NEURO INSTITUTE

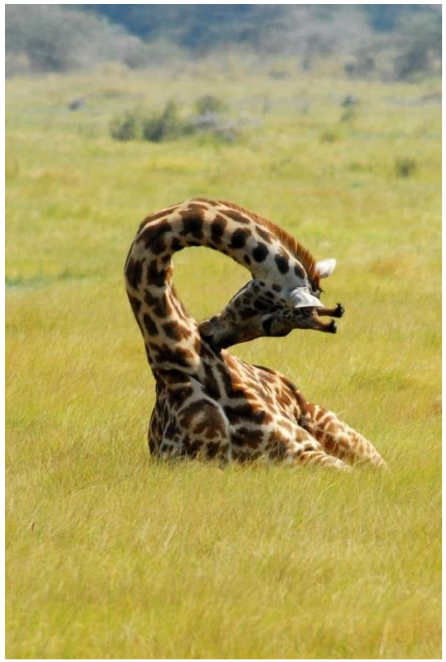
Continuing Education for Rehabilitation Professionals

Essential Nursing Care of the Patient with Treatment and Management Issues Following SCI

An Educational Tool for Healthcare Professionals

Presented by Patti Dorrell

Nursing Care of the Patient with Treatment and Management Issues Following SCI



Patti Dorrell, RN MS CBIS

- Healthcare professional for over 30 years
- MS in Health Administration
- Executive Director NeuroRestorative FL GA LA - post-acute brain and spinal cord injury program
- CMSA of Central Florida Board Member
- Association of Rehab Nurses Member
- Case Management experience includes brain and spinal cord injury, geriatric, transplants

Spinal Cord Injury (SCI) Facts and Figures at a Glance

- Incidence
  - 40 cases per million people or ~ 12,500 new injuries per year (does not include fatalities)

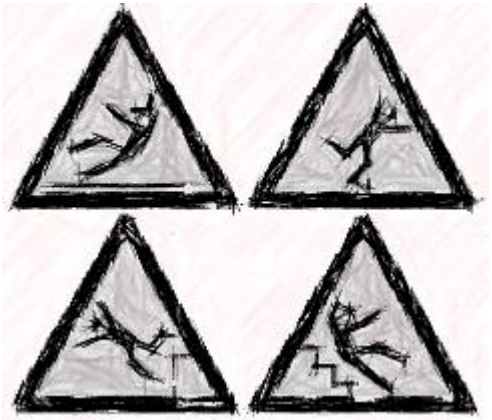
- Prevalence
  - # of people living with SCI in the USA as of 2014 is 276,000

- Age at Injury
  - From 1973 to 1979, the average age at injury was 28.7 years, and most injuries occurred between the ages of 16 & 30
  - Today the average age at injury is 42 years

Spinal Cord Injury (SCI) Facts and Figures at a Glance

- 14% (30%) complete quadriplegic
- 20% (26%) complete paraplegic
- 21% (20%) incomplete paraplegic
- 45% (19%) incomplete quadriplegic

