Basic Trauma Life Support and Trauma Team Response®

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Initial Assessment

Objectives

1. Demonstrate the systematic assessment and management of each injured patient
2. Determine and demonstrate; airway with restriction of cervical spine (c-spine) motion breathing efficacy, circulatory status and hemorrhage control, disability, and exposure
3. Differentiate between the primary and secondary surveys
4. Reevaluation the injured patient's status and response before transfer to definite care

The process of initial assessment

1. Preparation and triage
2. Primary survey (ABCDE) with resuscitation adjuncts (FG)
3. Reevaluation (consideration transfer)
4. Secondary survey (HI) with reevaluation adjuncts
5. Reevaluation and post resuscitation care
6. Definitive care or transfer to an appropriate trauma center

Preparation and triage

1. Safe practice and Safe care
    a. Safe practice; universal precautions, personal protective equipment
    b. Safe care; right hospital, right time, right resources
2. Preparation in the trauma room

Primary survey (ABCDE) with resuscitation adjuncts (FG)

A – Airway maintenance with restriction of cervical spine (c-spine) motion

- Cervical spine protection
- Manual stabilization
- Immobilization

Assessment

1. AVPU
2. If the patient is alert / responds to verbal or pain ask the patient to open his / her mouth
3. If the patient is unable to open the mouth, responds only to pain or is unresponsive,

   a. use the jaw-thrust maneuver to open the airway
   b. assess for obstruction
4. inspect for:
   a. the tongue obstructing the airway
   b. loose or missing tooth
   c. foreign objects
   d. blood, vomitus, other secretions
   e. edema
   f. burns or evidence of inhalation injury
5. auscultate or listen for: obstruction airway sounds as snoring, gurgling, or stridor
6. palpate for:
   a. possible occlusive maxillofacial bony deformity
   b. subcutaneous emphysema
7. if the patient has a definite airway in place; assess for proper placement of the airway device
   a. adequate rise and fall of the chest with assisted ventilation
   b. absence of gurgling on auscultation over the epigastrium
   c. bilateral breath sounds present on auscultation
   d. presence of carbon dioxide (CO_2) verified by a CO_2 detector device or monitor

Intervention

1. If the airway is not patent, suction, clear airway
   a. avoid stimulating the gag reflex
   b. if the airway obstructed by blood, vomitus, secretions, use a rigid suction device
   c. if a foreign body is noted, remove with forceps or another appropriate method
2. If suction does not relieve airway obstruction
   a. use the jaw thrust maneuver to open airway while maintain manual stabilization
   b. insert nasopharyngeal airway who are conscious or unconscious
   c. insert pharyngeal airway in the patient without gag reflex
3. Consider a definite airway (Endotracheal intubation)
   a. securely placed in the tracheal with the cuff inflated and select cuff tube
   b. conditions required a definite airway
      i. apnea
      ii. GCS $\leq$ 8
      iii. severe maxillofacial fractures
      iv. facial burns, evidence of inhalation injury
      v. laryngeal or tracheal injury or neck hematoma
      vi. high risk of aspiration and inability to protect the airway
      vii. ineffective ventilation
      viii. deterioration of neurologic status result in an inability to protect the airway
4. Difficult airway
   a. injury or anatomy variations which may make difficult to successful intubate

b. ventilate the patient with a bag-mask device with O_2 15 L/min until alternative airway can be established

B – Breathing and Ventilation

Assessment

1. Inspect for:
    a. spontaneous breathing
    b. symmetrical rise and fall of the chest
    c. depth, pattern, and rate of respirations
    d. signs of respiratory difficulty; use of accessory muscle / diaphragmatic breathing
    e. skin color
    f. contusion, abrasion, deformities
    g. open pneumothorax
    h. jugular venous distention, position of trachea
    i. signs of inhalation injury; carbonaceous sputum, singled nasal hairs
2. Auscultate for: presence, quality, equality of breath sounds bilateral at the 2nd intercostal space, midclavicular line, the base of 5th intercostal space at the anterior axillary line
3. Palpate for:
    a. bony structure and possible rib fractures
    b. subcutaneous emphysema
    c. soft tissue injury
    d. jugular venous pulsation at the suprasternal notch / supraclavicular area

