



# Spinal Cord Injury

## Week 1

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### REVIEW:

- PREVENTING SKIN PROBLEMS AFTER SCI TIP SHEET

### WATCH:

- ANATOMY AND PHYSIOLOGY
- HEALTHY LIVING
- PREVENTION OF PRESSURE SORES

## Teach-Back Week 1

From the information that we will cover in week 1, you should be able to tell us:

- What is the most important thing that you need to do to prevent skin problems?
- Be sure to tell your family.

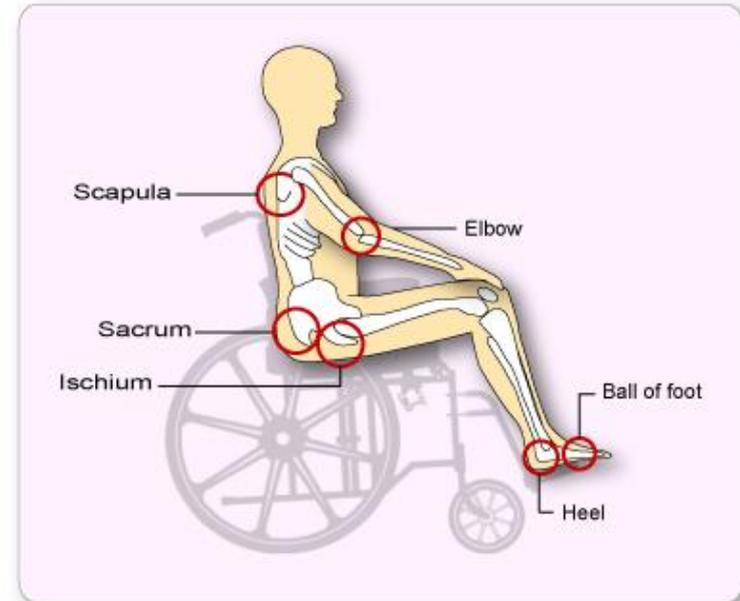
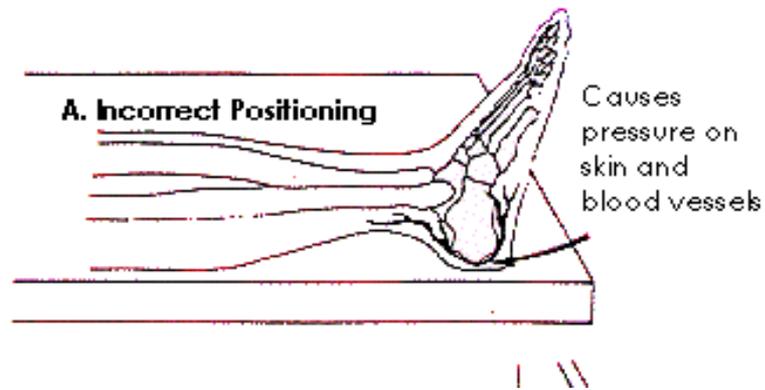
## Hands on teaching

- During week 1, you will be learning how to care for your skin while you are here and once you go home.
- We expect that by the end of this week, you will be able to call for your weight shifts and be able to direct both your family/friends and rehab staff on how to perform them.

# Preventing Skin Problems After Spinal Cord Injury (SCI)

- The staff, you, and your family will need to work as a team to help prevent skin sores (pressure ulcers). Eating healthy and preventing pressure involves planning ahead. Your skin is fragile and with too much pressure from firm surfaces, it can break down quickly. If this happens, your stay will be longer and you will be at risk for other problems such as infection.
- Pressure occurs on the skin over major bones of the body as you sit and lie down, see the picture below. It shows how skin can be 'squished' between the hard heel bone and a firm surface such as a mattress or a shoe. Before your spinal cord injury, when your skin became sore from pressure, you moved into a new position without even thinking. This doesn't happen after spinal cord injury, so we must all pay attention and limit the time you are in one position.

## Most common areas where pressure ulcers occur



## Key steps to prevent pressure ulcers from occurring.

1. Change positions about every 2 hours in bed. Staff will tilt you to both sides and onto your back. It is tempting to want to stay on your back longer, but that is dangerous to your skin. We will keep the head of bed to 30 degrees or less much of the time.
2. An air mattress or special low-air-loss bed mattress will be used. Please help staff remember to blow up the mattress with air when you are in bed.
3. Therapy will place a special cushion in your wheel chair to prevent pressure.
4. Keeping the skin dry and clean will prevent skin breakdown. For example, wet urine on the skin can damage skin. This is caused by strong chemicals in the urine. If you think urine or stool has leaked on your skin, let staff know so the skin is cleaned quickly.

5. The staff will teach you and your family how to check your skin for redness and breakdown. If this occurs, you will need to keep off the red area to relieve pressure. At home you will need to use a mirror to check for red skin on your back, bottom and heels 2-3 times a day.
6. Therapy and nursing will teach you pressure releases to shift your weight every 15 -25 minutes when you are in a chair. This may include tilting back, leaning to one side, or lifting up your bottom. A timer is used to help you remember to shift. By releasing pressure for 3-5 minutes, blood flow improves and takes oxygen and nutrients to tissue.
7. Use good lotion on dry skin.
8. Eat protein (meat, beans, nuts, eggs, milk for example) and Vitamin C (oranges, pineapple, grapefruit, berries-whole fruit or juice, cantaloupe, banana, avocado, broccoli, cauliflower, cabbage, lettuce, brussel sprouts, spinach, green peppers, tomatoes, sweet potatoes, and potatoes.

# Spinal Cord Injury

## Anatomy and Physiology

# What is a Spinal Cord Injury?

- Spinal cord injury, or (SCI) is damage to the spine that results in a loss of function such as movement or feeling.
- Causes include injury: such as gunshot, car accident, fall or disease: such as polio, spina bifida, tumor growth
- In most people with SCI, the spinal cord is intact, but the damage has caused loss of function

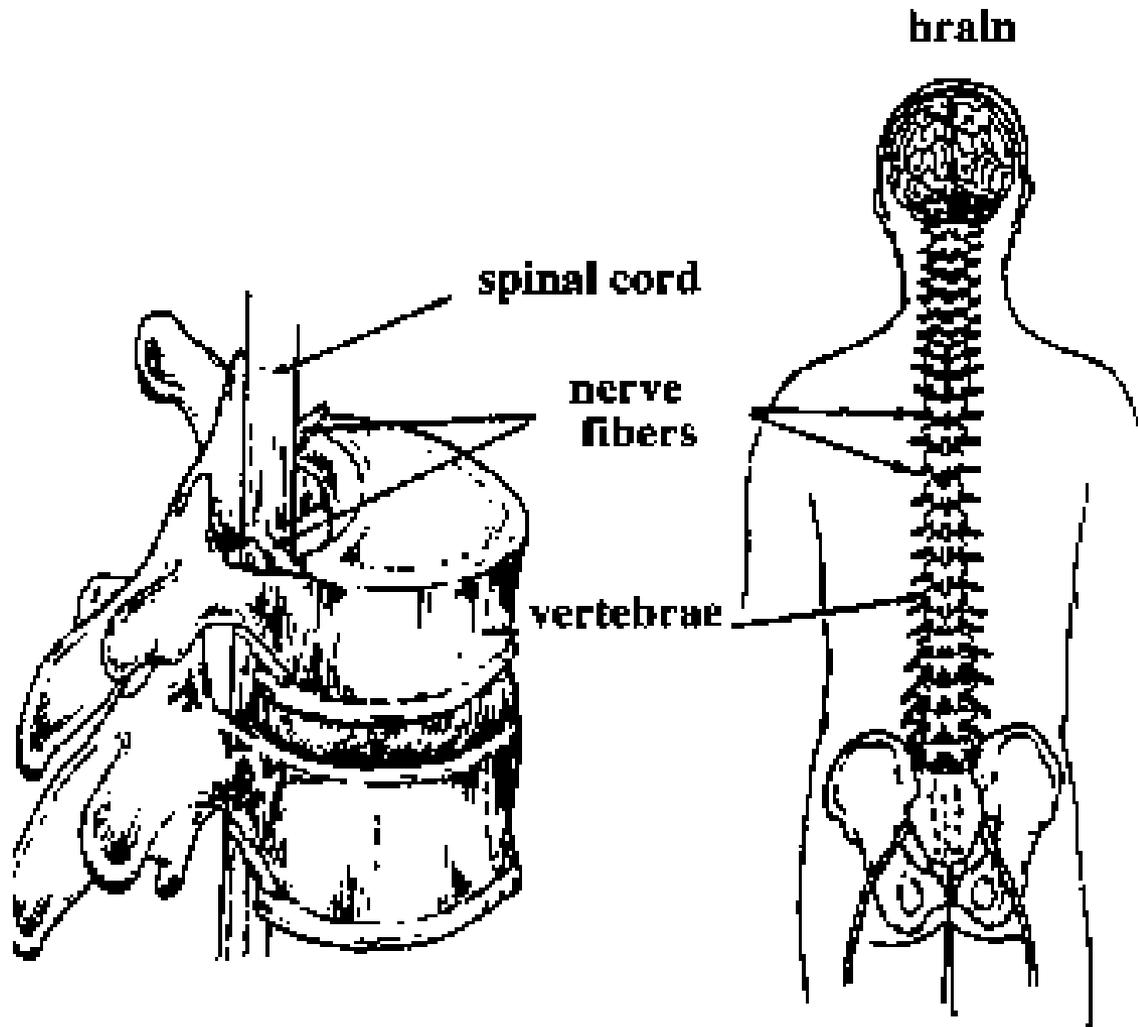
# Spinal Cord injury

- The ability to move and feel after a spinal cord injury will depend on
  - The type of spinal cord injury
  - Where the spinal cord is injured
  - The degree of spinal cord injury

- In order to understand what happens in a spinal cord injury, we must first have a basic understanding of what the spinal cord is and how it works.

# The Nervous System

- The nervous system is “in charge” of all communication that happens in the body
- The nervous system is made up of 3 parts
  - Central nervous system
    - Made of the brain and spinal cord
  - Peripheral nervous system
    - Made of the cranial and spinal nerves
  - Autonomic nervous system
    - a system that controls all vital organs and is responsible for things like heart rate, breathing, digestion, bowel and bladder function



# The Brain

- The brain is the body's control center
- The brain is protected by the skull
- It controls all actions of the body including thinking, moving, feeling, and breathing
- The brain is part of the Central nervous system

## The Spinal Cord

- The spinal cord is about 18 inches long and extends from the base of the brain to the middle of the back
- The spinal cord is the major bundle of nerves that carry messages to and from the brain to the rest of the body. It is like a telephone cable
- The brain and spinal cord make up the “Central Nervous System”

## The Vertebral Column

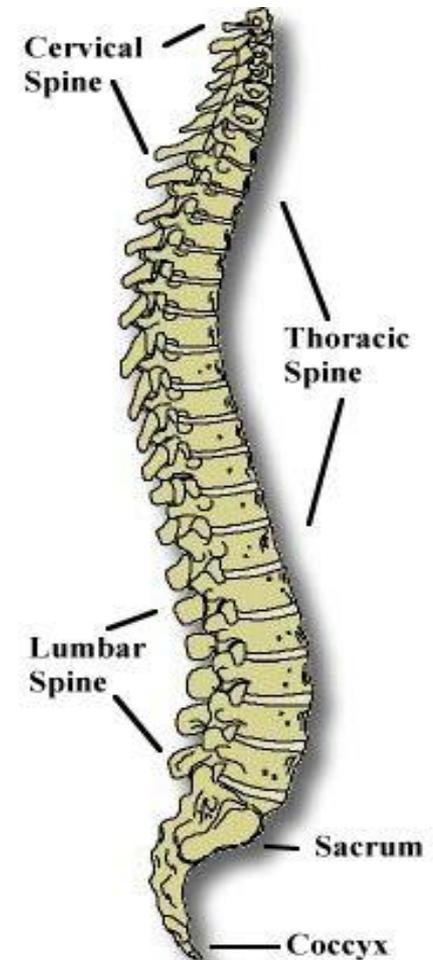
- The vertebral column is made up of several bony rings known as vertebra. Their function is to protect the spinal cord and they also help the body maintain an erect position
- There are 33 bony vertebrae
- Each vertebrae is separated by a disc, this disc is a spongy material that acts as a shock absorber

## The Vertebral Column

- The division of the vertebrae by the discs allow a person to be able to bend and move
- Ligaments hold the column together

## The Vertebral Column

- The vertebral/spinal column is divided into five sections:
  - Neck: (called cervical, 7 bones)
  - Upper back (called thoracic, 12 bones)
  - Lower back (called lumbar, 5 bones)
  - Back of pelvis (called sacral, 5 bones)
  - Tailbone (called coccyx, 3-5 fused bones)



# Spinal Nerves

- There are 31 pairs of spinal nerves
- Spinal nerves go from the spinal cord to a specific body part
- Spinal nerves continue even after the spinal cord stops. These nerves are called CAUDA EQUINA. They are like a horse's tail.
- Each spinal nerve relays feeling about a specific area of the skin to the brain. These areas are called dermatomes.

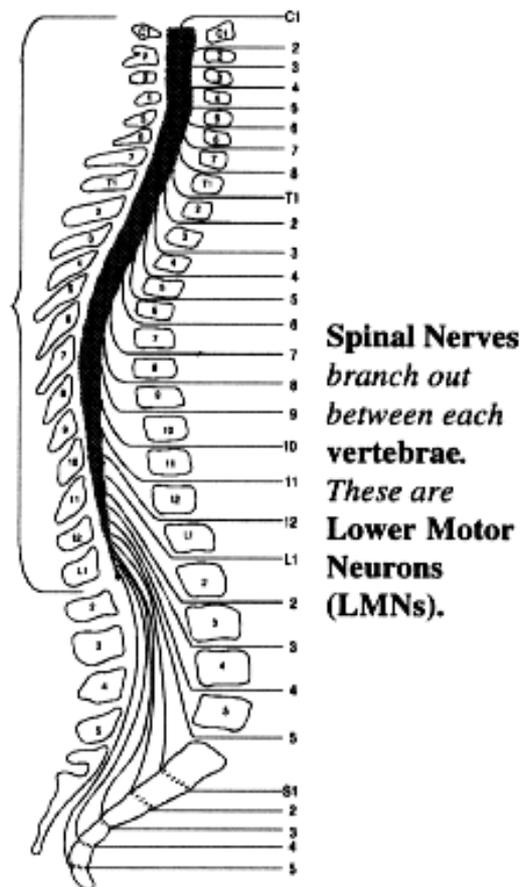
## Spinal Cord Nerves

- There are two types of nerves:
  - Upper motor neurons
  - Lower motor neurons

*The Spinal Cord ends in the back area near the waistline.*

*The nerves within the spinal cord are **Upper Motor Neurons (UMNs).***

*Nerves descend from the end of the spinal cord down through the vertebral column, exiting at each level.*



## Upper Motor Neurons (UPN)

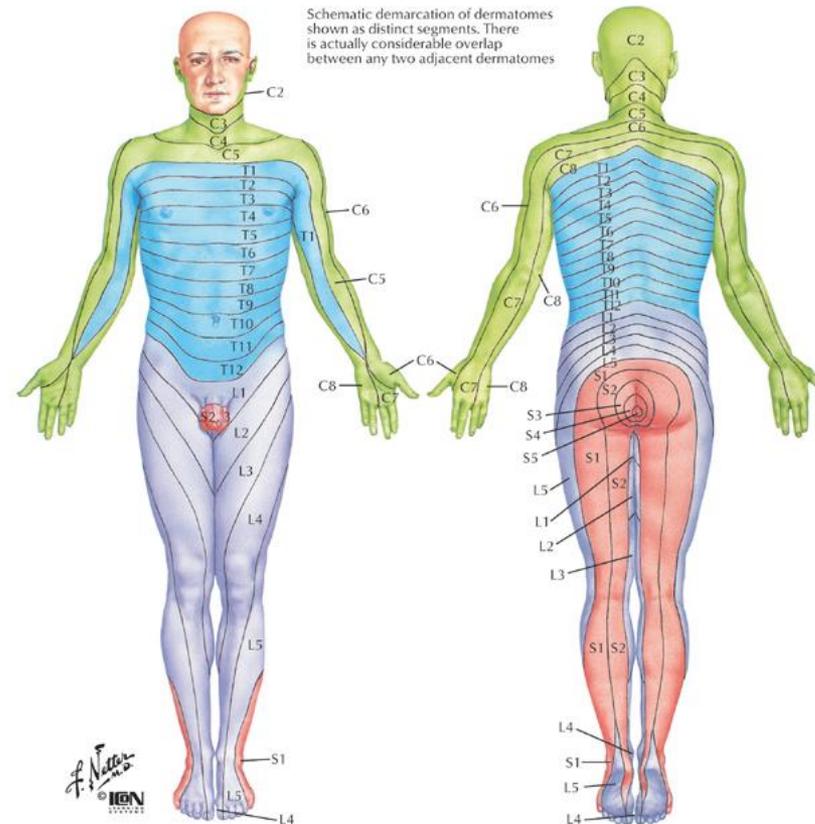
- These are the nerves that lie within the spinal cord
- They carry the messages back and forth from the brain to the spinal nerves.