Spinal Cord Injury (SCI) Facts and Figures at a Glance



- **ETIOLOGY**

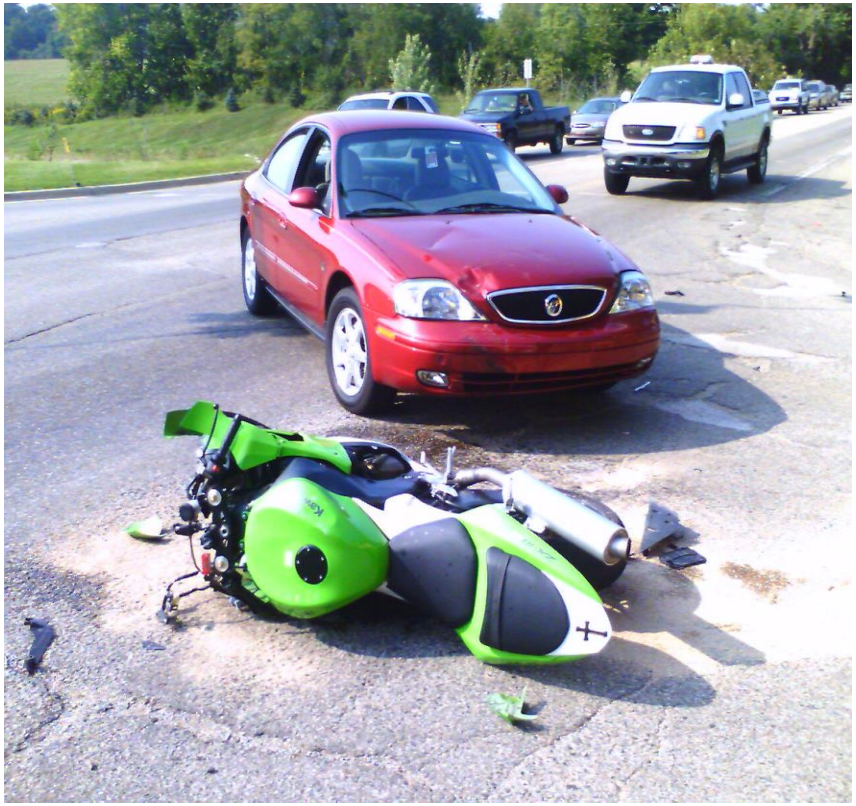
Vehicular accidents - 38%
- This number is decreasing.
Violence - 14% (primarily GSW)
Falls - 30%
Sports-related - 9%
Other - 9%

- **Discharge Disposition from Hospital**
  - Private Home – 89%
  - Nursing Home - 4.3%

Re-hospitalization

30% with SCI are hospitalized 1or more times during any given year following injury. LOS averages 22 days. Diseases of the genitourinary system are the leading cause

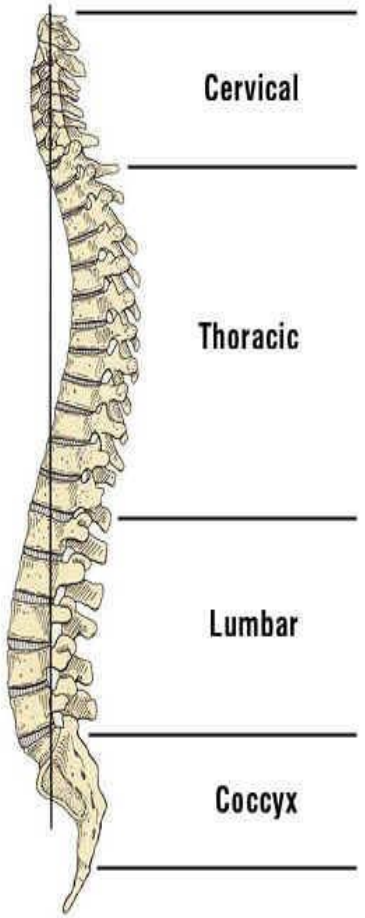
Spinal Cord Injury (SCI) Facts and Figures at a Glance



- Approximately 80% male
- 64% Caucasian
- 51% High school graduates
- 51% single

Anatomy & Physiology

- 7 Cervical Vertebra
- 12 Thoracic Vertebra
- 5 Lumbar Vertebra
- 1 Fused segment of 5 bones
- Spinal Column Anatomy: The Basics



Terminology

Complete

Absence of sensory and motor function in the lowest sacral segments – bowel, bladder, penis or vagina

Incomplete

Preservation of some motor and/or sensory control in the bowel, bladder or sex organs

Functional Outcomes by Level of Injury

- The level of injury for a person with SCI is the:

  lowest point on the spinal cord below which there is..

  — a decrease or absence of feeling (the sensory level)

  — and/or movement (the motor level).