Intervention

1. If breathing is absent
    a. open airway with jaw-thrust maneuver while maintain manual stabilization
    b. insert an oral airway adjunct
    c. assist ventilations with a bag-mask device
    d. prepare for and assisting in a definite airway
2. If breathing is present
    a. administer O_2 at 15 L/min via nonrebreather mask with reservoir bag
    b. determine if ventilation is effective
        i. an end tidal carbon dioxide ($ETCO_2$) is 35-45 mmHg
        ii. oxygen saturation ≥ 94% associated with effective ventilation
    c. If ventilation is ineffective:
        i. assisted ventilation with a bag-mask device with O_2 10-12 L/min or one every 5-6 seconds
        ii. determine the need for a definitive airway
        iii. identify life-threatening pulmonary injuries
            1. open pneumothorax
            2. tension pneumothorax

3. flail chest
4. hemothorax

C – Circulation with hemorrhage control

Assessment

1. Inspect for:
    a. uncontrolled external bleeding
    b. skin color
2. Auscultate for: muffled heart sounds
3. Palpate for:
    a. present of carotid and / or femoral pulses for rate rhythm and strength
    b. skin temperature and moisture
4. If pulses are absent:
    a. BLS for initial life-supporting
    b. assess for signs of uncontrolled internal bleeding
    c. consider and assess for the following:
        i. a penetrating wound to the heart
        ii. pericardial tamponade
        iii. ruptured of great vessels
        iv. abdominal hemorrhage

    Inspect for: any external bleeding, skin color

    Palpate for: central pulse

5. If pulses are present:
    a. immediately assess for signs of uncontrolled internal bleeding
    b. if ineffective circulation, consider common sites for hemorrhage: chest, abdomen, and pelvis

Intervention

1. Control and treat uncontrolled external bleeding:
    a. apply direct pressure over the site
    b. elevate bleeding extremity
    c. apply pressure over arterial sites
    d. consider a pelvic binder if an unstable pelvic fracture is suspected
    e. consider the use of a tourniquet
    f. if the patient has signs of bleeding, without pausing in the 1° survey, another team member may obtain a blood pressure for baseline and trending
2. Cannulate 2 veins with large-caliber IV catheters:
    a. if unable to gain venous access quickly, consider intraosseous (IO) or central venous, depending on available resources
    b. obtain a blood sample for type and crossmatch
    c. infusions of warmed isotonic crystalloid solution

   d. infusions normal saline (0.9%) for blood administration
   e. consider balanced resuscitation
   f. administer blood or blood products as ordered
   g. use a rapid infusion device per facility protocol
3. Intervene in life-threatening situation:
   a. prepare and assist with emergency thoracotomy as indicated
   b. prepare and assist with pericardial needle aspiration to relieve a cardiac tamponade as indicated
   c. be prepared to expedite patient transfer to the operating site
4. Volume resuscitation
   a. use massive transfusion protocol
   b. prevent vicious cycle

D – Disability (neurologic evaluation)

Assessment; GCS

Interventions

1. Evaluate for needed CT of the head
2. Consider ABGs
3. Consider bedside glucose, alcohol level or toxicology screening

E – Exposure / Environment Control

Assessment

1. Completely undress the patient for thorough assessment
2. Inspect for any uncontrolled bleeding and quickly note any obvious injuries

Interventions

1. Cut around suspected evidence and place clothing in a paper bag
2. Maintain body temperature:
   a. cover the patient with warm blankets
   b. keeping the ambient temperature warm
   c. administering warmed IV fluids
   d. using forced air warmers
   e. using radiant warming lights

F – Full set of V/S and Family presence

1. Full set of vital signs; blood pressure, pulse, respirations, temperature
2. Family process
   a. consider factors, age, ethnicity, cultural background, religion
   b. family member present during resuscitation and/or invasive procedure