## Lower Motor Neurons (LMN)

- These are the nerves that branch out from the spinal cord to the other parts of the body
- These nerves exit and enter at each vertebral level and communicate with specific areas of the body
- There are 2 types of LMN:
  - Sensory: carry messages to and from the brain about sensation from the skin and other body parts
  - Motor: Send messages from the brain to the various body parts to do actions such as move an arm

# Dermatomes

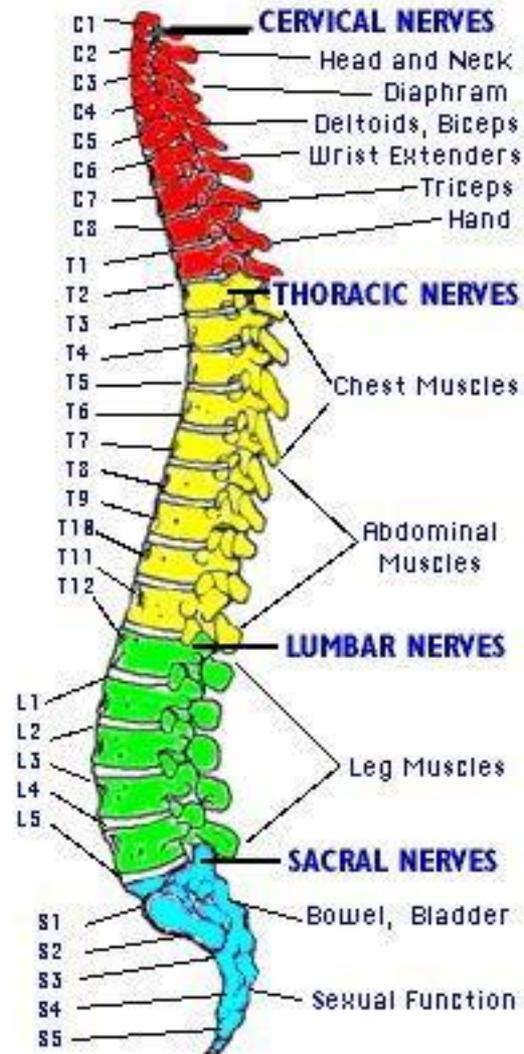
- There are 28 key sensory points. These are known as dermatomes.
- The dermatomes are the nerve roots that receive sensory information from the skin areas
- This helps determine the level of injury (sensory level)
- The next slide is a dermatome map and shows what each dermatome is responsible for.



**Levels of principal dermatomes**

C5 Clavicles  
C5, 6, 7 Lateral parts of upper limbs  
C8, T1 Medial sides of upper limbs  
C6 Thumb  
C6, 7, 8 Hand  
C8 Ring and little fingers  
T4 Level of nipples

T10 Level of umbilicus  
T12 Inguinal or groin regions  
L1, 2, 3, 4 Anterior and inner surfaces of lower limbs  
L4, 5, S1 Foot  
L4 Medial side of great toe  
S1, 2, L5 Posterior and outer surfaces of lower limbs  
S1 Lateral margin of foot and little toe  
S2, 3, 4 Perineum



## How the spinal cord works:

- The spinal cord serves as a sort of intercom system. It relays messages from the brain to the body and from the body to the brain
- The following slide explains what happens when something hot is touched.

## The spinal cord at work

1. Something HOT is touched.
2. The message “Hot” travels:
  1. From the hand-through the nerve-to the spinal cord
3. The message (from the spinal cord) will do two things:
  1. Go back to the hand (through the nerve).
    - Hand quickly moves away from HOT
    - Called reflex
  2. Goes up to the brain. Receives message “HOT”
    - The message (from the brain) travels back down spinal cord-through the nerve-to the hand
    - The hand pulls away from the hot (if the reflex has not already done it.)

## The spinal cord may be injured by:

1. Pressure from
  - A displaced vertebra
  - A displaced disc
  - A tumor
  
2. Injury to the blood vessel of the cord
  - Lack of oxygen supply
  - Blood clot
  
3. Overstretching and twisting of the spinal cord

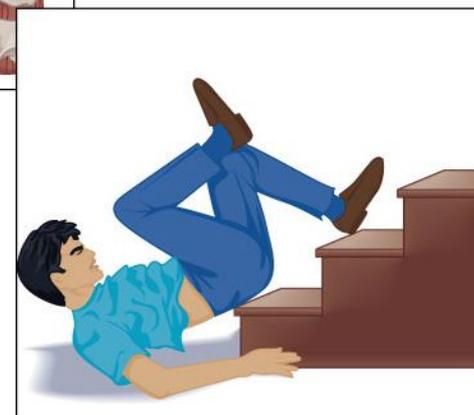
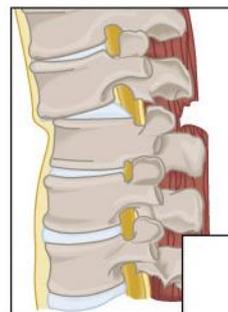
# Ways in which the spinal cord can be injured

- Flexion injury
- Compression injury
- Hyperextension injury
- Flexion-rotation injury
- Penetration injury

## Flexion Injury

- Caused by hyper flexion or a scrunching of the head and neck.
- Usually seen in head-on collisions and sometimes in diving accidents
- Occur most often in the cervical spine around C-5 or C-6

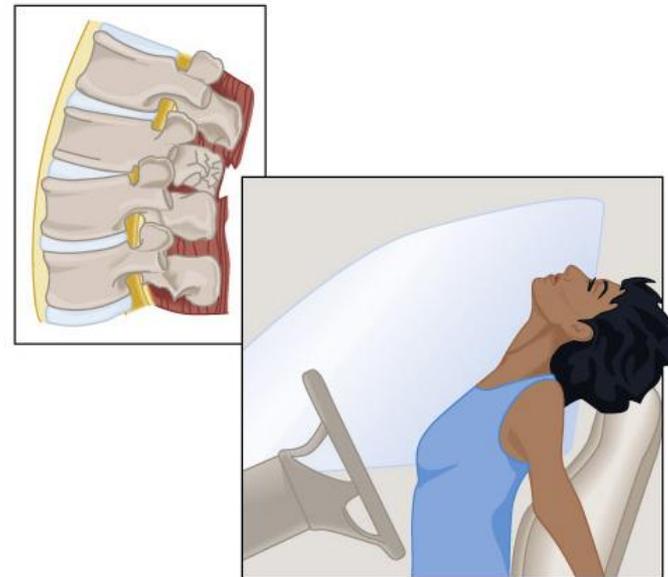
FLEXION INJURY



# Hyperextension Injury

- Caused by overly extending the head and neck.
- Most often seen in a rear-end vehicle collision
- A less severe form of this is known as whiplash
- Occur most often in the cervical spine around the C-4 C-5 region

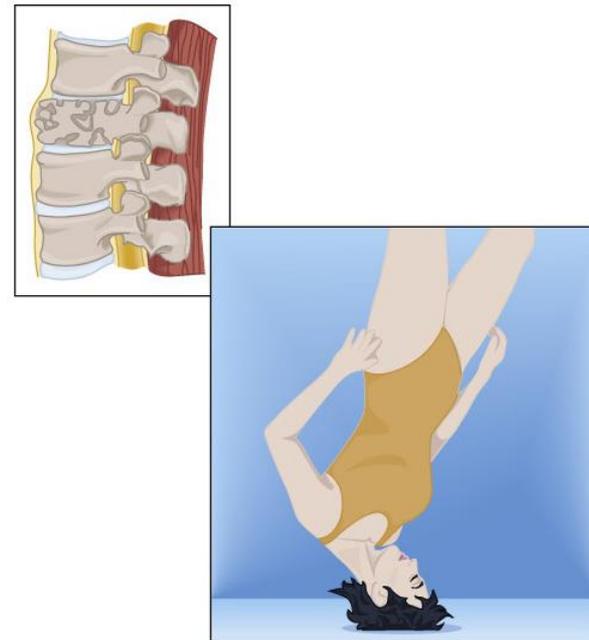
HYPEREXTENSION INJURY



## Compression Injury

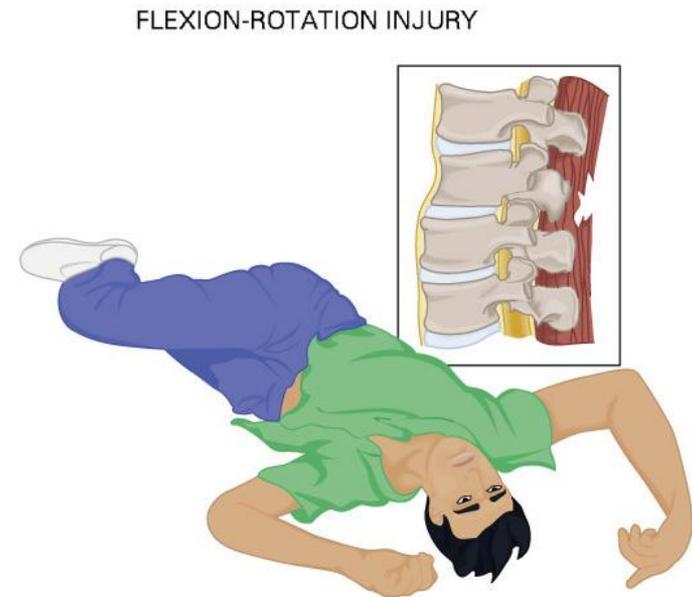
- A compression fracture is caused by extreme vertical pressure
- Usually caused when a person falls from a height and lands on their feet or butt. Also seen in diving injuries when a person falls directly onto the head
- Can occur at different levels depending on how injury occurs

COMPRESSION INJURY



## Flexion-rotation injury

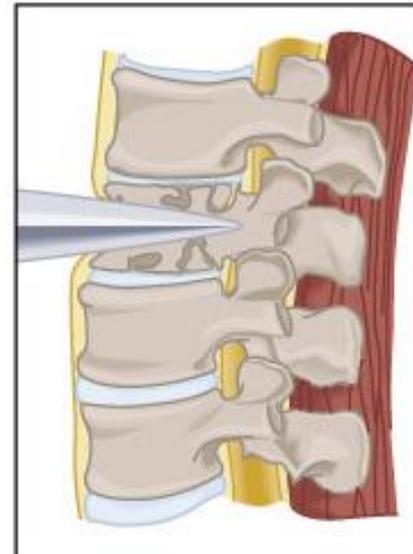
- Occur when the spinal cord is flexed and the head and neck is twisted
- Usually result in paralysis below the level of injury
- Most often occurs at the cervical level



## Penetration Injury

- Occurs when something enters the spinal cavity and punctures the spine
- Can occur at any level in the spine
- Most often seen in stabbing and gunshot accidents
- Maybe called Brown-Sequard Syndrome

PENETRATION INJURY



## Types of Spinal cord injury

- There are two basic types of spinal cord injury.
- Complete injury: an injury that causes a total loss of feeling and movement below the level of injury
- Incomplete injury: an injury that does not cause total loss of feeling or function, or both below the level of injury.

## Other Effects of Spinal Cord Injury

- Spinal cord injuries affect more than just movement and sensation. It also affects your social life, your finances, and your emotions.
- We want to help you make full use of your rehabilitation stay.
- It may help to talk with a trusted staff member or we can set up a time for other spinal cord injured people to come visit with you
- The important thing to know is that eventually you will find yourself in charge of your routine, your care, and your life.



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# Keeping fit in an unfit world

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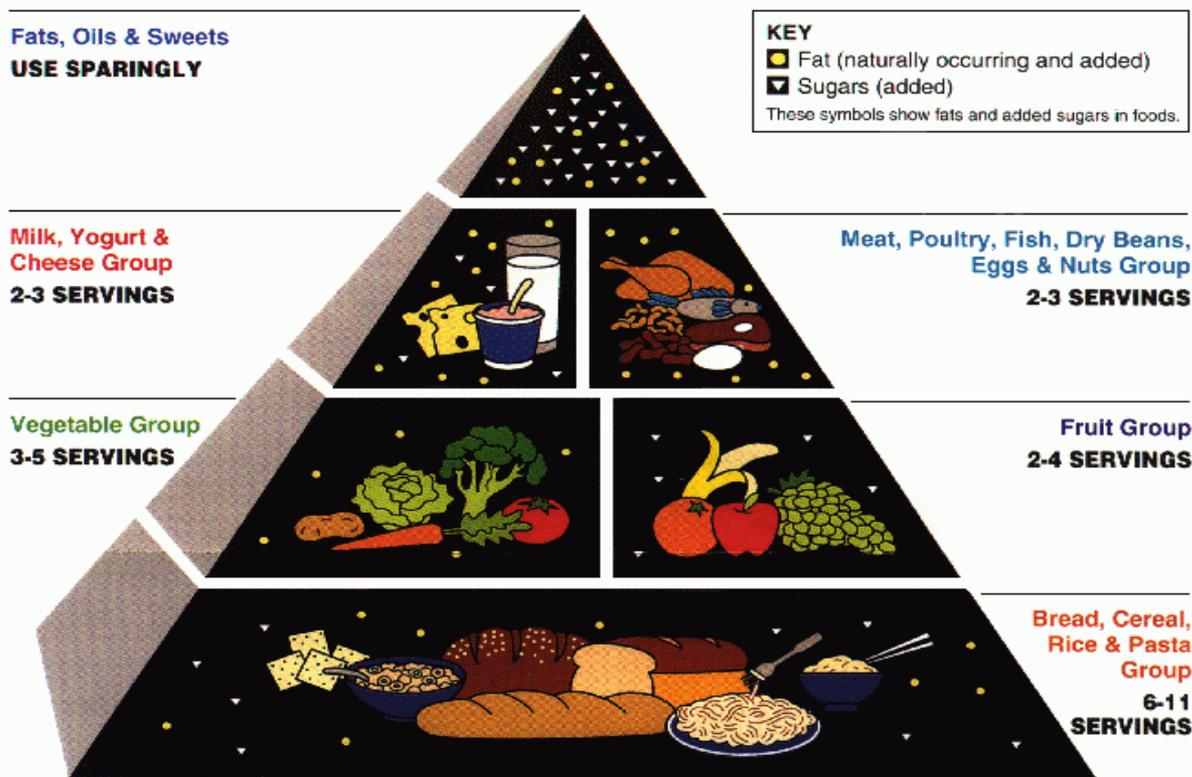
- GOOD NUTRITION
- EXERCISE
- STRESS BUSTERS

# Nutrition

- Food Pyramid
- Plan ahead
- How to shop
- How to eat



# Food Pyramid



## Food Pyramid

- 6-11 servings of bread, rice, pasta, cereal
- 3-5 servings of vegetables
- 2-4 servings of fruit
- 2-3 servings of milk, yogurt, cheese
- 2-3 servings of meat, poultry, fish, dry beans and nuts
- Sparingly: fats, oils and sweets

## What to shop for:

- Use a grocery list and stick to it!
- Make sure you are buying fresh foods, whole grains, nuts and lean meat.
- Shop with a full stomach. You will make better food choices.
- Eat at the dining room table when you are at home.
- Avoid eating while watching TV or working at your desk or computer.
- Be aware of what you are eating.

# Eat good food!



## How to eat

- Grains: Eat at least 3 oz. of whole grain cereals, breads, crackers rice or pasta very day.
- Vegetables: Eat more dark green veggies like broccoli & spinach. Eat more orange vegetables like carrots and sweet potatoes and eat more dry beans and peas like pinto beans, kidney beans, and lentils.

## How to eat...continued

- Fruits: Eat a variety of fruit and choose fresh, frozen, canned or dried fruit. Go easy on the fruit juice.
- Milk: Choose low fat or skim milk, yogurt and other milk products.
- Meat & Beans: Choose low fat or lean meats and poultry. Bake, broil or grill. Vary your protein, choose more fish, beans, peas, nuts and seeds.

# Exercise

- How to start
- What to do
- General exercise tips



# Exercise

- Start simple
  - Set weekly exercise goals.
  - Start out slowly!
  - Increase your daily activities by adding longer periods (20-30 minutes).
  - Keep an exercise journal.
  - Do different activities to avoid boredom.
  - You should feel warm and slightly out of breath.
  - Any activity counts.
  - Keep it up for at least 3 months to develop the habit.