Recovery - Expectations

- 50 – 67% of total 1-year recovery occurs in the first 2 months
- Slower recovery during months 3-6
- Motor recovery documented up to 2 years post-injury
- 90% discharged to home
- Life Expectancy: lower than average

Mortality

- 6.3% die in first year
- Mortality associated with:
  - Older age
  - Male
  - Violence
  - C4 or higher injury level
  - Vent dependent status
  - Neurologically complete injury
  - Medicare/Medicaid
  - Bowel
  - Bladder

Life Expectancy (survived 1st year)

Age at Injury	Para	C5-C8	C1-C4	Ventilator Dependent Any Level
20 years (59.3)	45.0	39.9	35.6	19.2
40 years (40.4)	27.6	23.3	19.9	8.7
60 years (23.0)	13.0	10.1	8.0	2.1

Health Risks Early Onset

- Neurogenic Bladder
- Neurogenic Bowel
- Autonomic Dysreflexia
- Skin breakdown
- Respiratory issues

Bladder Management

- A bladder management program is necessary to empty the bladder.
- The ability to empty the bladder completely on a regular basis in a low pressure manner is important in maintaining kidney health and preventing UTIs.
- An effective bladder management program achieve regular bladder emptying and avoids stasis; avoids high filling and voiding pressures; maintains continence and avoids frequency and urgency; and prevents and treats complications such as urinary tract infections (UTIs), stones, strictures and autonomic dysreflexia.
- Factors to consider when establishing an effective bladder management include:
  - Level of injury (mobility, dexterity)
  - Lifestyle
  - Reflex or Non-Reflex bladder
  - Susceptibility to infection

No matter which bladder management program is used, individuals with a SCI have a high risk for urinary tract infection.

Neurogenic Bowel

Alteration to defecation following SCI depends on the level and completeness of the injury. SCI can be classified as either:

- Upper Motor Neuron lesion – damage above the reflex defecation center in the sacral cord, or
- Lower Motor Neuron lesion – damage within the reflex defecation center

In either case, voluntary control is no longer present due to the disruption of communication to the brain.

Bowel Program

The objectives of an effective bowel management plan are:

- Social continence
- Effective emptying and predictability
- Regularity – to avoid complications

Health Risks – Autonomic Dysreflexia

- An over-activity of the autonomic nervous system causing an abrupt onset of excessively high blood pressure
- Generally affects persons with injury levels above T-5
- Can develop suddenly
- Medical emergency – can lead to seizures, stoke & even death
- Occurs when an irritating stimulus is introduced to the body below the level of SCI: overfull bladder, constipation, pressure sores, menstrual cramps, etc…
- Stimulus sends nerve impulses to the spinal cord; impulses travel upward until they are blocked by the lesion at the level of injury.
- Impulses cannot reach the brain, a reflex is activated that increases activity of the sympathetic portion of autonomic nervous system causing spasms and narrowing of the blood vessels.

Signs & Symptoms of Autonomic Dysreflexia

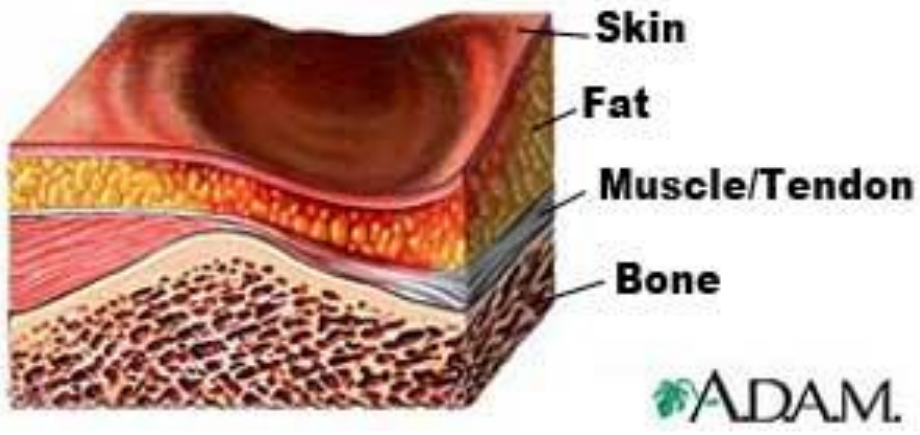
- Pounding headache
- Sweating above the level of injury
- Cold, clammy skin below level of spinal injury
- Blotching of the skin
  - Red blotches on the skin above level of spinal injury
- Nasal congestion
- Hypertension
  - B/P greater than 200/100
- Restlessness
- Goose bumps
- Flushed face
- Nausea
- Slow pulse
  - Less than 60 beats per minute