G – Get resuscitation adjuncts

Consider the mnemonic LMNOP

1. L – Laboratory: ABGs
2. M – Monitor cardiac rate and rhythm
3. N – Naso/orogastric tube
4. O – Oxygenation and ventilation assessment: SpO_2, $ETCO_2$
5. P – Pain assessment and management

Reevaluation (consideration transfer)

Portable Radiograph

1. A portable A-P chest and pelvis
2. Consider the need for patient transfer

Secondary survey (HI) with reevaluation adjuncts

The secondary survey begins after the completion of primary survey (ABCDE), after the initiation of resuscitation efforts

History

1. Mnemonic MIST
    a. MOI
    b. Injuries sustained
    c. Signs and symptoms (in the field)
    d. Treatment (in the field)
2. Patient history; SAMPLE
    a. Symptoms associated with the injury
    b. Allergies and tetanus status
    c. Medications currently used, including anticoagulant therapy
    d. Past medication history
    e. Last oral intake
    f. Events and environment factors related to the injury

H; Head-to-toe assessment

3. General appearance
    a. head & face
    b. soft tissue injuries
    c. inspect for; lacerations, puncture, abrasion, contusion, edema, ecchymoses, impaled objects
    d. palpate for; area of tenderness, crepitus
    e. bony deformities; a symmetry of facial expression, depressions, angulations, tenderness
        a. eyes
            1. determines gross visual acuity
            2. inspect for;
                a. pupils; size, equity, shape, reactivity to light
                b. muscle function; six cardinal positions

b. ears; inspect for unusual drainage, halo sign and glucose tests, ecchymoses, avulsions, lacerations
c. nose; Inspect for unusual drainage, position of nasal septum
d. neck and Cervical Spine
    1. inspect for;
        a. signs of penetrating, impaled objects, contusions, edema, open wounds
        b. position of tracheal and appearance of jugular veins
    2. palpate for;
        a. cervical tenderness or deformities
        b. tracheal deviation
        c. subcutaneous emphysema, area of tenderness
e. chest
    1. inspect for;
        a. presence of spontaneous breathing
        b. respiration rate, depth, WOB, paradoxical movement
        c. anterior and lateral chest walls; lacerations, puncture, abrasions, contusions, avulsion, ecchymoses, edema, impaled objects, and scars
        d. expansion and excursion during ventilation
        e. expression indicate of pain with inspiration and expiration
    2. auscultate for;
        a. lung sounds
        b. heart sounds
    3. palpate for;
        a. signs of subcutaneous emphysema
        b. bony crepitation or deformities; clavicles, sternum, ribs
f. abdomen / flanks
    1. inspect for;
        a. lacerations, puncture, abrasion, contusions, avulsions, ecchymoses, edema, impaled objects, and scars
        b. evisceration
        c. distension
    2. auscultate for;
        a. bowel sounds
    3. palpate for;
        a. rigidity, guarding, masses, area of tenderness all four abdominal quadrants
        b. light palpation in an area there are no pain, obvious injury
g. pelvis / perineum
    1. inspect for;

a. lacerations, puncture, abrasion, contusions, avulsions, ecchymoses, edema, impaled objects, and scars
b. bony deformities or exposed bone
c. priapism
d. pain, inability to void
e. scrotal / labial hematoma

2. palpate for;
   a. instability of the pelvis with gentle pressure
   b. instability of the symphysis pubis with gentle pressure
3. contraindication of insertion urethral catheter; signs and symptoms of urethral injury
   a. blood at the urethral meatus
   b. perineal ecchymosis
   c. scrotal ecchymosis
   d. high-riding / nonpalpable prostate
   e. suspected pelvic fracture

h. extremities
1. inspect for;
   a. soft tissue injuries; bleeding, lacerations, puncture, abrasion, contusions, avulsions, ecchymoses, edema, impaled deformity, and any open wounds
   b. bony injuries; angulation, deformity, and open wounds with evidence of protruding bone fragments
   c. previous applied splint
   d. skin color
2. palpate for;
   a. circulation
      i. skin temperature and moisture
      ii. pulses; compare one side with the other
   b. bony injury
      i. crepitus
      ii. deformity and area of tenderness
   c. sensation; ability to sense touch in all four extremities

