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GUIDELINE

FOR EARLY MANAGEMENT AND LIFE SUPPORT OF TRAUMA IN PHC CENTERS IN IRAQ

DISCLAIMER
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Acronyms

AHA	American Heart Association
BLS	Basic Life Support
ATLS	Advanced Trauma Life Support
ABCDE	Airway, Breathing, Circulation, Disability, and Exposure/environment control
AVPU	Alert, Verbal, Pain, Unresponsive
CT	Computed Tomography
CPR	Cardiopulmonary Resuscitation
FAST	Focused Abdominal Sonography for Trauma
GCS	Glasgow Coma Scale
LMA	Laryngeal Mask Airway
PHC	Primary Health Care
PPE	Personal Protective Equipment
SAMPLE	Symptoms, Allergies to medications, Medications taken, Past medical/surgical history, Last meal, Events/Environment
TBI	Traumatic Brain Injury

Clinical Guideline: Trauma Guideline

I. General Information

Trauma is the leading cause of death for people 1-44 years of age and is exceeded only by cancer and cardiovascular disease in all age groups. Emergency units play a key role in saving the lives of poly-traumatized patients. Teams in the Primary Health Care (PHC) centers including trained physicians and nursing staff should be available in order to optimize patient care. Each person on the team should be familiar with the basics of trauma resuscitations as outlined below.

All resuscitations should be performed using **Basic Life Support** (BLS) and **Advanced Trauma Life Support** (ATLS) guidelines. For the individual care provider, assessment of the poly-traumatized patient is performed using a multistep approach, in which the airway is handled first and no other procedures are initiated until the airway is secured. Then, breathing and circulation are sequentially addressed (referred to as the ABCs of stabilization). Using the trauma team approach, each team member should be assigned a specific task or tasks so that each of these can be performed simultaneously to ensure timely and rapid treatment.

II. Primary Survey

A. Assessment and Initial Stabilization

In the primary survey, airway, breathing, and circulation are assessed and immediate life-threatening conditions are diagnosed and treated. An easy-to-remember mnemonic is **ABCDE**: **A**irway, **B**reathing, **C**irculation, **D**isability, and **E**xposure/**E**nvironment control. The primary survey usually takes no longer than a few minutes, unless procedures are required. The primary survey must be repeated any time a patient's status changes, including changes in mental status or vital signs, and following the performance of invasive procedures or administration of new medications.

i. Airway Maintenance and Cervical Spine Protection

An obstructed airway is an immediate threat to life. The focused airway assessment should answer the following questions: "Is the airway patent? Is it protected? Is it at risk for obstruction?" The goals of treatment are to provide a patent airway and to protect the airway from future obstruction by blood, edema, vomitus, or other possible causes of blockage. The physician must also assure that in-line cervical stabilization is maintained for any patient with possible or confirmed cervical spine injuries.

a. Steps of Airway Assessment and Initial Stabilization

- Ask the patient a question such as "What is your name?" If the patient responds verbally, he or she has an intact airway (for the moment).
- Inspect for bleeding, swelling, foreign bodies and facial, mandibular or tracheal/laryngeal fractures that may result in airway obstruction. Measures to establish a patent airway should be instituted while protecting the cervical spine.
- Snoring or gurgling suggests partial airway obstruction. A hoarse voice, subcutaneous emphysema, or a palpable fracture may indicate laryngeal trauma. Such concerning

signs predict a worsening airway and airway decompensation should be anticipated and dealt with.

- Assess the patient's ability to protect his or her airway by assessing the gag reflex. Touch the posterior pharynx with a tongue blade or suction device to initiate the gag response. In alert patients, ask them to swallow to assess their ability to handle their secretions. Obtunded patients without a gag reflex cannot protect themselves from aspirating secretions into their lungs, and should be intubated for airway protection.

b. Treatment

- The jaw-thrust maneuver may relieve the most common airway obstruction, which is the base of the tongue falling backward into the posterior pharynx. The jaw-thrust is performed by placing the fingers behind the angle of the mandible and lifting the mandible anteriorly. This procedure is uncomfortable and may awaken an obtunded patient.
- An alternative to the jaw thrust is the chin-lift maneuver. The chin of the patient is lifted superiorly, hyperextending the neck and opening the airway. However, this maneuver is generally not recommended as it may worsen a cervical spine injury. Its use should be restricted to those patients in whom cervical spine injury is not suspected. Risk factors for cervical spine injury include polytrauma; altered level of consciousness; blunt injury above the clavicles; neck pain, ecchymosis or deformity; a concerning mechanism of injury; and, neurologic deficits.
- Remove any foreign bodies (including dentures, vomitus or blood clots) under direct visualization. Do not perform a blind finger sweep because this may push an obstructing foreign body farther down the pharynx. Suction any secretions and blood.
- An oropharyngeal airway is for use only in unconscious patients. It is easily inserted to ensure airway patency while using a bag mask device to ventilate the patient or while preparing for endotracheal intubation. A nasopharyngeal airway should be avoided in patients with evidence of midface or basilar skull fractures.
- A laryngeal mask airway (LMA) is a rescue airway device inserted through the mouth, with a mask that covers the glottic opening. It comes in different sizes, so choose the appropriate size for the patient. An LMA allows ventilation but does not provide airway protection. Placement of this device should be considered a temporizing measure until a definitive airway is established.
- Endotracheal intubation should be considered in any patient with airway compromise (unable to keep open, unable to protect, GCS $\leq$ 8), apnea or respiratory failure, or potential for impending airway compromise (e.g., expanding neck hematoma or thermal burns). During intubation, the cervical spine should be protected by in-line immobilization. Correct endotracheal tube (ETT) placement should be confirmed by a combination of the direct visualization of the ETT passing through the vocal cords, the presence of normal oxygen saturation, .
- A cricothyrotomy (surgical airway) may be necessary when endotracheal intubation either fails or is not feasible. This procedure involves incising the cricothyroid membrane to allow placement of an ET or tracheostomy tube directly into the trachea in the patient greater than 8 years of age

