



NEURO  
INSTITUTE

Continuing Education for Rehabilitation Professionals



# Dependence to Adaptive Independence

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## Objectives

- Define the most common causes of spinal cord injuries
- Review the incidence of spinal cord injuries
- Outline the costs of spinal cord injuries
- Describe the rationale behind post-acute rehab in spinal cord injury
- Understand the basis for adaptive-based therapies by level of spinal cord injury
- Identify a variety of adaptive-based therapies and their functional benefits (e.g., activities of daily living and functional mobility)
- Discuss spinal cord issues and therapy intervention (e.g., hypertonia, autonomic dysreflexia)
- Outline preventative measures and possible solutions including home and adaptive modifications
- Discuss benefits of a transitional care facility (TCF)

## Common Causes of Spinal Cord Injuries (SCI)

- Motor vehicle accidents—40%
- Acts of violence—15%
- Falls, especially over the age of 65
- Sports and recreational injuries—8%
- Diseases



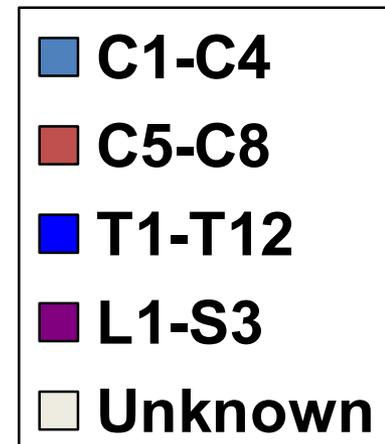
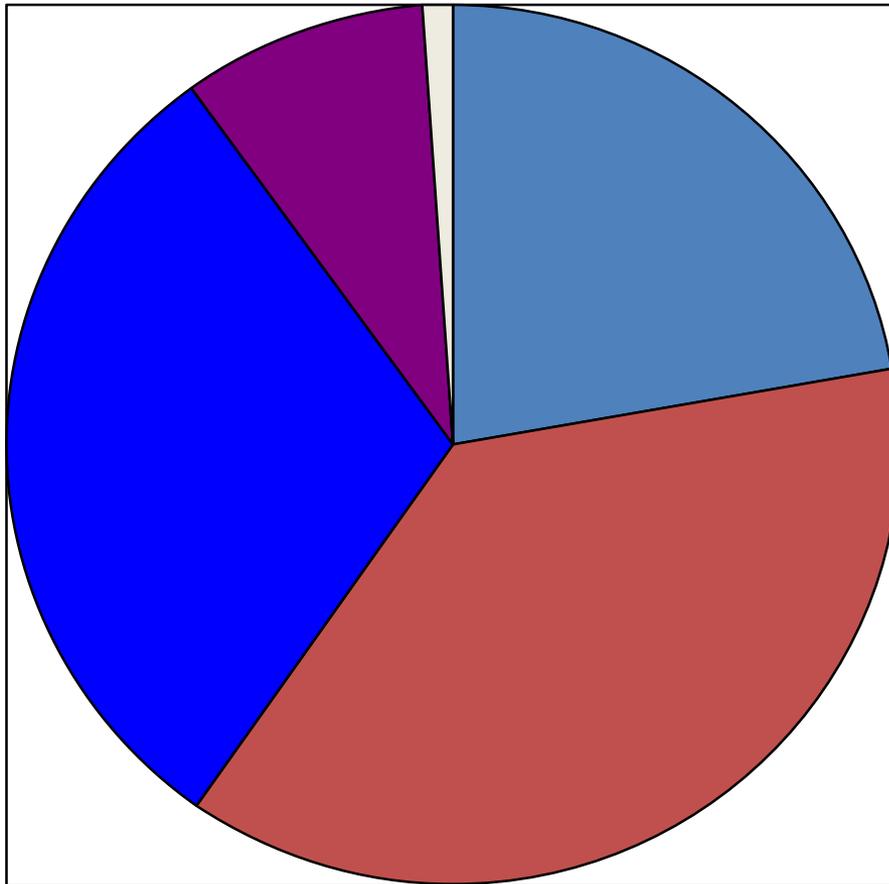
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- Alcohol is usually a factor in 1 out of every 4 SCI
  - SCI rarely exists as a solo condition, but in combination with other medical conditions (e.g., traumatic brain injury)

## SCI Incidence in Florida

- Approximately 760 new SCIs occurred in Florida during 2009. It is estimated that by 2015, approximately 800 new cases will occur each year and by 2030, it is estimated that approximately 960 will occur each year.



This is Slide Breakdown of Clients Served by Brain and Spinal Cord Injury (BSCIP) Trust Fund in Florida



## Total Costs

The total cost of services received by Waiver participants between 2005 and 2008 was over **\$25 million**. The Medicaid Waiver Program consists of tools used by states to obtain federal Medicaid matching funds to provide long-term care to patients in settings other than institutions.



## Total Costs



Service	Cost
Personal Care	\$11,001,363
Companion Services	\$6,871,318
Attendant Care	\$3,456,732
Life Skills Training	\$97,294
Comprehensive Inpatient Rehabilitation	\$91,515
Occupational Therapy	\$44,470
Physical Therapy	\$32,642
Assistive Devices	\$340,102
Home Modifications	\$283,168

## Medical Issues Related to SCI

- Urinary tract infections (UTIs)
- Pressure sores
- Pain
- Muscle spasms
- Autonomic dysreflexia
- Bowel/bladder issues
- Medication management



## Community Issues Related to SCI

- Limited number of healthcare providers knowledgeable about SCI and related issues
- Inaccessibility of healthcare facilities for SCI
- Limited access to transportation needs
- Limited supply to affordable, accessible housing
- Under-employment and lack of vocational services



## Other Issues Related to SCI

- Economic burden and related issues due to financial expense
- Home modification issues
- Equipment issues, especially if purchased too soon after injury
- Limited access to information, education, and peer support services

## Rationale for Post-Acute SCI Rehabilitation

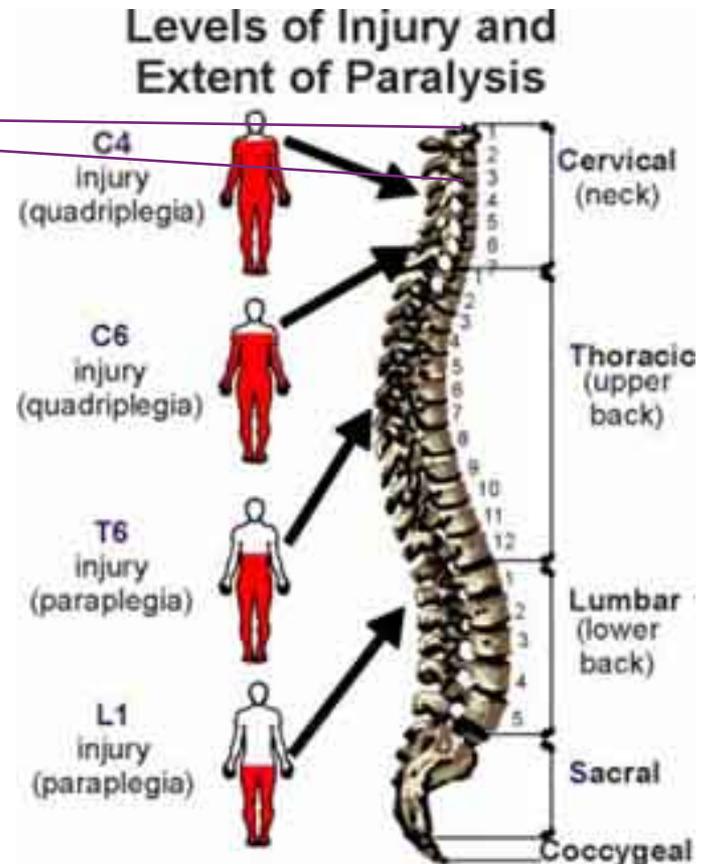
- National average length of stay for inpatient spinal cord rehab is 26.6 days
- Given the exorbitant long-term costs of attendant care and the shorten length of stay for inpatient rehab it follows that increasing rehabilitation in the post-acute setting would significantly decrease the long-term expense by increasing functional independence prior to discharge home

“They will fund a client to live in a nursing home, but they won’t fund a client to live in a facility that teaches them how to be independent and live on their own.”