I; Inspect posterior surfaces

- Maintain cervical spinal protection
- Support extremities with suspected injuries
- Logroll with the assistance of the trauma team
- Inspect for;
  a. blood in or around the rectum
  b. lacerations, puncture, abrasion, contusions, avulsions, ecchymoses, edema, impaled

objects, and scars

c. palpate for;
    i. deformity and area of tenderness along vertebral column, costrovertebral angles
    ii deformity and area of tenderness along posterior surfaces, flanks
d. perform a rectal examination; absence of rectal tone, high-riding prostate
f. promote timely removal of the patient from the spine board if there are no contraindications

Reevaluation Adjuncts

Reevaluation adjuncts include (but are not limit to)

1. Laboratory studies
2. Radiologic imaging; radiographs, CT scans, MRI
3. Wound care
4. Application of splint
5. Application of traction devices
6. Tetanus prophylaxis
7. Administration of medications; antibiotics, pain medications, neuromuscular blocking agents
8. Angiography
9. Contrast urography and angiography
10. Bronchoscopy, esophagoscopy
11. Preparation for the operating room
12. Preparation for admission or transfer

Additional considerations;

1. Accurate documentation; assessment, interventions, resuscitation, and patient's response
2. Family support

Reevaluation and post resuscitation care

Post resuscitation care include;

1. Components of primary survey; ABCDE
2. Vital Signs
3. Pain and response to pain medications
4. All identified injury and the effectiveness of the treatments & interventions

Definite care or Transfer to an appropriate trauma center

Post resuscitation care include;

1. The need for specific subspecialty care
2. The need for monitoring and care in ICU
3. The need for evaluation and operative intervention

Airway and ventilation management

Objectives

1. Demonstrate an assessment of airway patency and breathing
2. Identify the appropriate interventions to obtain and maintain a patent airway and ensure effective ventilation
3. Prepare the devices for intubate the trachea
4. Preparation equipment of insertion of a chest tube and closed chest drainage system

The process of airway and ventilation management

Basic airway skills

1. Preparation;
    a. equipment; for effective airway management
    b. education; recognition of an airway problem and lifesaving interventions
2. Triage;
    a. MOI
    b. injuries sustained; Facial – neck - thoracic trauma, Inhalation injury
    c. signs and symptoms; altered mental status, dyspnea, dysphagia, dysphonia, substance use, nausea, vomiting
3. Primary survey
4. Reevaluation

Assessment

1. AVPU
2. Open the airway
    a. assess airway patency;
        i. vocalization
        ii. tongue obstruction
        iii. loose teeth or foreign objects
        iv. bleeding, vomitus, secretions
        v. edema
3. Manually open and clear airway
    a. perform a jaw thrust or chin lift maneuver
    b. airway suctioning
    c. reassess airway patency
4. Airway adjuncts
    d. apply a pulse oximeter
    e. insertion a nasopharyngeal / oropharyngeal airway
    f. apply a non-rebreathing mask to maximize oxygenation; a spontaneous breathing patient

g. Bag-Mask ventilation
    I. one-Person Bag-Mask Ventilation
    II. two-Person Bag-Mask Ventilation
h. assess breathing effectiveness;
    I. spontaneous breathing
    II. chest rise and fall
    III. rate and pattern of breathing
    IV. WOB
    V. Skin color
    VI. Bilateral breath sounds

Advanced airway management

1. Insertion of Laryngeal Mask Airway (LMA) / Laryngeal Tube Airway (LTA)
    a. check the appropriate size before insertion
    b. pre-oxygenated the patient
    c. consider sedation prior to procedure
2. Detect the indications for a definite airway
    a. presence of blood, emesis, and/or foreign bodies in the oral cavity
    b. pallor or cyanosis
    c. agitation
    d. altered mental status
    e. severe maxillofacial trauma
    f. prepare for assisting of oral endotracheal intubation instrument

