outcomes based on spine injury level					
Psychological support for acute stress for the patient and family					

Initial Management

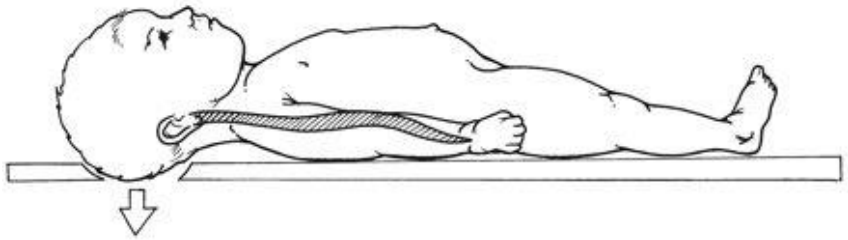
- Backboard Protocols
- Do you have what you need? Collar size etc.
- Consider removal of extrication devices during transport only if able to minimize unnecessary movement of the patient
- Skin assessment after transfer off board
- Transfer off hard board while awaiting transfer to another facility
- Consider padded board or bean bag boards for pediatrics

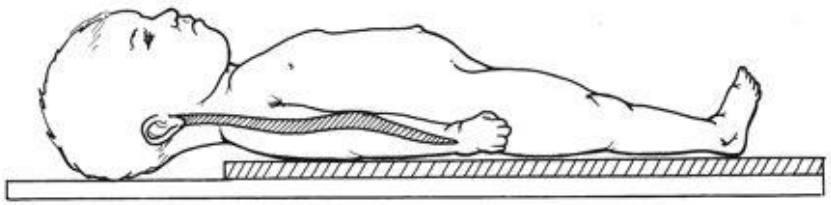
Early acute management in adults with SCI: a clinical practice guideline. PVA 2008

Best Practice Guidelines-Spine Injury. Am College of Surgeons 2022

Figure 2a. Young Child Positioned On A Standard Adult Backboard

Because the occiput of the child is more prominent and the head is larger relative to the body as compared to an adult, the neck becomes flexed and the cervical spine does not assume a neutral alignment.



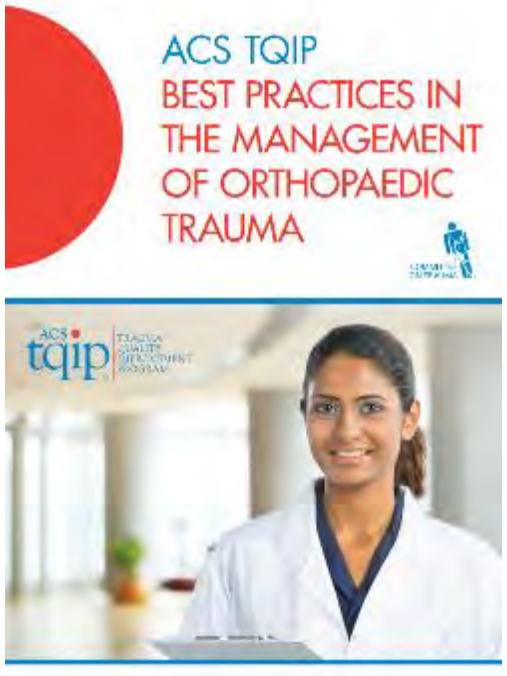


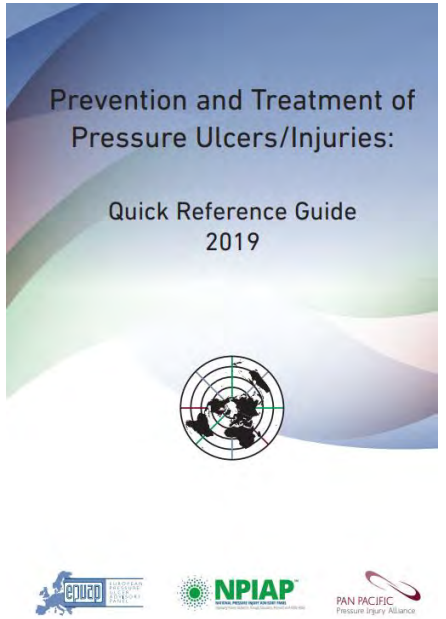
Easter, et al

Pediatric Readiness

- National Pediatric Readiness Project
  - Emscimprovement.center
- Online Pediatric Readiness Assessment www.pedsready.org
- Pediatric-Epidemiology_2022.pdf

Clinical Practice Guidelines





PVA
Paralyzed Veterans of America

SCIRE Professional
SPINAL CORD INJURY RESEARCH EVIDENCE

APPENDIX B: TRANSFER WORKSHEET

Here is an example of a worksheet that can be used by hospitals to predetermine the specific orthopaedic injuries they are appropriately resourced to optimally manage.