Autonomic Dysreflexia Treatment

- Keep head elevated and sit participant up.
- Identify and remove the offending stimulus.
- If applicable, check urinary drainage system for kinks, position of drainage bag, plugged catheter, etc.
- If participant does not have a foley or suprapubic catheter, perform a catheterization and empty bladder.
- If bladder is not the trigger, check for bowel impaction and/or perform digital stimulation to empty bowel.
- Check for pressure ulcers, ingrown toenails, bone fractures.
- Loosen clothing.
- If the offending trigger/stimulus cannot be identified and removed, notify a physician and/or EMS.

Health Risks – Skin

The break in the skin extends through the dermis (second skin layer) into the subcutaneous and fat tissue.



Health Risks

- Respiration
- Heterotopic Ossification
- Deep Vein Thrombosis
- Pyschosocial Behavior
- Pain
- Sexuality
- Aging

Respiration

- Inspiration
  - Diaphragm - C3-C5
  - Intercostals - T1-T11
  - Scalene – C3-C5
  - Trapezious and sternocleidomastoid – cranial nerve XI

- Expiration
  - Passive Plus Abdominal muscles

Respiratory Management

- C3, 4,5 keep you alive
- 2/3 of newly injured SCI patients will experience respiratory complications during the first 7 days
  - Atelectatsis, pneumonia, aspiration, respiratory failure
- C2 and above have no functional diaphragm & need ventilator assistance
- 80% of C3-4 can eventually be weaned from the ventilator

Respiratory Management

- C5 and below are usually able to breathe without assistance, but will require close monitoring
- Assisted coughs
- Postural drainage
- Positive pressure ventilation (CPAP or Bi-Pap)
- Ventilator
- Negative pressure ventilation (Iron Lung)
- Electrophrenic respiration
- Pneumobelts

Heterotopic Ossification

- The incidence of heterotopic ossification in spinal cord injury is between 16% and 53%, depending on the incidence reports from various institutions. Once present, neurogenic heterotopic ossification is clinically significant in 18-27% of cases. Fortunately, only 3-5% of cases involve joint ankylosis.
- Patients with limb spasticity have a greater risk of developing neurogenic heterotopic ossification, and patients with extensive amounts of neurogenic heterotopic ossification have severe spasticity.
- The pathophysiology of heterotopic ossification involves an inflammatory process, with increased blood flow in soft tissue. Bone matric is laid down and mineralized, and this sequence reached completion in 6-18 months.
- The average length of time reported between spinal cord injury and diagnosis of neurogenic heterotopic ossification in the adult population is 6 months.
- Limited ROM is seen at the involved joint, possibly accompanied by redness, warmth, or swelling. Surgery is indicated in those patients with seating problems, skin breakdown, pain, or loss of function.

Psychosocial

- Research has suggested that SCI is associated with raised risks of negative psychological outcomes that should not be considered a “normal” response to the injury.
- Depression symptoms from 20% to 43% (inpatient rehab)
- Depressive symptoms and anxiety 15% up to 50-60% (at home)
- Research also suggests that risks of negative psychological states remain high unless SCI individuals receive effective treatment such as cognitive behavior therapy during rehabilitation
- Risks of negative psychological states has been associated with factors such as pain, poor sleep and feelings of helplessness as well as frequent hospitalization, medical complications, poor self-care, and difficulties with transportation.