Intervention

1. If the patient is alert or respond to verbal or pain ask the patient to open his/her mouth
2. If the patient is unable to open the mouth, responds only to pain or is unresponsive,
    a. use the jaw-thrust maneuver to open the airway
    b. assess for obstruction
3. inspect for:
    a. the tongue obstructing the airway
    b. loose or missing tooth
    c. foreign objects
    d. blood, vomitus, secretion
    e. edema
    f. burns or evidence of inhalation injury
4. auscultate or listen for obstruction airway sounds as snoring, gurgling, or stridor
5. palpate for:
    a. possible occlusive maxillofacial bony deformity
    b. subcutaneous emphysema
6. if the patient has a definite airway in place; assess for proper placement of the airway device

a. adequate rise and fall of the chest with assisted ventilation
b. absence of gurgling on auscultation over the epigastrium
c. bilateral breath sounds present on auscultation
d. presence of carbon dioxide (CO_2) verified by a CO_2 detector device or monitor

7. If the airway is not patent, suction, clear airway
    a. avoid stimulating the gag reflex
    b. if the airway obstructed by blood, vomitus, secretions, use a rigid suction device
    c. if a foreign body is noted, remove with forceps or another appropriate method
8. If suction does not relieve airway obstruction
    a. use the jaw thrust maneuver to open airway while maintain manual stabilization
    b. insert nasopharyngeal airway who are conscious or unconscious
    c. insert pharyngeal airway in the patient without gag reflex
9. Consider a definite airway (endotracheal intubation)
    a. a definite airway is a tracheal tube securely placed in the tracheal with the cuff inflated
    b. select cuff tube
    c. conditions required a definite airway
        i. apnea
        ii. GCS ≤ 8
        iii. severe maxillofacial fractures
        iv. facial burns, evidence of inhalation injury
        v. laryngeal or tracheal injury or neck hematoma
        vi. high risk of aspiration and the patient inability to protect the airway
        vii. ineffective ventilation
        viii. deterioration of neurologic status result in an inability to protect the airway
10. Difficult airway
    a. injury or anatomy variations may make it difficult to successful intubate
    b. ventilate the patient with a bag-mask device with O_2 15 L/min until alternative airway can be established

Pediatric airway maintenance

1. Assess pediatric airway patency
2. Assess signs of airway injury or obstruction:
    a. lack of vocalization.
    b. foreign bodies.
    c. accumulated secretions

Interventions

a. positioning
    i. avoid passive flexion of the c-spine
    ii. placement of a one-inch thick layer of padding beneath a child's entire torso, preserve the neutral alignment of the spinal column.
b. open the airway with jaw thrust maneuver combined with manual in-line spinal

immobilization.

c. suction to remove secretions and debris.

d. supplemental oxygen with non-rebreather mask in a spontaneously breathing child

2. Inserted oropharyngeal airway (OPA)
   a. oropharyngeal airway only used in unconscious child
   b. use tongue blade to depress the tongue and insert gently, directly into oropharynx
3. Prepare for infant endotracheal intubation
   a. indication for Drug-Assisted Intubation for inserting endotracheal tube
      i severe brain injury
      ii inability to maintain airway
      iii signs of ventilatory failure
      iv significant hypovolemia
   b. pre-oxygenated and select appropriate size of endotracheal tube
   c. use of atropine before intubation in infants less than 1 year of age can minimize intubation-associated bradycardia.
   d. prepare; sedatives - dose-adjusted based on volume status, paralytic agents, neuromuscular blocking agents
   e. following intubation;
      i assess tube position
      ii observe equal rise of chest
      iii auscultate breath sounds over epigastrium and bilateral axillae
      iv observe results of colorimetric $ETCO_2$ detector (pediatric size)
      v obtain chest radiograph as soon as possible
4. Alternative airway adjuncts; if the airway cannot be maintained or controlled via bag-mask ventilation or orotracheal intubation
   f. pediatric LMA
   g. needle cricothyroidotomy
   h. surgical cricothyroidotomy

