Simulation Objective:
Identification and Management of a patient with increased intracranial pressure/spinal cord injury.

Scenario: Physiologic System
Epidural Hematoma:
Collection of blood between the inner table of the skull and the outmost layer of the dura, most frequently associated with skull fractures and middle meningeal artery lacerations. A blow to the head that causes a linear skull fracture on the lateral surface of the head may tear the middle meningeal artery. As the artery bleeds, it pulls the dura away from the skull, creating a pouch that expands into the intracranial space. This can occur as a result of low impact falls or high impact injuries (MVA). It occurs as a result of trauma to the skull, not acceleration/deceleration forces. This is a linear fracture.

Classic manifestations of EDH include brief LOC followed by periods of lucidity that may last up to 12 hours. This lucid period is followed by a progressive deterioration in LOC and development of hemiparesis on the opposite side of the injury. A dilated and fixed pupil on the same side as the impact is the hallmark of EDH. The patient may complain of a severe, localized headache and may be sleepy. Diagnosis of EDH is based on clinical symptoms and evidence of collection of epidural blood identified on CT. Treatment of EDH involves surgical interventions to remove the blood and to cauterize the bleeding vessels. Outcome is directly related to the patient’s status preoperatively. For patients not in coma, mortality is very low; for those in light coma, mortality is 9%; and for patients in deep coma, mortality is 20%.

Scenario: Skills
Evaluate for increased BP, bradycardia and decreased LOC.

Glasgow Coma Scale (moderate injury with a scale of 9 – 12).

Evaluation of Airway, Breathing and Circulation is the first step.

Assess for hypoxia, hypoventilation, and hypoperfusion (reduce the risk of hypercapnia which can lead to cerebral vasodilation = increased ICP)
Assess:
Level of Consciousness, motor function, papillary response, respiratory function, vital signs.

Prep for Diagnostics: CT, EEG, MRI,

Priority nursing goals:
Stabilize VS, prevent further injury, reduce IICP.

Maintain HOB 30 – 45 degrees and in a neutral position to ensure venous drainage.

Control ventilation to ensure PaCO2 at 25 – 30 mm Hg and PaO2 level greater than 70 mmHg.

Administer Diuretic agents, anticonvulsants and meds to ensure SBP between 140 and 160 mm Hg.

Reduce intracranial blood flow is goal: controlling hyperventilation to keep Paco2 25 – 30 mm Hg is goal (to cause vasoconstriction and decrease blood flow)

Control Temperature - increased temp will increase ICP increases cerebral metabolic rate, which increased blood flow, which increases ICP. If temp continues to rise, unresponsive to interventions, may be adverse event.

Blood Pressure must be maintained at high-normal to provide nutrients and oxygen to the brain.

Learning Objectives:

Demonstrate care for a patient experiencing increased intracranial pressure. During the care, demonstrate awareness of signs / symptoms to monitor and notify to physician.
Demonstrate appropriate positioning of the patient and type of environment to maintain.
Demonstrate ability to prioritize patient issues that must be addressed.

Competencies:

Reference:

Patient Data:
Account Number: 313256799
Medical Record Number: 02-09-11
Name: Martha Sees
Birthdate: July 4, 1953

Patient Case History (brief past medical history of present illness)
Side impact MVA, airbags deployed, seatbelt on. Oncoming car estimated speed 70 mph. 50 KG in weight.

Chief Complaint:
MVA with LOC
Laceration to left temporal area

History of present Illness:
The patient was in an MVA today. Arrived in the ED. Had Loss of Consciousness x 1 hour. A CT scan was performed while in the ED and a small left lateral Epidural Bleed was detected.

Past Medical History:
Mrs. Sees is a 53 year old female who resides in Portland, Oregon. She has no significant medical history. She had her appendix removed as a teen.

Allergies:
Penicillin

Social History
She is a single female. She does not smoke. She consumes one to two alcoholic beverages a day.

Current Medications
Vasotec 10 mg every day. One multivit daily.

Family History
HTN - maternal side. Grandmother one CVA at age 67.

Review of Systems;
Physical Examination:
- Vital Signs
  - Temp 99F, Resp 20 Pulse 78 regular BP 142/88, SpO2 98
- General
  - She appears mildly uncomfortable. Awake at this time with periods of somnolence. No nausea at this time.
Skin
  - Somewhat pale, dry and warm to touch

HEENT
  - Normocephalic, 4 cm laceration right temporal area. Conjuctivae clear. PEERL, Oropharyx shows good dental hygiene. Tongue midline.

Neck
  - Supple and non-tender

Spine
  - Normal curve, no deformity noted.

Lungs
  - Clear to auscultation with some diminish in right lower lobe

Heart
  - S1, S2, no murmur or gallop noted

Abdomen
  - Soft and non-tender. No guarding noted. Bowel sounds normal for adult. Stool guaiac negative.

Extremities
  - No clubbing, cyanosis, or edema noted. Hands and Feet are warm, though skin is pale. Pulses thready. Capillary refill symmetric, though somewhat sluggish.