ii. Breathing

Airway patency alone does not assure adequate ventilation. Adequate gas exchange is required to maximize oxygenation and carbon dioxide elimination. Ventilation requires adequate function of the lungs, chest wall and diaphragm. Each component must be examined and evaluated rapidly. The focused breathing assessment should answer the following questions: "Is the patient oxygenating? Is the patient ventilating? Is there a treatable structural abnormality (e.g., tension pneumothorax)?"

a. Steps of Breathing Assessment and Initial Stabilization

- Expose the neck and the chest
- Look at the skin, lips, and tongue for cyanosis; watch the patient as he or she breathes, assessing for symmetry and the presence of structural abnormalities (e.g., open wounds).
- Listen for equal breath sounds; palpate the entire thorax with both hands, assessing for equal bilateral chest expansion, subcutaneous air, tenderness and swelling.
- Check the pulse and oxygen saturation using a pulse oximeter; remember that pulse oximetry may be unreliable in patients with poor peripheral perfusion after trauma. Note: **Pulse oximetry** is a non-invasive method for monitoring the patient's arterial oxygen saturation.

b. Treatment

- Give Oxygen at 6-10 L/min via a non-rebreathing face-mask. Oxygen should be administered to all patients suffering from polytraumatic injuries even if their measured arterial oxygen saturation is normal.
- Ventilate the patient with a bag-mask ventilation device or a ventilator. Keep in mind that vigorous bag-mask ventilation can convert a small pneumothorax into a tension pneumothorax, leading to rapid deterioration of the patient.
- A tension pneumothorax is initially treated with needle thoracostomy (rapid insertion of catheter over needle into the anterior 2nd intercostal space in the midclavicular line).
- An open pneumothorax is initially treated with a sterile, occlusive three-way dressing (leaving one corner untapped) to produce a flutter-type valve.
- A flail chest is treated with high-flow oxygen, careful fluid administration, pain medication, and consideration of intubation and positive pressure ventilation. Strapping, bulky dressings and Ace bandaging are no longer recommended.
- A hemothorax requires restoration of blood volume and tube thoracostomy.

iii. Circulation and Hemorrhage Control

Hemorrhage is the most common cause of shock in trauma victims. Most preventable trauma deaths result from the failure to recognize and treat hemorrhagic shock. The level of consciousness, skin color and temperature, nail bed capillary refill time, and rate and quality of the pulses are all markers for adequate circulation. The focused circulatory assessment should answer the following questions: "Is there active external bleeding? Is the patient in shock? Is there active internal bleeding?"

a. Steps of Circulation Assessment and Rescue

- Identify and control external bleeding with direct pressure.
- Cardiac and blood pressure monitoring are indicated.
- Look for early signs of shock including altered level of consciousness; ashen, grey skin; pale, cool extremities; a rapid or thready pulse; and, delayed capillary refill. Hypotension is a late sign of shock.
- Intra-abdominal hemorrhage is a common life-threatening source of bleeding, must be considered in any hypotensive patient, and can be assessed quickly at the bedside with focused abdominal sonography for trauma (FAST).
- Sites of hidden (occult) blood loss can be remembered by the mnemonic CRAMP: **C**hest (e.g., massive hemothorax), **R**etroperitoneum, **A**bdomen (e.g., splenic rupture), **M**issed long bone (e.g., femur), **P**elvis (e.g., pelvic fracture).
- Other causes of shock in the trauma patient include tension pneumothorax, cardiac tamponade, and neurogenic ("spinal") shock. Cardiac tamponade is diagnosed by ultrasound and initial treatment consists of IV fluids and pericardiocentesis.

b. Treatment

- Control hemorrhage by direct pressure over the wounds; tourniquets should be considered when conventional approaches (e.g., direct pressure) to hemorrhage control have failed.
- Establish 2 large-bore (14- to 16-gauge) intravenous catheters; if traditional IV access fails, consider central venous access, intraosseous catheters or peripheral venous cutdowns.
- Draw blood for basic laboratory studies, including hematocrit and a pregnancy testing (for all females of childbearing age).
- Resuscitate with warmed electrolyte solutions (Ringers lactate or normal saline). The initial fluid bolus is 1-2 L in adults and 10-20 mL/kg in children.
- Administer O negative or type-specific blood if concern for active, uncontrolled hemorrhage.
- Place third-trimester pregnant patients in the left lateral recumbent position to relieve uterine pressure on the inferior vena cava.
- Perform Cardiopulmonary resuscitation (CPR) if needed.
    - **Cardiopulmonary resuscitation (CPR) s**hould follow the latest American Heart Association (AHA) guidelines.
        - Follow the C-A-B technique (compression–airway–breathing)
        - Compression should be in a rate of 100/min, compressing the chest inward at least 2 inches in adults and 1/3 of the chest diameter in children.
        - Compression:ventilation ratio should be 30:2.
        - Minimize interruptions to chest compressions.

