

(Assessment/Problem Solving/Intervention/Teaching-Learning)

CRITICAL THINKING EXERCISES: (**Spinal Cord Injury**)

1. What physiologic problems are causing Sam to have hypotension and bradycardia?
 - Initially, Spinal shock
 - All SCI go into some degree of spinal shock.
 - Remember that Sympathetic nervous system arises from spinal segments T1-L2 (some books say T6-L3)---when a SCI occurs, communication between this area and brainstem is lost. The Parasympathetic nervous system is partially in brainstem and partially in S2-4. The parasympathetic remains working because of the brainstem portion---the heart rate is slowed, often below 60 bpm. Loss of sympathetic tone in peripheral vessels results in vasodilatation---A CHRONIC Problem for the rest of their lives is low blood pressure with potential postural hypotension—of course this hypotension will be at various degrees---just be aware of it.
 - SO, persons with SCI at T6 or above, experience more problems with regulating vasomotor tone. Those below T6 usually have sufficient sympathetic function to maintain adequate vasomotor function (but still have hypotension/bradycardia). With lower lumbar and sacral injuries, sympathetic function remains essentially unaltered

REMEMBER----

Autonomic Dysreflexia or Hyperreflexia: cannot occur while pt is in spinal shock—refer to your book and notes as to when spinal shock is over.

- a hypertensive crisis that may occur from noxious stimuli during rehabilitation or, rarely, during the acute stage (or even when pt. comes to the hospital for another medical reason)
- most common cause is bladder or rectal distention (or anything that stimulates—hot or cold)
- Strikes only SCI pts. with injuries **above** T7 level
- The thoracic sympathetic outflow is disrupted and the feedback system between the sympathetic and parasympathetic of the ANS is disrupted (THEY CAN'T TALK).

Noxious stimulus below level of injury triggers sympathetic nervous system→causing massive release of catecholamines→ vasoconstriction below the lesion→ high blood pressure occurs → sending inhibitory signals to the medulla→the inhibitor signals can't traverse the cord lesion→Instead, the baroreceptors in carotid sinuses/aorta detect high B/P and cause vasodilation.

Parasympathetic response occurs **above** the injury (red, flushed, warm skin, headache, nasal congestion, diaphoresis, vagal slowing of HR)→

Sympathetic response **below** the lesion, skin is cold, producing gooseflesh (piloerection)→bradycardia occurs to

compensate and try to lower BP but is not effective enough→→the hypertension could lead to an MI, Stroke, SAH

2. What would the first line of treatment be for Samuel's hypotension and bradycardia?
 - You will try fluid--be careful, a SCI pt can have fluid overload problems easily and go into CHF because HR doesn't increase when the fluid increase in an attempt to pump the extra fluid more efficiently (this is what our body usually does)
 - If bradycardia is symptomatic, an anticholinergic med such as atropine
 - Hypotension is managed with a vasopressor agent such as dopamine and fluid replacement.

3. Explain the use of Methylprednisolone for SCI
 - Methylprednisolone (solumedrol)--high dose therapy within 8 hours (I think) of injury X 24 hours can reduce the extent of damage and disability
 - Reduces ischemia and edema
 - Improves perfusion
 - Prevents cell membrane breakdown
 - Enhances conduction of nerve impulses
 - Improves energy metabolism
 - Better odds of moving to a higher motor/sensory category
 - 30 mg/kg over 1hr. then 5.4 mg/kg/hr over 23 hours (steroid side effects---
-masks infection, GI bleed, hyperglycemia, impaired wound healing
(TOTAL TIME = 24 hrs) DO NOT MEMORIZE

4. What nursing activities would be a priority on Samuel's arrival in the intensive care unit?
 - Edema of the SCI may increase the level of dysfunction and respiratory distress
 - If Sam become's exhausted from labored breathing or his ABG's deteriorate then intubation & mechanical ventilation is necessary. Respiratory arrest could always happen. THEREFORE, the nurses action should be to:
 - Frequently Assess:
 - Breathsounds
 - Breathing pattern
 - Subjective comments about ability to breath(" I can't cough very hard") (IS HE HYPOVENTILATING--TIRING OUT?)
 - ABGs
 - Tidal Volume, Vital capacity
 - color of sputum
 - Vital signs—any increase in vagal stimulation such as turning or suctioning can result in profound bradycardia or cardiac arrest (remember: loss of sympathetic tone)
 - Skin color
 - Start Methylprednisolone--EXPLANATION BELOW

