



Shepherd Center

Beyond Injury: Strategies to Reduce Spinal Cord Injury Complications

Presented by:

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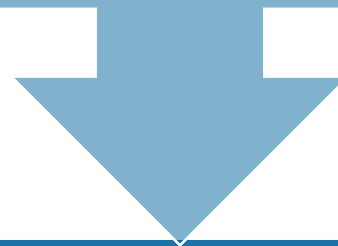
Disclosure Statement

***Tiffany LeCroy, MSN, RN, CRRN, FNP-C, ACNS-BC, FARN
has disclosed no relevant financial or nonfinancial
conflicts of interest.***








Objectives

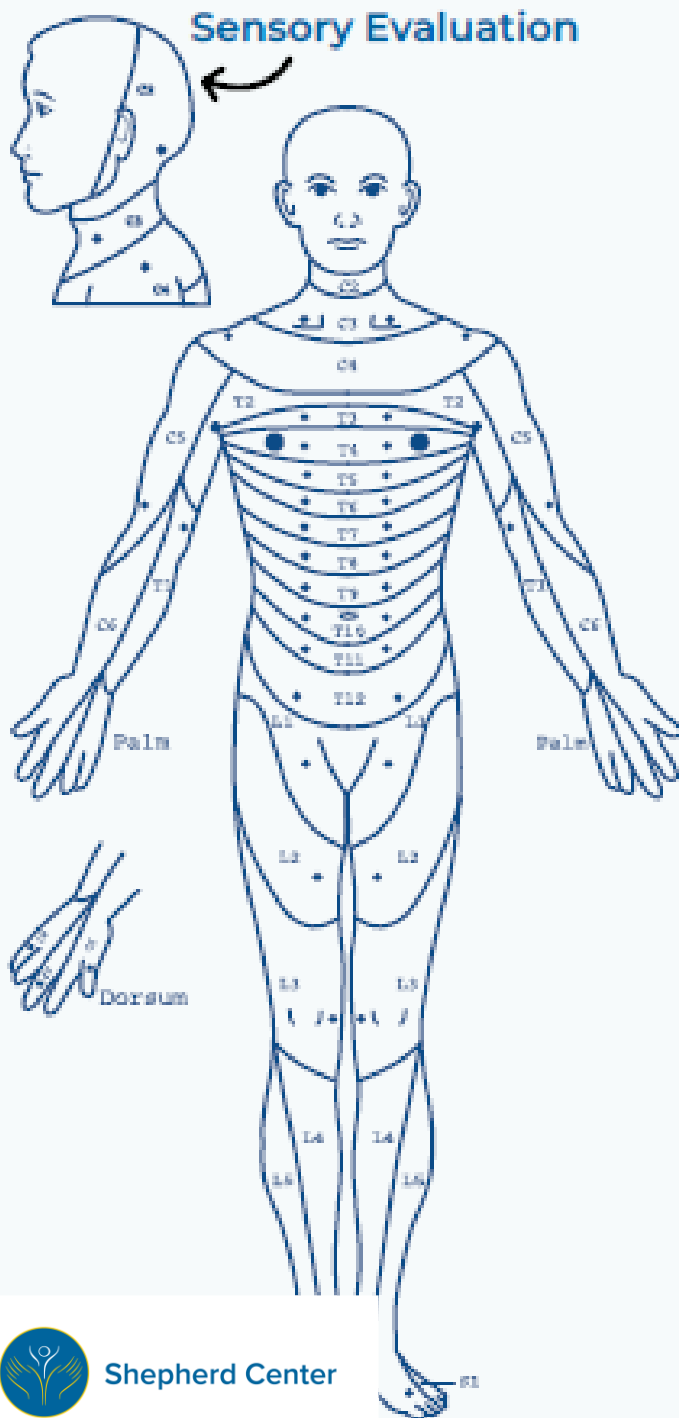
Define 3 conditions associated with autonomic dysfunction after spinal cord injury.



Describe physiologic priorities and ICU-level considerations for patients with spinal cord injury across the continuum of care.

Spinal Cord Injury: A Brief Clinical Overview?

