TREATMENT:

A. Treat per Universal Patient Care.
B. Patient evaluation should include best GCS to help categorize injury severity.
    1. Mild injury GCS of 13-15
    2. Moderate GCS 9-12
    3. Severe GCS <= 8
C. Avoid hypoxia at all times. Place a non-rebreather facemask on **ALL** patients with potential TBI.
D. Prevent hypotension (Goal SBP > 100).
    1. Initiate a bolus of normal saline or lactated ringers.
    2. Continue fluid boluses to maintain the systolic blood pressure >100 mmHg.
E. If patient is unable to maintain airway, consider oral airway (nasal airways should not be used in the presence of significant facial injury or possible basal skull fracture).
F. Place an advanced airway (oral endotracheal intubation, supraglottic device, surgical airway) if BVM ventilation ineffective in maintaining oxygenation or if airway is continually compromised. Nasal intubation should not be attempted.
G. If the patient has an airway placed (oral or advanced), carefully manage ventilations in order to minimize hyperventilation.
    1. Monitor ETCO2 with goal of ETCO2 of 40 mmHg.
    2. If available, use a pressure-controlled bag (PCB) and ventilation rate timer (VRT).
    3. If a transport ventilator is available, begin with the following settings:
        i. Tidal volume of 7ml/kg,
        ii. Rate of 10 BPM. Adjust rate to keep ETCO2 within target range
H. If there are signs of herniation, then **MILD** hyperventilation to an ETCO2 of 35 mmHg may be performed. Signs of herniation include:
    1. Blown pupil
    2. Posturing
I. Consider and treat reversible causes of altered mental status including hypoxia, hypoglycemia, and overdose. Obtain pmhx including blood thinner use.

PEDIATRIC PATIENTS:

A. Manage hypoxia. Place a non-rebreather facemask in **ALL** patients with potential TBI.
B. Manage blood pressure. Avoid hypotension.
    a. Initiate a 20ml/kg bolus of normal saline or lactated ringers.
    b. Continue fluid boluses to maintain SBP goals:
        i. Infants/children age < 10: 70 mmHg + (age X 2).
        ii. Children age >/= 10: 100 mmHg (same as adults)
C. If patient unable to maintain airway, consider oral airway (nasal airways should not be used in the presence of significant facial injury or possible basal skull fracture).
D. Place an advanced airway (oral endotracheal intubation, supraglottic device, surgical airway) if BVM ventilation ineffective in maintaining oxygenation or if airway is continually compromised. Nasal intubation should not be attempted.
E. If an airway is placed (oral or advanced), then carefully manage ventilations in order to minimize hyperventilation.
    a. Monitor ETCO2 on all patients with goal of ETC02 of 40 mmHg.
    b. If available, use a pressure-controlled bag (PCB) and ventilation rate timer (VRT).
    c. If a transport ventilator is available, set a tidal volume of 7ml/kg. Adjust rate to keep ETCO2 within target range.

   d. Pediatric ventilatory rates:
      i. Infants: (age 0-24 months): 25 breaths per minute (bpm);
      ii. Children: (age 2-14): 20 bpm;
      iii. > 15 years: 10 bpm (same as adults).
F. If there are signs of herniation, then MILD hyperventilation to an ETCO2 of 35 mmHg may be performed. Signs of herniation include:
   a. Blown pupil
   b. Posturing

NOTES & PRECAUTIONS:

A. The main goal is to avoid the three H's that increase mortality:
   a. Avoid hypoxia
   b. Avoid hyperventilation
   c. Avoid hypotension
B. A single episode of hypoxia is independently associated with DOUBLING of the mortality rate.
C. Hyperventilation is independently associated with a mortality rate that is between TWO and SIX times higher.
D. Inadvertent hyperventilation happens reliably if not meticulously prevented by proper external means.
E. A single episode of hypotension is independently associated with DOUBLING of the mortality rate and persistent hypotension is independently associated with a mortality rate that is eight times higher.
F. If the pt takes blood thinners, ensure that information is relayed during the HEAR.