# Exercise

- At least 3-5 times per week you should as you are able
  - Exercise 20-30 minutes doing:
    - Wheelchair propulsion
    - Upper arm exercises
    - Take the dog for a walk.
    - Work in the garden.
    - Weight lifting and stretching
    - Wii bowling or golf



# Exercise

- Rarely you should:
  - Have times of prolonged sitting in one place
  - Do computer or video games
  - Watch long periods of television



# Stress

- Stress is how you react both physically and emotionally to any real or imagined situation.
  - Good stress: eustress- situations that give us feeling of satisfaction and achievement.
  - Bad stress: distress- situations that leave us overwhelmed, helpless and dissatisfied with life.

# Problems with Stress

- Hypertension
- Heart Attack
- Strokes
- Gastritis and Ulcers
- Sleep disturbances
- Problems with appetite
- Headaches
- Muscle aches/tension
- Cancer
- Colitis
- Chronic diarrhea or constipation
- Arthritis

## Learn to recognize stress

- Tightness in neck and shoulder
- Stomachache
- Dry mouth
- Fast or pounding heart
- Cold, clammy hands
- Clenched jaw

# Emotional Signs

- Forgetfulness
- Feeling hyper
- Irritability
- Urge to cry, run or hide
- Anxiety
- Withdrawal
- Accident prone
- Overwhelmed

## Avoid these things

- Smoking
- Drinking alcohol
- Overeating
- Explosive anger
- Driving fast

# Quick Suggestions for Stress Control

- Avoid hassles or situations that increase your stress.
- Build up your resistance so you are better able to handle the crisis that come your way. Get adequate rest. Eat a well balanced diet.
- Work off stress by exercising.
- Laugh!
- Include time just for yourself each day for something you enjoy.
- Find a hobby that suits you.

# Stress Relief

- Develop a positive attitude.
- Talk it out.
- Don't expect perfection from yourself or others.
- Try some relaxing music.
- Many people find prayer helpful.
- Bubble baths, aromatherapy (lavender)

# Stress Busters

- Exercise
- Deep breathing
- Limit caffeine
- Fresh air
- Eat healthy.
- Learn to be still.
- Have a massage
- Be ok with saying “No”
- Put yourself on the TOP of your priority list.
- Soak in the tub.
- Take time to write in a journal.
- Have or find someone you can talk to.

# Support Groups

- There are multiple community agencies that may be able to offer support. Ask a member of your rehab team for details.



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# PREVENTION OF PRESSURE SORES THROUGH SKIN CARE

For individuals with spinal cord injury, good health is very important in being free to do whatever life has to offer.



However, those who do not maintain good health may be limited by a serious skin problem.



## This problem is known by many names such as:



- Pressure ulcer
- Decubitus ulcer

## Also known as:

- Ischemic ulcer
- Pressure sore



## And...

- Skin sore
- Bed sore



## Definition

- A Pressure Sore is an area of the skin or underlying tissue that is dead or dying as a result of the loss of blood flow to the area



# What Causes a Pressure Sore?

- Pressure
- Moisture
- Cut
- Scratch
- Sheering

A small scratch can quickly develop into a large problem if not properly treated.



# Prevalence

- Up to 80% of individuals with SCI will have a pressure sore during their lifetime
- 30% will have more than one pressure sore



# SCI Risk Factors for Pressure Sores

- Limited mobility
- Bladder and bowel accidents
- Spasticity
- Lack of feeling



## Other factors that increase the risk of a pressure sore include:

- Aging
- Circulatory problems
- Skin disorders
- Diseases
  - Diabetes
  - Cancer
- Weight
  - Overweight
  - Underweight

## Early Sign of Pressure Sore

- An appearance of red area, or red spot on the skin
- If redness does not clear within 30 minutes of relief from pressure, a pressure sore has begun

# There are four stages of a pressure sore



# Pressure Sore – Stage 1



Stage 1 is limited to the top two layers of skin, which are the epidermal and dermal layers. The skin is not broken, and the redness does not turn white when touched.

## Pressure Sore – Stage 1



A person with dark skin will also see a change in skin color at stage 1. The area may become light, dry, flaky, or ashy. The area may be warmer than other areas, and there may be a change in the skin's texture.

## Pressure Sore – Stage 2



At stage 2 the damage extends beyond the top two layers of the skin to the adipose tissue.

The skin is slightly broken. The sore appears to be an abrasion, blister or small crater.

## Pressure Sore – Stage 3



Stage 3 sore extends through all the superficial layers of the skin, adipose tissue, down to and including the muscle. The ulcer appears as a deep crater and damage to adjacent tissue may be present.

## Pressure Sore – Stage 4



Stage 4 wounds show destruction of all soft tissue structures and involves bone or joint structures. Undermining of adjacent tissue and sinus tracts may be associated with these ulcers.

## What To Do?

By the time you realize there is a problem, damage to the skin has already occurred. Anyone who has a pressure sore at any stage should keep pressure off of the area and contact a doctor immediately for advice on treatment.

- Skin damage can occur quickly
- Keep pressure off area
- CALL DOCTOR IMMEDIATELY

# Costs of Pressure Sores

- \$1.3 billion for treatment in US
- Lost time from work and other activities
- Health risks from infections and other complications

# Treatment



The total cost to treat a pressure sore depends on how quickly the sore is treated. It is much quicker and less costly to heal a sore when it is in stage 1...



Than it is to heal a pressure sore that is in stage 4. The treatment for a stage 1 sore is typically extended bed rest. Treatment for a stage 4 sore can range from extended bed rest to surgery.

# Prevention = Best Treatment

- 95% of all pressure sores are preventable\*
- Maintaining healthy skin is the key to preventing a pressure sore

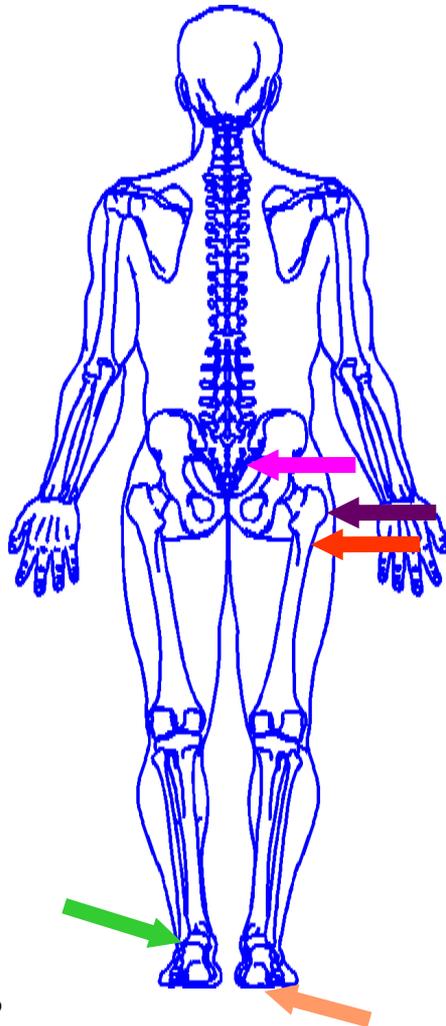
*\*American Family Physician, October 1996 v54 n5 p1519(14)*

## Check skin

The first step in preventing a pressure sore begins with a complete inspection of the skin. Individuals with spinal cord injury should check their skin in the morning and at night.

It is a good idea to carefully check for skin damage or redness, especially bony areas. Individuals with low levels of injury can inspect their skin using a mirror. Individuals with high levels of injury should have a family member or personal care attendant check their skin.

# Location of Pressure Sores

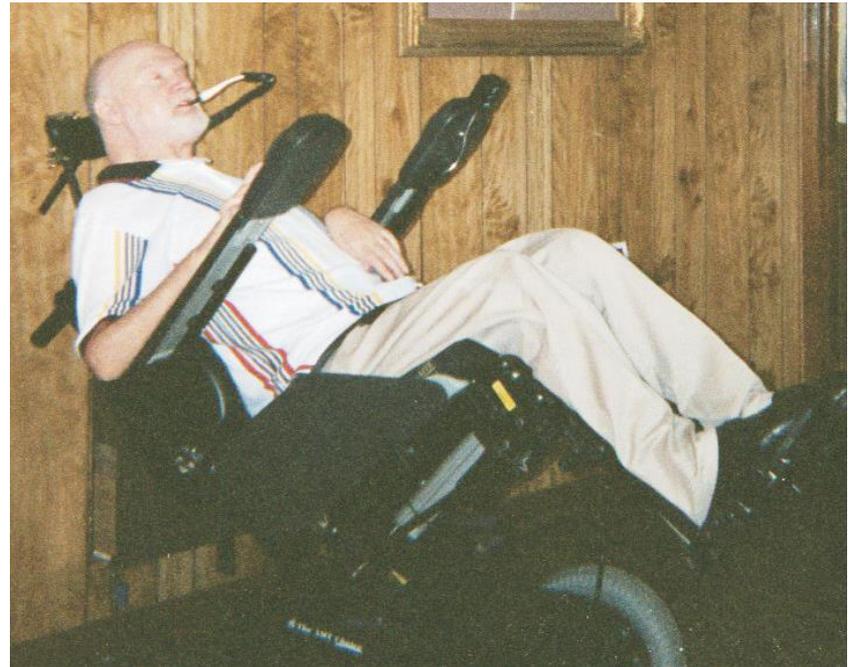


A pressure sore can occur anywhere on the body. However, the four most common areas for a pressure sore to develop are:

- Sacrum (tail bone)
- Heel
- Ischium (base of buttocks)
- Foot (bony areas like the ankle)
- Trochanter (hip)

## Pressure relief every 20 minutes while in wheelchair

Individuals with spinal cord injury should change position regularly to prevent pressure areas from occurring. It is recommended that individuals should do a pressure relief at least every twenty minutes while in a wheelchair. Those with injuries at levels C4 or higher can use a power tilt wheelchair for regular pressure relief.



## Pressure Relief



Individuals with injuries at levels C5 or C6 can usually lean forward or side-to-side for regular pressure relief.

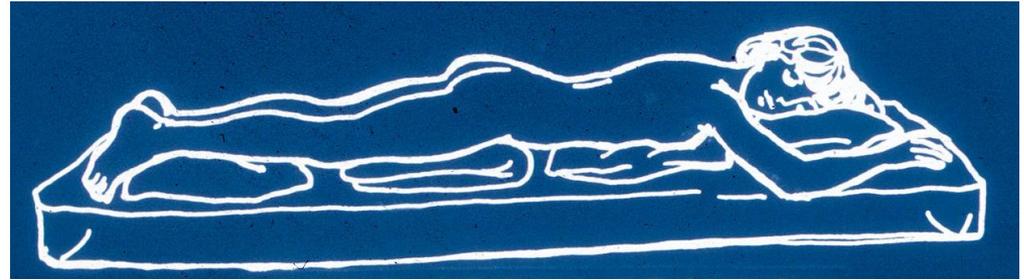
## Pressure Relief

Those with injuries at levels C7 and below can usually perform a wheelchair push-up for regular pressure relief.



# Pressure Relief

No matter what your level of injury, it is important to change position regularly while in bed. It is usually recommended that individuals with SCI change position at least every 2 hours. Do not sleep on wrinkled clothes or sheets, and protect areas of the body that are at risk for a pressure sore with a soft pillow or sheepskin.



**Change position every  
2 hours while in bed**

# Proper Equipment

Consult a qualified professional on what specialized equipment best protects against pressure areas. When sitting, it is important to always have correct positioning and use the proper seat cushion.



When in bed, it is important to have a mattress that provides both support and protection against the development of a pressure sore.



# Skin Care

Skin care is extremely important in preventing a pressure sore. Wet skin can become soft, inflamed, and less resistant to skin damage.

- Keep skin clean and dry
- Wash skin softly with warm water using a mild soap
- Change clothes quickly after they become wet
- Wash and dry skin after any bowel or bladder accident

## Help Skin Stay Healthy

Supple Skin = soft, moist, and flexible

- Drink at least 8 - 10 glasses (8oz) of water per day
- Use lotion on dry areas of the skin

A well balanced diet can also help keep skin healthy and help the skin heal more quickly if there is a breakdown.

- Individuals with SCI should eat foods high in protein, vitamins, and minerals.

## Do Not Harm Skin

- Individuals with SCI should avoid things that can increase the risk of developing a pressure sore.
- Avoid clothes and shoes that do not fit properly
  - Not too loose
  - Not too tight
- Do not wear clothes with thick seams, buttons, or zippers that put pressure on your skin.
- Never use powder on skin

## Do Not Harm Skin

- Drink Caffeine in moderation
  - Caffeine
    - Coffee
    - Tea
    - Soft drinks
- Do not smoke
- Do not abuse drugs or alcohol
  - Both can damage the skin and can also lead to other health problems.

## Do Not Harm Skin

Since most individuals with SCI cannot feel discomfort or pain in areas of the body, extra caution should be taken to protect the skin from damage that can occur by accident during activities like transferring...



and participating in sports or other recreational activities.

# Pressure Sores Conclusion

For individuals with spinal cord injury, prevention of pressure sores is something that is a lifelong process.



It is important to always look for ways to better keep skin healthy and protect skin from damage that may lead to a pressure sore.

**After all, good health is always the key to staying on the go.**



# Credits

**Developed by** Phil Klebine, MA  
Linda L Lindsey, MEd

**Consultant** Anne Marie Oberheu, MD

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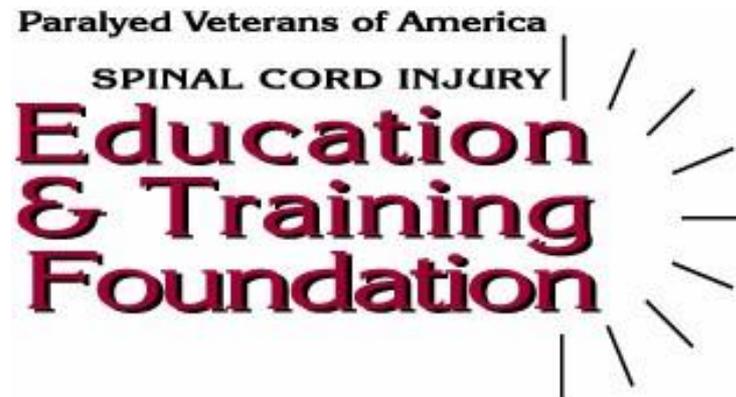
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# Spinal Cord Injury

## Week 2

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### REVIEW:

- **BLADDER CARE AFTER SCI AND PREVENTING AUTONOMIC DYSREFLEXIA AFTER SCI**

### WATCH:

- **BLADDER MANAGEMENT**
- **AUTONOMIC DYSREFLEXIA**
- **BOWEL CARE**
- **SEXUALITY**

## Teach-Back Week 2

- Tell me why it is so important to take care of your bladder
- If applicable, tell me about autonomic dysreflexia. Why is this an emergency?

## Hands on teaching

- During week 2, you will be learning how to care for your bladder after you go home. We may be asking that one other person (of your choice) also learns this information.

## Bladder Care After Spinal Cord Injury (SCI)

The body is in a state of “shock” after a spinal cord injury, so many organs and muscles don’t work. The bladder often times has a Foley catheter to drain urine the first few weeks after spinal cord injury. Later on, urine can be drained by periodic in/out catheters every 4-6 hours (the catheter is left in to drain urine then removed, staff may call this intermittent catheterization). It is very important to prevent urinary tract, bladder and kidney infections.

## Ways to safely manage urination after spinal cord injury

1. Drink 2-3 pitchers of water/fluid per 24 hours. If you drink more or less water, you can trigger problems.
2. Drink a variety of fluids not just those with caffeine. It is wise to drink some water, some milk, some coffee/tea/pop (all have caffeine), some juice. Foods such as soup, watermelon, Jell-O, popsicles, malts and ice cream also give the body fluids.
3. It is smart to drink most of the fluids between 6 am to 7 pm. Drinking the majority of fluids in the daytime prevents a large/excess urine output at night so you will get better sleep. The leg bag won't have to be emptied as often and intermittent cath's won't need to be done as often.
4. You and your family need to pay attention to the color of your urine. Clear, yellow urine is best. If it is pale yellow, drink a little less. If it is dark gold or tea colored, drink more fluids.
5. Dark gold or tea colored urine, or cloudy urine suggests you are at risk for a urinary tract or bladder infection. Drinking the right amount of fluids is a key step in preventing infections.