-  Spinal cord injury is a disruption in communication between the brain and body
-  Can be traumatic or non-traumatic causes
-  Primary vs. secondary injury processes
-  Clinical impact varies by injury level (cervical, thoracic, lumbar)
-  SCI is not a single event – it is a chronic condition



Sensory Evaluation

Motor Evaluation

C2, C3, C4	Diaphragm
C5	Elbow Flexors
C6	Wrist Extensors
C7	Elbow Flexors
C8	Finger Flexors
T1	Small Finger Abductors
L2	Hip Flexors
L3	Knee Extensors
L4	Ankle Dorsiflexors
L5	Long Toe Extensors
S1	Ankle Plantar Flexors
S2, S3, S4	Anal Sphincter

Neurologic Classification

- ASIA Impairment Scale (AIS)
- Complete vs incomplete injuries
- Why early classification matters clinically

Make a Referral

Contact Shepherd Center's admissions team to make a referral for patients with a spinal cord injury, brain injury, stroke or neuromuscular diagnosis.

 shepherd.org/admissions

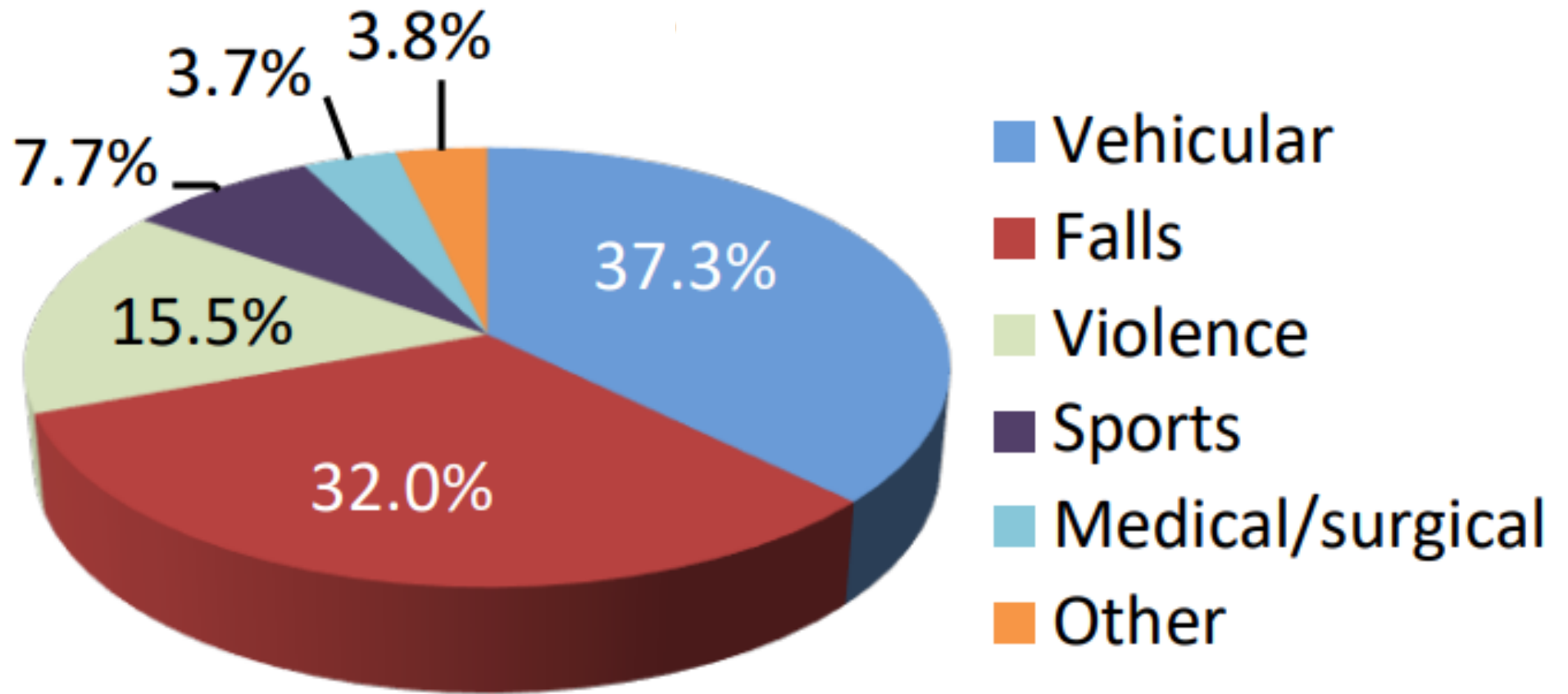
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Facts & Figures