iv. Disability

During the initial assessment of the critically ill trauma patient, the focused disability assessment should answer the following questions: "Is there any evidence of intracranial injury? Is there any evidence of spinal cord injury?" The disability assessment includes level of consciousness, pupillary reactivity and a brief motor exam. The level of consciousness may be assessed by the AVPU scale or the Glasgow Coma Scale (GCS).

- **A**-Alert: able to answer questions and follow commands
- **V**-Verbal: responds to verbal stimuli
- **P**-Pain: responds only to painful stimuli and needs airway protection

- **U**-Unresponsive: patient needs airway protection

A dilated, unreactive ("blown") pupil in a comatose trauma patient suggests transtentorial herniation from an intracranial injury (leading to unilateral compression of the third cranial nerve). The brief motor exam is a gross assessment of movement in all extremities looking for lateralizing signs and/or spinal cord injury level.

v. Exposure/Environment Control

Expose the patient by removing all of his or her clothes. Hypothermia is a frequent complication of trauma and the patient's chance of survival drops with every degree drop in core temperature. Prevent hypothermia by covering the patient with blankets (after the initial assessment), by using warmed humidified air and by administering warmed IV fluids.

B. Adjuncts to the Primary Survey

Specialized diagnostic tests are performed to help identify potentially life-threatening injuries only after the primary survey has been completed, all immediate threats to life are treated or stabilized, and hemodynamic and ventilation status is normalized. These tests include plain film radiography and ultrasonography.

- **Plain films:** The "trauma triple" includes an anteroposterior chest, an anteroposterior pelvis and three-view cervical spine radiographs. These x-rays provide the maximum amount of information about potentially dangerous conditions in a minimum amount of time.
- **Ultrasound:** Focused abdominal sonography for trauma (FAST).
- **Laboratory studies:** Obtain a complete blood cell count and chemistry, , serum lactate, urinalysis and in all females of childbearing age a beta-human chorionic gonadotropin value.
- **Blood preparations:** Order a type and screen, and consider cross-matching 2-4 units of red blood cells (RBCs), depending on the severity of the trauma and shock.
- **Urinary and gastric catheterization**
- **Temperature monitoring**

III. Secondary Survey

The secondary survey is performed only after the primary survey has been finished and all immediate threats to life have been treated. The secondary survey includes a focused patient history followed by a head-to-toe examination designed to identify additional injuries that might have been missed on the primary survey.

The trauma patient must be re-evaluated constantly to identify trends from the physical examination and laboratory findings. Administer intravenous opiates or anxiolytics in small doses to treat pain and anxiety without obscuring subtle signs of injury or causing respiratory depression.

A. Patient History

The history in the secondary examination is focused on the traumatic event and pertinent pre-operative information. The mnemonic **SAMPLE** covers the basics.

- **S**ymptoms - Pain, shortness of breath, other symptoms

- **A**llergies to medications
- **M**edications taken
- **P**ast medical/surgical history; **P**regnancy
- **L**ast meal - Important to determine risk of aspiration
- **E**vents leading up to trauma; **E**nvironment related to the injury

B. Physical Examination

i. Head and Skull Examination

Head trauma causes 50% of all trauma deaths and should be the highest priority during the secondary survey. An abnormal neurologic exam raises concern for intracranial bleeding (including subarachnoid hemorrhage, intracranial hemorrhage, subdural hematoma, and epidural hematoma) which may be detected by non-contrast head computed tomography (CT). Suspect intracranial injury in any patient with focal neurologic signs, altered mental status, loss of consciousness, persistent nausea and vomiting, or headache, even if those symptoms may be explained easily by other intoxications or injuries. Any patient with suspected intracranial injuries should undergo head CT scanning as soon as he or she is hemodynamically stable.

Examination of the head involves assessing the level of consciousness, the eyes, and the skull. The level of consciousness can be quickly quantified using the **Glasgow Coma Scale** (GCS). The GCS measures eye opening, verbal response, and gross motor function. Each category has a point score, and the sum of the 3 scores is the total GCS rating. The GCS is as follows:

Eye opening (E)

- Spontaneous - 4 points
- To speech - 3 points
- To painful stimulus - 2 points
- No response - 1 point

Verbal response (V)

- Alert and oriented - 5 points
- Disoriented conversation - 4 points
- Nonsensical words - 3 points
- Incomprehensible sounds - 2 points
- No response - 1 point

Movement (M)

- Follows commands - 6 points
- Localizes to painful stimulus - 5 points
- Withdraws from painful stimulus - 4 points
- Decorticate flexion - 3 points
- Decerebrate extension - 2 points
- No response - 1 point

An abnormal GCS or altered level of consciousness is assumed due to intracranial injury, but may also be the result of intoxication, hypoxia, or hypotension.

Examine the skull for evidence of skull fractures or lacerations. Cover all open wounds and leave impaled objects in place.