--SCI Survivor

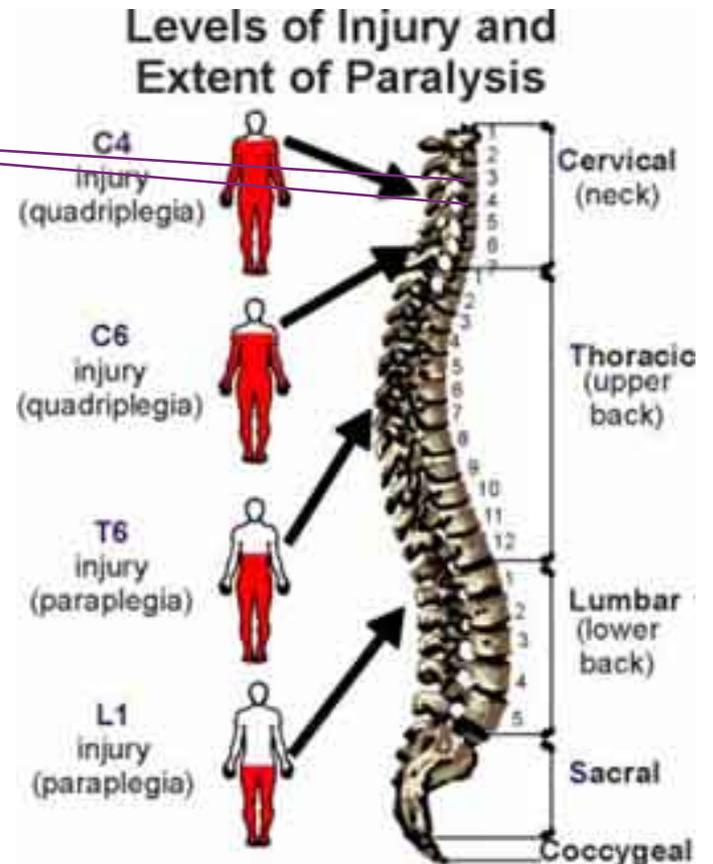
## Therapy Intervention

- Level: C1-C3
- Functional Deficit: Limited movement of head and neck, can be dependent on ventilator for breathing
- Therapy Intervention: Communication and wheelchair mobility through mouth stick and assistive technologies



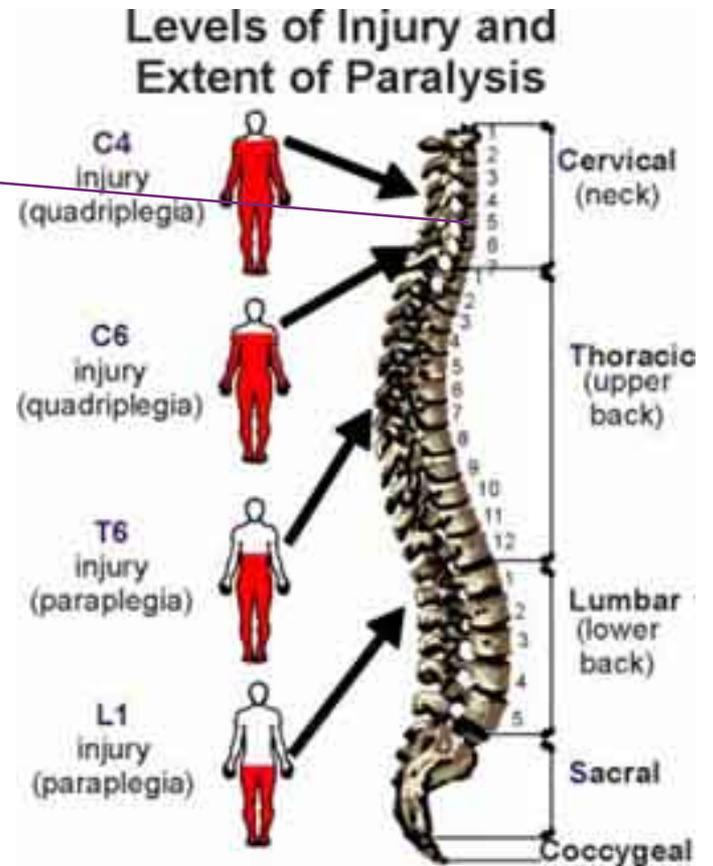
## Therapy Intervention

- Level: C3-C4
- Functional Deficit: Limited movement of neck and shoulders, might be intermittently dependent on ventilator for breathing
- Therapy Intervention: Increasing independence with feeding and operation of adjustable bed through assistive technologies



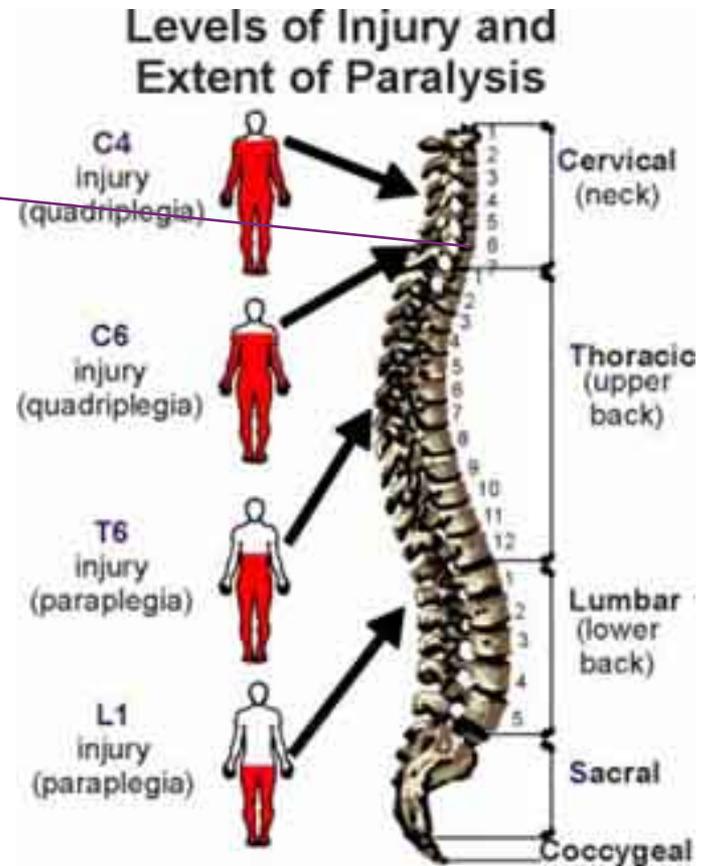
## Therapy Intervention

- Level: C5
- Functional Deficit: Limited movement of arms; usually can bend elbows and turn palms up
- Therapy Intervention: Increasing independence with feeding, bathing, grooming with adaptive equipment, possibly wheelchair propulsion



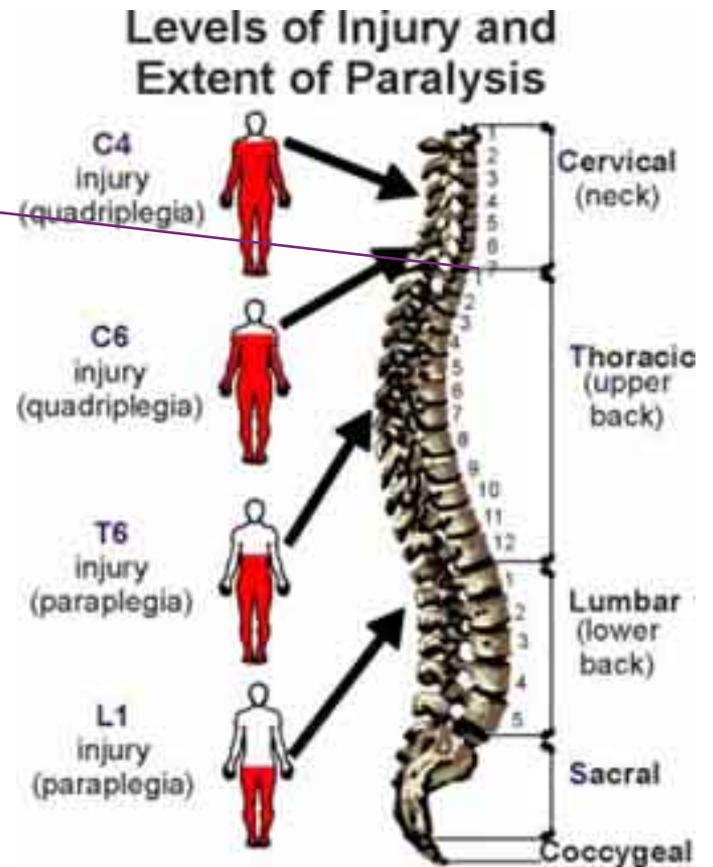
## Therapy Intervention

- Level: C6
- Functional Deficit: Limited movement of upper extremity; usually can turn palms up/down and extend the wrists
- Therapy Intervention: Increasing independence with feeding, bathing, grooming with adaptive equipment, wheelchair propulsion, transfers, and bowel and bladder management