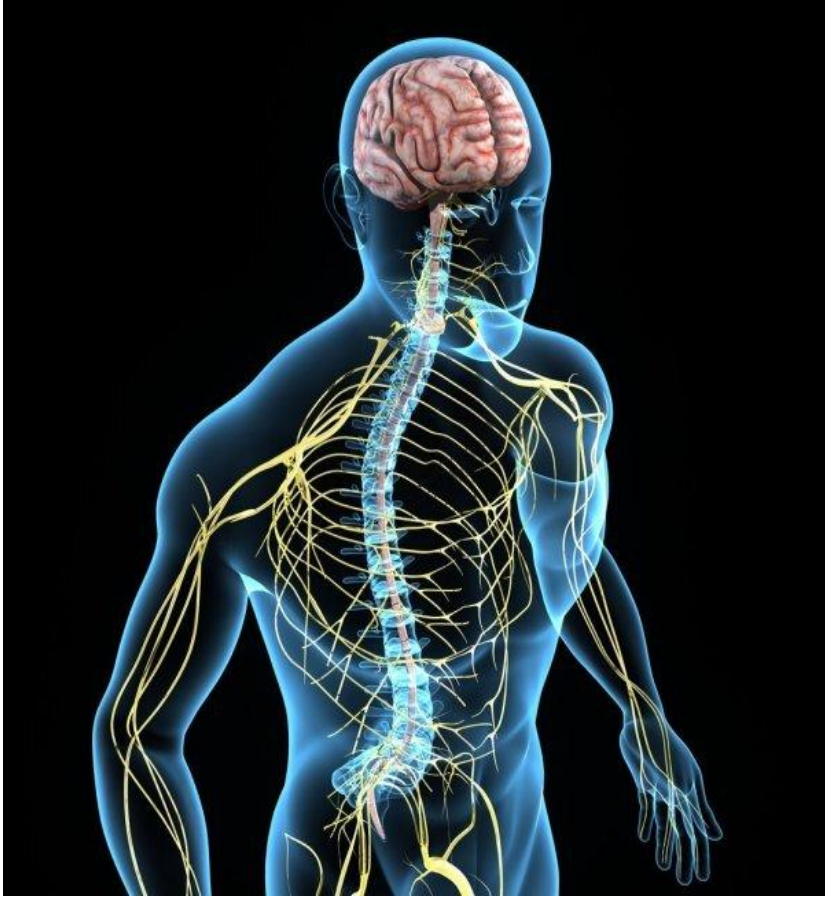
- Incidence of new cases
 - 18,421 annually (54:1 Million)
- Age
 - Average age has increased
 - In 1970 was 29
 - Since 2015 increased to 44
- Gender
 - 78% Male
 - 22% Female



Cause of Injury



Why Autonomic Dysfunction Happens After SCI



Brain normally coordinates sympathetic and parasympathetic balance

Spinal cord injury disrupts descending sympathetic control

Result: uncoordinated, reflex-driven autonomic responses

Parasympathetic control above the injury remains intact

Autonomic Nervous System Dysfunction

- Autonomic dysreflexia
- Orthostatic hypotension
- Thermoregulatory dysfunction
- Why these complications persist across the continuum of care





How many of you have managed an episode of autonomic dysreflexia in the past year?

Autonomic Dysreflexia



- Exaggerated sympathetic response in injuries at or above T6
- Triggered by noxious stimuli below the level of injury
- Presents with acute hypertension
- Medical emergency requiring immediate action




Your SCI patient transfers from bed to chair. Within minutes they say “I don’t feel right.” What do you do next?