Orthopaedic Trauma Worksheet

Indicate which orthopaedic conditions may be managed at your hospital.

Chest

- ☐ Flail chest
- ☐ Multiple rib fractures
- ☐ Scapular fracture
- ☐ Clavicular fracture
- ☐ Sterno-clavicular dislocation

Spine

- ☐ Cervical spine fracture/ dislocation
- ☐ T/L spinal fracture/dislocation with neuro impairment
- ☐ Vertebral body fracture
- ☐ Vertebral burst
- ☐ Spinal process fracture
- ☐ Compression fracture

Pelvis

- ☐ Open pelvic fracture
- ☐ Stable pelvic ring disruption
- ☐ Unstable pelvic ring disruption
- ☐ Acetabular fracture
- ☐ Pelvic fracture with shock

Extremeties

- ☐ Open long bone fracture
- ☐ Two or more long bone fractures
- ☐ Fracture or dislocation with loss of distal pulses
- ☐ Extremity ischemia
- ☐ Fracture with abnormal neuro exam
- ☐ Compartmental syndromes
- ☐ Shoulder dislocation
- ☐ Acromioclavicular fracture/dislocation
- ☐ Proximal humerus fracture
- ☐ Distal humerus fracture
- ☐ Elbow fracture/dislocation
- ☐ Forearm fracture

  Distal radius fracture

- ☐ Hand/wrist comminuted fractured with nerve involvement
- ☐ Carpal dislocation
- ☐ Metacarpal fracture
- ☐ Hand amputation
- ☐ Finger amputation
- ☐ Finger amputation involving phalange
- ☐ Phalanx fracture
- ☐ Hip fracture
- ☐ Femur fracture
- ☐ Knee dislocation
- ☐ Proximal tibia fracture
- ☐ Distal tibia fracture

  Pilon fracture

- ☐ Ankle fracture
- ☐ Talus fracture
- ☐ Calcaneus fracture
- ☐ Midfoot dislocation
- ☐ Subtalar dislocation
- ☐ Metatarsal fracture
- ☐ Phalanx fracture

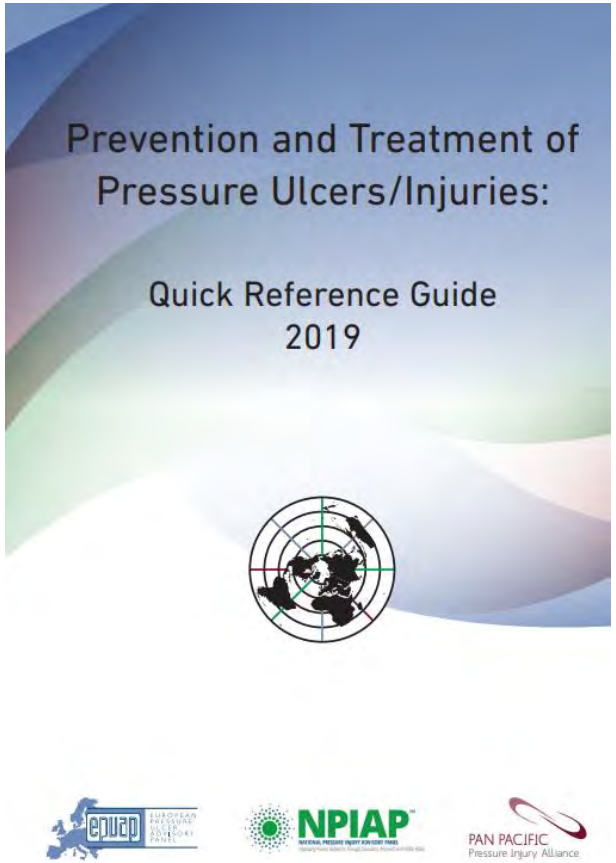
- ☐ Our hospital routinely transfers all of these orthopaedic conditions.