Head injury management involves aggressive treatment of hypoxia and hypotension to prevent secondary brain injury, followed by immediate referral to a neurosurgeon. Maintain the mean arterial blood pressure at 90 mm Hg or above in patients with suspected intracranial injury in order to maintain cerebral perfusion. Methods to treat intracranial hypertension, such as raising the head of the bed, hyperventilation, furosemide (Lasix), and mannitol, may be considered before referring the patient.

The **Traumatic Brain Injury (TBI)** scale is as follows:

- **Mild TBI**: GCS rating of 14-15
- **Moderate TBI:** GCS rating of 9-13; requires careful monitoring to avoid hypotension or hypoxia
- **Severe TBI**: GCS rating of 8 or less; requires careful monitoring to avoid hypotension or hypoxia, but also requires intubation and admission to an intensive care setting

ii. Maxillofacial Examination

Injuries to the face are rarely life-threatening unless they involve the airway. Look inside the mouth and nose for bleeding or hematomas. Examine the zygoma, maxilla and mandible for evidence of injury or instability. Do not place or insert any devices into the nose (e.g., nasogastric tube) if there is concern for a midface or basilar skull fracture. A basilar skull fracture is suggested by the presence of Raccoon eyes (ecchymosis around the eyes), Battle's sign (ecchymosis over the mastoid), clear fluid from the ear or nose (CSF leak), a salty taste at the back of throat (CSF leak), or hemotympanum (blood behind the eardrum). Consider early intubation to protect the airway, which may become compromised later because of airway swelling or excessive secretions.

iii. Neck and Cervical Spine Examination

The neck contains three very important structures anteriorly (i.e., trachea, pharynx/esophagus, great vessels) and the spine posteriorly. All these structures must be evaluated in patients with penetrating trauma to the neck. Inspect the neck for swelling, bruising, laceration, active bleeding, deformity; the position of trachea (deviation); accessory muscle use; and difficulty with swallowing. Listen for difficulty phonating, stridor and carotid bruits. Palpate for subcutaneous emphysema and focal tenderness.

Swelling from an expanding hematoma can compress or distort the airway; intubate these patients early. Never probe neck wounds or remove impaled objects. Any patient with penetrating trauma to the neck and violation of the superficial fascia and muscles should be referred to a facility where an otolaryngologist and vascular surgeon are available.

a. Cervical spine clearance

All patients with any possibility of cervical spine injury based on history, physical examination or mechanism of injury must be immobilized with a hard collar until a proper examination can be performed. Patients with serious cervical spine injuries may not have neurologic symptoms. Do not leave patients on the long spinal immobilization board with a hard collar in place longer than necessary; the limitation of movement increases the risk of aspiration and prolonged immobilization may lead to pressure ulceration.

Patients who can be considered for clinical cervical spine clearance must meet all five of the following criteria:

- No focal neurologic deficits
- No distracting injuries (e.g., gunshot wound, pelvic fracture, long bone fracture)
- No intoxication (e.g., alcohol, opiates)
- Fully alert, oriented and aware
- No midline neck tenderness

If the patient meets these five criteria, you may attempt to clinically clear their cervical spine. First, gently remove their cervical collar; then, instruct the patient to slowly rotate their head from side to side, and then flex and extend. If the patient develops pain or neurologic symptoms, ask the patient to stop moving and reaffix the cervical collar. If the patient can fully range their neck (rotation, extension, flexion) without pain or tingling sensations or numbness, the cervical spine is considered clinically cleared and the patient no longer requires a cervical collar. In general, removal of the collar and cervical spine clearance should be performed following completion of the secondary survey.

iv. Chest Examination

Thoracic injuries account for 25% of trauma-related mortality. Of thoracic injuries, only 15% require surgical treatment, such as a thoracotomy and/or specialized surgical procedures; thus, most cases of thoracic trauma can be managed by any ATLS-trained physician.

Inspect the chest for tracheal deviation, bruising, and deformity, and observe the motion of the chest wall during respiration. Auscultate the heart for muffled heart sounds. Auscultate the lungs for breath sounds. Percuss the chest for hyper-resonance or dullness. Palpate the entire chest wall (including clavicles, ribs and sternum) for tenderness, deformity, crepitus and subcutaneous emphysema. The presence of tracheal deviation may indicate hemothorax or pneumothorax, and subcutaneous emphysema or bony crepitus may indicate tracheobronchial disruption or rib fractures, respectively.

v. Abdominal Examination

Abdominal trauma is separated into blunt and penetrating injuries. Patients are indicated for referral to a medical center with emergency surgical capabilities immediately if any of the following are present:

- Evisceration
- Penetrating abdominal injuries caused by firearms or objects
- Any abdominal trauma accompanied by shock
- Free air under the diaphragm on chest radiographs, and/or peritoneal signs

Patients with subtle blunt abdominal injuries may rapidly bleed to death. Significant amounts of blood may be present in the abdomen with no change in external appearance. Reliable abdominal assessment may be compromised by altered mental status, intoxication, or painful distracting injuries.

Examine the abdomen for surgical scars, bruising (seatbelt sign) or lacerations. Palpate gently for tenderness, peritoneal signs and rigidity. Patients with serious injuries may have unremarkable physical examinations (no signs of peritoneal irritation).