## Ways to safely manage urination after spinal cord injury

6. If you have a Foley catheter, help staff look at the tubing often to make sure it isn't kinked. A kinked tube prevents urine from emptying, this can be dangerous.
7. Staff will show you and your family how to empty the urine bag in case it gets too full. You won't be expected to do it routinely, but could do it quickly if the bag is bulging. If you go home with a Foley (rare), then you and your family will already know how to empty the bag.
8. Clean the skin with soap and water twice a day, where the catheter exits the body.
9. ALWAYS wash hands before handling a Foley catheter or doing an in/out catheterization.



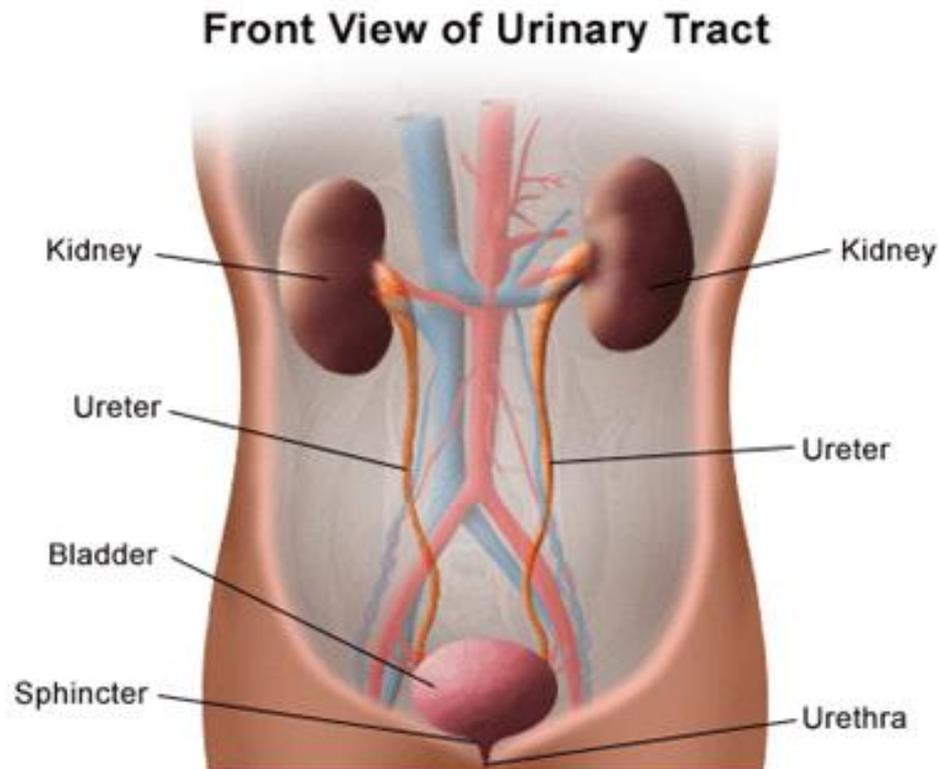
# Spinal Cord Injury

## Bladder Management

# The Urinary System

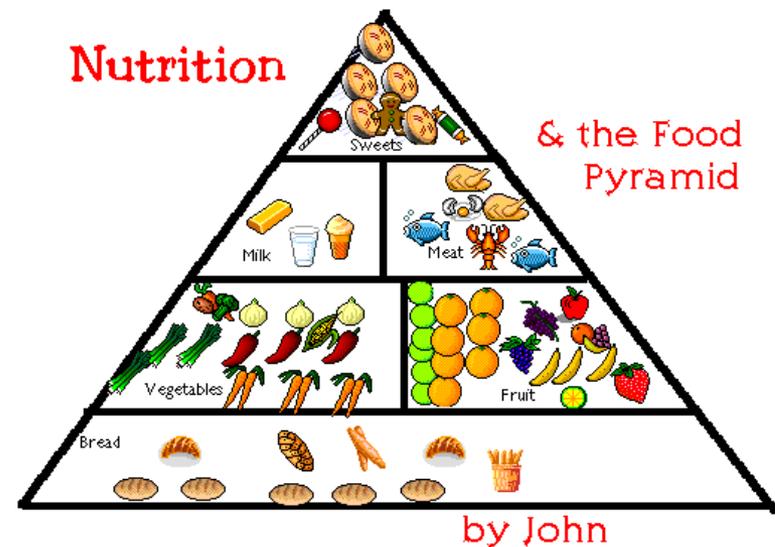
- Anatomical diagrams of male and female urinary systems
- How your body makes, stores and releases urine

# Anatomical Structure of Urinary System



# How does the Urinary System Work?

- Your body takes nutrients from food and uses them to maintain all bodily functions including energy and self-repair. After your body has taken what it needs from the food, waste products are left behind in the blood and in the bowel.



## How does your Urinary System work?

- The urinary system works with the lungs, skin, and intestines-*all of which also excrete wastes*-to keep the chemicals and water in your body balanced.

## How does the urinary system work?

- Adults eliminate about a quart and a half of urine each day.
- The amount depends on many factors, especially the amounts of fluid and food a person consumes and how much fluid is lost through sweat and breathing.
- Certain types of medications can also affect the amount of urine elimination.

## How the Urinary System Works

- Kidneys: are bean-shaped organs about the size of your fists. They are near the middle of the back, just below the rib cage. The kidneys remove urea from the blood through tiny filtering units called nephrons. Each Nephrons consists of a ball formed of small blood capillaries, called a glomerulus and a small tube called a renal tubule. Urea, together with water and other waste substances, forms the urine as it passes through the nephrons and down the renal tubules of the kidney.

## How the Urinary System Works

- From the Kidneys, urine travels down two thin tubes called ureters to the bladder. The ureters are about 9-10 inches long.
- Muscles in the ureter walls constantly tighten and relax to force urine downward away from the kidneys.
- If urine is allowed to stand still, or back up, a kidney infection can develop.
- Small amounts of urine are emptied into the bladder from the ureters every 10-15 seconds.

## How the Urinary System Works

- The bladder is a hollow muscular organ shaped like a balloon. It sits in your pelvis and is held in place by ligaments attached to other organs and the pelvic bones.
- The bladder stores urine until you are ready to go to the bathroom to empty it.
- It swells into a round shape when it is full and gets smaller when empty.
- If the urinary system is healthy, the bladder can hold up to 16 ounces (2 cups) of urine comfortably for 2-5 hours.

## How the Urinary System Works

- Circular muscles called sphincters help keep urine from leaking.
- The sphincter muscles close tightly like a rubber band around the opening of the bladder into the urethra.
- The Urethra is the tube that allows urine to pass outside the body.

## How your Urinary System works

- Nerves in the bladder tell you when it is time to empty your bladder (urinate).
- As the bladder first fills with urine, you may notice a feeling that you need to urinate.
- The sensation to urinate becomes stronger as the bladder continues to fill and reaches its limit.
- At that point, nerves from the bladder send a message to the brain that the bladder is full, and your urge to empty your bladder intensifies.
- When you urinate, the brain signals the bladder muscles to tighten, squeezing urine out of the bladder.
- At the same time, the brain signals the sphincter muscles to relax.
- The muscles relax, urine exits the bladder through the urethra.
- When all the signals occur in the correct order, normal urination occurs.

## Temporary Causes of Urinary incontinence

- Urinary tract infections(UTI)
- Constipation
- Caffeine, Medications and Alcoholic beverages.
- Overweight, extra fat around your abdomen can cause pressure on your bladder.
- Surgery

## Temporary Causes of Urinary incontinence: Bladder infections

- An Urine infection can irritate the bladder and may cause the bladder muscle to not work as it should.
- Dark urine can be a sign of concentrated urine. If you do not drink enough fluids you can irritate your bladder.

## Temporary Causes of Urinary Incontinence -Constipation

- Constipation can cause incontinence in some individuals.
- Stool that is not passes presses against the bladder and urethra, triggering urine leakage.

## Temporary causes of Urinary Tract Infections: Caffeine, Medications and Alcohol

- Drinking a lot of caffeine beverages can make you feel like you have to urinate often or cause leakage of urine.
- Medications that cause drowsiness, such as tranquilizers and sleeping pills, can alter how the urethral nerves and bladder work.
- Both sedatives and alcohol can impair an person's ability to recognize the need to urinate, and act on that need in a timely manner.
- Other medications such as diuretics, muscle relaxants and blood pressure medication can also affect the bladder function.

## Other Causes of Urinary incontinence

- Weakness of muscles that hold the bladder in place
- Weakness of the bladder itself
- Weakness of the urethral sphincter muscles
- Overactive bladder muscles
- Blocked urethra(can be from prostate enlargement)
- Hormone imbalance in women
- Neurological disorders
- Immobility

## Types of Urinary Incontinence

- Urge Incontinence
- Stress Incontinence
- Overflow Incontinence
- Functional incontinence
- Reflex Incontinence

## Urge Incontinence

- People with urge incontinence lose urine as soon as they feel a strong need to go to the bathroom to urinate. Due to poor bladder muscle. May be due to local irritation.
- Symptoms are:
  - If you can not get to a bathroom quick enough and you leak urine.
  - If you drink even a small amount of liquid, or when you hear or touch running water and have leakage.
  - If you go to the bathroom very often, which is every 2 hours during the day or night.
  - If you wet the bed.

## Stress Incontinence

- With stress incontinence you may lose urine when you exercise or move in a certain way.
- Symptoms are:
  - Leakage when you sneeze, cough, or laugh.
  - You leak urine when you get up from a chair or get out of bed.
  - Leakage when you walk or do other exercise (especially lifting or bending)..
  - You knowingly go to the bathroom to urinate to prevent leakage.

## Overflow Incontinence

- Overflow incontinence is the dribbling or leakage of urine due to an over full bladder.
- This can be due to an obstruction to the flow of urine (Such as an enlarged prostate in men) or a bladder muscle weakness.
- Some people do not have the feeling of fullness, but they leak urine day and night.
- Symptoms are:
  - Often lose small amounts of urine during the day and night.
  - get up often during the night to go to the bathroom.
  - Often feel as if you have to empty you bladder but can not.
  - Pass only a small amount of urine but feel as if your bladder is still partly full.
  - Spend a long time on the toilet, but produce only a weak, dribbling stream of urine

## Functional Incontinence

- Functional incontinence is the loss of urine because you can not get to the bathroom. It is not due to a failure in your urinary system.
- Inability to get to the bathroom can be because of pain, not able to think of going to the bathroom, or physically unable to get there.

# Reflex Incontinence (Neurogenic Bladder)

Neurogenic Bladder is the loss of urine because of poor bladder and sphincter muscles. Urine leaks with urge to void.

Person is unable to feel bladder fullness.

Symptoms similar to urge incontinence as well as:

- While voiding your stream of urine may start and stop.
- May have overflow incontinence.
- May void frequently at night.

Most frequent type of incontinence seen.

## Treatment of urinary incontinence

- External Catheter (Condom Catheter)
- Indwelling Foley catheter
- Scheduled in and out catheterization
- Protective wear (attends or peri-pads)
- Use of protective ointment/creams
- Medications
- Schedule voiding
- If overweight: weight loss
- Kegel exercises
- Pessary
- Drinking enough fluids

## Treatment of urinary incontinence: External Catheter(Condom Catheter)

- Is a rubber sheath that is put over the penis.
- Sometimes called a Texas catheter.
- Allows your bladder to empty without using a urinal or toilet.
- It is hooked to a plastic tube which leads to a drainage bag.
- The penis and condom catheter are cleaned daily when changing the condom catheter.

# Treatment of Urinary Incontinence:

## Protective wear and use of creams

- Protective wear such as Depends or peri-pads are used to contain the urine.
- Depends are absorbent underwear worn to soak up an episode of incontinence.
- Peri-pads worn if some leakage before complete emptying of bladder.
- Change soiled wear as soon as possible to prevent skin irritation.
- Protective ointments are applied after cleansing to prevent skin irritation from the loss of urine.
- Protective creams are used to heal the skin irritated by the leaked urine.

## Treatment of urinary incontinence: Medications

- Which medications to use that relax the bladder or tighten the sphincter muscles depends on the type of incontinence you have.
- Stress incontinence may be treated with drugs that cause sphincter muscles to tighten the bladder neck. Two of these medications are pseudoephedrine (Sudafed) and Imipramine (Tofranil).
- Urge incontinence is treated with drugs that have anticholinergic actions (they block the impulses through the nerves). These drugs allow the bladder to relax. Detrol and Ditropan are commonly used.
- Overflow incontinence due to enlarged prostate is treated with drugs that can shrink prostate, such as Proscar (Finasterdide). Flomax relaxes the bladder sphincter. Urecholine and Hytrin increase the muscle tone of the bladder.

# Treatment of urinary incontinence:

## Kegel Exercises

- Kegel Exercises are exercises to strengthen or retrain the pelvic muscle.
- They can help ease stress incontinence in both men and women.
- During the exercise you tighten the muscles of the pelvic floor. Similar to when you try not to have a bowel movement or urinate.

## Weight Loss

- Individuals who are overweight have more pressure placed on their bladder.

## Treatment of urinary incontinence:

### Pessary

- A pessary is a stiff ring you put into the vagina, where it presses against the wall of the vagina and the nearby urethra.
- The pressure helps reposition the urethra, leading to less leakage of urine.
- If you used, you need to watch for possible signs of a vaginal or urinary tract infection.
- It is fitted by a doctor.

### Surgery

- T.U.R.P (Transurethral Resection of the Prostate) which is the cutting away of an enlarged prostate. The release of the pressure allows for easier urine flow.
- Bladder neck suspension surgery is used to correct female stress incontinence if medications and voiding techniques don't work.

# Treatment of Urinary Incontinence:

## Scheduled voiding

- Scheduled voiding is going to the bathroom to void every 2 to 3 hours without feeling the urge to urinate.
- Prompted voiding is for the thinking-impaired person who has someone around to check, prompt, and praise. The caregiver needs to prompt the incontinent person to use the bathroom every 2-3 hours.
- Use relaxation or distraction to control any urges to void before the set time.
- Keep a record of voiding.

# Treatment of Urinary Incontinence

## Drink fluids

- Drinking a lot of fluids prevent infection.
- A constant flow of urine from the bladder keeps germs from going back up to the bladder. *If germs go to the bladder, it may cause a urinary tract infection or a kidney infection.*
- Drink at least 8-10 of the 8 ounce glasses of fluid a day. Water is the best fluid to drink for the urinary system.
- Fluids high on acid can kill germs and lower the risk of bladder infection. Cranberry, pineapple, plum and prune juice are fluids high on acid.

## Indwelling Foley Catheter

- Placed if continually incontinent or unable to empty your bladder.
- A Foley catheter is a thin, sterile tube inserted into the bladder, kept in place with a small balloon filled with 10 milliliters of sterile water.
- The Foley remains in your bladder at all times. Recommendations are to change at least monthly.
- The urine drains into a collection bag and is to be emptied at regular intervals.
- If the bladder isn't emptied urine can REFLUX, which is urine traveling back up the ureters to the kidneys possibly causing a kidney infection.
- Peri-care should be done twice a day with soap and water, especially around tube. Keep the area clean.
- Wear looser fitting cotton clothing.

## Common Indwelling Foley catheter problems

- Possible infection
- Leaking of urine around catheter. Could be bladder spasms. Drink more fluids. Apply a warm washcloth to lower abdomen. Call the home care nurse.
- Plugged catheter. Could be due to increased sediment in urine or a clot. You could change the Foley catheter, irrigate the catheter if instructions have been given or call the home care nurse.
- Loose connections or kinks in tubing. Check the tubing and make sure it is straight and free of being kinked or caught between objects. Be sure all connection sites are tight.

## Treatment of Urinary Retention

- Indwelling Foley catheter –See previous slide
- In and out catheterization/Intermittent catheterization: female and male
- Suprapubic catheter
- Monitoring fluid intake

## Intermittent catheterization “Cath”

- It is the draining of the bladder at set times.
- A rubber tube is put through the urethra to drain the urine. Once the bladder is drained the tube is taken out.
- It allows the bladder to fill and empty as before and keeps the bladder muscles toned.
- Make sure you catheterize regularly. The amount of urine with each catheterization should be around 350 milliliters (ml.).