Consider mechanism of injury and presence of specific injuries that can lead you…

TBI- high risk for associated C-Spine Injury
Pelvic Fx
Rib Fx, sternal/clavicular fx
Seat belt shaped abdominal contusion

Initial Management

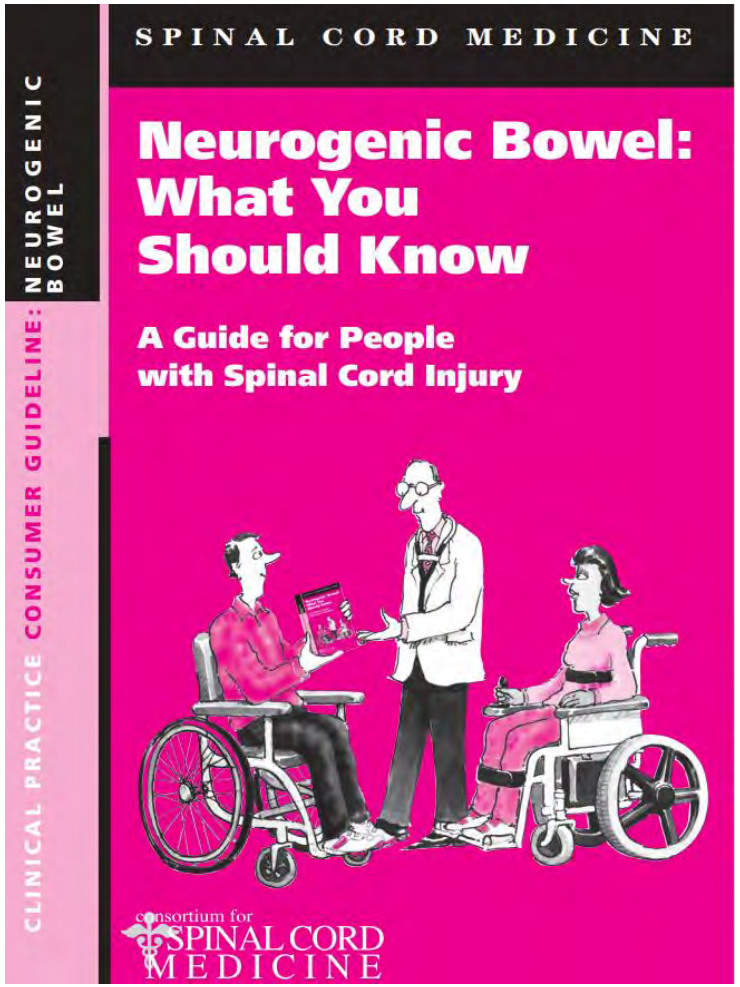
- Need a risk and skin assessment within hours
- Need appropriate pressure reduction mattresses in place from day 1—don’t wait for a wound!
- Implement protocols and standing orders for turning patients and for pressure relief when up
- Incontinence management plan