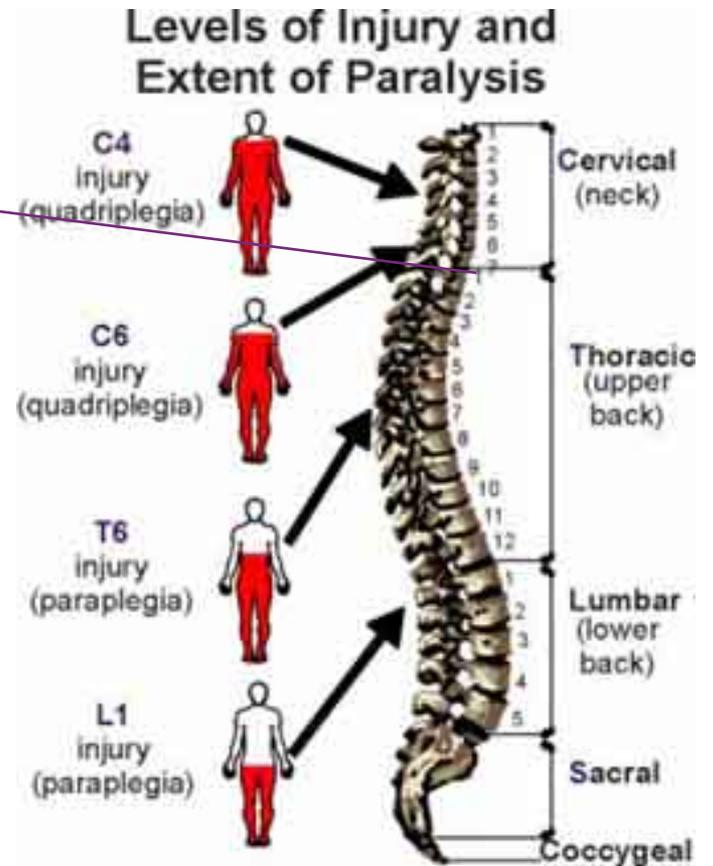
## Therapy Intervention

- Level: C7
- Functional Deficit: Limited movement of upper extremity; usually can extend elbow, turn palms up/down, extend wrists
- Therapy Intervention: Increasing independence with feeding, bathing, grooming with less adaptive equipment, wheelchair propulsion, transfers, and bowel and bladder management, pressure relief and light housekeeping



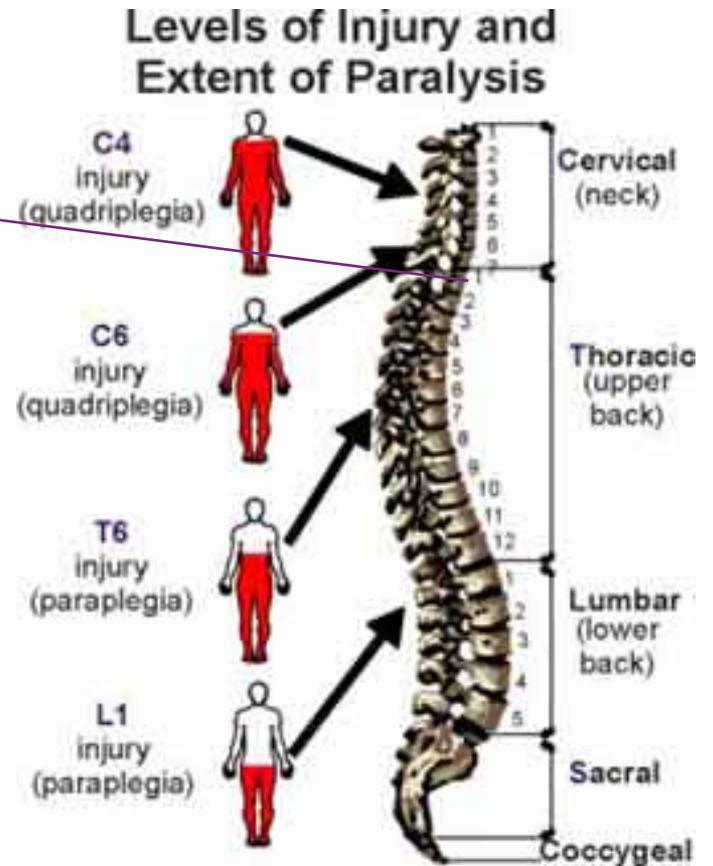
## Therapy Intervention

- Level: C8
- Functional Deficit: Limited movement of hands; usually can flex the fingers
- Therapy Intervention: Increasing independence with feeding, bathing, grooming with less adaptive equipment, wheelchair propulsion, transfers, and bowel and bladder management, pressure relief and light housekeeping



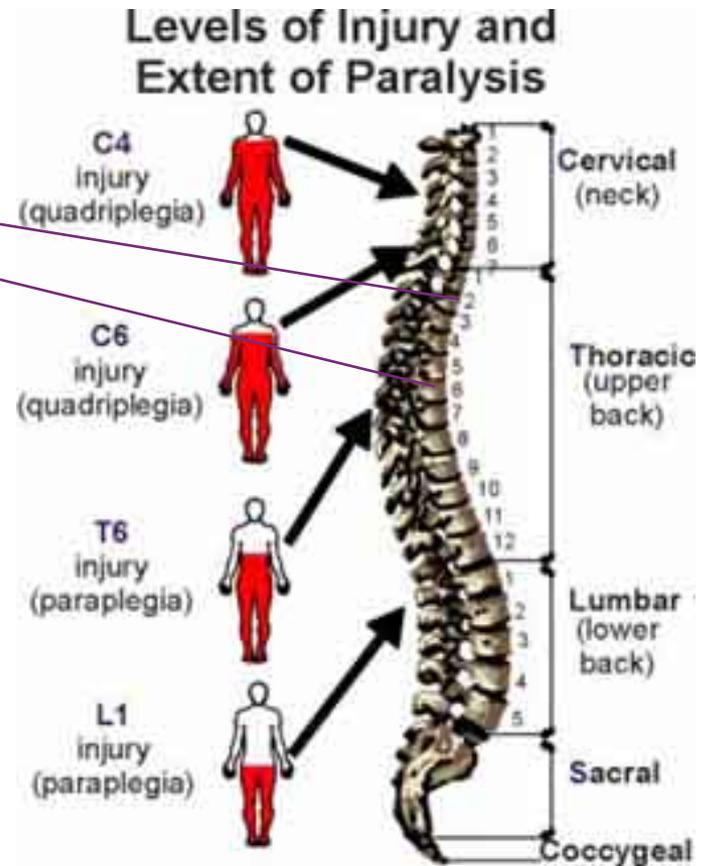
## Therapy Intervention

- Level: T1
- Functional Deficit: Limited movement of hand; usually can abduct the fingers
- Therapy Intervention: Increasing independence with feeding, bathing, grooming with less adaptive equipment, wheelchair propulsion, transfers, and bowel and bladder management, pressure relief and light housekeeping



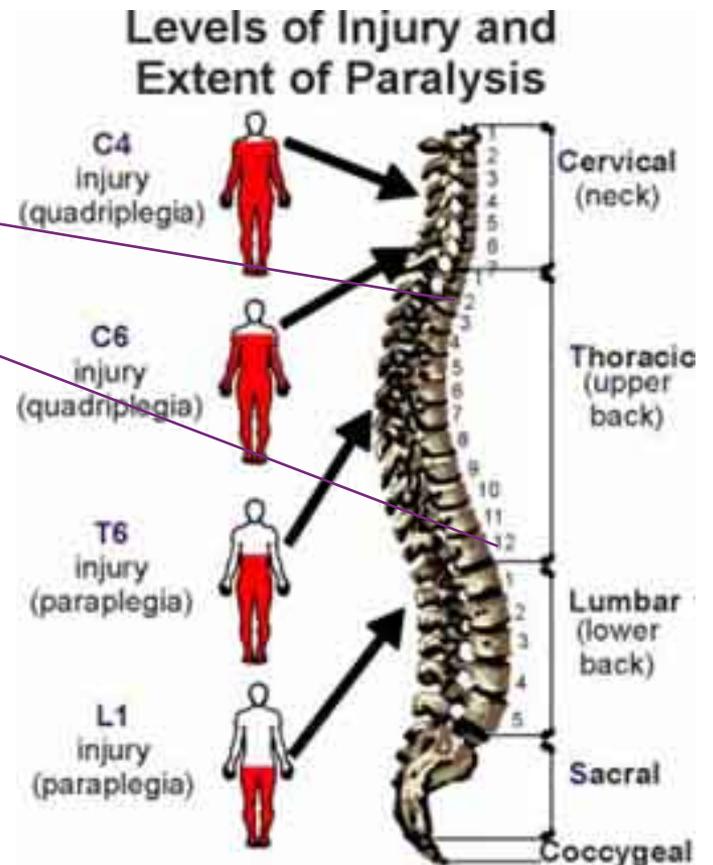
## Therapy Intervention

- Level: T2-T6
- Functional Deficit: Limited control of trunk
- Therapy Intervention: Improving cough effectiveness and ability to perform unsupported seated activities