- Maintain proper immobilization of the neck to prevent lateral rotation of C-Spine.
 - DO NOT remove c-collar until neck x-ray is "cleared: by the ER MD or Neuro MD, or the neck is stabilized w/ tongs or surgery
 - Turning should be done in log-roll fashion.
 - If patient is in traction, it MUST be maintained at all times.
5. What physiologic problem explains Sam's respiratory distress?
- Sam has labored and rapid respirations
 - Cervical fractures cause a paralysis of abdominal musculature and frequently intercostal musculature. Therefore, Sam cannot cough effectively enough to remove secretions, leading to atelectasis and pneumonia.
 - lesions above T 12 interfere with deep breathing and coughing
 - ⇒ T1 controlling intercostals—any lesion above this will have intercostal problems
 - ⇒ T12 control abdominal muscles—any lesion above this will have abdominal muscles affected
 - ⇒ C 3-5 control diaphragm—affects the phrenic nerve from working the diaphragm--any lesion at this level shows diaphragmatic breathing
6. How can you (the nurse) prevent respiratory complications in a spinal cord injury patient who has difficulty taking a deep breath and has a weak cough?
- Refer to your syllabus regarding how to help the SCI patient take deep breaths and expectorate mucous ("quad cough" and "diaphragmatic breathing")
 - Need to teach Sam how to effectively clear his secretions use 2 techniques
 - a) Quad cough--push on pts. abd.--pushing toward diaphragm while pt coughs/exhales
 - Don't schedule for after eating
 - oral suction needs to be available
 - b) Glossopharyngeal breathing--to hyperventilate the lungs--pt. inhales 4-5 times without exhaling (may need to use ambu bag)
 - watch for fatigue with both techniques
7. Identify nursing implications for Sam while he is in tongs and when he has a halo vest
- TONGS:** (1) need to perform "pin care", (2) maintain alignment to neck, (3) make sure traction weight is the accurate amount and hanging freely
- HALO:** (1) need to perform and teach Sam about "pin care", (2) initially when Halo put on, need to elevate HOB very slowly over a period of hours because of the possibility of orthostatic hypotension (3) teach Sam about the change in the center of gravity and difficulty with balance (4) teach Sam about clothing that will work with the Halo Vest. (5) discuss body image (6) teach Sam about skin care—keep it dry!)

8. Identify the teaching on sexual function that is necessary for Sam. When should the teaching begin?
- In particular, men will suffer erectile dysfunction. Devices are available to assist the client to have an erection, but the ability to achieve ejaculation is RARE
 - **upper motor lesion:** most pts. can't ejaculate and have reflex erections (priapism); absent orgasm
 - **lower motor lesion:**
 - complete lesion: rare erection, ejaculation, orgasm
 - incomplete lesion: reflex/psychogenic erection; 70%-able to ejaculate ; orgasm, and 10% of these men can father a child
9. Compare and contrast the nursing roles and priorities of the acute or critical care nurse and the rehabilitation nurse in caring for clients with SCI

Acute Phase	Rehab Phase
<ul style="list-style-type: none"> • Preserving life and function immediately post injury • Prevention of complications of immobility (pulmonary, skin, bowel) • Maintain alignment • Support the magnitude of client's ability to cope at this early phase 	<ul style="list-style-type: none"> • Concerned with restoring and maximizing optimal function • Rehab nurse is the center of the rehab team of therapists—scheduling therapies and ensure that the patient is properly prepared for therapy • Bowel and bladder training must be developed and established • Work with the patient as they grow toward acceptance of whatever disabilities remain • Because the rehab phase is longer than the acute phase, the rehab nurse has time to accomplish more long-term goals