ISNCSCI

- Determine Level of Injury
- Includes Anorectal exam
- Standardized Assessment

Bowel Management



Paralyzed Veterans of America

consortium for SPINAL CORD MEDICINE
CLINICAL PRACTICE GUIDELINES

CLINICAL PRACTICE GUIDELINES:
SPINAL CORD MEDICINE

Management of Neurogenic Bowel Dysfunction in Adults after Spinal Cord Injury

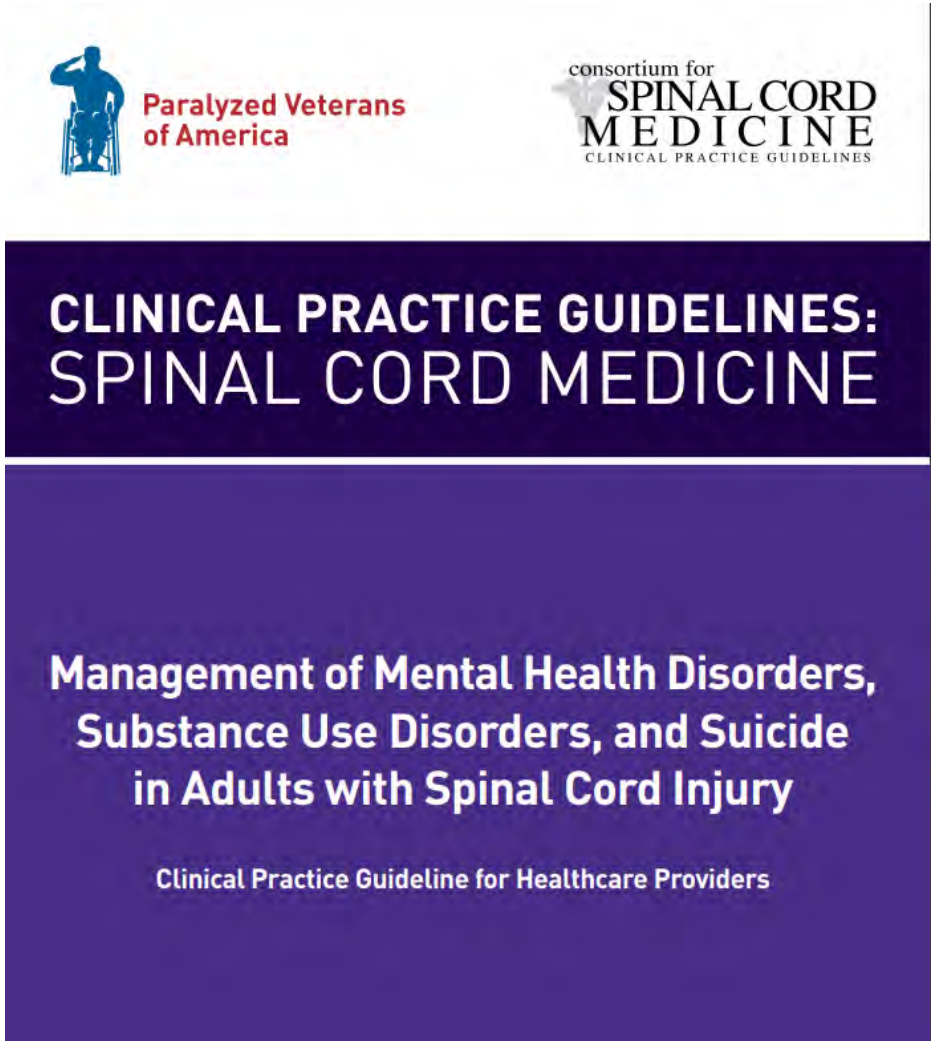
Clinical Practice Guideline for Health Care Providers

Bladder Management

- Indwelling catheterization important to monitor input/output for fluid balance
- Suprapubic catheter placement for individuals with urethral abnormalities/complications
- Intermittent Catheterization-
- 4-6x/24 hours. Avoid bladder volumes greater than 400ml
- External catheters/Purewick not appropriate for neurogenic bladders
- Avoid Overflow and bladder distension

Psychosocial Adjustment

- Coping looks different for everyone
- Preparing for transitions from ICU to rehab and rehab to community
- Grief and denial reactions
- Treat depression and anxiety aggressively
- Honest answers about medical condition
- Get psychology and spiritual care staff involved right away



Case Study

Admission photograph. Area of eschar over coccyx. Unable to determine how much tissue damage.