## Intermittent Catheterization

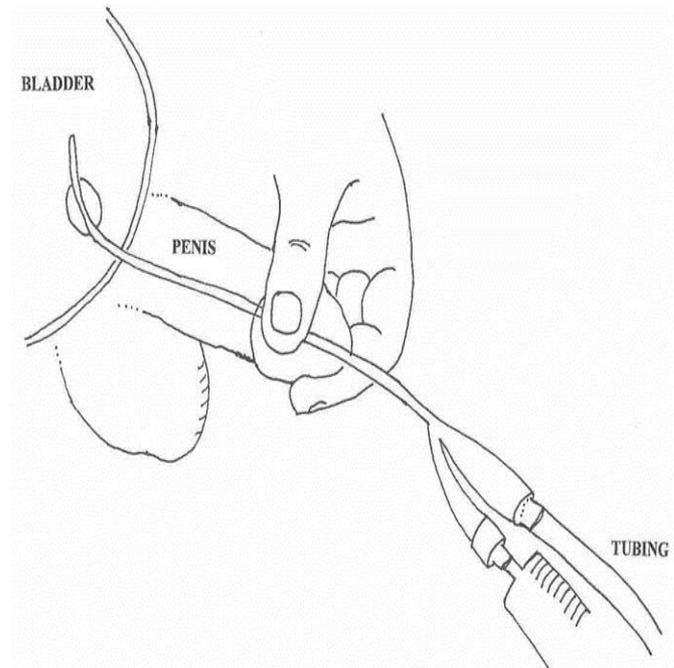
- A person on intermittent cath program should drink about 1500 to 2000 milliliters which is 6-10 cups or 1 ½ to 2 quarts.
- NOTE: There is 30 milliliters in 1 ounce.
- If urine amounts are higher than 350 milliliters drink LESS.
- If Urine amounts are lower than 350 milliliters drink MORE.
- Catheterization of a bladder that doesn't empty urine should occur every 4-6 hours. The time to catheterize depends on the amounts of urine in the bladder. The amount of urine depends on how much fluid a person drinks.

## Intermittent Cath

- If the urine amount is 400ml or over, cath every 4 hours.
- If urine amount is 400 or less, cath every 6 hours.
- You can use sterile or clean technique.
- Sterile technique is usually done in the hospital setting.

## Intermittent Catheterization (Cath) of Male

- Penis: An erectile organ that carries urine and sperm out of the body.
- Urinary Meatus: Opening through which urine leaves the body.
- Bladder: A round organ like a balloon that holds urine.
- Prostate” A doughnut-shaped gland that surrounds the upper part of the urethra. It is the size of a chestnut.
- Urethra: A tube from the bladder that drains urine to the outside of the body in the male it is 6 to 8 inches long.



## “Clean” intermittent “cath” of male Equipment needed

- Medium sized pan to collect urine, used only for the catheterization.
- Waterless bacterial hand soap
- Deodorant/antibacterial soap
- Two to four washcloths and one towel, or strong paper towels or wet wipes
- K-y jelly or other water-soluble lubricant. *Do NOT use Vaseline or a petroleum jelly.*
- Red rubber catheter
- Urinal

## Steps for Male Intermittent “Cath” Clean Technique

- Gather all equipment.
- Wash hands with deodorant soap and rinse well. *May use waterless bacterial soap.*
- Put washcloths in water and wash penis. Wash the penis opening real well. *If uncircumcised, pull back the skin and wash well.*
- Do not put the soap or soapy washcloth back in the clean water. Rinse the penis well with clean water.
- IF away from running water use wet wipes or paper towels to wash with.

## Continued on Male intermittent “cath”

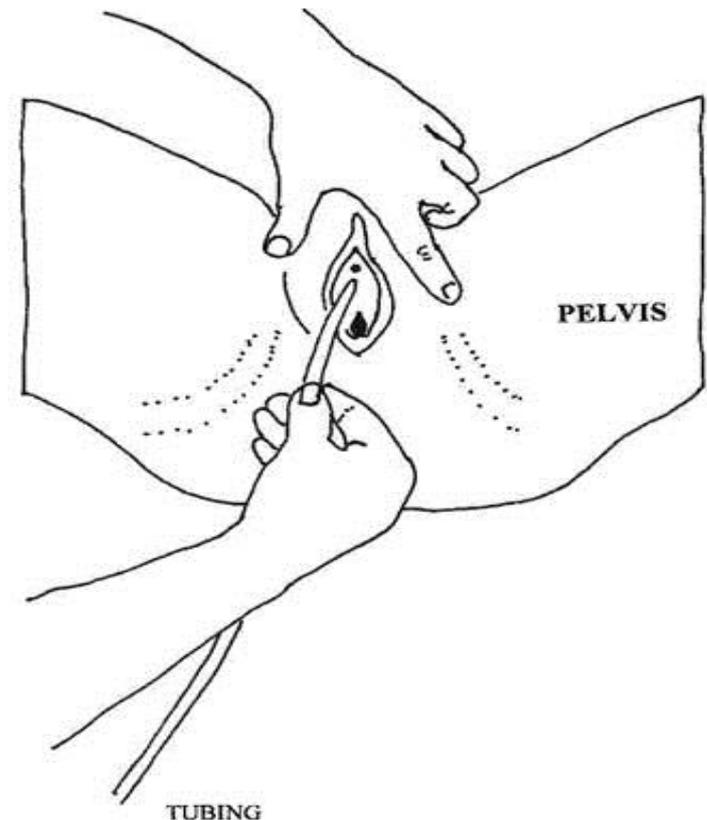
- Squeeze out some lubricant onto a towel.
- Open the container with the catheter in it.
- Before each use, check catheter. *DO NOT USE longer than 2-3 weeks or if it is dry, cracked, or peeling.* USE A NEW CATHETER EVERY 2-3 WEEKS.
- Put a lot of lubricant on the first few inches of the catheter tip.
- Hold penis up, away from the body.
- Insert red rubber catheter into the urethra. Drain urine into urinal.

## Continued on Male Intermittent “Cath”

- If instructed to, gently press over the bladder. This pressure will help push urine out. Also if told to, try taking a deep breath and bearing down (Valsalva maneuver).
- Remove catheter. Wash catheter with soap and water.
- Dry catheter and put in clean container or Ziploc bag.
- Wash area well. Then, if uncircumcised, pull foreskin back down.
- Empty urine container and then wash hands with soap and water or may use waterless bacterial soap.

## Intermittent Catheterization of a female

- Clitoris: an erectile organ similar to the male penis.
- Urinary meatus: an opening through which urine leaves the body.
- Urethra: A tube that drains from the bladder out of the body. It is 2 inches long in a female.
- Labia: Two long folds of skin from the clitoris to the perineum.
- Vagina: A hollow, tubular organ that leads to the uterus. It is between the urinary bladder and the rectum.
- Perineum: A muscular area between the opening of the vagina and the anus.



## Intermittent Catheterization of female: Clean technique-equipment

- Medium-sized pan (used only for catheterization)
- Deodorant/antibacterial soap
- Two to four washcloths and one towel, or strong paper towels or wet wipes
- K-Y jelly or other water-soluble lubricant ( used only for catheterization) DO NOT USE Vaseline or petroleum jelly.
- A standard catheter for bed catheterization and a shorter catheter for toilet/commode catheterization
- Quart container for a fracture bedpan works well.
- Mirror

## Clean Intermittent “cath” female

- Gather all equipment.
- Wash hands with deodorant soap and rinse well. May use waterless antibacterial soap.
- Put washcloths in water. Wash self well with deodorant soap, especially the opening. Do NOT put soapy wash cloth back in clean water.
- Rinse well with another washcloth. (If away from running water use wet wipes or paper towels to wash with.)

## Clean intermittent “cath” female

- Squeeze out some lubricant onto the towel.
- Open container with the catheter in it.
- Before each use, check the catheter. DO NOT USE for longer than 2-3 weeks or if it is dry, cracked or peeling. *USE A NEW CATHETER EVERY 2-3 WEEKS.*
- Put a lot of lubricant on the catheter tip.
- Insert catheter into urethra. Drain urine into fracture bedpan.
- If told to, gently press over the bladder, this will help push urine out.

## Clean Intermittent “cath” female

- If told it is okay, try taking deep breaths and bearing down. This is the Valsalva maneuver.
- Remove catheter. Wash catheter with soap and water.
- Dry catheter and put in clean container or Ziploc bag.
- Wash self well using water or wet wipes.
- Wash hands with soap and water or wet wipes. May use antibacterial soap.

## Suprapubic catheter

- Is a rubber tube put inside your bladder where urine is stored in your body. The catheter is put through a long-term hole in your lower abdomen(belly) wall called a stoma.
- The catheter empties your bladder so you will not urinate the normal way using a toilet or bedpan.
- A balloon on one end of the catheter holds it inside your bladder.
- It is connected to a plastic tube which leads a bag.
- The urine stays in the bag until you empty it in the toilet.

## Tests that diagnose urinary problems

- Common laboratory tests
- Post void residual(PVR)measurements: either by bladder scan or by in and out catheterization
- Urodynamic Testing
- Cystoscopy or x-rays of the bladder

## Common Laboratory Tests

- Urinalysis-a test that studies the content of urine for abnormal substances such as protein or signs of infections. For this test you must urinate in special container and leave the sample to be studied.

## Post void residual PVR measurements

- Post void residual is to check if you emptied your bladder completely after you emptied your bladder as much as possible on your own.
- Usually done immediately after urinating.
- Bladder scan- An instrument that measures the fullness of your bladder by sound waves. A gel, as a conductive agent, with the wand of the bladder scan is rubbed over your lower abdomen. The amount of urine left in your bladder is seen in millimeters.
- A normal bladder is empty after urinating.
- *If unable to use a bladder scan* may need to use a catheter to make sure your bladder is empty.

## Urodynamic Testing

- Urodynamic- Evaluates the storage of urine in the bladder and the flow of urine from the bladder through the urethra.
- Ordered if having symptoms that suggest problems with the muscles or nerves of your lower urinary system and pelvis(ureters, bladder ,urethra, and sphincter muscles.)
- Measures the contractions of the bladder muscle as it fills and empties.
- May involve inserting a small tube called a catheter into the bladder to fill it with water or gas. Another small tube is inserted into your rectum to measure the pressure put on your bladder when you strain or cough.

## Cystoscopy or x-rays

- Cystoscopy- a test which allows the Doctor to see inside your bladder. A small tube is inserted into your bladder. This lets the doctor use a telescope-like instrument to look for anything abnormal. You will need to sign a consent.
- Cystogram-with your cystoscopy the Doctor may order an x-ray after a dye is placed in your bladder to check for abnormal. You will need to sign a consent.
- IVP(Intravenous Pyelogram) an x-ray of the kidney, ureters and bladder after injection of a dye into your vein to check for any abnormalities such as kidney stones. You will need to sign a consent.

# Autonomic Dysreflexia:

What you need to know

# What is Autonomic Dysreflexia?

- An **EMERGENCY CONDITION** that demands immediate attention
- Autonomic Dysreflexia can be **LIFE THREATENING**
- Abnormal response to a problem in your body below your SCI
- Most common in people with injuries above the T-6 level

# Autonomic Dysreflexia: The Reality

- Many Health Professionals do NOT know what it is.
- Important for YOU and your care providers to be aware this condition to aide in your own treatment

# Autonomic Dysreflexia: What's going on

- Body cannot respond properly to signals that something is wrong
- Body cannot get messages through to the brain to tell it something is wrong
- Message to the spinal cord turns on special *autonomic* nerves
- Nerves cause blood vessels in legs and abdomen to squeeze tight and get small

## Autonomic Dysreflexia: What's going on

- This squeezing causes extra blood into vessels in the rest of your body
- Extra blood causes your blood pressure to increase
- Sensors near the brain see the rise in blood pressure
- Sensors attempt to lower the blood pressure by sending out three signals

# Autonomic Dysreflexia: What's going on

- Three Signals
- (1) Tells heart to slow down
- (2) Increases size of blood vessels in your face, neck and upper chest
- (3) Tries to tell vessels in your legs and abdomen to stop squeezing – but message cannot get there (because of your injury) and your pressure stays high

## Common Warning Signs

- Fast, major increase in blood pressure
- Pounding Headache
- Heavy sweating, especially in your face, neck and shoulders
- Flushed or reddened skin, especially in your face, neck, and shoulders
- Goose bumps – above your spinal cord level
- Blurry vision or seeing spots
- Anxiety or jitters
- A feeling of tightness in your chest, flutters in your heart

## Blood Pressure Increase

- Major Increase is 20 – 40 mm Hg higher than usual
- Many individuals with a SCI at or above T-6 have a blood pressure between 90 and 110 mm Hg systolic (top number)
- Key Point: Know your own blood pressures to you know what be abnormal

## Causes of Autonomic Dysreflexia

- Bladder or Kidney
- Bowel or Abdomen
- Skin
- Other Causes:

## Causes: Bladder or Kidney

- Overfull bladder
- Urinary tract infections
- Kidney Stones
- Bladder Tests

## Causes: Bowel or Abdomen

- Overfull bowel
- Constipation
- Problems such as gall stones, stomach ulcers or gastritis
- Bowel or abdominal tests

## Causes: Skin

- Pressure sores
- Problems such as ingrown toe nails, burns, or insect bites
- Contact with hard or sharp things or other injuries to the skin

## Causes: Sexual Activity or Reproduction

- Too much genital stimulation
- Men: Ejaculation, infection or inflammation of the testicles
- Women: Menstruation, pregnancy (especially labor and delivery), infections of vagina or uterus

## Other Causes

- Clots in the leg (deep vein thrombosis)
- Broken bones or other injuries
- Everyday problems such as too tight clothing, shoes, braces, etc...
- Extreme temperatures or quick temperature changes

## What should I do if I suspect Autonomic Dysreflexia?

- Prompt Action is essential
- Sit up or raise your head to 90 degrees
- DO NOT LIE DOWN
- Loosen clothing

## Autonomic Dysreflexia: Treatment

- *Principle #1 is to identify and remove the offending stimulus whenever possible*
- Often, this alone is successful in allowing the syndrome to subside without need for pharmacological intervention

## How can autonomic dysreflexia be prevented?

- Frequent pressure relief in bed/chair
- Avoidance of sun burn/scalds (avoid overexposure, use of #15 or greater sunscreen, watch water temperatures)
- Faithful adherence to bowel program (no longer than 3 days between bowel evacuations)
- Keep catheters clean and remain faithful to intermittent catheterization schedule
- Well balanced diet and adequate fluid intake
- Compliance with medications

# Autonomic Dysreflexia: Treatment

- Suspected cause = skin?
- Loosen clothing
- Check for source of potential offending stimulus
  - check for pressure sores
  - toenail problems
  - soles of the feet

## Autonomic Dysreflexia: Treatment

- Suspected cause = bowel?
- If episode happens during digital stimulation, stop stimulation until symptoms and signs subside
- Consider use of a prescribed anesthetic ointment to suppress the noxious stimulus.
- If the issue is impacted stool, disimpact
- If it occurs while doing a bowel program in bed, try commode-based bowel evacuation. Consider use of abdominal massage instead of [digital stimulation](#)

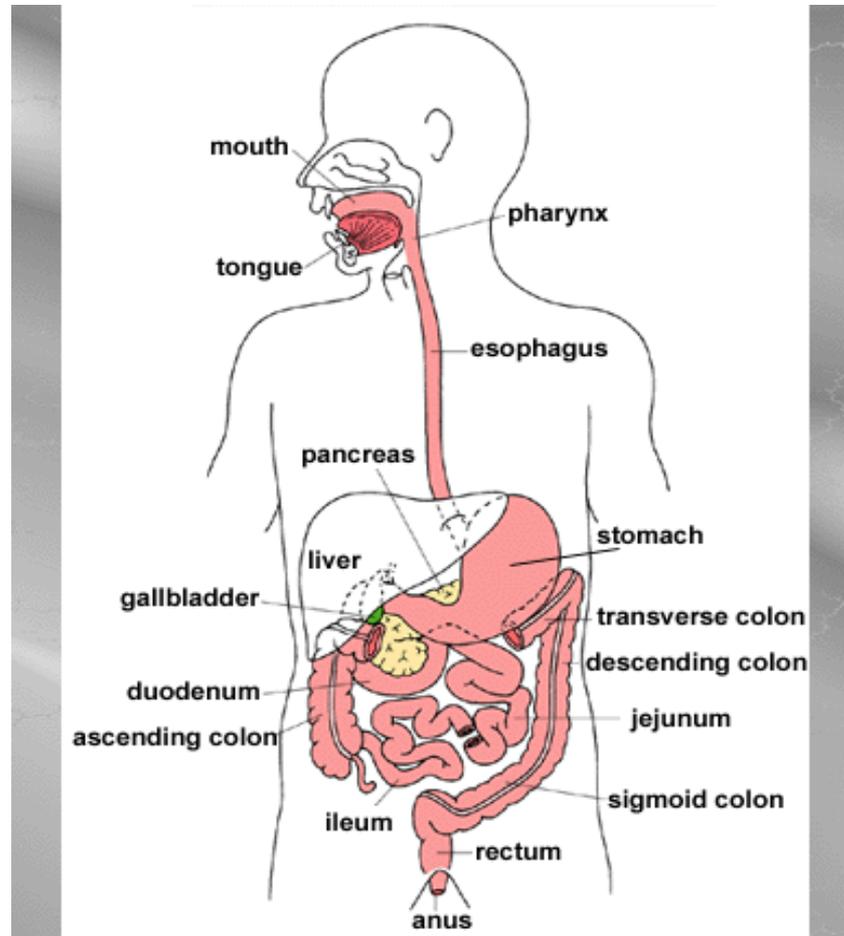
# Autonomic Dysreflexia: Treatment

- Suspected cause = bladder
- If an intermittent catheterization program is in place, a straight catheterization should be performed immediately with (slow drainage to prevent bladder spasms)
- Check catheter
  - Remove kinks if found
  - Empty urinary collection bag
  - Irrigate catheter
  - If catheter is not draining, replace it immediately

# Spinal Cord Injury

## Bowel Management

# The Digestive System



# The Digestive System

- Mouth: The opening of the body through which food is taken.
- Esophagus: A tube through which food passes from the mouth to the stomach.
- Small Intestine: The digestive tube that passes from the stomach to the large intestine. Digestion continues here.
- Large Intestine: Called the bowel or colon. Connects the small intestine to the rectum.
- Rectum: End part of the large intestine.
- Anus: Opening of the rectum to the outside of the body.