Abdominal x-rays (plain films) are not useful in the evaluation of blunt abdominal trauma. Consider other methods of invasive (e.g., diagnostic peritoneal lavage) or non-invasive evaluation (e.g., ultrasound, computed tomography). Patients may rapidly bleed to death from intra-abdominal injuries. Give fluids and blood early if concern for intra-abdominal hemorrhage, and refer the patient to a surgeon (as definitive hemorrhage control can only occur in the operating room).

vi. Pelvis Examination

Pelvic injuries can lead to severe blood loss (up to 4-6 L), and hemorrhage is the primary cause of death in patients with pelvic ring injuries.

Inspect the pelvis for bruising, swelling and open wounds. Palpate the pelvic ring for tenderness, crepitus and widening. Gently assess for pelvic pain and stability by compression-distraction (inward and outward) of the anterior superior iliac spines. Minimize manipulation of an unstable pelvis.

Obtain a pelvis x-ray to evaluate for bony pelvic injury. For suspected pelvic fractures, bind the pelvis (pelvic stabilization) with a sheet or commercial pelvic binder to prevent further blood loss. Pelvic binding reduces unstable pelvic fractures, prevents ongoing hemorrhage and provides pain relief. When properly performed, the procedure is safe with low risk for skin necrosis or compartment syndrome.

vii. Genitourinary Examination

Perform a rectal examination, examine the perineum, and perform a genital/vaginal examination. Rectal tone is an indicator of spinal cord function, and a patient with poor rectal tone is considered to have a spinal cord injury until proven otherwise. The rectal vault is assessed for fresh blood that might indicate an open pelvic fracture or other injury that has lacerated the rectum. The perineum, vagina and genitals should be examined for ecchymosis, lacerations, bleeding and priapism (a sign of possible spinal cord injury). A Foley (transurethral bladder) catheter is placed unless contraindicated by signs of urethral injury, such as a high-riding prostate, blood at the urethral meatus, or a scrotal/perianal hematoma.

viii. Extremities

Evaluate the patient's extremities for sources of significant blood loss (e.g., up to 2 L from a femur fracture), risk of crush syndrome, and evidence of limb-threatening injuries, such as fracture-dislocation with neurologic injury, open fractures/joints, vascular injury (including traumatic amputation) and compartment syndrome.

Inspect and palpate the extremities in their entirety. Assess for deformity, crepitus, tenderness, swelling, bruising, and lacerations. Check the range of motion at all joints. Re-check the vascular status of each extremity, including pulses, color, capillary refill, and temperature. Worrisome exam findings include loss of a previously palpable pulse; change in pulse quality; a rapidly expanding hematoma; a cool, pale extremity; an open wound near a deformity; loss of sensation or motor function; and, a tender or firm muscle compartment.

Suspected femur fractures should be placed in traction to decrease motion, pain, blood loss, and muscle spasm. Early treatment of suspected crush syndrome with IV fluids and osmotic diuresis can prevent subsequent myoglobin-induced renal failure. Unstable fractures or those associated with neurovascular compromise should be reduced immediately and splinted. Open fractures or joints should be covered with sterile gauze and splinted. Amputated "parts" should be cleaned with water, wrapped in moistened gauze, and placed in a plastic bag on (not in) ice. All suspected limb-threatening injuries should be immediately referred to the appropriate specialist (vascular or orthopedic surgeon). Early diagnosis and surgical treatment of a vascular injury or compartment syndrome can prevent muscle necrosis and limb loss.

ix. Back, Vertebral Column and Spinal Cord

The back examination is often forgotten during the secondary survey, leading to potentially missed injuries. Examination of the back can identify thoracic and lumbar vertebral fractures, and flank injuries.

Logroll the patient while maintaining spinal alignment. Inspect the flanks and palpate the entire spine for any tenderness. Look for gaps between the spinous processes, hematomas and defects in the posterior pelvis. Assess for hidden wounds in the gluteal and perineal regions. Complete the neurologic examination, including motor and sensory examinations and reflexes.

Any spinal tenderness, bony step-offs, or abnormalities should prompt spinal radiography to evaluate for injury. Management of spinal fractures includes total immobilization of the spine and referral to a neurosurgical specialist. The use of high-dose methylprednisolone is no longer recommended for acute spinal cord injuries. Consider neurogenic shock (a high spinal cord injury) in any patient with hypotension and bradycardia.

IV. Pitfalls in Trauma Patient Management

- Focusing on the obvious injury rather than using a systematic approach (primary and secondary survey)

- Failing to anticipate a difficult airway
- Failing to protect the cervical spine when managing the airway
- Not recognizing an esophageal intubation
- Sealing an open pneumothorax on all four sides: can lead to tension pneumothorax
- Not recognizing compensated hemorrhagic shock
- Attributing tachycardia to pain without searching for occult hemorrhage
- Attributing hemorrhagic shock to a head injury
- Administering large volumes of crystalloid to a patient in hemorrhagic shock: they need blood
- Failing to fully undress, roll, and examine a patient: leads to missed injuries
- Blindly probing wounds in the neck, chest or abdomen to gauge their depth: can lead to uncontrolled hemorrhage
- Blindly clamping within a wound to stop it from bleeding: can lead to nerve injury
- Assuming a patient with an altered level of consciousness is intoxicated
- Placing a nasogastric tube in a patient with a midface or basilar skull fracture: can lead to intracranial tube placement
- Relying on physical exam alone to diagnose an intra-abdominal injury: serious injuries may present with minimal findings initially
- Failing to recognize that penetrating injuries below the nipple line may enter the peritoneal cavity
- Failing to bind an unstable pelvis or place a femur fracture in traction
- Placing a Foley catheter in a patient with a urethral disruption: can convert a partial urethral tear into a complete tear
- Waiting for a loss of pulses before recognizing a compartment syndrome