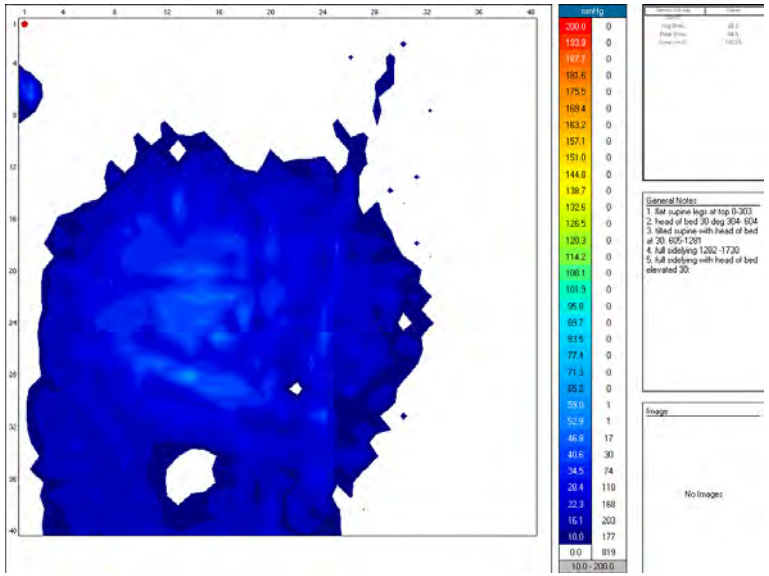
After debridement found exposed bone

Occipital pressure injury

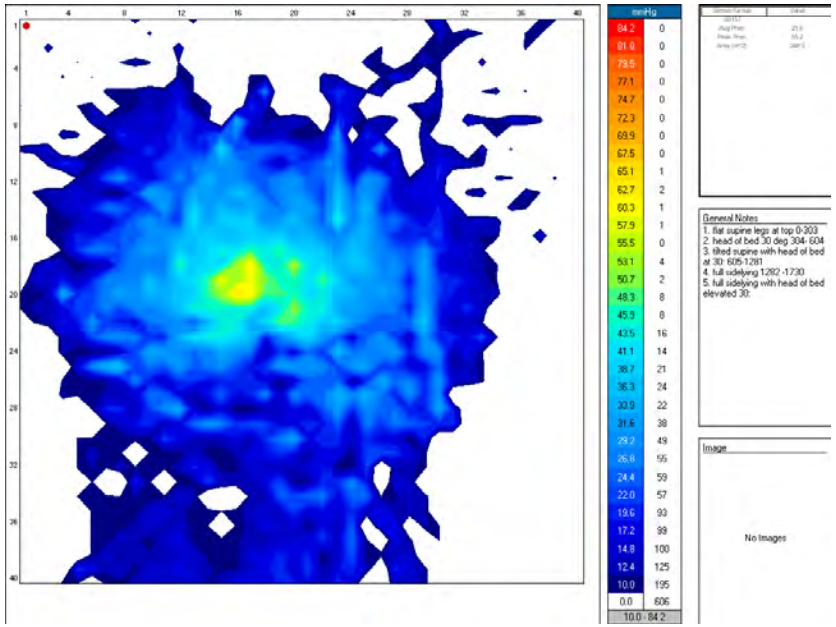
His journey

- Transfer to LTCH
- Transfer to acute care for Osteomyelitis/infection, required OR debridement, IV antbx, myocutaneous flap
- Readmitted to LTCH 11 days later for bed rest
- Back to acute rehab 7 weeks later
- Up/down schedule to be down every 4 hours for an hour
- Home with ongoing restrictions
- Return to work and parenting with restrictions