Breathing Skill

Assess adequate ventilation and oxygenation:

1. Inspect for:
   a. spontaneous breathing
   b. symmetrical and bilateral chest wall movement
   c. depth, pattern, rate of respirations
   d. work of breathing
2. Auscultate:
   a. listen the breath sounds at the 2nd intercostal space midclavicular line, and the 5th intercostal space at the anterior axillary line
   b. heart tones
3. Palpate for:

   a. tenderness and swelling
   b. jugular venous pulsations at the suprasternal notch / in the supraclavicular area
   c. bone structures; fractures, subcutaneous, soft tissue injury
4. Percussion for:
   a. dullness
   b. hyperresonance

Intervention

If breathing is present

1. assess for ventilation effectiveness
2. skin color
3. respiratory effort

If breathing is absent

1. reassess and open the airway if not already done
2. insert an airway adjunct if not only done
3. use a bag-mask device with O_2 10-12 L/min or one every 5-6 seconds
4. reassess the effectiveness of the interventions
5. prepare for a definite airway

If ventilation is present

1. administer O_2 at 15 L/min via nonrebreather mask with reservoir bag
2. reassess ventilation effectiveness

If ventilation is absent

1. administer O_2 at 15 L/min via nonrebreather mask with reservoir bag to 10-12 L/min normal breath per minute or one every 5-6 seconds
2. compress the bag just enough to produce visible chest rise
3. once the patient is stabilized, support oxygen saturation $\geq$ 94% to 98%
4. determine the need for a definitive airway
5. identify life-threatening pulmonary injuries
   a. tension pneumothorax
   b. massive hemothorax
   c. open pneumothorax
   d. cardiac tamponade
6. consider the conditions as a source of inadequate ventilations:
   a. preexisting pulmonary disease
   b. spinal cord injury
   c. multiple rib fractures
   d. blunt thoracic trauma
   e. pain

Needle decompression

1. prepare needle decompression;
   a. assess respiratory status

b. administer high-flow oxygen and ventilate as necessary

2. prepare site for insertion
   a. pediatric patients; the 2nd intercostal space midclavicular line is appropriate
   b. adults; the 4th or 5th intercostal space anterior to the midaxillary line
3. prepare the-needle catheter; 5 cm for smaller adults, 8 cm for large adult with a Luer-Lok 10 cc syringe
4. assist to anesthetize the area as ordered, and 3 cc of saline for identify of aspirated air
5. listen for the air escape when the needle enters the pleural space to indicate relief of the tension pneumothorax.
6. stabilize the catheter and prepare for chest tube insertion.

Finger and tube thoracostomy

1. prepare for;
   a. tube thoracostomy kit (tray) and appropriately sized chest tube (28-32 F)
   b. underwater seal and collection device
2. position the patient
3. prepare the insertion site; the 4th or 5th intercostal space between the anterior and midaxillary lines.
4. assist to local anesthesia
5. after air or fluid will be evacuated, look and listen for air movement and bloody drainage; “fogging” of the chest tube
6. connect the tube thoracostomy to an underwater seal apparatus with a collection chamber.
7. secure the tube to the skin with heavy, nonabsorbable suture.
8. apply a sterile dressing and secure it
9. Obtain a chest x-ray.
10. Reassess the patient.