Orthostatic Hypotension



- Drop in blood pressure with position change
- Loss of sympathetic vasoconstriction below the level of injury
- Most common with acute SCI and high thoracic/cervical injuries
- Highest risk during first mobilization
- Can limit participation in therapy if not managed



You notice it's very warm in your SCI patient's room. You check his temperature and it is elevated. What is your next step?

Thermoregulatory Dysfunction

Impaired ability to regulate body temperature

Poikilothermia

More common with cervical and high thoracic SCI

Can mimic infection or sepsis

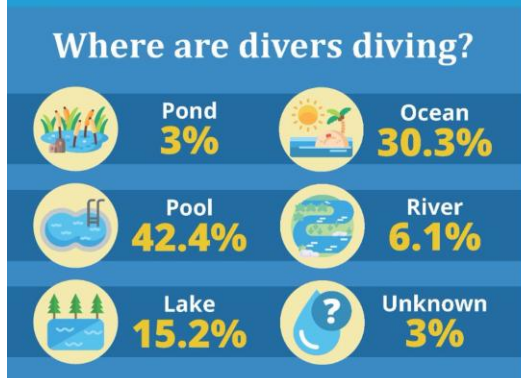
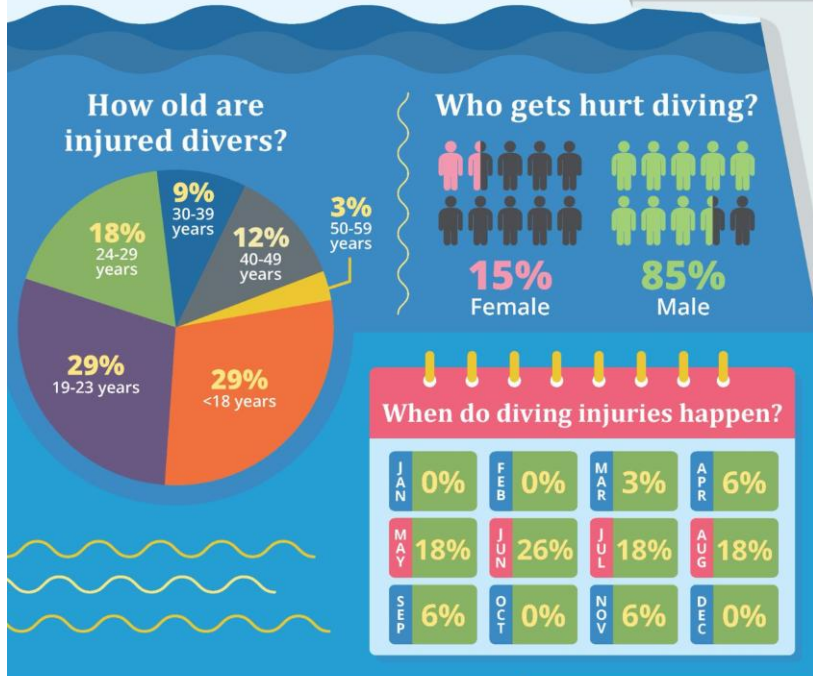
Managed through environmental and nursing interventions



CDC & National Data on Diving-Related SCI

The Only Safe Dive is the One You Never Take

Diving is the fifth leading cause of spinal cord injury. To help raise awareness and encourage you to think before diving, Shepherd Center has compiled data on diving injuries we've treated. Get the facts and help spread the word.



Shepherd Center

DO NOT DIVE
GO IN FEET FIRST

Data provided by Shepherd Center and the National Spinal Cord Injury Statistical Center (NSCISC)

- Estimated ~700 spinal cord injuries annually in the U.S. related to aquatic accidents, with diving accounting for the most severe injuries [cdc.gov]
- Diving-related spinal cord injuries have historically exceeded those from all other sports combined [cdc.gov]
- Majority result in permanent paralysis

Using a Diving Injury as a Clinical Lens

- Young, often previously healthy individuals
- High-risk injury pattern: cervical level, often complete
- Tetraplegia with autonomic and respiratory vulnerability
- Deceptively stable appearance early after injury
- Medically fragile despite functional potential



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What Typically Follows After Diving-Related SCI