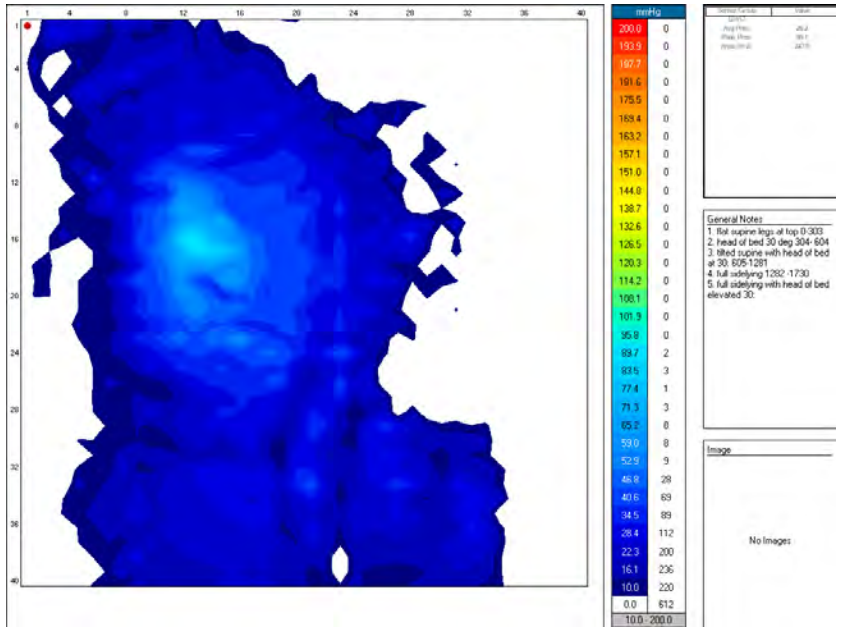
- Supine on flat bed



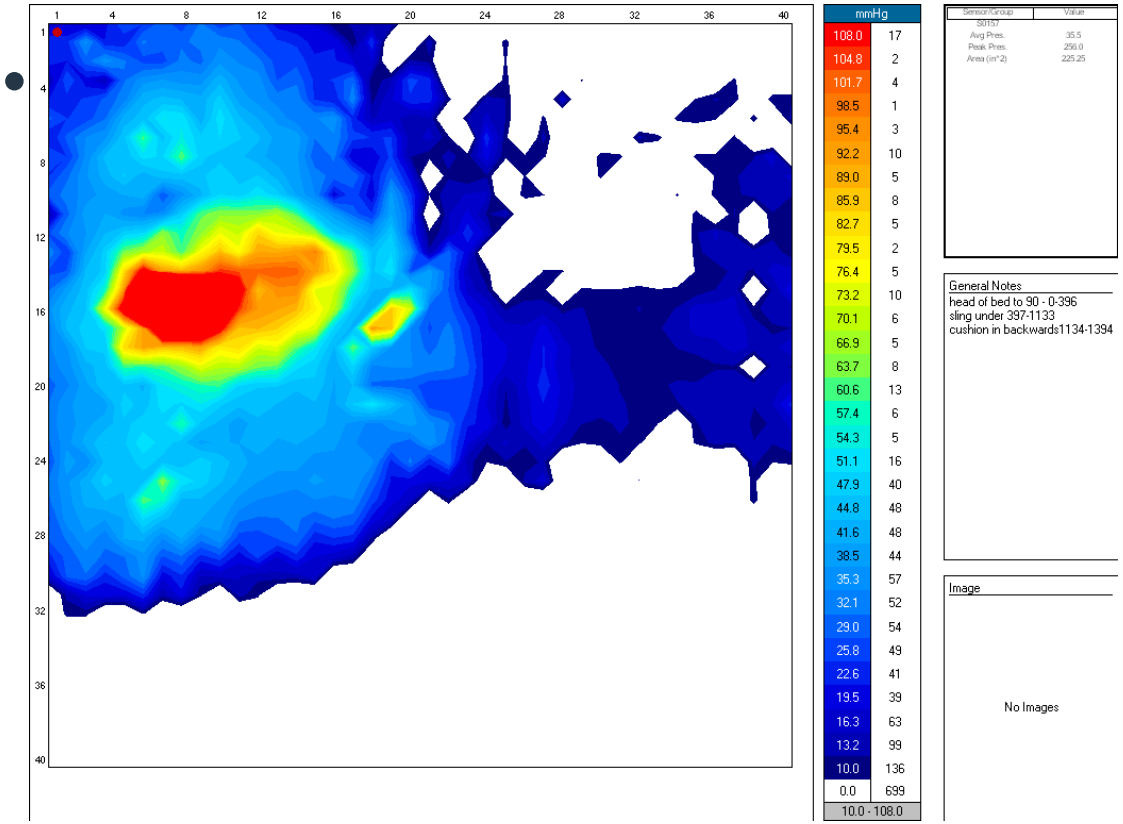
- Supine with HOB at 30 degrees



- Sidelying with HOB at 30 degrees



Supine with HOB at 90 degrees



mmHg	
108.0	17
104.8	2
101.7	4
98.5	1
95.4	3
92.2	10
89.0	5
85.9	8
82.7	5
79.5	2
76.4	5
73.2	10
70.1	6
66.9	5
63.7	8
60.6	13
57.4	6
54.3	5
51.1	16
47.9	40
44.8	48
41.6	48
38.5	44
35.3	57
32.1	52
29.0	54
25.8	49
22.6	41
19.5	39
16.3	63
13.2	99
10.0	136
0.0	699
10.0 - 108.0	

Sensor/Group	Value
S0157	
Avg Pres.	35.5
Peak Pres.	256.0
Area (in^2)	225.25

General Notes

head of bed to 90 - 0-396
sling under 397-1133
cushion in backwards1134-1394

Image

No Images

MADONNA REHABILITATION Hospitals

How are you going to do pressure relief every 15 minutes in chair?