## How the Digestive System Works

1. Food is chewed in the mouth.
2. Swallowed down the esophagus.
3. Breakdown of food begins in the stomach. Enzymes and digestive juices break down the food. The food then moves from the stomach to the small intestine.
4. Digestion is finished in the small intestine. The digested food and liquid that the body needs are absorbed through the walls of the intestine into the blood. The unused food and liquid move on to the large intestine.
5. Extra water from the wastes is reabsorbed into the body. A solid mass of stool is made. The large intestine stores the stool.
6. The rectum is a set of muscles that keeps stool and gas in the body and helps to push the stool out through the anus.
7. Stool is eliminated through the anus.

## Steps for a Normal Elimination of the Bowels

1. Waste(stool) enters the large intestine after digestion.
2. Wavelike contractions(peristalsis) moves stool down through the intestines.
3. Stool moves into the rectum, stretching the rectal wall.
4. The stretching of the rectum sends a message to the spinal cord.
5. The message of a “full rectum” then travels from the spinal cord to two places. One place is the brain. The second is back to the rectum to begin emptying which is a reflex action.
6. A person then decides whether it is an okay time to have a bowel movement.

## Steps for a Normal Elimination of the Bowels

- If a person decides to have a bowel movement then the contractions, also known as peristalsis, of the rectum begins. The stomach muscles tighten and the pelvic floor and anal muscles relax. The stool then passes out of the body.
- If the person decides NOT to have a bowel movement then the anal muscles stay closed and the rectum keeps holding the stool.

## Promoting regular bowel function

- Diet
- Exercise
- Bowel Habits

## Diet

- A well balanced diet is important for bowel control
- Foods with fiber keep the stool firm and the lower bowel empty
- A low fiber diet slows the time it takes food to move through the intestines; the longer stool remains in the intestines, the more water leaves the stool and the stool gets harder

## Diet



- Foods that are high in fiber include:
  - Apples, Pears, Bananas
  - Prunes and Raisins
  - Nuts
  - Dried beans and peas
  - Broccoli, baked potatoes

## Water in your diet

- Water is important to keep food moving through the bowel.
- Everyone should drink 1 ½ to 2 quarts of water everyday
- A full glass of water before meals is recommended to promote good bowel function



## Exercise

- If a person is not active, the bowel is also less active and does not move the stool through the digestive system.
- The more active a person is throughout the day, the more regularly the stool moves through the bowel
- Exercise starts the wavelike contractions that move the stool downward (peristalsis)
- Weak stomach muscles make it hard to bear down, this can be improved with regular exercise.

## Bowel Habits

- Travel, poor bathroom facilities, or lack of privacy can change your normal routines
- Learn to respond to the urge to pass stool.
- Set a definite unhurried time for bowel movements
- Sit for at least 10 minutes, whether you have a BM or not
- Do not strain or force
- Be patient, changes will not occur overnight

## Causes of irregularities in bowel movements

- Medications
- Disturbances in movement
- Disturbances in Sensation



## Medications

- Some medications may cause constipation or diarrhea. These include some antacids, pain meds, diuretics, iron supplements, cough/cold medications, antidepressants, and antibiotics
- Discuss your medications with your doctor or nurse if you notice a change in your usual bowel habits after starting a new medication
- Long-term frequent use of laxatives can cause chronic constipation and are not routinely used in a bowel-retraining program

## Disturbances in Movement

- May be caused by strokes, spinal cord injury, prolonged illness, or any other condition interfering with normal body movement.
- Pain, tremor, or weakness may slow normal motion and encourage one to ignore the urge to pass stool.

## Disturbance in sensation

- Can affect the individual's ability to feel rectal fullness or pay attention to the urge to have a bowel movement.
- Inability to speak can prevent one from getting assistance to the bathroom in time.
- You will learn to look for other signals of rectal filling; such as eating certain foods, doing certain exercises or same time every day.
- Plan to use the bathroom after meals, when the reflex to empty the bowel is strongest<sup>1</sup>. Food is chewed in the mouth.

# Constipation

- Constipation is hard and infrequent stools that are difficult to pass.

## Treatment of constipation

- Promoting regular BM's
- Use of stool softener and oral laxatives
- Use of a Rectal suppository
- Dietary fiber, adequate fluid intake
- Increased mobility
- Digital stimulation or manual removal if necessary. Ask for handout on digital stimulation.

## Bowel incontinence

- There are 3 main types of bowel incontinence:
  1. Reflex-no longer feeling urge to have BM. Damage to the spinal cord and nerves below T-12.
  2. Flaccid-weakness in the muscles that hold a BM in until okay time to evacuate stool.
  3. Uninhibited-not able to pay attention to the urge to have a BM.

## Treatment of involuntary BM's

- Bulk laxatives to add fiber-No stool softeners
- Daily suppository same time every day
- Digital stimulation to promote complete evacuation of BM. Ask for handout.
- Use of nursing care ointment to prevent skin breakdown
- Wear attends to contain any possible leakage

## Bowel Habits after Spinal Cord Injury

- After a spinal cord injury, messages from the rectum do not get through to the brain and you do not get the urge to have a bowel movement.
- As a result of not feeling the urge, you may not be able to control the sphincter that makes the bowels move.
- Not being able to control the sphincter can cause your bowels to not move and can cause you to become impacted.
- It is possible to develop a regular bowel program that will avoid accidents. Your nurse will help you work out the best possible bowel program for you

## Goals of the Bowel Program

- To have a bowel movement at a predictable time
- To make the stool soft
- To make a sluggish bowel work better

## Bowel program

- Suppository every day or night
  - In the beginning, your program will be as simple as a supp every day, which will cause the rectum to empty of stool
  - As time goes on, a pattern should start to develop and you should have bowel movements fairly regularly
- Eventually, can decrease to every 2<sup>nd</sup> day supp

## A typical “Bowel program”

- The program usually begins with insertion of either a suppository or a mini-enema, followed by a waiting period of approximately 15-20 minutes to allow the stimulant to work. This part of the program should, preferably, be done on the commode or toilet seat.
- After the waiting period, digital stimulation is done every 10-15 minutes until the rectum is empty. In order to avoid damage to the delicate rectal tissue, no more than four digital stimulations should be performed in any one session.
- Those with a flaccid bowel frequently omit the suppository or mini-enema and start their bowel programs with digital stimulation or manual removal.
- Most bowel programs require 30-60 minutes to complete.

## Bowel guidelines

- Choose foods high in fiber (roughage), such as fresh fruits, vegetables, and whole grain foods.
- Drink enough liquids to keep the stool soft and/or use a stool softener. Prune juice is a great natural laxative.
- Avoid foods which cause constipation: meats and dairy products which are low in fiber
- Avoid foods which cause diarrhea: spicy, greasy foods, onions
- Be as active as you can

## Not a perfect science

- Learn, by experimenting, the foods and lifestyles that let you have bowel movements at a predictable time
- Once you are having regular bowel movements, stick to the bowel program you developed
- Skipping your program can cause constipation, impaction, and bowel accidents
- If something is wrong with your program, it is usually related to diet and/or activity. Remember to think about what you eat, drink, and do if a difficulty occurs.

## Your bowel program

- When you are discharged from the hospital, you may decide to change your program to fit your lifestyle.
- If you have learned the things that work, and do not work for you, you will be able to make changes with a minimum amount of discomfort .

# Sexuality

## Sexuality after a spinal cord injury

## Is it possible to be sexually active after a spinal cord injury?

- A spinal cord injury (SCI) affects many areas of your life. You may have to make some changes in how you are sexually active, but you can still have a fulfilling sex life. Many people define themselves, at least in part, by their sexuality.
- Some people believe that sexual intimacy (closeness) means the same thing as the physical act of intercourse. Believing this and being afraid that your partner will not want you anymore can make you feel depressed. This can decrease your libido (the feeling of wanting sex and intimacy).
- Intimacy is different than intercourse, but both are needed for a good relationship with a partner.

# Sexuality

- Sexual health includes:
  - Function
  - Physical sensations
  - Mental sensations

## Sexuality

- Things that may change after a spinal cord injury.
  - Level of interest for one or both partners
  - Bowel and bladder function can affect a sex life
  - Fertility
  - Emotional issues related to self-esteem
  - Society's perception
- It is important to talk openly about sexuality during your rehab stay.

## Emotions

- Feeling good about yourself is an important part of sexuality. After a spinal cord injury, many emotions will surface.
- It is important to remember:
  - The BRAIN is the major sex organ. Orgasm is a brain or mind centered event
  - You need to accept self as a sexual being with sexual desires
  - Not being able to move does not mean the loss of emotional feeling
  - The loss of genital function and/or sensation does not mean the loss of sexuality

## Emotions

- Develop good communication skills
- Talk openly about physical needs to decrease fears and embarrassment
- Remember that you still are lovable and desirable in many ways
- Talking with a counselor may be helpful
- Join a spinal cord injury support group
  - There is one here at St. Luke's. There are also tons of online resources available

## Sexual Functioning (Males)

- Erections:
  - There are two types of erections:
    - Psychogenic
    - Reflexogenic
    - The two types work together to keep a full erection

## Erections

- Psychogenic:
  - These are erections that occur by thinking (fantasy, looking at sexual magazines or books)
  - Spinal nerves at T12 to L2 control these erections
  - Complete damage at this level or below may decrease the chance of a psychogenic erection
  - With incomplete injuries or injuries above this level, psychogenic erections may still happen

## Erections

- Reflexogenic
  - These are erections that happen by a reflex in the sacral part of the spinal cord.
  - The reflex system at S2, 3, or 4 must be connected for the system to work, no connection to the brain needed
  - Any type of stimulation to the scrotum, penis or anus can cause this type of erection.
  - The higher the level of injury, the greater the chances for having and keeping this type of erection

## Erections

- Use stimulating materials to help get an erection
- Use vibrators for stimulation
- Stuffing technique: Putting a soft penis inside the vagina; this can help cause an erection
- Penile injections, implants, and vacuum devices can keep an erection. Also the new medications such as Viagra, Levitra, and Cialis may work. Talk with your physician if you are interested in these.

# Ejaculations

- For ejaculation to occur, the nervous system must be working right.
- Men with incomplete injuries are more likely to ejaculate than men with complete injuries
- Often with a SCI, Retrograde ejaculation occurs
  - This is when the sperm goes into the bladder instead of through the penis
- Each person will need to determine if they are able to ejaculate or not by trying

## Ejaculations

- Masturbation or self-stimulation may be used to help ejaculate
- Vibrators can help with stimulation
- A SCI does not always make a person unable to bear children.
- If any ejaculate or mucus-like fluid comes from the penis, birth control may be needed

## Sexual Functioning (Female)

- Lubrication
  - An injury to the spinal cord may cause lack of lubrication
  - Lack of lubrication often occurs with an injury to the T12 to L2 area
  - Use K-Y jelly
  - Do not use lubricants that do not dissolve in water, such as Vaseline

## Loss of feeling (sensation)

- Feeling is one part of the sexual experience
- With a complete SCI there is loss of feeling below the level of injury. Sexual sensations may be felt above the level of injury
- The areas that you are able to feel, may have increased sensation that can be sexually stimulating
- Explore your body for sexual sensations and areas of increased sensitivity
- Communicate feelings, likes, and dislikes with your partner
- Be creative, try different positions. Things that you did not enjoy before may be enjoyable now

## Movement problems

- Partial or complete loss of movement below the level of injury may change sexual positioning
- Sexual activity can still be enjoyable
- Try new and different positions
- The partner may need to take a more active role
- If spasticity is a problem, some positions may help decrease spasms

## Bowel and Bladder Control

- Incontinence or being unable to control the bowel or bladder may occur after a SCI.
- This may affect sexual desire or activity
- Talk openly about issues to decrease embarrassment.
- Sexual encounters may need to be planned in advance

## Bowel and Bladder Control

- Set up and keep a bowel and bladder program
  - Empty bowel and bladder before sexual activity
- Prepare for incontinence
  - Use protective covering on the bed
  - Keep supplies on hand in case of an accident
- Avoid positions that may put pressure on the bladder
- Do not drink large amounts of liquid before sexual activity

## Bladder issues: Males

- Foley catheter
  - Tape the catheter to the side of the penis or put on a condom OR remove the catheter before sexual activity (talk with your doctor first) then insert a sterile catheter after sex
- External Urinary condom
  - Empty the bladder as much as possible then remove the catheter. Wash penis prior to sexual activity, apply condom if needed. After sex, apply a clean external condom with drainage bag
- Intermittent catheter
  - It may be helpful to catheterize before sex
- Ostomies or Suprapubic catheter
  - Use extra tape and avoid direct pressure on catheter site to prevent leakage

## Bladder issues: Females

- Foley catheter
  - Tape the indwelling catheter to the thigh.
  - Be sure to use long tubing to allow for movement and check the tubing for kinking or twisting OR
  - Remove the catheter before sexual activity (talk with your doctor first) then insert a sterile catheter after sex
- Ostomies or suprapubic catheter
  - Use extra tape and avoid direct pressure on catheter site to prevent leakage

# Fertility

- Fertility is the ability to reproduce and have children
- A spinal cord injury can affect fertility
- Males
  - Few SCI males are able to father children. This does not mean that you do not have to use protection. Some males are able to father children so we advise that you use protection if you are not trying to conceive
  - Sperm are sensitive to heat. A temperature increase in the scrotum may lower sperm count, making men less fertile
  - Fertility tests may be needed
  - Doctors may be able to get sperm for artificial insemination

## Fertility (cont)

- Females
  - Fertility of the SCI woman is usually not affected. Once the menstrual cycle begins again (may take 1-6 months) the woman is as fertile as before her injury
  - Find a doctor who understands SCI and the risks of pregnancy (labor and autonomic dysreflexia)
  - Breastfeeding is not affected by SCI.
  - Birth control choices are the same as those before injury. Think about the pros and cons of the many choices and discuss them with your doctor

## Positive Sexual Adjustment

- Factors that affect positive sexual adjustment are:
  - Level of sexual knowledge
  - Openness
  - Communication with partner
  - Time since injury.
    - The longer it has been since your injury allows for a general increase in self-esteem and an increase in sexual self-esteem.
  - Being familiar with your options will help with exploration of sexual issues. Feel free to talk with various members of the rehabilitation team or other specialists as needed.

**The End**



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# Spinal Cord Injury

## Week 3

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### **REVIEW:**

- **PREVENTING BOWEL PROBLEMS AFTER SCI**

### **WATCH 4 POWERPOINT PRESENTATIONS:**

- **BLOOD CLOTS**
- **POSTURAL HYPOTENSION**
- **RESPIRATORY DIFFICULTIES**
- **TEMPERATURE REGULATION**

## Teach-Back Week 3

- Tell me what the goal of training your bowels is?

## Hands on teaching

- During week 3, you will be learning how to care for your bowels after you go home. We may be asking that one other person (of your choice) also learns this information.

# Preventing Bowel Problems After Spinal Cord Injury (SCI)

Damage to nerves, from spinal cord injury may prevent you from passing stool normally. Staff will start you on a bowel program soon after you enter rehab. Overall, it will be wise for you to actively drink water each day, eat fiber, exercise in therapy and learn to train the bowel to empty so accidents don't occur.