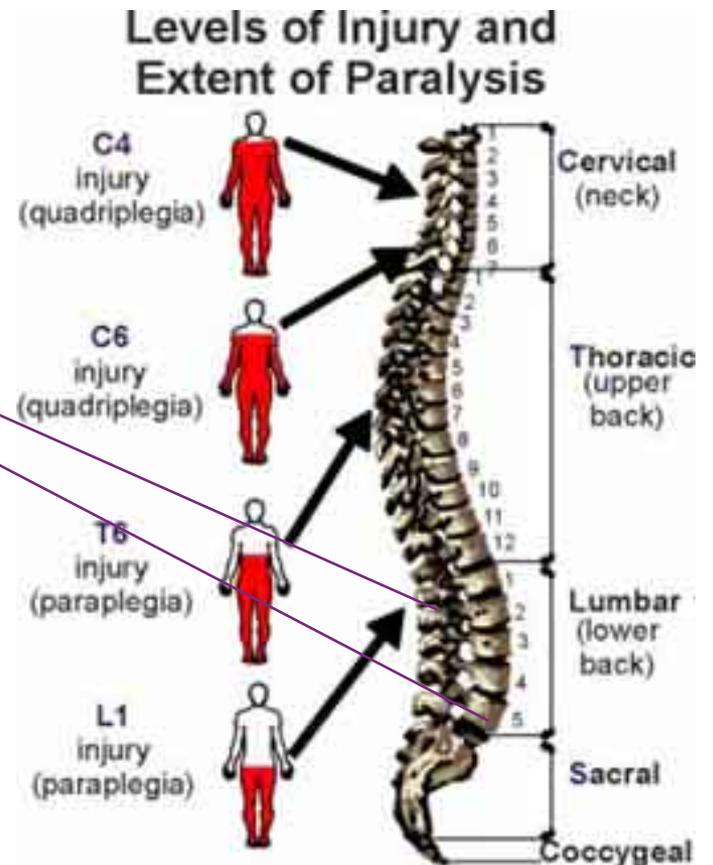
## Therapy Intervention

- Level: T2-T12
- Functional Deficit: Limited control of trunk
- Therapy Intervention: Some individuals are capable of limited walking (usually with loftstrand crutches); this can lead to damage of upper joints and often does not offer a functional benefit



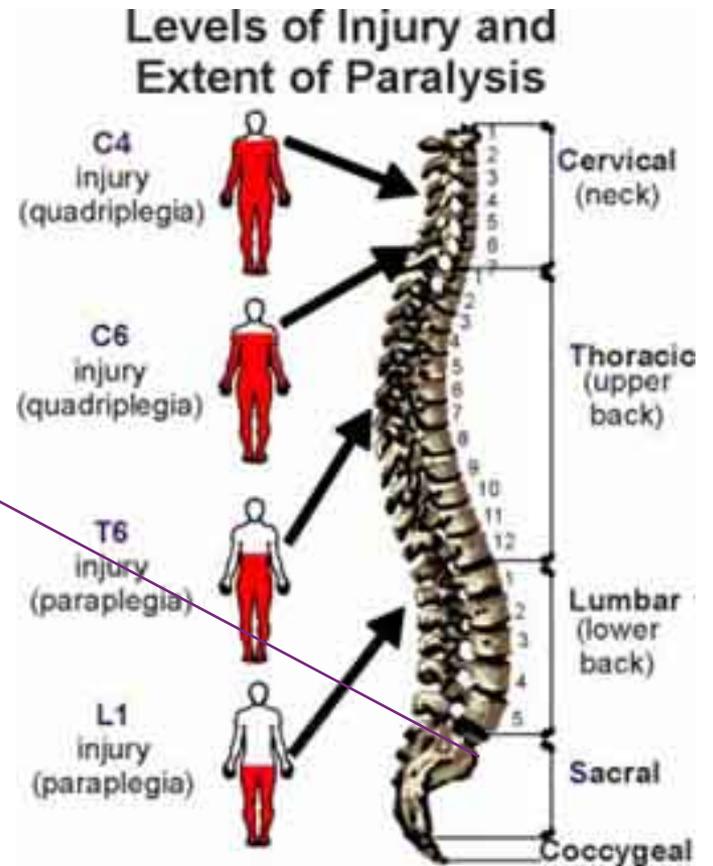
## Therapy Intervention

- Level: L2-L5
- Functional Deficit: Limited control of lower extremities
- Therapy Intervention: Walking with various levels of adaptive equipment



## Therapy Intervention

- Level: S1
- Functional Deficit: Limited control of ankle, feet and varying degrees of control over bladder, bowel and sexual function
- Therapy Intervention: Walking and transfers with fewer assistive devices and adaptive equipment; training of bladder, bowel and sexual function