Other tools for success

AUTONOMIC DYSREFLEXIA

SIGNS & SYMPTOMS

Flushed Above Level of Injury

Pounding Headache

Blood Pressure 20-40mm Hg Greater Than Normal

Profuse Sweating

Other:
Goose Bumps
Nasal Congestion
Anxiety/Tight Chest
Blurred Vision/Spots

WHAT TO DO

1. Sit patient upright and lower legs
2. Loosen or remove anything tight
3. Closely monitor BP
4. Check for cause and resolve it
5. Call healthcare provider
6. If symptoms persist take prescribed medication
7. If not resolved go to emergency department

MADONNA Rehabilitation Hospitals

Madonna.org

WHAT TO CHECK

BLADDER
- Catheter kinked
- Over full bladder
- Infection
- Stones

BOWEL
- Hemorrhoids/anal fissures
- Constipation
- Over full bowel
- Irritation

SKIN
- Wrinkles (clothing/bedding)
- Shoe fit
- Tight clothing
- Wound
- Pressure on skin
- Scrotal pressure

OTHER
- Ingrown toe nail
- Sexual stimulation
- Pain
- Fractures
- Any noxious stimuli

232

MADONNA Rehabilitation Hospitals

WHO IS AT RISK?

Individuals with spinal cord injuries at neurological level of T6 or above.

WHAT OCCURS?

The stimulus below the level of injury is not getting the message to the brain, the body increases blood pressure.

THIS IS AN EMERGENCY!

Fast increase in blood pressure 15mm hg above your normal can cause an artery or vein to burst. A stroke or cardiovascular injury can result in permanent body or brain damage.