## Remember to do these simple steps:

1. Drink 2-3 pitchers of water/fluid each 24 hours. Drinking water is key to preventing constipation (hard stools).
2. Eat fiber each meal. Foods high in fiber include: fruits (especially those with skins), vegetables, whole grain bread/ cereal/ muffins, oatmeal, bran, flax, nuts, and prune juice to help prevent hard stools.
3. Exercise and stretch in therapy and afterwards as instructed by your therapists.
4. Prepare to have a bowel movement (BM) the same time each day based on your pattern before injury. For example, if you usually had a BM each morning or evening before injury, it is wise to do a bowel program at that time after injury.

## Bowel Program steps:

1. Take stool softeners such as Colace, natural laxatives such as prune juice or senna, and fiber medicine as ordered by your doctor.
2. You will be given a suppository to promote a BM daily or every other day depending on how often you passed stools at home. A suppository needs to be put against the rectal muscle for it to work, so it will be placed inside the rectum.
3. A “dab” of KY jelly will be placed on the suppository to help it slide inside easily. Never use petroleum jelly, always use a water soluble jelly such as KY jelly.
4. You will probably be on your left side in bed after the suppository is placed in your rectum, so gravity can help you empty. A soft lined plastic pad will be put under the bottom to keep linen clean.
5. The suppository triggers rectal muscles to move (shorten) and this pushes stool out.

## Bowel Program steps continued:

6. If no BM passes in 15-20 minutes, digital stimulation will be done. This involves putting a finger just inside the rectum and doing slow, circular, movements for about 20 seconds, to help stool move down/out. It may need to be repeated a few times.
7. Once you can tolerate sitting up in the chair for 1-2 hours without getting dizzy, you will be assisted onto a commode or shower chair soon after the suppository is put in. Sitting up allows gravity to help stool exit the body. Digital stimulation will then be done while you are still sitting up, to help make sure all stool empties.
8. Once you have normal BMs without accidents, your suppository and dig stimulation program may be done every other day or every third day.
9. The goal is to train the rectal muscles to empty at a set time each day so no accidents happen.



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## Spinal Cord Injury

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# BLOOD CLOTS

## Blood Clots

- Thrombophlebitis
  - What is it?
  - What puts a person at risk
  - Symptoms
  - Prevention
  - Treatment
- Pulmonary Emboli
  - What is it?
  - Symptoms
  - Treatment

## What is Thrombophlebitis?

- May also be called deep vein thrombosis (DVT)
- To the average person, this is known as a blood clot
- An abnormal blood clot that forms if the blood flows slowly in the vein as a result of:
  - decreased tone in the veins
  - paralyzed and/or weak muscles.
- A DVT can be life threatening. The clot or piece of it can break away from the vein and travel to heart or lungs causing breathing problems or death.

## What puts a person at risk?

- Surgery
- A history of varicose veins or blood clot
- Decreased muscle tone
- Changes in activity
- Age (over age 40)
- Hormone therapy replacement
- Contraceptives
- Heart disease
- Infection
- Pregnancy
- Injury, including bruising
- Obesity
- Traveling long distances
- Tumors

## Symptoms of a Blood Clot

- Swelling in the area
- Warm when touched
- Redness over area of the clot
- Pain in affected area
  - (People with spinal cord injuries may not feel pain)

## Problems caused by DVT

- A DVT below the knee is unlikely to cause any bad problems.
- When a clot forms in or above the knee, there is a risk that it will break away and travel up the vein to block a blood vessel in the lung. This is called a Pulmonary Emboli (PE).
- A DVT can damage the valves in the vein, so that instead of flowing upwards, the blood pools in the lower leg. This can result in pain and swelling because the blood is not able to return to the heart.

## How do we treat a blood clot?

- Bed rest.
- Prop leg or arm that has clot with pillow.
- Do not massage leg.
- Do not exercise affected leg.
- Medications that will thin the blood if clot present, only if ordered by Doctor
  - Heparin intravenously(IV) or subcutaneously
  - Enoxaparin subcutaneously
  - Coumadin (Warfarin) a tablet you take by mouth
- If unable to treat with medication may need to have Inferior Vena Cava Filter placed.

## How do we treat a blood clot?

- Keep legs higher than the hips to reduce the pressure in the veins of the calves.
- Change position often. Walk if able.
- Look at legs every day and check for signs of DVT.
- Wear loose fitting clothing.
- Drink plenty of fluids.
- By treating a blood clot, the doctors are not able to remove it. They are only trying to prevent it from becoming larger, breaking loose and traveling to the lungs, and prevent more clots to form

## What can we do to prevent getting a blood clot?

- Wear elastic stockings(TED hose or anti-embolism stockings. Compression stockings used to relieve pain and swelling.
- While in the hospital the use of intermittent compression device, a mechanical device that squeezes the feet and lower legs to help the circulation of blood from the legs.
- Range of motion-passive or active.
- Take medication as prescribed for prevention such as: heparin, enoxaparin or warfarin if ordered.

# Pulmonary Emboli

- What is it?
  - A Pulmonary emboli is a blood clot in the lung. It occurs when a piece of a blood clot that formed in a vein breaks off and travels to the lung.
- By having a blood clot in your lung, your lungs are not able to work properly. Your lungs are not able to provide enough oxygen to your body.
- The blood clot makes it painful and harder to breath.
- Is very serious, if not treated, it may cause death

# Symptoms of a Blood clot in your lungs OR a pulmonary embolism

- Sudden sharp chest pain.
- Sudden shortness of breath.
- Painful breathing.
- Coughing up blood.
- Fast heart rate.
- Red spots on the chest the size of a pinhead, which is called petechiae.
- Feeling of being restless and anxious

## Treatment of PE

- Call 911
- Go to the Emergency Department.
- Bed rest.
- Medications that will thin the blood if clot present, only if ordered by your Doctor.
  - Heparin intravenously through your IV or a shot in your belly or arm
  - Enoxaparin shot the nurse gives in your belly or arm
  - Warfarin(Coumadin) tablet you take by mouth.
- If unable to treat with medication may need to have Inferior Vena Cava Filter placed.



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## Spinal Cord Injury

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# POSTURAL HYPOTENSION

## What is postural hypotension?

- It is a lower-than normal drop in blood pressure when moving to a sitting or standing position.
- Postural hypotension happens if an illness or injury has affected the circulatory (blood vessel) system.

## What causes of Postural Hypotension?

- Caused when blood vessels cannot respond to position changes as before
- Conditions that may cause this are:
  - Illness affecting the blood vessels
  - Injury to the blood vessels
  - Prolonged bed rest
  - Surgery.

## Treatment of Postural Hypotension

- Move slowly when changing positions
- Dangle feet for a few minutes when getting out of bed.
  - This allows the body adapt to change to position before standing
- A doctor may order you to wear these things which help support the veins and arteries
  - Elastic stocking (for the veins in the legs)
  - Ace bandage wraps (for extra support) on the legs.
  - Abdominal binder (for arteries in the abdomen)



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## Spinal Cord Injury

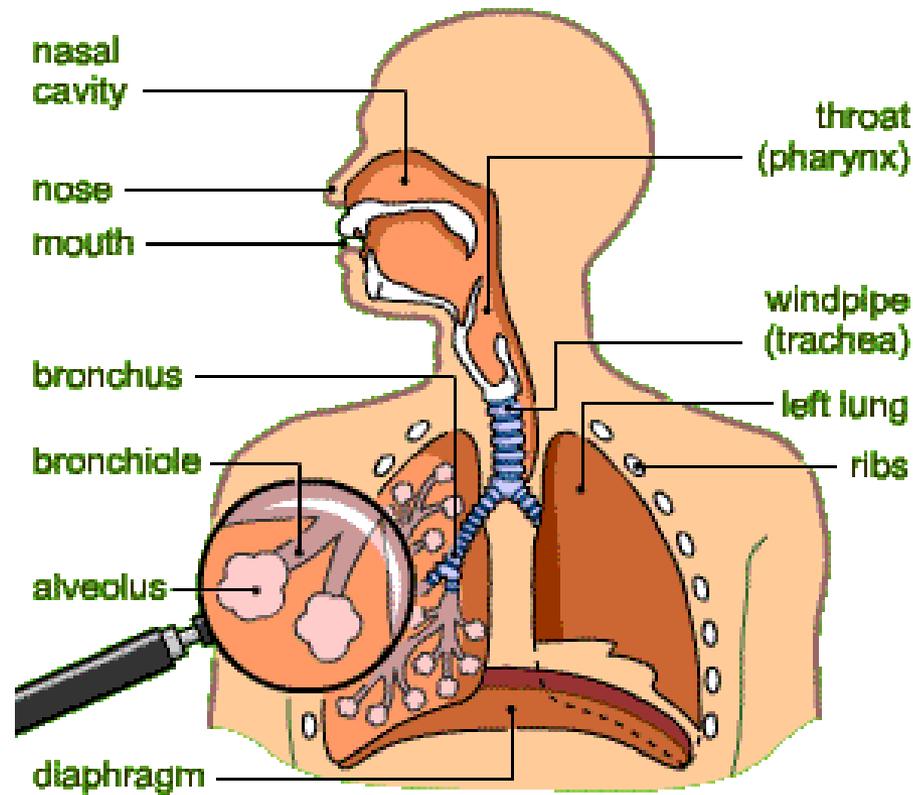
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# RESPIRATORY DIFFICULTIES

# The Respiratory System

- A person with a spinal cord injury can develop different degrees of breathing problems
- Types of problems depend on the level of injury
- After a spinal cord injury, breathing structures remain the same, but they often work differently

# The Respiratory system



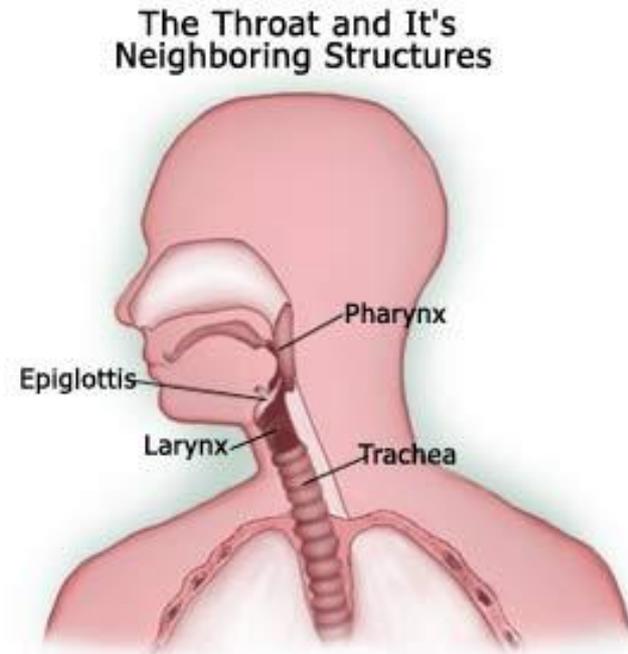
## The Nose

- The nose and mouth increase the air that enters the trachea to 100% humidity. The hairs that line the inside of the nose act like a filter to clean the air. The nose also warms or cools air before it enters the lungs. These actions are important. By keeping the air moist and clean, the lungs have less chance of becoming infected.



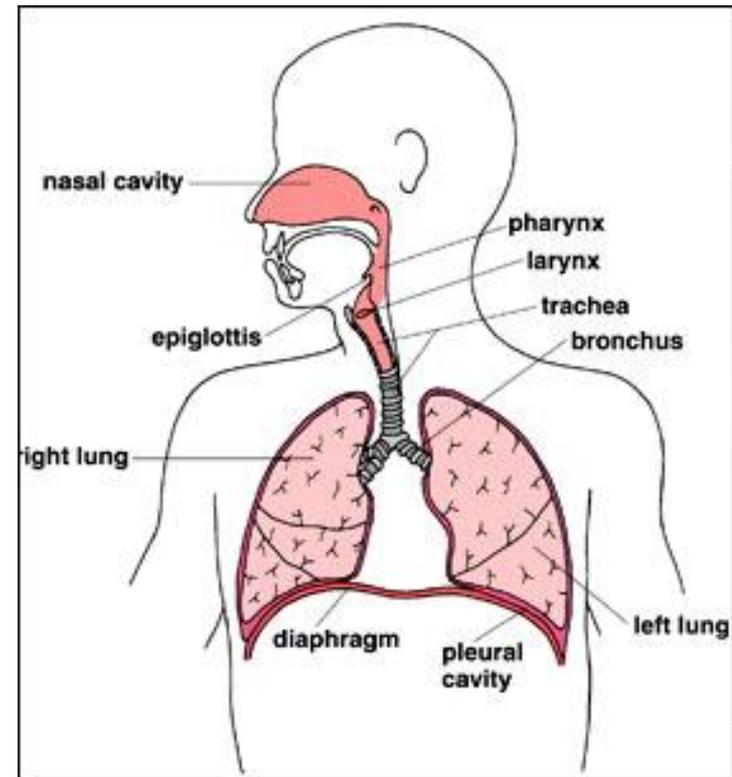
## Throat, Epiglottis, and Trachea

- Throat: The moist air then passes from the nose and mouth down the throat into the trachea (windpipe).
- Epiglottis: The epiglottis is a small flap of tissue that closes over the trachea. When food, fluid, or a pill is swallowed, the flap closes to prevent them from entering the lungs.
- Trachea: The trachea is the passageway leading from the throat to the lungs



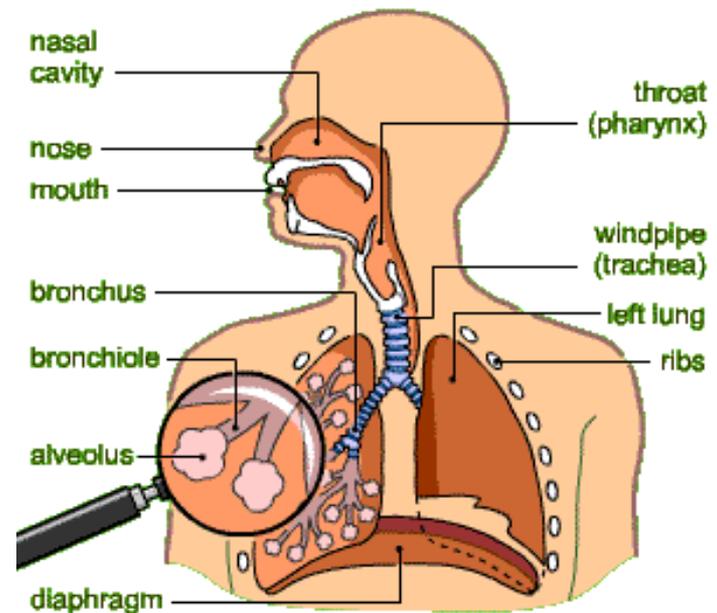
# The Lungs

- Lungs: The lungs receive oxygen from air that is breathed in. Oxygen is then delivered to cells in the body. The lungs also receive carbon dioxide (a waste product) from the body cells and release it out the nose and mouth



# Alveoli, Bronchioles, and Capillaries

- Alveoli: These are small lung sacs that fill with air each time air is breathed in.
- Bronchioles: These are tubes that take air to and from the lungs
- Capillaries: These are small blood vessels. The capillaries in the walls of the alveoli carry oxygen to body cells. They also pick up carbon dioxide from the cells to get rid of it
- Diaphragm: A large muscle that separates the chest from the abdomen. It starts the inhalation process (breathing in of air).

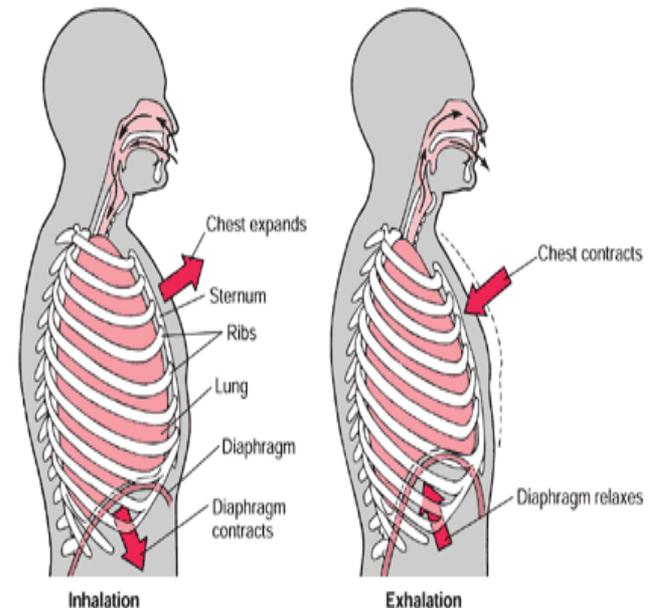


## Nerves and Muscles

- Nerves control the muscles that are used for breathing. There are four groups of muscles involved in breathing. These include the:
  - Diaphragm
  - Intercostal muscles
  - Abdominal muscles
  - Accessory muscles

# The Diaphragm

- This is the major muscle for breathing
- When one inhales, this muscle contracts (shortens) and moves downward. This creates suction which draws air into the lungs and expands them. (see the picture).
- The nerves which stimulate the diaphragm are called phrenic nerves. They begin at C3, C4, and C5 and travel to the diaphragm
- A spinal cord injury at C1 to C5 may result in partial or complete paralysis of the diaphragm



## The Intercostal Muscles

- These muscles lie between the ribs.
- Intercostal nerves stimulate these muscles.
- The nerves are located at T1 through T11.
- These muscles increase and decrease the chest size.
- One's ability to take a deep breath and cough is affected if there is loss of control in these muscles

## The Abdominal Muscles

- These muscles are stimulated by nerves at T6 through L1.
- They allow people to cough effectively.
- These muscles force the diaphragm upward thus forcing air back out.