## Transfers Into Bed



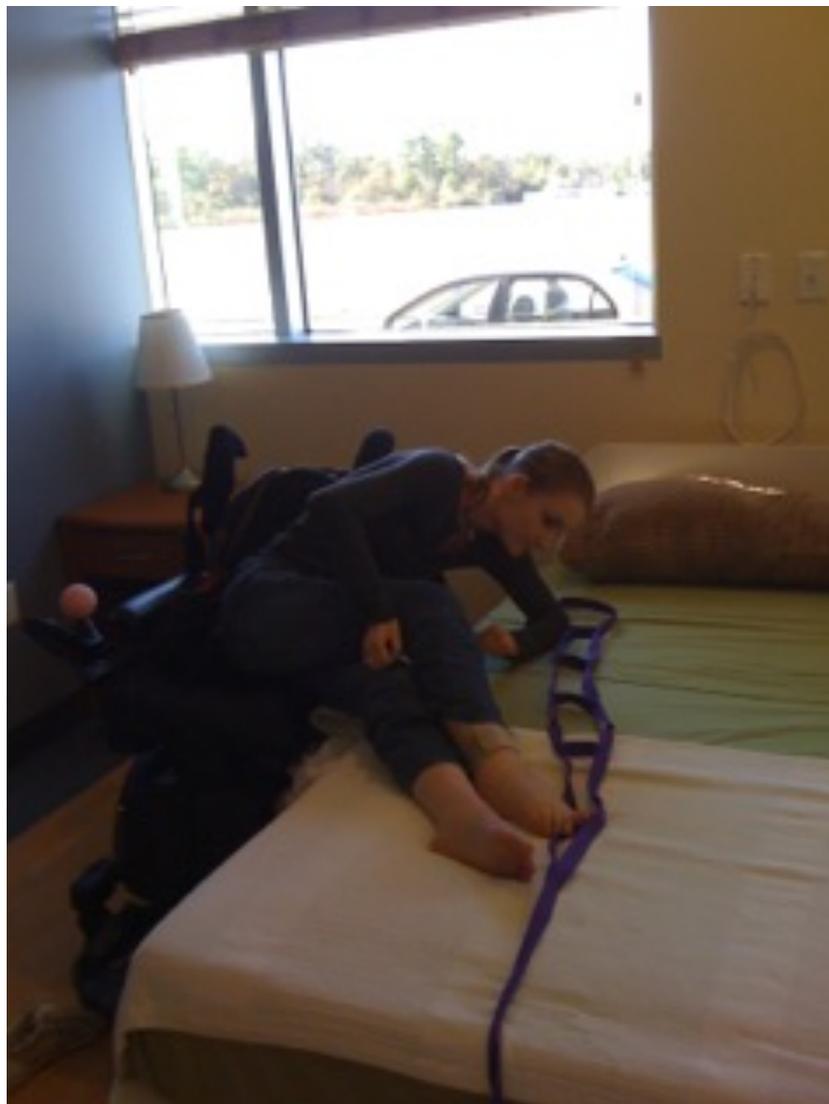
## Transfers Into Bed



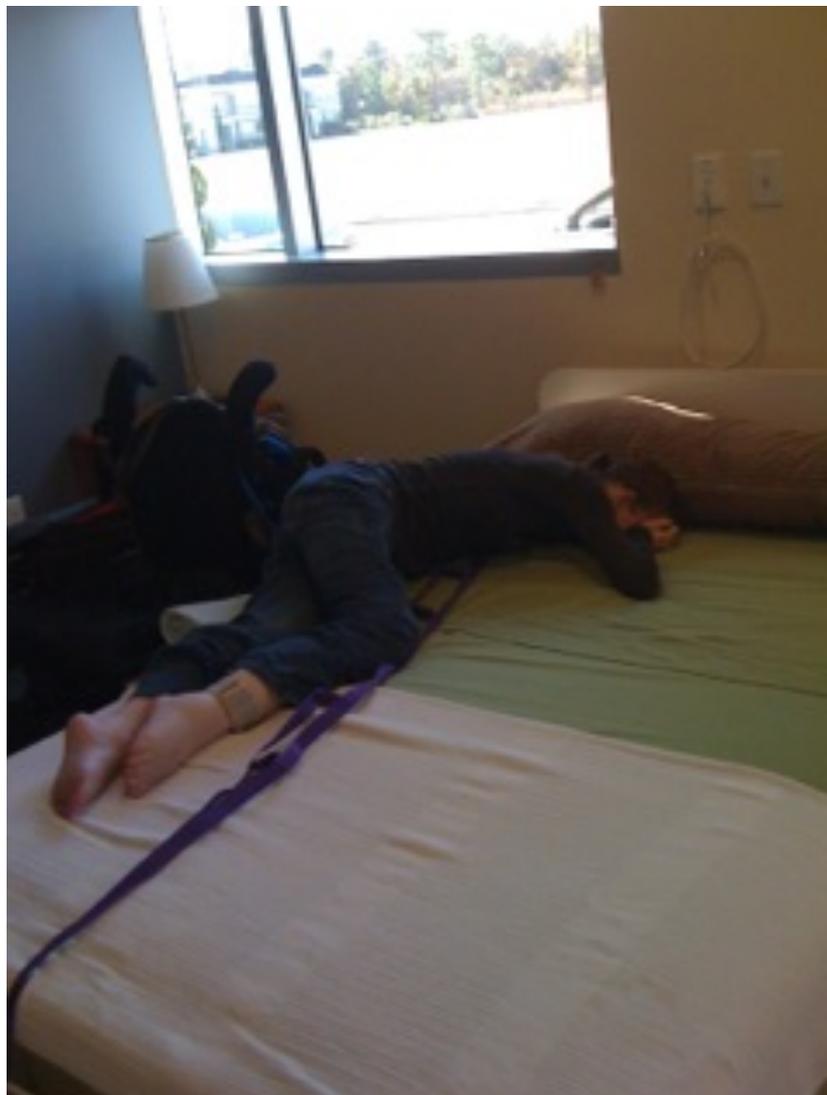
## Transfers Into Bed



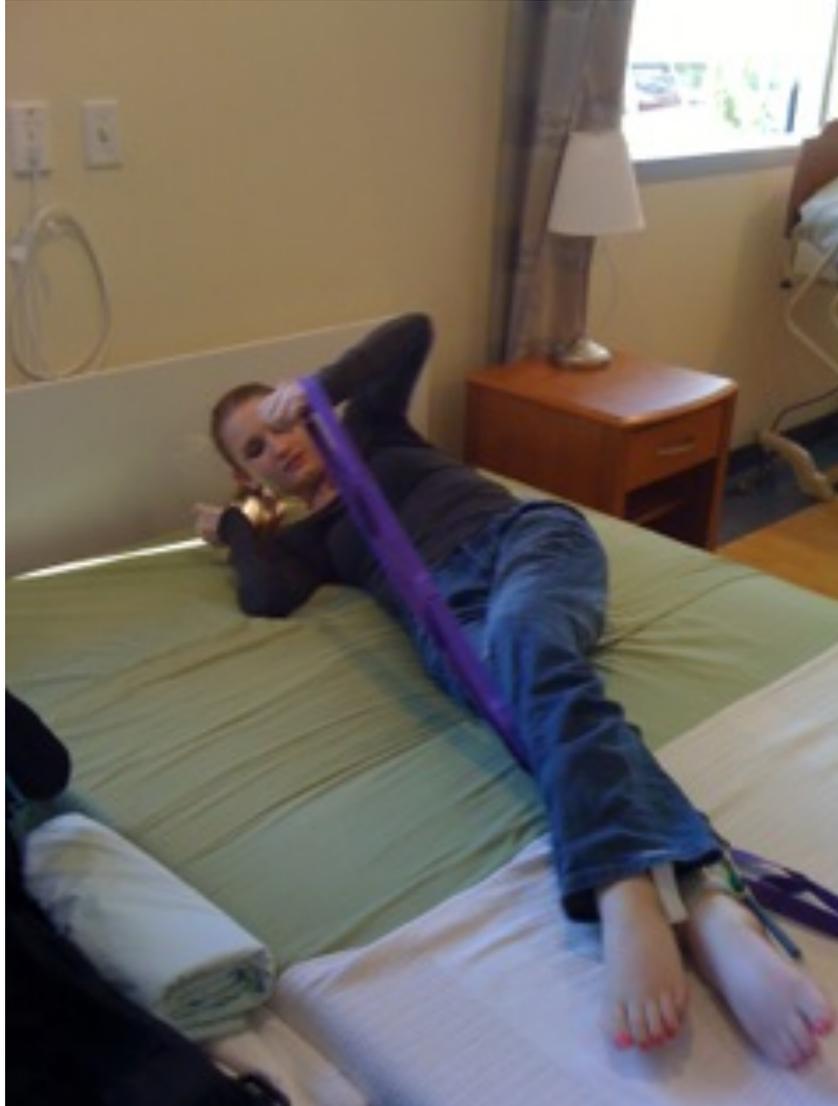
## Transfers Into Bed



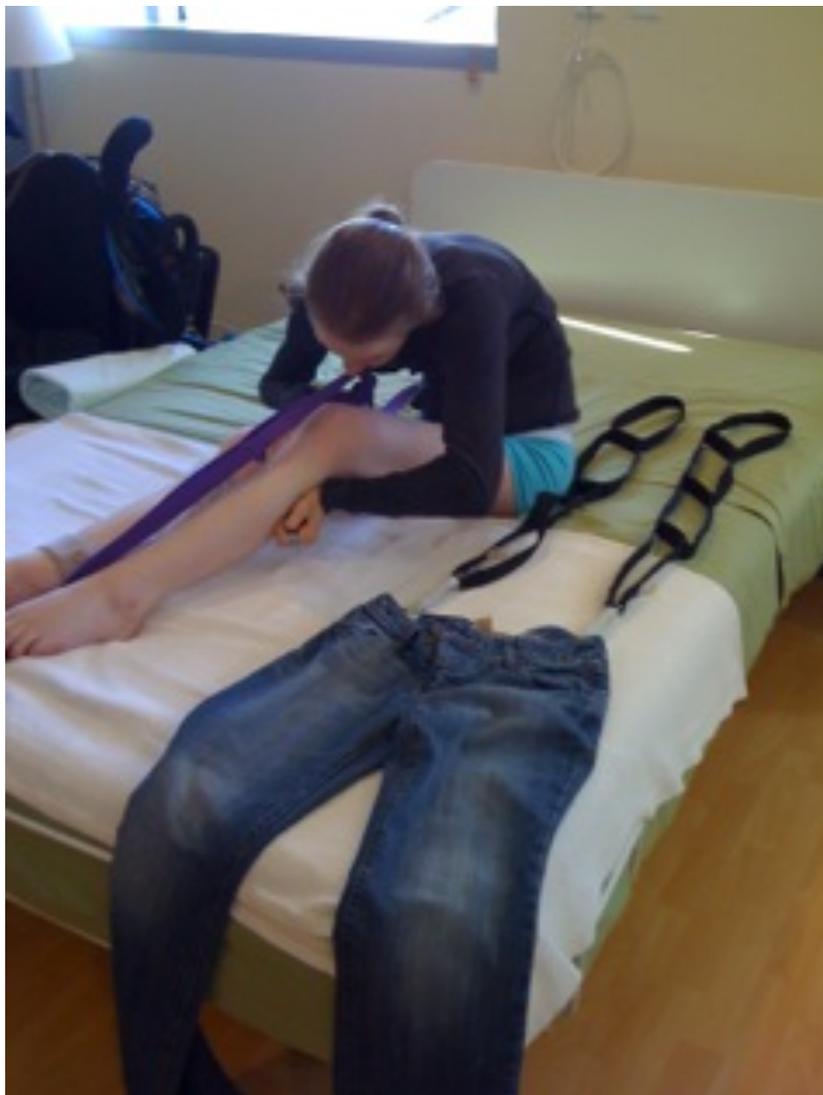
## Transfers Into Bed



## Transfers Into Bed



# Dressing



## Dressing



# Dressing



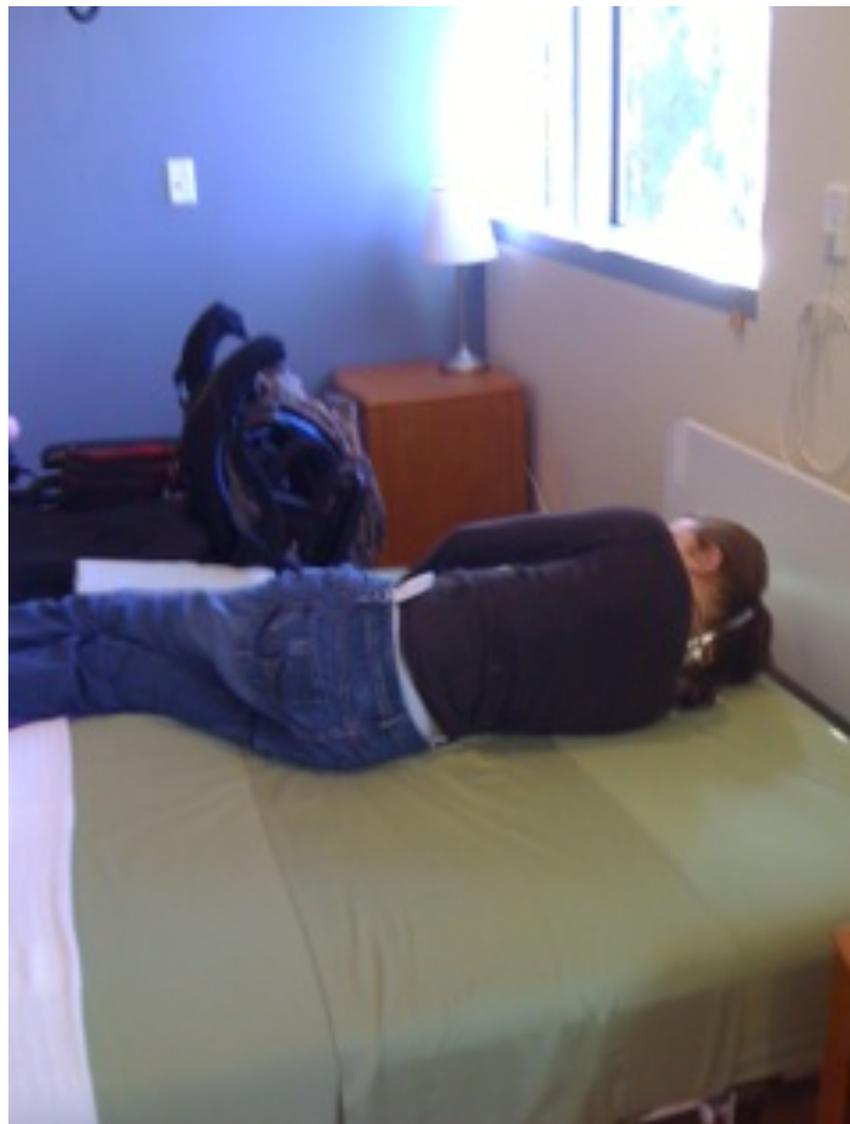
# Dressing



# Dressing



# Dressing



## Putting On Shoes



## Putting On Shoes



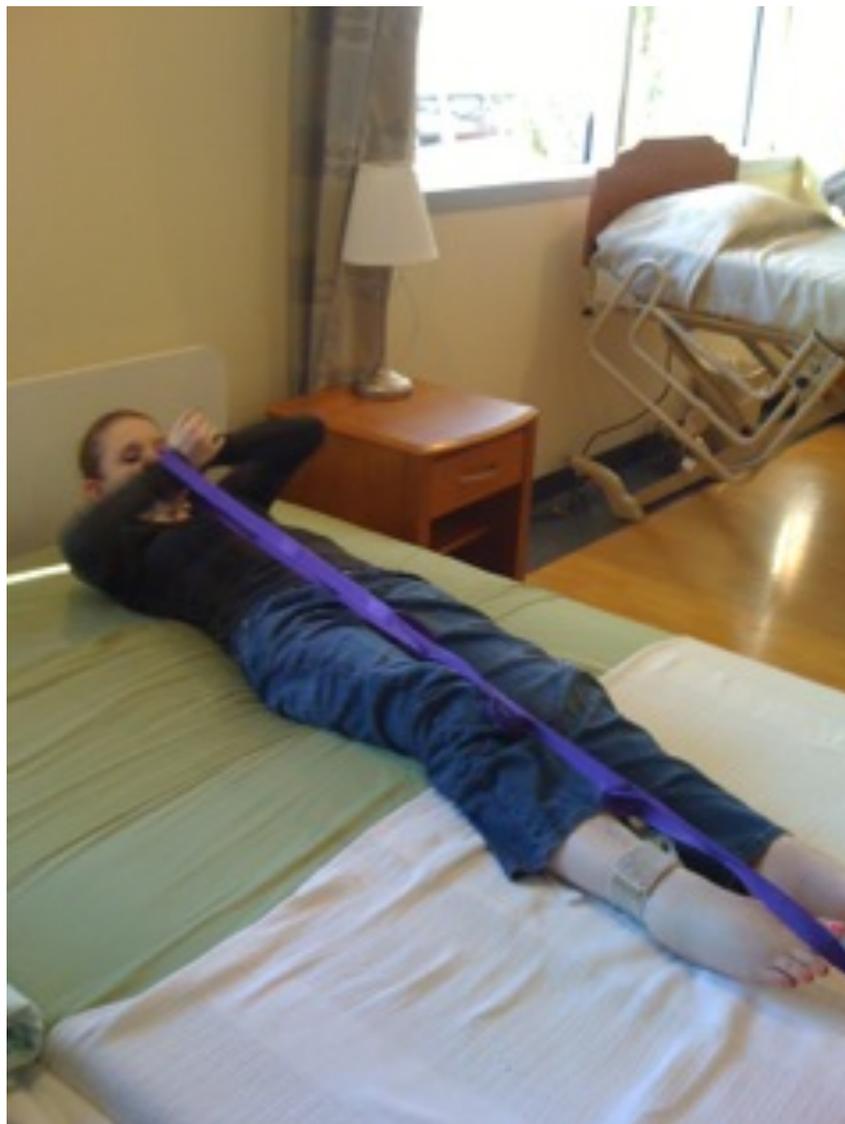
## Putting On Shoes



## Emptying Catheter Bag



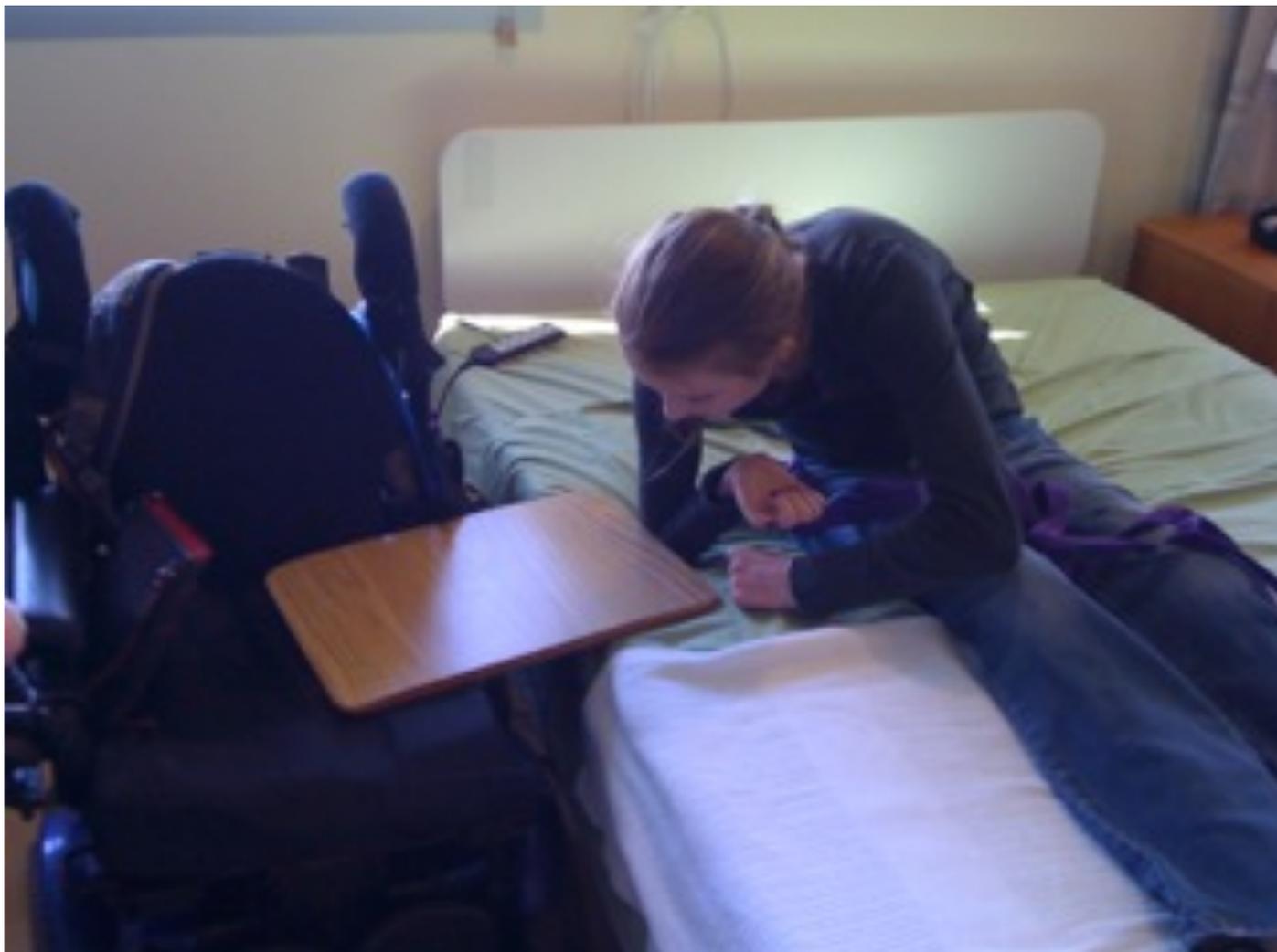
## Transfers Out Of Bed



## Transfers Out Of Bed



## Transfers Out Of Bed



## Transfers Out Of Bed



## Transfers Out Of Bed



## Transfers Out Of Bed



## Transfers Out Of Bed



## Transfers Out Of Bed



## Transfers Out Of Bed



“Access to rehabilitation. Now you only get six to eight weeks of rehabilitation versus nine months. That is not enough time to develop independence.”

--SCI Survivor

## Spastic Hypertonia

- Spastic Hypertonia—uncontrolled “jerking” movement, stiffening, straightening, or rigidity of muscles
- Can be a warning sign of problems in an area of no sensation