Pain

- 70% of SCI patients report significant pain
- 30-40% of SCI patients report severe to disabling pain
- Pain stages: acute, sub-acute, chronic

Pain

Musculoskeletal

- Damage to spinal column
- Acute traumatic injuries
- Overuse
- Treatment
  - Nsaids
  - Acetaminophen
  - Muscle relaxants
  - Tramadol
  - Narcotics

Neuropathic Pain

- Damage to the central nervous system
- Compression neuropathies
- Segmental pain
- Treatment
  - Antiseizure medications
  - Antidepressants
  - Therapy PT/OT, cold, heat, massage
  - Modalities – TENS, acupuncture
  - Adaptive equipment

Pain

Neuropathic pain (cont'd)

- Treatment (cont'd)
  - Steroidal injections, blocks, biofeedback
  - Relaxation, hypnotism, vibration, magnets
  - Surgery – if compression neuropathies are unresponsive to conservative measures, surgery may be necessary

Visceral Pain

- Poorly localized and defined
- Treatment
  - Above the level of injury – nociceptive pain due to visceral injury or inflammation – treatment is identifying the cause and then treat the injury or inflammation.
  - Below the level of injury may be nociceptive or neuropathic – celiac plexus block can be diagnostic if neuropathic.

Sexuality

Men

- Sexual Function After Injury
- Medications for ED
- Alternative Treatments for ED
- ED Treatment Risk Factors
- Fertility
- Fertility Treatments
- Sexual Adjustment
- Relationships
- Smart Sex

Women

Less is known about the effect of spinal cord injury (SCI) on females than on males for several reasons, such as:

-There are fewer female injuries

- The effect of SCI on female sexuality is far less devastating than on males

- The physiological sexual responses for women are mostly internal and less conspicuous than in males and, therefore, more difficult to study.

- **Intercourse**
- **Vaginal Lubrication**
- **Orgasm**
- **Bladder Management**
- **Fertility**
- **Contraception**
- **Pregnancy**
- **Breast Feeding**

Aging

- Cardiovascular
- Respiratory
- Genitourinary
- Gastrointestinal/Metabolic
- Musculoskeletal
- Metabolic/Endocrine

Cardiovascular Disease

Number 1 cause of death

- Higher risk of HTN with para than tetra
- Thickening and rigidity of heart valves
- Poor cholesterol profile
- Decreases insulin efficiency leading to diabetes
- Metabolic Syndrome common in SCI

Prevention

- Exercise
- Change diet to limit sugars
- Also, carbs, fat and cholesterol
- Medical follow-up
- Keep weight down

Pulmonary

Effects of SCI

- Restrictive lung disease due to muscle paralysis
- May have obstructive component due to airway hyperreactivity
- Risk of pneumonia increases

Prevention

- Stop smoking
- Yearly flu shot/pneumonia vaccination
- Exercise and keep weight down
- Take deep breaths to keep chest expanded
- Treat sleep apnea if needed

Genitourinary

Aging Issues

- Impairment in concentration and dilution capabilities
- Increased risk of UTI
- Bladder cancer
- Bladder/Kidney stones

Prevention

- Annual exam to include KUB, urodynamic evaluation and urine test preferably with a physician who treats individuals with SCI
- Daily attention to bladder management – prevention of UTIs
- Recognition and prompt treatment of UTIs
- Cystoscopy every one or two years after 12 years of an indwelling catheter to ensure early detection of cancerous cells

Gastrointestinal

Aging Issues

- Bowel management becomes more important
- Constipation increases
- Colostomies more often considered
- Increased risk of rectal fissures, hemorrhoids and diverticular disease
- Increase gallstone formation T6 & above

Prevention

- Dietary considerations high fiber/protein
- Exercise
- Manage weight
- Consider other bowel options
- Yogurt to combat antibiotics
- Periodic cancer screening

Musculoskeletal

Aging Issues

- Osteoporosis universal
- Joint capsules tighten
- Change in body composition
- UE pain/overuse
- Peripheral nerve entrapment

Prevention

- Transition to power mobility early but maintain exercise program
- Keep shoulders strong
- Stretch front shoulder muscles and strengthen back muscles
- Avoid overhead reaching
- Avoid sleeping on shoulders
- Sit upright with shoulders pulled back
- NSAIDS
- Osteoporosis preventive measures