NAME _____

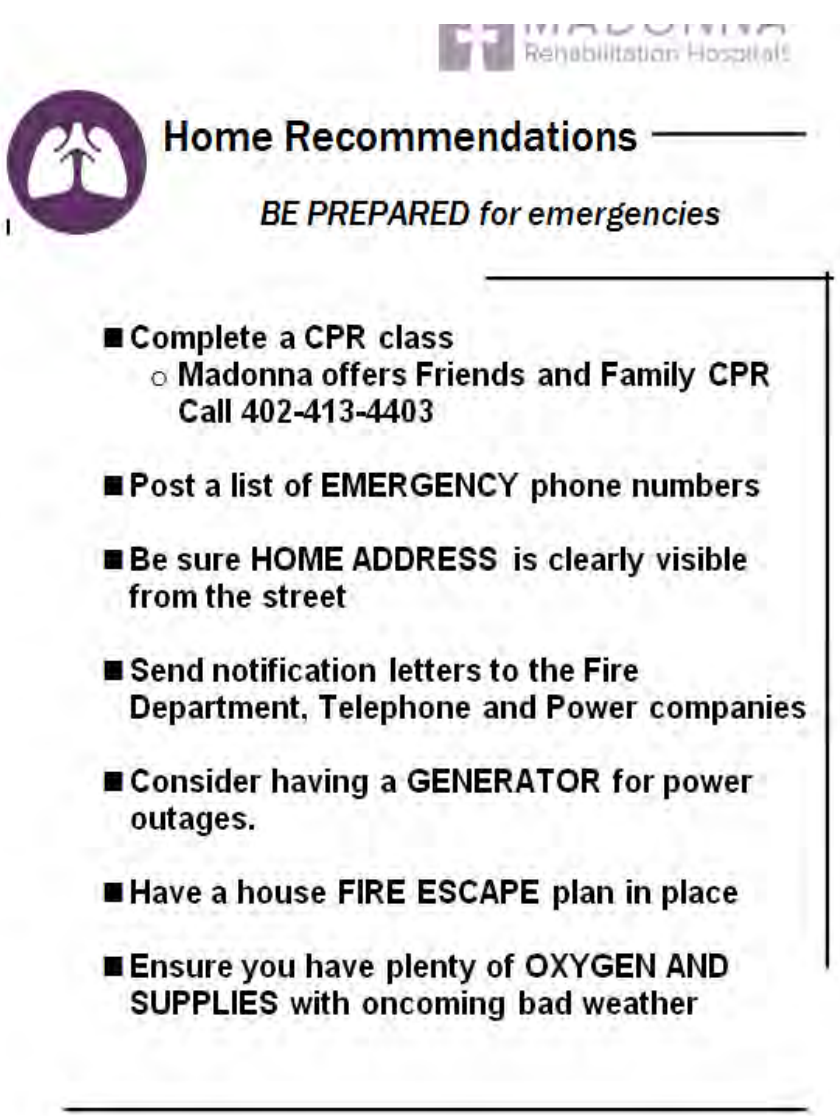
NORMAL BP _____

M.D. _____

EMERGENCY CONTACT _____

_____

- Label their equipment
- Place CPAP settings on their CPAP
- Fill out their Portable Health Profile
- Fill out Contact numbers for their Fridge
- Set them up for success



Rehabilitation Hospitals

Home Recommendations

BE PREPARED for emergencies

- Complete a CPR class
  - Madonna offers Friends and Family CPR Call 402-413-4403
- Post a list of EMERGENCY phone numbers
- Be sure HOME ADDRESS is clearly visible from the street
- Send notification letters to the Fire Department, Telephone and Power companies
- Consider having a GENERATOR for power outages.
- Have a house FIRE ESCAPE plan in place
- Ensure you have plenty of OXYGEN AND SUPPLIES with oncoming bad weather

Important Contact Numbers

EMERGENCY- 911

EMERGENCY CONTACT_____

PHYSICIAN'S _____

_____

_____

DME_____

PHARMACY_____

Life Long Follow up

- Annual Urological exams
- Monitor Weight Gain
- Monitor risk for overuse syndromes, respiratory risk, skin risk
- Reassessment of DME
- Changes to bowel and bladder programs
- Update transfer techniques
- Pressure mapping with posture change and pregnancy

ThinkFirst Injury Prevention
United Spinal Association of Nebraska
get involved!

United Spinal Association
Nebraska Chapter

thinkfirst.org

MADONNA REHABILITATION Hospitals

Madonna.org

References

- National Pressure Ulcer Advisory Panel (2016). Pressure Injury Stages. Retrieved from http://www.npuap.org/resources/educational-and-clinical-resources/npuap-pressure-injury-stages/
- Coyer, F. et al (2022). Preventing pressure injuries among patiets in the intensive care unit: insights gained. Intensive Care Med 48:1787-1789.
- Roderman, N. et al (2024). Effectviely Addressing Hosptial-Acquired Pressure Injuries with a Multidisciplinary Approach. HCA Healthcare Journal of Medicine 5:5
- Everett, S. et al (2022). Repositioning Strategies to Prevent Pressure Injuries in the ICU:Integrative Review on Implementation Factors. Advances in Skin &Wound Care, June 2022.
- Clinical Practice Guidelines-spinal cord medicine: Management of Mental Health Disorders, substance abuse disorders, suicide in adults with SCI. Consortium for spinal cord injury. Paralyzed Veterans of America. 2020
- Prevention and Treatment of Pressure Ulcer Injuries: Clinical Practice Guidelines. International Guidelines. National Pressure Injury Advisory Panel. 2019
- Prevention and Treatment of Pressure Ulcers: quick reference guide. 2019. National Pressure Injury Advisory Panel
- Ashburn, N. et al. Pre-hospital Trauma Scene and Transport Times for Pediatric and Adult Patients. West J Emergency Med. 2020. Feb 21;21 (2) 455-462.

References and Resources

- Glennie, R.A, et al. Rural and Urban Living in Persons with SCI-Comparing Environmental Barriers, health and Quality of Life Outcomes. 2017 J Neurotrauma Oct 15, 34(20) 2877-2882
- Lezzoni et al. Physicians Perceptions of People with Disability and their Health Care. Healthcare Affairs 40, No.2(2021) 297-306
- Stillman M, Ankam N, Mallow M et al. A survey of Internal and Family Medicine Residents:Assessment of Disability-Specific Education and Knowledge. Disabil Health J. 2020 Oct 7
- Consortium for Spinal Cord Medicine (2008) Early Acute management in Adults with Spinal Cord Injury: a clinical practice guideline for health-care professionals.
- Med Wish Low cost supplies and equipment
- http://www.agrability.org/
- Ventusers.org
- https://www.caregiver.org/
- https://www.christopherreeve.org/

Copyright notice
All rights reserved