Shock

Objectives

1. Identify causes and characteristics of traumatic shock
2. Describe pathophysiology changes for assessment of traumatic shock
3. Demonstrate the assessment priorities for the patient in traumatic shock
4. Plan appropriate interventions for the patient in traumatic shock
5. Evaluate the effectiveness of nursing interventions for the patient in traumatic shock

Primary survey and resuscitation adjuncts

A – Airway and Alertness

1. Observe for restlessness, anxiety
2. AVPU; detect unresponsiveness
3. Determined uncompensated shock with blood volume loss
4. Determined alcohol, substances use

B – Breathing and Ventilation

1. Inspect for:
    a. WOB
    b. active external bleeding
    c. bruised, swollen, deformed extremities
    d. distend abdomen
2. Auscultate for: diminished breath sounds, muffle heart tones
3. Palpate for: central and peripheral pulses

Intervention

1. Administer supplemental oxygen via nonrebreather mask and monitor SpO_2
2. Control external hemorrhage with direct pressure, tourniquet
3. A pelvic binder for stabilization for suspected unstable pelvic fracture
4. Insert 2 large-bore IV catheters with warming resuscitation fluid
5. If IV cannot be rapidly, consider intraosseous (IO), or central venous
6. Consider activation of the MTP
7. Prevent hypothermia

C – Circulation

1. Assess bleeding and source of hemorrhage
2. Assess signs of adequate perfusion to periphery
3. Assess signs of adequate SpO_2
4. Assess temperature, HR, RR

Intervention

1. Monitor SpO_2, $ETCO_2$, ABGs
2. Reassess and monitor for rebleeding and source of hemorrhage

3. Focus assessment; Imaging, CT, MRI
4. Monitor urine output hourly
5. Ongoing monitoring; Hb, Hct, platelet, clotting time
6. Continued frequent monitoring;
    a. signs of adequate perfusion to periphery
    b. adequate SpO_2
    c. normothermia
    d. normotension
    e. stable heart and respiratory rates
    f. controlled hemostasis
    g. normal serum pH
    h. decreasing serum lactate
    i. improved base excess

D – Disability (Neurogenic status)

Assess LOC

E – Exposure and Environment Control

Obtained the patient's temperature

F – Full set of V/S and Family presence

G – Get resuscitation adjuncts

1. L- Laboratory studies; platelet, serum lactate, toxicology, calcium level
2. O-Oxygenation; SpO_2, $ETCO_2$

Reevaluation (consideration transfer)

1. Determine there is an early need for transport to trauma center or to surgery
2. FAST result; assess for bleeding, detect pneumothorax
3. Portable radiography result; risk for internal hemorrhage

Secondary survey and reevaluation adjuncts

H – History

1. Estimated blood loss at scene
2. SBP during transportation
3. Complaint of dizziness, pain at chest and/or abdomen
4. History of antihypertensive medication, anticoagulant therapy and/or anemia, hemophilia

Reevaluation Adjuncts; diagnostic studies;

1. Diagnosis Peritoneal Lavage (DPL)
2. CT
3. Others; ECG, urine output

Reevaluation and post resuscitation care

1. SpO_2, $ETCO_2$, ABGs
2. Assess and monitor for rebleeding and source of hemorrhage
3. Focus assessment; Imaging, CT, MRI
4. Monitor urine output hourly
5. Ongoing monitoring; Hb, Hct, platelet, clotting time
6. Continued frequent monitoring;
    a. signs of adequate perfusion to periphery
    b. adequate SpO_2
    c. normothermia
    d. normotension
    e. stable heart and respiratory rates
    f. controlled hemostasis
    g. normal serum pH
    h. decreasing serum lactate
    i. improved base excess

Definite care or Transport

Reassess and prepare for interfacility transfer

Spine and Musculoskeletal Injuries

Objectives

1. Describe pathophysiology changes for assessment of spine and musculoskeletal injuries
2. Immobilize the patient suspected of spine and musculoskeletal injuries
3. Plan appropriate interventions for the patient with spine and musculoskeletal injuries
4. Evaluate the effectiveness of nursing interventions for the patient with spine and musculoskeletal injuries

Preparation and triage

1. Preparation;
    a. spinal injury; a vague history
    b. musculoskeletal injury; recognition of fractures, amputations, crush injury, compartment syndrome, rhabdomyolysis, joint dislocation
2. Triage; spinal injury
    a. suspected of SCI
    b. alteration of V/S from neurogenic shock
    c. diminished respiratory effort