## The Accessory Muscles

- These muscles are located in the neck.
- They are stimulated by the spinal cord nerves C1 through C3 region.
- They raise the rib cage and help one to take a deep breath.

## Persons with SCI are at high risk for respiratory problems

- Injuries above the mid-thoracic level often have trouble taking deep breaths, exhaling forcefully, and coughing.
- When a person has a cold or respiratory infection, secretions collect in the lungs.
- Bacteria tends to grow in the secretions
- Pneumonia or atelectasis can follow

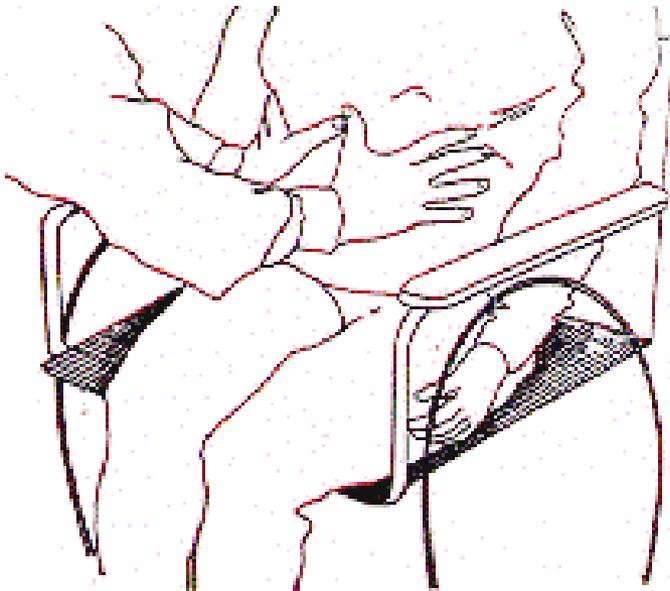
# Treatment for Lung Congestion

- Assisted Cough (Quad Cough)
- Postural Drainage

## Quad Cough

- This involves having another person help with coughing
  - Makes coughs more forceful
  - Helps to raise secretions higher into the airway so they can be spit out or suctioned out.
  - May be done sitting up or while lying in bed

## How to do an Assisted (Quad) Cough



- Place the fist of one hand, immediately below the breastbone, and the heel of the other hand on top of the breastbone. The hands need to be over the diaphragm area.
- The hand position may vary from the illustration, but the hands must be below the ribs.
- Take a breath and cough as you exhale the air. Your assistant should push inward and upwards as you cough. NOTE: If you are on a ventilator, your assistant should push during inhalation. An ambu-bag may be substituted for the ventilator for a stronger cough.
- Repeat, as necessary, with rest periods, as needed, between efforts

## Quad Cough

- Reasons for doing an assisted (Quad) cough:
  - A weak cough
  - Too many secretions
  - Thick secretions
- Reasons to avoid an assisted (Quad) cough:
  - Pain
  - Chest injury
  - Internal problems such as an ulcer or kidney stone

## Postural Drainage

- This means getting into a position so that gravity can be used to help drain the secretions out of the lungs.
- This should be used when secretions are thick and an assisted cough cannot raise them up.
- The healthcare providers can assist you with this if needed

# Spinal Cord Injury

## Temperature Regulation

# Temperature Regulation

- Temperature Regulation and SCI
- Prevention
- Treatment

## Temperature and SCI

- Your body is not able to control its temperature as before.
- When the air is hot, you may run a high temperature.
  - May feel dizzy, faint or headachy.
- If you get too cool, your body temperature will lower.

## Prevention

- To prevent overheating:
  - Stay in shaded areas if outside.
  - Use fans and air conditioning when able.
- To prevent a low temperature:
  - Wear warm clothes
  - Drink warm liquids
  - Dry yourself quickly after showering.

## Treatment (Overheating)

- If you become overheated:
  - Drink more liquids
  - Sponge with cool water
  - Adjust room temperature with use of fans or air conditioning.
  - Check your temperature. If it stays above 100 degrees Fahrenheit even with sponging, ***call your doctor.***

## Treatment (too cold)

- If you become too cold:
  - A low temperature is one to one and a half degrees less than your usual temperature
  - Wear warm clothes
  - Drink warm liquids
  - Adjust room temperature for warmth
  - Check your temperature. If body temperature remains low despite attempts to warm up ***call your doctor.***



# Spinal Cord Injury

## Week 4

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### **REVIEW: *(IF APPROPRIATE)***

- **PREVENTING TEMPERATURE REGULATION PROBLEMS AFTER SCI**
- **PREVENTING AUTONOMIC DYSREFLEXIA AFTER SCI**

### **WATCH 3 POWERPOINT PRESENTATIONS:**

- **EDEMA**
- **HETEROTROPHIC OSSIFICATION**
- **SPASTICITY**

## Teach-Back Week 4

- **Tell me why it is so important to control your temperature**

## Hands on teaching

- **By this time, you should be able to perform all of the cares that are needed to go home. Please be sure to ask questions if needed. You are doing well and almost ready to go home!**

## Preventing Temperature Regulation Problems After Spinal Cord Injury (SCI)

**After a cervical spinal cord injury in the neck, persons are unable to sweat and shiver normally to help control their body temperatures. Therefore, if it is very hot or cold, your body is unable to adjust your temperature to cool down or warm up. It is very important to avoid being in severely hot or cold temperatures. It is also important to prevent heat exhaustion, heat stroke, sunburn, and frostbite by being cautious and planning ahead.**

## Steps to prevent problems

- Remain in an air conditioned setting and close drapes and blinds when it is hot outside. Try to avoid going outside all together when possible.
- When it is warm indoors or out, use of a fan or paddle fan may help keep you cooler.
- If you must be outside when it is hot, remain in the shade, spray your arms, leg, and face with cool water from a spray bottle about every 30 minutes, and drink extra fluids.
- Apply sunscreen and a wide brimmed hat before going outside in hot weather.
- Take Tylenol or Aspirin according to the directions to help lower a fever.
- If you have a high fever, then drink extra fluid and place a cold wash cloth in both underarms and groins until you get medical help.
- Avoid crowds in the flu and cold seasons. This helps prevent getting an infection and thus chilling and fevers.

## Steps to prevent problems

- Take precautions to prevent bladder infections and kidney stones by drinking enough fluids to prevent infection also.
- Pay attention to weather reports and wind chill factors in cold weather since you will be at greater risk for frostbite and low body temperatures.
- Avoid going outside when it is cold. If you must go out, dress warmly and in layers of clothes with natural fibers (wool, down) to help conserve body heat.
- Wear a hat/cap to save body heat in cold weather.
- Drink warm fluids to help stay warm too when out in the cold.
- If you get wet, remove wet layers right away to prevent heat loss.

# Preventing Autonomic Dysreflexia After SCI

Persons with spinal cord injury above T8 are at risk for a life threatening problem known as autonomic dysreflexia. If not corrected, it is a medical emergency. Sometimes it is just called dysreflexia or hyperreflexia by staff but it all means the same problem. It occurs because something is wrong below your spinal cord injury. Because your nerves can't send information up to the brain, your body doesn't respond to the problem. For example, your bladder may be full or your foot may have a blister or ingrown toenail, but you don't feel it or know it's there due to your injury.

(Continued...)

## Preventing Autonomic Dysreflexia After SCI

When this occurs, your nervous system becomes excited and you may have the following warning signs: a sudden pounding headache, your face/neck/shoulders may become red, and/or sweaty, you may also get a stuffy nose, blurred vision, increased spasticity and feel jittery or anxious. With some or all of these symptoms, your blood pressure is likely HIGH. You and your family must look to find out what is wrong, and fix it. If you can't find and fix the problem, then go to an emergency room because you could have an infection, kidney stone, blood clot, bowel constipation.

## Things to do and look for:

1. Put your head up, even if you are in bed.
2. Loosen tight clothing and devices (binders) and remove TED socks if you are wearing them.
3. Consider if your bladder could be full. Catheterize yourself if you do in/out cath. Put a small amount of Lidocaine in the urethra, and wait 2-3 minutes before cathing. If you have a Foley, catheter, check to see if the bag is full or the tubing is kinked or twisted. If not, try to irrigate with 30 oz of normal saline or replace the catheter. Bladder problems are the most common cause of dysreflexia.

## Things to do and look for:

4. Check to see if your bowels are full of stool. Put a teaspoon or more of a numbing ointment such as Lidocaine inside the rectum and wait 2-3 minutes then try to gently remove the stool with a gloved hand. Repeat this again if needed to remove the stool.
5. If your bladder and bowel are not the cause then check your skin below the level of spinal cord injury for cuts, scrapes, burns, pressure, sunburn, bruises, blisters, ingrown toenail, and a tear on the tip of the penis if you have a Foley catheter etc.
6. Look to see if you have hemorrhoids and if they are red and bleeding. If so, you can apply Preparation H which you can get from a local pharmacy, or a prescribed ointment from your doctor on the hemorrhoids.

## Things to do and look for:

7. Some persons use numbing ointments before their bowel program especially if they have hard stools, before doing their bowel program to prevent dysreflexia.
8. Check your joints for swelling or redness, in case you sprained an ankle or broke a toe etc.
9. If the symptoms occur during sexual activity, stop love making and resume later. Remember to do thorough bowel and bladder programs before love making.
10. Menstrual cramps can cause dysreflexia, so taking aspirin or Motrin, Ibuprofen, Aleve etc. may prevent dysreflexia the first few days of your period.



# Spinal Cord Injury

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## **EDEMA:**

Abnormal swelling under the skin

- Causes
- Prevention & Treatment

## Causes of Edema

- Gravity
- Venous insufficiency
- Paralyzed or weak muscles

## Causes of Edema

- Gravity
  - While sitting, feet and legs dangle. Because of gravity the blood pools(stays) in the feet, ankles, and legs longer than normal. The veins must work against gravity to bring the blood back to the heart. The fluid moves into the tissue of the feet and ankles, causing swelling.

## Causes of Edema

- Venous insufficiency (Veins)
  - Illness or injury may affect the veins' ability to pump blood back to the heart. The valves in the veins do not work and the muscles around the veins do not work.

## Causes of Edema

- Paralyzed or weak muscles. The muscles help veins pump the blood back to the heart. If the muscles are weak and/or paralyzed it takes longer for veins to pump the blood back to the heart. The blood stays in the legs longer. The fluid moves into tissues, causing swelling.

## Prevention and Treatment of edema

- Do wear support stockings.
- Do prop legs and feet on a chair when sitting.
- Do prop hands on a pillow when sitting.
- **FOR HANDS ONLY:** Do massage hand toward arm. (Start at fingers and rub toward wrist.)
- Do use muscles (exercise and range of motion) often.
- Diuretics(water pills) as ordered by physician.



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# Spinal Cord Injury

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## Heterotropic Ossification

# Heterotropic Ossification(HO)

- Definition
- Causes
- Signs
- Treatment and Prevention

## What is Heterotrophic Ossification?

- It is the abnormal formation of bone. Pieces of bone may form around joints or in soft tissue.
  - Most often affects the hips, knees, shoulders, and elbows.
  - It can limit movement and independence.
- Often seen in people with brain and/or spinal cord injuries
- Usually seen within the first year after the injury
- Can sometimes form between muscles

# What Causes Heterotrophic Ossification?

- The cause is unknown
- It does not occur in all people who are injured.
- Researchers believe that it may be caused by changes in the body due to injury.
  - Young bone cells drift out of place. Deposit themselves outside of bones, where they mature and harden.

## What are the symptoms of Heterotrophic Ossification? (HO)

- At the affected area, the following signs may be present:
  - Swelling
  - Increased temperature
  - Pain,
  - Redness
  - Stiffness and limited movement.
- Call the doctor if there are changes in movement that occur after discharge or if any of the above symptoms occur.

## What happens to your body?

- Over 2 to 4 weeks, the movement of the joint continues to decrease. In about 4-10 weeks the new bone can be seen in a bone scan or x-rays.
- Over the next 3-6 months new bone continues to form and grow. It may grow for years, decreasing the ability to move.

## Treatment of HO

- The goal of treatment is to prevent it from getting worse, provide pain relief, and to limit the stiffness
- Medication
- Radiation
- Surgery
- Activity and positioning

## Treatment of HO: Medications

- Didronel (Etidronate)
  - prevents further abnormal growth of the bone.  
Take as instructed by your Doctor.
- Non-steroidal anti-inflammatory medications,
  - Such as Indomethacin and naproxen used for the treatment of pain. Take as instructed by your Doctor.

## Treatment of HO: Surgery

- Surgical removal of the abnormal growth of bone may be done to relieve stiffness and provide an improved quality of life.
- Prevention and medical treatment is preferred.

## Treatment of HO: Radiation

- Low dose radiation can prevent extra bone growth by not allowing the cells to grow and divide.
- *May* be done within 3 days after surgery for heterotrophic ossification.

# Treatment of HO: Activity and Positioning

- Aggressive movement of joints (range of motion exercises-ROM)
  - Active (ROM done by the injured)
  - Passive (ROM assisted by someone else)
- Joint manipulation (A therapist moves the joint)
- Proper positioning in bed and wheelchair.



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# Spinal Cord Injury

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## Spasticity

## What is Spasticity?

- Spasticity is a condition in which certain muscles are continuously contracted.
- This contraction causes stiffness or tightness of the muscles and may interfere with movement, speech, and manner of walking.

## What is spasticity?

- Spasticity is the involuntary movement of muscles, which occurs because messages can travel from parts of your body to the spinal cord and cause reflex activity (muscle movement). This is possible because the spinal cord has certain normal automatic functions under the influence of the brain.
- After spinal cord injury the nerve cells below the level of injury become disconnected from the brain. Automatic reflexes are no longer under the regulating influence of the brain and therefore become exaggerated

## What are the symptoms?

- Increased muscle tone
- Rapid muscle contractions
- Exaggerated deep tendon reflexes
- Muscle spasms
- Scissoring (involuntary crossing of legs)
- Fixed joints

## What triggers spasticity?

- Any sensory stimulus below the level of injury can trigger spasticity.
  - Change in position
  - Bladder irritation
  - Bowel programs
- Some stimuli can cause a change in your spasticity. Anything that would ordinarily be uncomfortable or painful can increase spasticity
  - Skin problems- a skin sore or ingrown toenail
  - Bladder problems- high residuals, infection
  - Bowel problems- constipation, impactions, hemorrhoids
  - Medical problems- viral infection, influenza, intestinal flu

## Spasticity is not all bad...

- Minor degrees of spasticity may be helpful to you
- It can improve your circulation.
- It can maintain muscle size.
- It can maintain bone strength. It helps to some degree to prevent osteoporosis.
- Some people use their spasms for function, to empty bladders, to transfer, to dress.
- It can serve as a warning mechanism to identify pain or problems in areas where there is no sensation.

## When is spasticity too much?

- Spasticity is considered to be too much, when it is severe enough to interfere with function or when it interferes with sleep
- If spasticity is severe, there are treatments available.

## Treatment of Spasticity

- The best way to manage or reduce excessive spasms is to perform a daily range of motion exercise program taught to you by a physical therapist.
- Other physical therapy regimens such as muscle stretching and things to help prevent shrinkage or shortening of muscle and reduce severity.
- Avoiding and preventing situations that trigger increased spasms.

## Medications to treat spasticity

- There are 3 primary medications to treat spasticity:
  - Baclofen
    - Taken both orally and used in a pump that is surgically implanted that applies the drug directly to the area of dysfunction
  - Valium
  - Dantrium
- All medications carry some side effects and none of them will completely eliminate spasticity.

## Last words

- Spasticity is something that differs from person to person, for some it serves benefits that outweigh the disadvantages and for some vice versa.
- If you decide that it is time for a change, educate yourself about the pros and cons of each option. Then, find a healthcare provider who understands both spinal cord injury and spasticity and will look with you at the big picture.