- Can be useful for accomplishing functional movement patterns

## Advantages of Spastic Hypertonia

- Maintains muscle tone and mass
- Reduces bone loss and reduces risk for osteoporosis
- Increases metabolic requirements (e.g., promoting blood circulation)
- Improves performance of ADLs (e.g., pressure relief)
- Improves functional mobility
- Warns that there is a problem in an area of decreased sensation

## Disadvantages of Spastic Hypertonia

- Limits range of motion
- Causes pain due to stress on joints and muscles
- Interferes with daily functional activities (e.g., driving, walking, sexual function)
- Causes unwanted bladder/bowel release
- Affects posture and ability to sit comfortably and maintain positions or balance
- Causes scraping of skin and increases risk for pressure sores
- Adds to cost of medications and attendant care

## Treatment of Spastic Hypertonia

- Daily range of motion
- Performance of functional movements
- Standing devices
- Relaxation techniques
- Medications



## Autonomic Dysreflexia

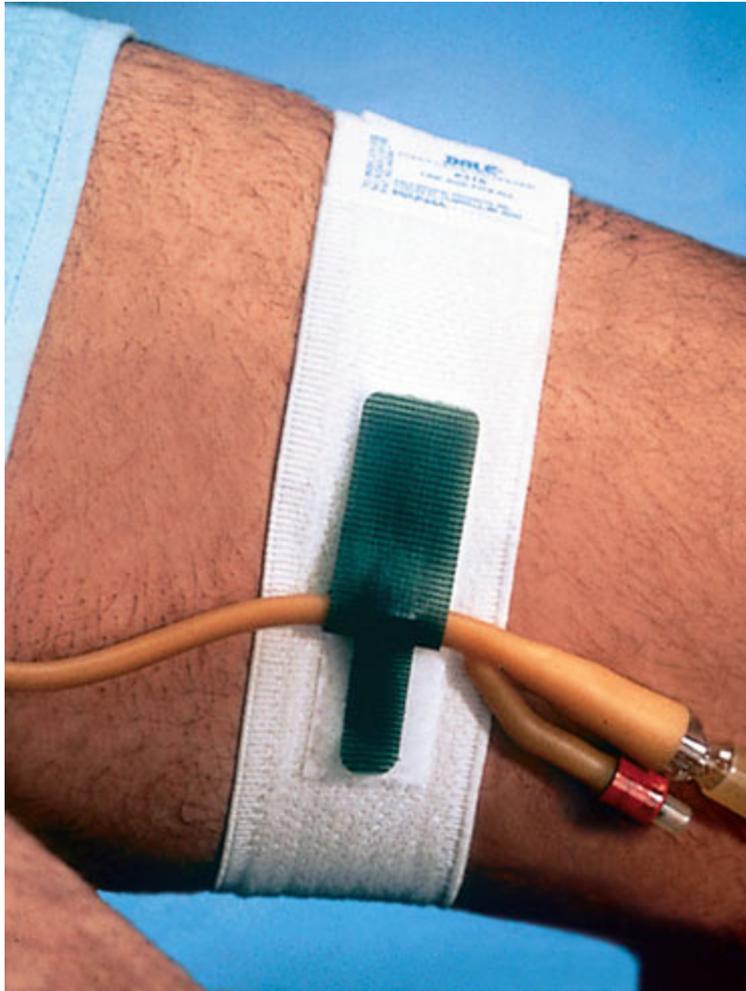
- Autonomic Dysreflexia (AD) a.k.a. hyperreflexia occurs in people with a SCI at or above the level of T6