CNS
  - Age appropriate. Move all four extremities on command, but is somewhat difficult to arouse intermittently. Glasgow coma scale is 12

Pending Studies:
CT (non-contrast) –
Type and Hold
CBC – to monitor for infection and bleeding
PT/PTT – to identify coagulation problems
BMP –
Toxicology Screen – surveillance for withdrawal

Assessment:
1. Moderate Head Injury – small epidural hematoma found
2. HTN – controlled

Plan:
Admit for observation. Monitor neuro assessment q 2 hours. Continue serial CT scan x 2. Further treatment will be based on assessments for CNS and CT.

Presentation:
Characterized by "lucid interval".

Epidural hematoma volume can increase rapidly over hours or even minutes with sudden onset of neurologic deficit and/or depression of consciousness.
Any patient with a headache after a blow to the side of the head should be considered for CT scan.

**Management:**

Clot evacuation, possible ICP monitoring.

LP provides little data and may exacerbate neurological compromise

**Pt drug allergies**

Penicillin

**Lab and other information available to participant upon request**

Labs

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<table>
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<tr>
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Phenytoin Level   17
### Scenario Flow (desired course events during scenario: changes in VS and assessments)

Use S-B-A-R for all communications. (Situation – Background – Assessment – Recommendations)

<table>
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<tr>
<th>Notice/Interpret</th>
<th>Respond</th>
<th>Outcomes</th>
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| LOC – Periods of Lucidity, patient is not oriented to place and time but does know name at this time | Increase HOB to 30 degrees only if no spinal cord injury. If spinal cord injury leave patient flat. Perform Glasgow coma scale with the following results | Best Eye Open: to voice (3)  
Best Verbal: confused (4)  
Best Motor: Localized (5)  
12 |
| Heart Rate – 74 | Keep environment stimuli low | Call physician for orders –  
Prepare for transfer to Level 1 facility. |
| Resp – 12 | Keep SBP between 140 – 160. or MAP at 70 - 130 | Consult to Neurosurgeon/Neurologist/Rehab specialist |
| BP – 180/90 | IVF with isotonic solutions to maintain cerebral perfusion – rate at tko. |  
MAP: 
(2xdiastolic) + systolic  
3 |
| SpO2 – 94 on room air | Anticipate Tylenol to regulate Temperature. | normal is 70 - 110 |
| Patient’s HOB is flat | Anticipate Dilantin as an anticonvulsant 15 – 20 mg/kg leading dose followed by 300mg IV every 24 hours  
This drug (dilantin) needs filter. put in 100ml bag and administer over 15 min. for this wt – dose is 750mg. |  |
<p>| Lungs – clear | Anticipate Solu-Medrol (for spinal cord injury) to reduce injury associated with spinal |  |
| Heart – Normal |  |  |
| Bowel – normal |  |  |
| Fluid from ears and nose (get some water or glycerine from moulage kit) |  |  |</p>
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<td>cord compression and decreases inflammation 30 mg/kg IV now and 4mg/kg over next 23 hours. For this wt – dose will be 1500mg and place in a 50 ml bag over 15 min.</td>
<td></td>
<td>Best Eye : to Pain (2) Best Verbal: Inappropriate words (3) Best Motor: Normal Flexion withdrawl (4)</td>
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<td>Starts to complain of Headache and has increased confusion. Starts to complain of some nausea. Weakness found on contralateral side of lateral head wound</td>
<td>Take vital signs: T - 99 Heart Rate – 65 Resp – 10 BP – 170 / 100 Re-evaluate Glasgow</td>
<td>9</td>
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**How will participants be introduced to the case (Report)?**
Oncoming report from Med Surg Nurse. Patient will be in room.

**Manikin used and initial computer set-up (v.s. and assessment information for beginning of scenario: SpO2%, temperature, heart rate, blood pressure, heart, lung and bowel sounds)**

Vital Signs: Temp 99F, Resp 20 Pulse 78 regular BP 142/88
SpO2 96%
4 cm laceration right temporal area
Lungs - Clear to auscultation with some diminish in right lower lobe
Heart - S1, S2, no murmur or gallop noted
Abdomen - Soft and non-tender. No guarding noted. Bowel sounds normal for adult.
Stool guaiac negative.
LOC somnulant
C-collar on pt for spinal cord injury.

**Equipment and props needed:**
IV pump
O2 sat
BP cuff
Lacerated head
C-collar
Drug book
Various bags of saline
Trauma form from ED
Intubation equipment
Foley

**Medications:**
Diuretics
IVF
Solu-Medrol

**Paperwork and documentation:**
Report from ED or ED documentation form (document)
Transfer form
Physician’s Order form
Labs

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**Personnel and actors (numbers, roles, and instructions)**

**Orders (if applicable)**
Q 15 min Neurochecks (Glasgow Coma Scale) x 2, then q one hour x 2, then Q 2 hour x 2, then q 4 hour. Call MD for any change.

Q 15 min VS with pulse Ox x 2, then q one hour x 2, then Q 2 hours x 2, then Q 4 hours. Call MD if SBP less then 140 or greater then 160.

CBC in am
IVF NS at TKO

CT of Head in am

Mannitol 1gm/kg IV
Dilantin 15 mg/kg
SoluMedrol 30 mg/Kg then SoluMedrol 100mg every four hours for 4 doses.

Additional teaching tools needed