V. Referral to a Higher Level of Care

Appropriate initial management of trauma patients at PHC centers is critical to reducing morbidity and mortality. However, definitive care for severely injured patients often requires the active participation of a surgeon and access to an operating room and/or intensive care unit. The decision to transfer a patient to another facility for definitive care depends on the patient's injuries and the receiving facility's resources. An organized referral system from PHC centers to trauma specialty hospitals is imperative to improving outcomes. While informal arrangements often exist, ideally, pre-defined agreements and protocols should be instituted that include the key stakeholders: PHC centers, transportation services (ambulances, taxis, hospital vehicles), and trauma specialty hospitals. Knowledge of each institution's capabilities is essential to developing appropriate injury-specific transfer protocols. Furthermore, a communication system between institutions helps to facilitate the timeliness and appropriateness of transfers. Before transferring any trauma patient, life-threatening injuries should be treated but additional diagnostic procedures (e.g., diagnostic peritoneal lavage or computed tomography) that do not change the immediate plan of care should be avoided.

Indications for transfer will depend on the resources at the respective institutions. General guidelines necessitating transfer include:

- Patients with shock, neurologic deterioration or high-risk mechanisms of injury
- Patients requiring advanced surgical care not available at the PHC center (such as an emergent operation, management in an intensive care unit, or other specialty care)
- Lack of essential equipment
- Lack of necessary diagnostic services, principally radiology (CT, ultrasound, plain radiography)

The precise interventions recommended prior to transfer varies depending on institutional capabilities, mode of transport, and travel time to receiving hospital. From a PHC center the majority of care interventions will focus on management of the ABCs. Examples include:

- Airway stabilization and maintenance
- Supplemental oxygen
- Mechanical or bag ventilation
- Open pneumothorax dressing
- Needle/tube thoracostomy
- IV access
- Fluid resuscitation / blood (and/or blood product) transfusion
- External hemorrhage control
- Pelvic binding
- Treatment of elevated intracranial pressure
- Rewarming
- Splinting and traction of suspected fractures
- Spinal immobilization
- Gastric tube
- Urinary catheterization
- Clean and dress wounds
- Tetanus prophylaxis
- Antibiotics

When indicated rapid transport to a higher level of care should follow stabilization measures. Preferably, transport occurs via ambulance with trained attendant(s). Contraindications to transfer include:

- Patients with obviously non-survivable injuries,
- Patients with only minor injuries and mechanisms of injury not requiring specialty care,
- Patients/families refusal following an explanation of risks and benefits by the healthcare provider.

VI. Burn Care and Cardio-Pulmonary Resuscitation(CPR)

Objective

To appropriately treat patients with burns caused by heat, electricity, or chemicals.

Important Points

- The severity of a burn depends on the temperature of whatever caused the burn and the length of time the patient is exposed to it, the burns location on the body, the size of the burn, and the patient's age and medical condition.
- Burns are described by their cause (heat, electricity, chemicals and radiation) or by their depth.
- A burn first destroys the top layer of skin. If it continues to burn, it injures or destroys the second layer of skin.
- When burns break the skin, they can cause infection and loss of fluid from the body. The body's ability to control its temperature and the patient's ability to breathe can also be affected by deep burns.
- A critical burn needs immediate medical attention and can be lifethreatening.

Bums *are* Considered Critical When They

- **Involve breathing difficulty**
- ***Cover more* than one *body part***
- **Involve the *head,* neck, *hands,* feet or *genitals***
- **Involve *a child* or *elderly* person (other than minor burns)**
- ***Are caused* by *chemicals,* explosions or electricity**

Caring for Burns: 3 Basic steps

1. Stop the burning
2. Cool the bum
3. Cover the burn

Table 7. Burn classification

First Degree Burn (Superficial)	Second Degree Burn (Partial Thickness)	Third Degree Burn (Full Thickness)
Involves on the top layer of skin	Involves the top layers of skin	Destroys all layers of skin and may destroy fat, muscle, bones, and nerves underneath
Skin is red and dry	Skin is red and has blister that may open and weep clear fluid	Skin appears brown or black (charred) and tissues underneath may appear white
Usually painful	Usually painful	Extremely painful (or painless, if nerve endings are destroyed)
Burned area may swell	Burned area usually swells	Tissue too damaged to swell
Healing usually within 5-6 days	Healing usually within 3-4 weeks	Healing process is long and may take many months
No permanent scarring	Scarring may occur	Extreme, permanent scarring that may require multiple plastic surgeries to correct