- It is the result of an irritation, pain or stimulus to the nervous system below the level of injury, essentially the affected area sends a message to the brain causing a reflex of tightening blood vessels, causing the blood pressure to rise it can cause a stroke, seizure or even death

## Signs and Symptoms of AD

- High blood pressure
- Seeing spots or blurred vision
- Pounding headache
- Nasal stuffiness
- Flushed face
- Red blotching on chest
- Sweating above the level of injury
- Goose bumps
- Cool, clammy skin
- Nausea
- Feeling anxious



## Autonomic Dysreflexia Intervention



- Check the bladder and bowel
- Check the skin
- Check for sources of irritation

## Autonomic Dysreflexia Prevention

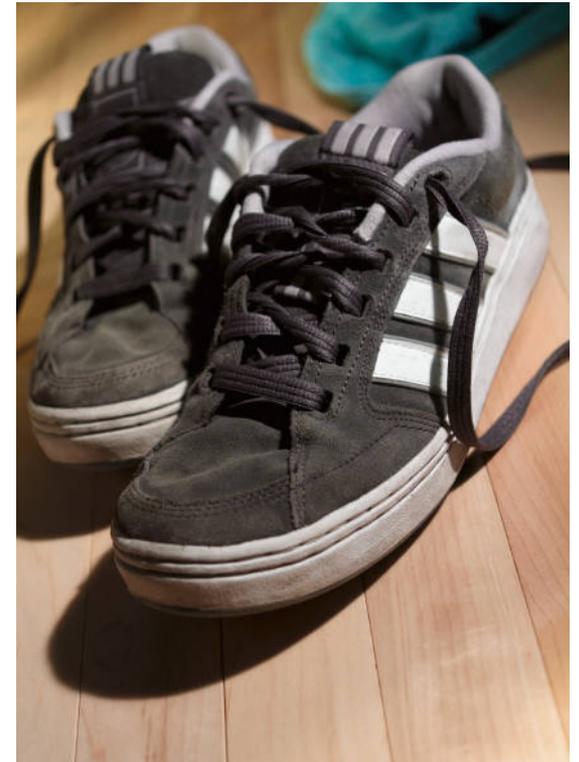
- Do not lay patient down
- Keep catheter equipment clean and drain frequently
- Empty bladder routinely
- Follow a regular bowel program
- Check skin daily
- Wear loose fitting clothing
- Check for painful stimuli and remove
- Carry a medical alert card

“There was a place [transitional living facility] where I went to have rehabilitation. I went and lived there and they taught me how to do everything, dress myself, get in the shower and take a shower. I learned how to do everything on my own, so I could live independently.”