- High rates of tetraplegia at presentation
- Longer ICU stays and extended acute care needs
- Greater medical complexity across recovery
- Early disruption of education, work, and independence



Physiologic Priorities In SCI Care

Respiratory status and airway protection

Hemodynamic stability and perfusion

Neurologic baseline and change from baseline

Autonomic triggers: bowel, bladder, skin, temperature



Clinical Changes That Pause Rehabilitation

- Respiratory decline or secretion burden
- Hemodynamic instability or arrhythmia
- Autonomic crisis not responsive to unit-level interventions
- Suspected infection or evolving sepsis
- Thromboembolic concern

Dysreflexia*

Dysreflexia is a life-threatening emergency that may affect people with spinal cord injury at T-6 or above.

Signs and Symptoms:

- Sudden headache
- Elevated blood pressure
- Stuffy nose
- Flushing in the face/neck/shoulder
- Blotchy skin
- Bradycardia
- Sweating
- Goose bumps

Causes:

The most common noxious stimuli are:

- Bladder distention
- Pressure ulcers
- Constipation
- Autonomic Nervous System Dy...
- Pressure on the skin
- Urinary tract infection

Treatments:

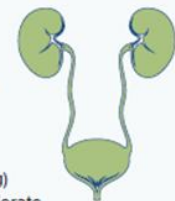
- Sit up straight and loosen tight clothing.
- Catheterize or check for obstruction in bladder drainage system.
- Remove stool from rectum manually using lidocaine ointment.
- Check skin for cause of pressure.
- If systolic blood pressure is not lowered below 150 mm Hg, consider administration of anti-hypertensive medication with rapid onset and short duration.
- Continue to monitor for noxious stimuli.

*If the patient is pregnant and labor is imminent, dysreflexia may develop and is life-threatening to the mother and fetus.

Urinary Tract Infection

In the patient with spinal cord injury, the indications for obtaining urinalysis with urine culture and treating with antibiotics are:

- Fever above 101 degrees F
- Blood in urine (hematuria)
- Bladder program change (e.g., leaking or not draining)
- Urinalysis positive for inflammatory markers (i.e., moderate leukocyturia or significant positivity of leukocyte esterase)
- Bacteriuria alone without inflammatory marker findings does not correlate with urinary tract infection in a person using urinary catheters.



Respiratory Issues

If the patient has an open airway, review the most recent chest radiograph and vital capacity measurement available. Use this radiograph as a baseline because the patient with spinal cord injury may not have a normal radiograph at baseline. Also, ask the patient if he/she has a history of sleep apnea. If so, they may be sensitive to pain and sleep medications that could cause respiratory failure.



High-Risk Complications Seen at Shepherd



- Autonomic dysreflexia
- Hyperthermia / hypothermia
- Pneumonia and atelectasis
- Pulmonary embolism
- Skin breakdown and wound complications

Early Recognition and Nursing Impact



Subtle changes precede clinical deterioration



Pattern recognition over single data points



Trusting nursing judgment and patient cues



Early escalation prevents failure-to-rescue

Key Takeaways



Autonomic complications after SCI are common and predictable

Early mobility is essential — and is a psychologic stress test

ICU-level complications can emerge outside the ICU

Subtle changes often precede clinical deterioration

Nursing recognition and escalation prevent failure-to-rescue

Rehabilitation nursing is specialty practice

Case Study: Patient Background

- Young, healthy adult → diving-related cervical SCI (C5 burst fracture)
- Diving-related C5–C6 spinal cord injury
- Initial resuscitation and stabilization at trauma center
- ICU ~2 weeks prior to transfer
- Transferred to Shepherd Center for specialized SCI rehabilitation
- High cervical injury with anticipated autonomic and respiratory risk

The power of recovery at Atlanta hospital



PUSHING THE LIMITS

0:25 / 4:18 Intro

CBS
MORNINGS

PHYSICIAN'S INSPIRING JOURNEY

DOCTOR CARES FOR PATIENTS AT SAME CENTER WHERE HE WAS TREATED

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Thank You!

- Thank You
- Questions & Discussion
- Contact information