Procedures for Burn Care

1. Explain to the patient what you are going to do in a reassuring manner.
2. Patients with burns are usually very scared and in a lot of pain.
3. Act quickly, but be gentle and place the patient in a comfortable position, carefully and quickly remove any of the patient's clothing (if necessary) in order to inspect/treat the burned area.
4. Stop the burning by flushing the skin with large amounts of cool, clean water. Do not use ice or ice water other than on small superficial burns because ice causes body heat loss.
5. If the burned area cannot be immersed in cool water then apply soaked clean towels, sheets or other wet cloths (make sure that anything used is clean).
6. Keep the cloth wet and cool by adding more water as necessary.
7. After you have stopped the burning/cooled the burned area, follow the
8. Surgical Dressing Procedure and apply a dry sterile dressing (s) to the burn.
9. Be sure that the dressing is LOOSE otherwise it can cause further pain and damage to the sensitive tissue.
10. Covering the burn helps prevent infection and reduces pain
11. Do NOT break blisters if they are present because that can increase the risk of infection. Blisters protect the raw, delicate skin underneath.
12. Do NOT use any kind of ointment on a severe burn. In general, oil-based ointments do not allow for evaporation of fluids. The usual practice is to use creams that are water-based and allow evaporation of water from the wound.
13. Provide health education to the patient and their family such as how to keep the burned area clean and dry and when to return for follow-up care.

Cardio-Pulmonary Resuscitation(CPR):

CPR is a combination of chest compressions and rescue breathing (breathing for the person). Rescue breathing supplies the oxygen that the patient needs into the lungs and the chest compressions circulate the oxygen to the vital organs in the body.

Objectives

1. Ensure that nurses know and use appropriate procedures in administering CPR.
2. Understand the management of airway obstruction.
3. Know the definition and priorities in CPR.

Background

Targeted education and training regarding treatment of cardiac arrest directed at emergency medical services (EMS) professionals as well as the public has significantly increased cardiac arrest survival rates, CPR consists of the use of chest compressions and artificial ventilation to maintain circulatory flow and oxygenation during cardiac arrest. A variation of CPR known as "hands-only" or "compression-only" CPR (COCPR) consists solely of chest compressions. This variant therapy is receiving growing attention as an option for lay providers (that is, nonmedical witnesses to cardiac arrest events). Several large randomized controlled and prospective cohort trials, as well as one meta-analysis, demonstrated that bystander-performed COCPR leads to improved survival in adults with out-of-hospital cardiac arrest, in comparison with standard CPR. The 2010 revisions to the American Heart Association (AHA) CPR guidelines state that untrained bystanders should perform COCPR in place of standard CPR

Indications

CPR should be performed immediately on any person who has become unconscious and is found to be pulseless. Assessment of cardiac electrical activity via rapid "rhythm strip" recording can provide a more detailed analysis of the type of cardiac arrest, as well as indicate additional treatment options.

Although prompt defibrillation has been shown to improve survival for VF and pulseless VT rhythms, CPR should be started before the rhythm is identified and should be continued while the defibrillator is being applied and charged. Additionally, CPR should be resumed immediately after a defibrillation shock until a pulsatile state is established. This is supported by studies showing that "pre-shock pauses" in CPR result in lower rates of defibrillation success and patient recovery

Preparation

I-Equipment

CPR, in its most basic form, can be performed anywhere without the need for specialized equipment but it advisable to use CPR board, mask gloves and other protections if available, an additional device employed in the treatment of cardiac arrest is an Automatic External Defibrillator (AED). This device provides an electrical shock to the heart via 2 electrodes placed on the patient's chest and can restore the heart into a normal perfusion rhythm. Regardless of the equipment available, proper technique is essential.

II-Positioning

CPR is most easily and effectively performed by laying the patient supine on a relatively hard surface, which allows effective compression of the sternum. Delivery of CPR on a mattress or other soft material is generally less effective the use of CPR board is recommended.

The health care provider giving compressions should be positioned high enough above the patient to achieve sufficient leverage, so that he or she can use body weight to adequately compress the chest.

III- Technique

In its full, standard for, cardiopulmonary resuscitation (CPR) comprises 3 steps: CA B

- Chest compressions
- Airway check
- Breathing

to be performed in that order in accordance with the 2010 American Heart Association (AHA) guidelines.

STEPS:

1. **Compression**

CPR is initiated using 30 chest compressions.

2. **Airway**

Perform the head-tilt chin-lift maneuver to open the airway and determine if the patient is breathing, rule out airway obstruction by looking in the patient's mouth for a foreign body blocking the patient's airway. CPR in the presence of an airway obstruction results in ineffective ventilation/oxygenation and may lead to worsening hypoxemia.

3. **Breathing:**

Give 2 rescue breaths.

DON'T FORGET to call for the physician if available or ACLS provider.

Check the carotid or femoral pulse.

Repeat the cycle pulse returns or the patient is transferred to definitive care according to the ACLS provider.

Procedures

Chest compression

The heel of one hand is placed on the patient's sternum, and the other hand is placed on top of the first, fingers interlaced. The elbows are extended, locked and the provider leans directly over the patient. The provider presses down, compressing the chest at least 2 in. The chest is released and allowed to recoil completely.

With the hands kept in place, the compressions are repeated 30 times at a rate of 100/min followed by 2 breaths. The key thing to keep in mind when doing chest compressions during CPR is to push fast and hard. Care should be taken not to lean on the patient between compressions, as this prevents chest recoil and worsens blood flow.