Primary survey and resuscitation adjuncts

A – Airway and Alertness

Cervical spinal immobilization

Assessment;

1. Spinal injury
    1. assess immobilization devices for correct placement and proper fit
    2. assessment of spinal cord integrity
2. Musculoskeletal injury; system approach as the initial assessment

Intervention;

Spinal injury; apply manual stabilization

B – Breathing and Ventilation

Assessment

Spinal injury; shallow respirations, increased WOB

C – Circulation and control of hemorrhage

Assessment

Spinal injury

a. neurogenic shock; bradycardia with normal / strong pulse
b. hypovolemic shock; tachycardia with a weak peripheral pulse

Intervention

Spinal injury; avoid pulmonary edema while administering IV, consider inotropic support if there is no improvement hypotension

D – Disability (Neurogenic status)

Assessment

Spinal injury

a. monitor GCS, motor response
b. anxiety from ineffective breathing

E – Exposure and Environment Control

Assessment

Spinal injury; anticipate temperature instability

G – Get resuscitation adjuncts

Spinal injury; pain assessment and management

Reevaluation

Spinal injury; early evaluation for interfacility transfer if suspected SCIs

Secondary survey

H – History

1. Spinal injury
    a. MOI associated with SCIs
    b. symptoms; neck pain, numbness, tingling, loss of motor activity of extremities, loss of bladder or bowel control
    c. medication use
    d. medical history; spinal injury, stenosis, arthritis, osteoporosis
2. Musculoskeletal injury
    a. component of history; MVCs, pedestrian, falls, crush injuries, blast injuries

H; Head -to-toe assessment

Spinal injury

1. Neck and cervical spine; palpate for; Neck pain, tenderness, crepitus, subcutaneous emphysema, deformities
2. Pelvis / perineum; Inspect for priapism
3. Extremities
    a. inspect for;
        i. movement and control by ask the patient to wiggle the toes and fingers, lift the arms and legs
        ii. gross extremity movement
    b. palpate for;
        i. crepitus, edema, deformity
        ii. skin temperature
        iii. muscle strength
        iv. sensory function, loss of sensation

Musculoskeletal injury

1. Head; possible fat embolism in the cerebral vasculature
2. Chest; fat embolism – respiratory difficulty with multiple injuries
3. Extremities
    a. inspect and palpate for;
        i active, uncontrolled bleeding
        ii integrity of the injured area, break skin, fractures, dislocations
        iii deformity or angulation
        iv color, position, shortening, rotation, displacement, loss of function
        v neurovascular assessment; pain, pallor, pressure, pulses, paresthesia, paralysis
    c. intervention
        i. control hemorrhage; direct pressure, compression dressings, tourniquet
        ii. immobilizing the affected extremities; splinting; rigid splints, soft splints, traction splints, custom splints
        iii. administer an IV isotonic crystalloid solution to increase urinary output to 100 ml./hour to enhance the excretion of myoglobin
        iv. fascial compartment pressure, fasciotomy

I – Inspect posterior surfaces

1. Inspect for; vertebral column for deformity, tenderness, open wounds, impaled objects
2. Palpate for; pain, tenderness, crepitus, deformities
3. Assess for sacral sparing; perianal sensation, anal sphincter tone
4. assess for reflexes; areflexia, a Babinski or plantar reflex, deep tendon reflex

Reevaluation Adjuncts

Spinal injury; diagnostic procedure

1. Radiographic studies; CT of cervical, thoracic, and lumbar spine, MRI
2. Medications; steroids

Musculoskeletal injury; AP & Lateral radiographs, CT, Angiography, spectroscopy

Reevaluation and post resuscitation care

Spinal injury

1. Maintain cervical spinal immobilization
2. Monitor breathing effectiveness
3. Monitor changes in sensory and motor function
4. Monitor temperature

Definite care or Transport

Spinal injury; Reassess and prepare for interfacility transfer

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ลิขสิทธิ์ของชมรมพยาบาลศัลยกรรมอุบัติเหตุแห่งประเทศไทย