--SCI Survivor

## Issues and Intervention

- Issue—Dressing and Undressing
- Therapy Intervention—education on wearing accessible clothing and selecting attire (1-2 sizes bigger than normal) that will make dressing easier, requiring less energy exertion and reducing aggravation



## Issues and Intervention

- Issue—Dressing and Undressing
- Therapy Intervention—education to wear clothing that does not restrict joint motion, that is light-weight or stretch-knit fabric to allow for greater movement and ability to fit over braces as well as smoother to allow for easier sliding during transfers, education to wear clothing with larger leg or armholes with front opening and large buttons

## Issues and Intervention

- Issue—Dressing and Undressing
- Therapy Intervention—adapting clothing by sewing fabric loops inside pants, underwear; dressing and undressing is often easier to accomplish in lying down or in long-sitting on the bed; intervention also includes instruction on adaptive equipment for managing zippers and fasteners

## Issues and Intervention

- Issue—Bladder Control—the bladder will continue to store urine from the kidneys, however the brain may no longer be able to control emptying the bladder increasing risk for urinary tract infections
- Therapy Intervention—education on maintaining adequate hydration and techniques for emptying the bladder (i.e., bladder program)

## Issues and Intervention

- Issue—Decreased Bowel Control—the muscles of the anus are no longer able to open and close causing fecal incontinence
- Therapy Intervention—education on benefits of high-fiber diet and techniques for improving control of bowels (i.e., bowel program)

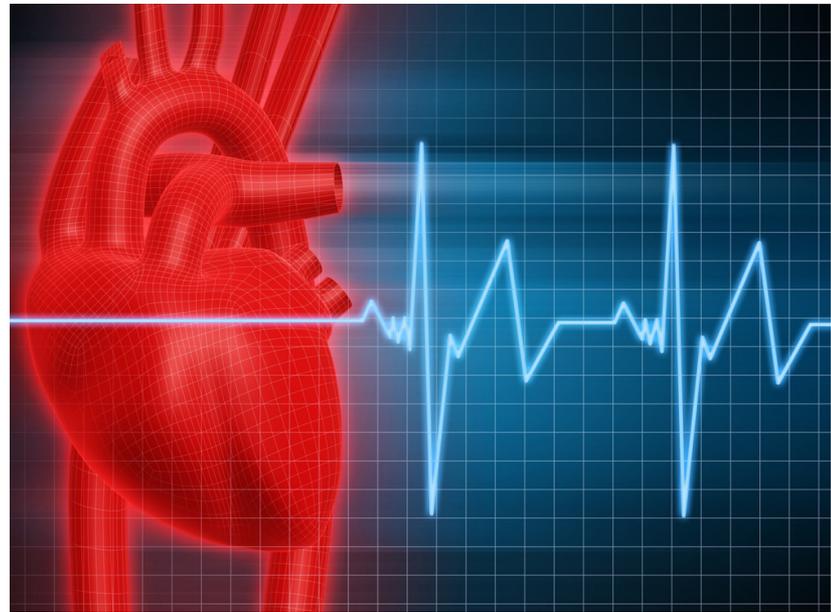


## Issues and Intervention

- Issue—Impaired Skin Sensation—the skin cannot send messages to the brain when it's injured by things such as prolonged pressure, heat or cold causing injury or pressure sores
- Therapy Intervention—education on pressure relief and skin care

## Issues and Intervention

- Issue—Decreased Circulation Control—the ability to maintain blood pressure and swelling increasing risk for blood clots
- Therapy Intervention—education on preventing autonomic hyperreflexia



## Issues and Intervention

- Issue—Impaired Muscle Tone—may be increased, decreased, or fluctuating causing decreased recruitment and control of muscle for motor control which can lead to spasms, pain and increased fatigue
- Therapy Intervention—pain management, training of compensatory strategies to gain motor control and selective muscle recruitment

## Issues and Intervention

- Issue—Decreased Fitness and Wellness—weight management and muscle atrophy are issues which can lead to a sedentary lifestyle, obesity, cardiovascular disease and diabetes
- Therapy Intervention—education regarding a nutritious diet and physical fitness programs specific to functional abilities

## Issues and Intervention

- Issue—Impaired Sexual Health—sexual function and fertility can be affected along with decreased sensation
- Therapy Intervention—some therapists specialize in rehabilitation of sexual function and fertility



## Issues and Intervention



- Issue—Presence of Pain—in joints or muscles is usually from overuse, nerve pain is often the direct result of the spinal cord injury
- Therapy Intervention—focused on a variety of approaches to pain management

“The cost of doing things to improve or enhance your quality of life. There is some basic equipment that is funded, but a lot of these things are too expensive...There are many technological advances, but the cost of these things hinders access.” --SCI Survivor

## Preventing Secondary Conditions



- Eat a well-balanced diet
- Change your position frequently
- Drink plenty of water
- Do not smoke
- Regularly examine skin and pay special attention to bony areas
- Establish a good relationship with physicians and have routine check-ups

## Additional Assistance

- Maximizing funding source (e.g., Medicare, Medicaid Waiver System, Brain and Spinal Cord, Insurances, Veteran's Administration)
- Maximizing transportation resources within community
- Establishing relationship with Medipass, primary and specialty physicians, and Vocational Rehabilitation

## Additional Assistance

- Evaluate wheelchair and adaptive equipment needs (consider renting expensive equipment prior to purchase)
- Teach patients how to give instructions for all of their personal care needs
- Establish life line system



## Home Modifications

- Home Evaluation conducted by therapists and rehabilitation specialists
- Home Modifications completed per Americans with Disabilities Act (ADA)



## Home Modifications

- Dramatically impact the ability to be independent
- Significantly improve safety
- Prevent potential injury and further medical complications



## Adaptive Modifications

- Enables productive and competitive work
- Promotes independence in community



## Adaptive Modifications

- Enables independent transportation



“Community reintegration component is huge. We are seeing people who have been injured two and three years and are not reintegrating back into the community and to work. Clinically, I know these individuals should be capable of participating in life independently. Many of them don’t have insurance so they don’t have access to services.”

--SCI Specialist

## Benefits of a Transitional Care Facility (TCF)

- Ability to provide skilled care in a relaxed, home-like setting
- Ideal setting for uninterrupted recuperation from surgery, illness or injury and is intended for use by those no longer needing the full resources of hospital care, yet who still require medical attention during their recovery or rehabilitation
- Prepares patients for return to home or placement within an appropriate community facility

## Benefits of a TCF

- Complete team of health care professionals, including nurses, social workers, case managers, physical, occupational, and speech therapists, rehabilitation specialists, life skills therapists, certified athletic trainers, and a physician readily available for consultation and treatment
- Comprehensive patient and family education
- Community outings, integration and post-discharge follow-up
- Provides respite for caregivers

## Benefits Of Our TCF

All benefits listed above plus:

- Brand new facility with differentiated rooms based on need
- Excellent location for community integration



# Questions



## Bibliography

- [http://www.alsa.org/files/cms/Resources/FYI\\_Dressing.pdf](http://www.alsa.org/files/cms/Resources/FYI_Dressing.pdf)
- [http://www.alsa.org/files/cms/Resources/FYI\\_Respite.pdf](http://www.alsa.org/files/cms/Resources/FYI_Respite.pdf)
- <http://www.mayoclinic.org/spinal-cord-injury-rehabilitation/>
- [http://www.alsa.org/files/pdf/fyi/Rehab\\_Approach.pdf](http://www.alsa.org/files/pdf/fyi/Rehab_Approach.pdf)
- <http://www.doh.state.fl.us/demo/BrainSC/index.html>
- [http://images.main.uab.edu/spinalcord/html/spas\\_hy\\_files/outline.htm](http://images.main.uab.edu/spinalcord/html/spas_hy_files/outline.htm)
- <http://www.mayoclinic.com/health/spinal-cord-injury/DS00460/DSECTION=symptoms>
- <http://www.mayoclinic.org/spinal-cord-injury/DS00460/desection=all&meth>
- <http://www.mayoclinic.org/spinal-cord-injury-rehabilitation/>
- <http://www.mayoclinic.org/spinal-cord-injury-rehabilitation-rst/>
- <http://www.spinal-injury.net/treatment-of-spinal-cord-injury.htm>
- [www.cdc.gov/ncipc/factsheets/sciprevention.htm](http://www.cdc.gov/ncipc/factsheets/sciprevention.htm)
- [www.spinalcord.uab.edu/show.asp?durki=21426](http://www.spinalcord.uab.edu/show.asp?durki=21426)
- [www.spinalcord.uab.edu/show.asp?durki=30166](http://www.spinalcord.uab.edu/show.asp?durki=30166)
- [www.spinalcord.uab.edu/show.asp?durki=41119](http://www.spinalcord.uab.edu/show.asp?durki=41119)
- [www.spinalcord.uab.edu/show.asp?durki=46905](http://www.spinalcord.uab.edu/show.asp?durki=46905)