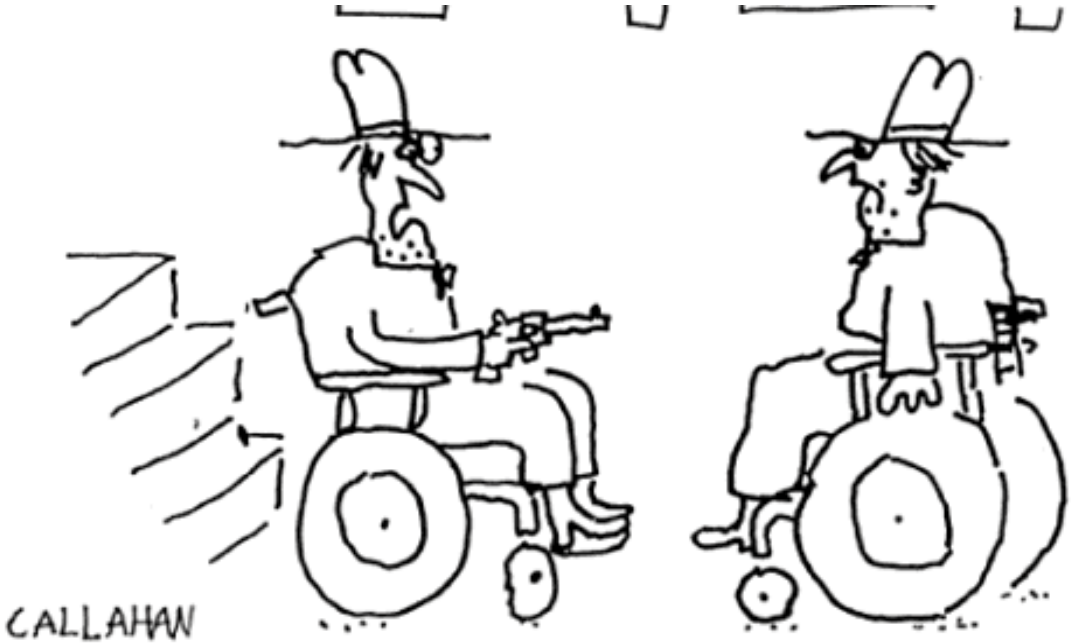
Endocrine

Effects of SCI

- Reduced growth hormone
- Reduced testosterone
- Impaired glucose tolerance
- Reduced capacity to maintain lean tissue
- Increased insulin resistance
- Impaired calcium metabolism
- Reduced cellular repair

Results

- Diabetes
  - 4x more common in men with SCI
  - Obesity more common
  - Obesity without being overweight
- Dyslipidemia
  - 40% had low HDL cholesterol
  - Greater than 70% of paras need treatment according to guidelines



"THIS TOWN AIN'T ACCESSIBLE ENOUGH FOR BOTH OF US!"

Questo villaggio non è abbastanza accessibile per tutti e due...

What do Spinal Cord Injuries Really Cost?

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- Average length of initial acute hospitalization following SCI: 15 days
- Average stay in rehabilitation unit: 44 days
- Initial hospitalization costs following injury: $140,000
- Average first year expenses for SCI (all groups): $198,000
- First year expenses for paraplegics: $152,000
- First year expenses for quadriplegics: $417,000
- Average lifetime costs for paraplegics, age of injury 25: $425,000

Source: The University of Alabama National Spinal Cord Injury Statistical Center – March 2002.

What do Spinal Cord Injuries Really Cost?

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- Average lifetime costs for paraplegics, age of injury 25: $428,000
- Average lifetime costs for quadriplegics, age of injury 25: $1.35 million
- Percentage of SCI individuals who are covered by private health insurance at time of injury: 52%
- Percentage of SCI individuals unemployed eight years after injury: 63%

Source: The University of Alabama National Spinal Cord Injury Statistical Center – March 2002.

Needs

- Participant/caregiver education
- Support systems
- Personal care services
- Psychosocial
- Accessibility
- Equipment
- Health management

Thank You!

Patricia.dorrell@thementornetwork.com

NeuroRestorative Avalon Park