When done properly, CPR can be quite fatiguing for the provider. If possible, in order to give consistent, high-quality CPR and prevent provider fatigue or injury, new providers should intervene every 2-3 minutes (i.e., providers should swap out, giving the chest compressor a rest while another rescuer continues CPR).

Ventilation

If the patient is not breathing, 2 ventilations are given via a bag-valve-mask (BVM) or if not available the provider's mouth.

The BVM or invasive airway technique is performed as follows:

- The provider ensures a tight seal between the mask and the patient's face.
- The bag is squeezed with one hand for approximately 1 second, forcing at least 500 mL of air into the patient's lungs.
- The mouth-to-mouth technique is performed as follows (see the video below):
- The nostrils of the patient are pinched closed to assist with an airtight seal
- The provider puts his mouth completely over the patient's mouth
- The provider gives a breath for approximately 1 second with enough force to make the patient's chest rise
- Effective mouth-to-mouth ventilation is determined by observation of chest rise during each exhalation. Failure to observe chest rise indicates an inadequate mouth seal or airway occlusion. As noted (see above), 2 such exhalations should be given in sequence after 30 compressions (the 30:2 cycle of CPR). When breaths are completed, compressions restarted.

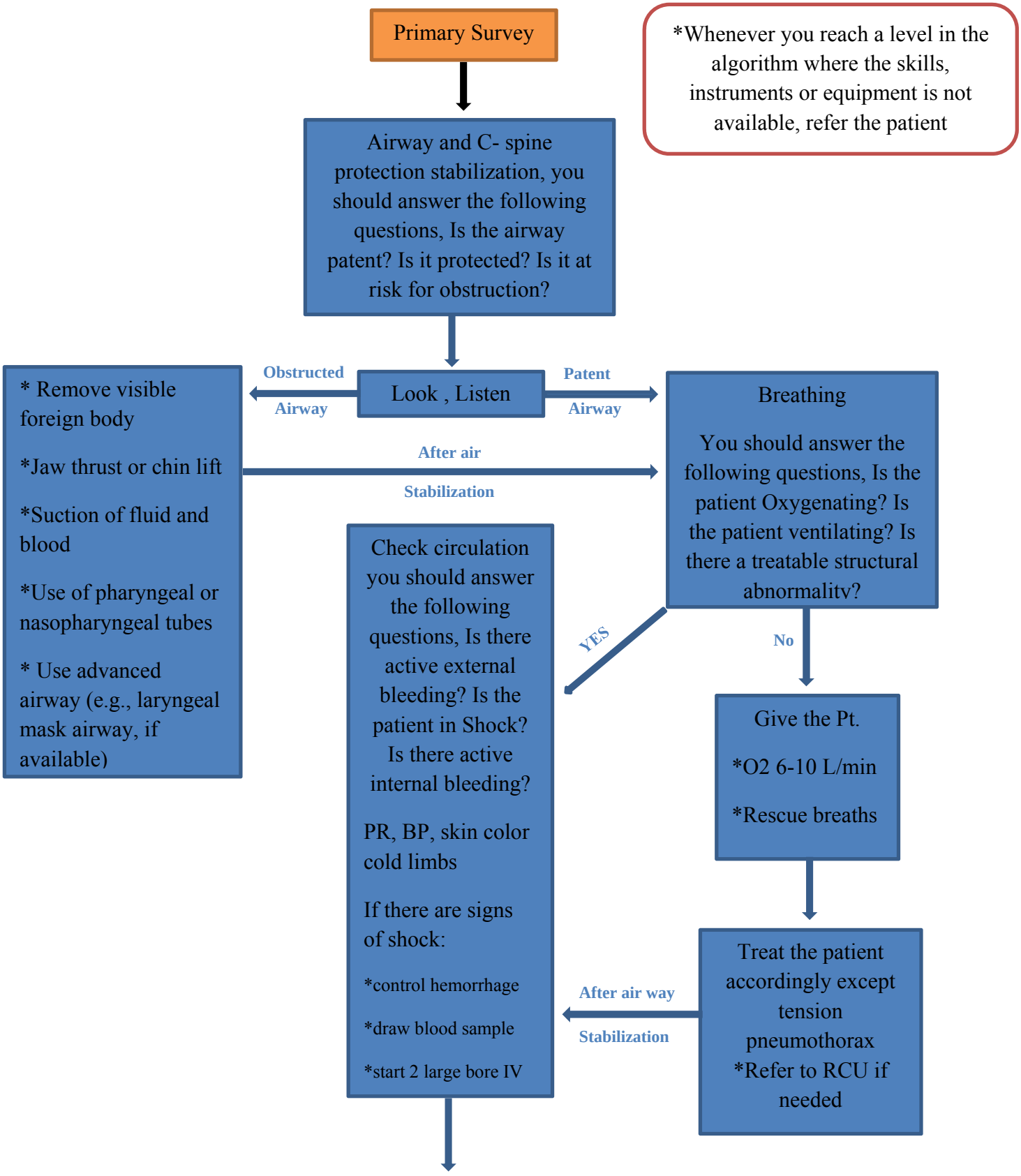
Administering CPR to an Infant or Child

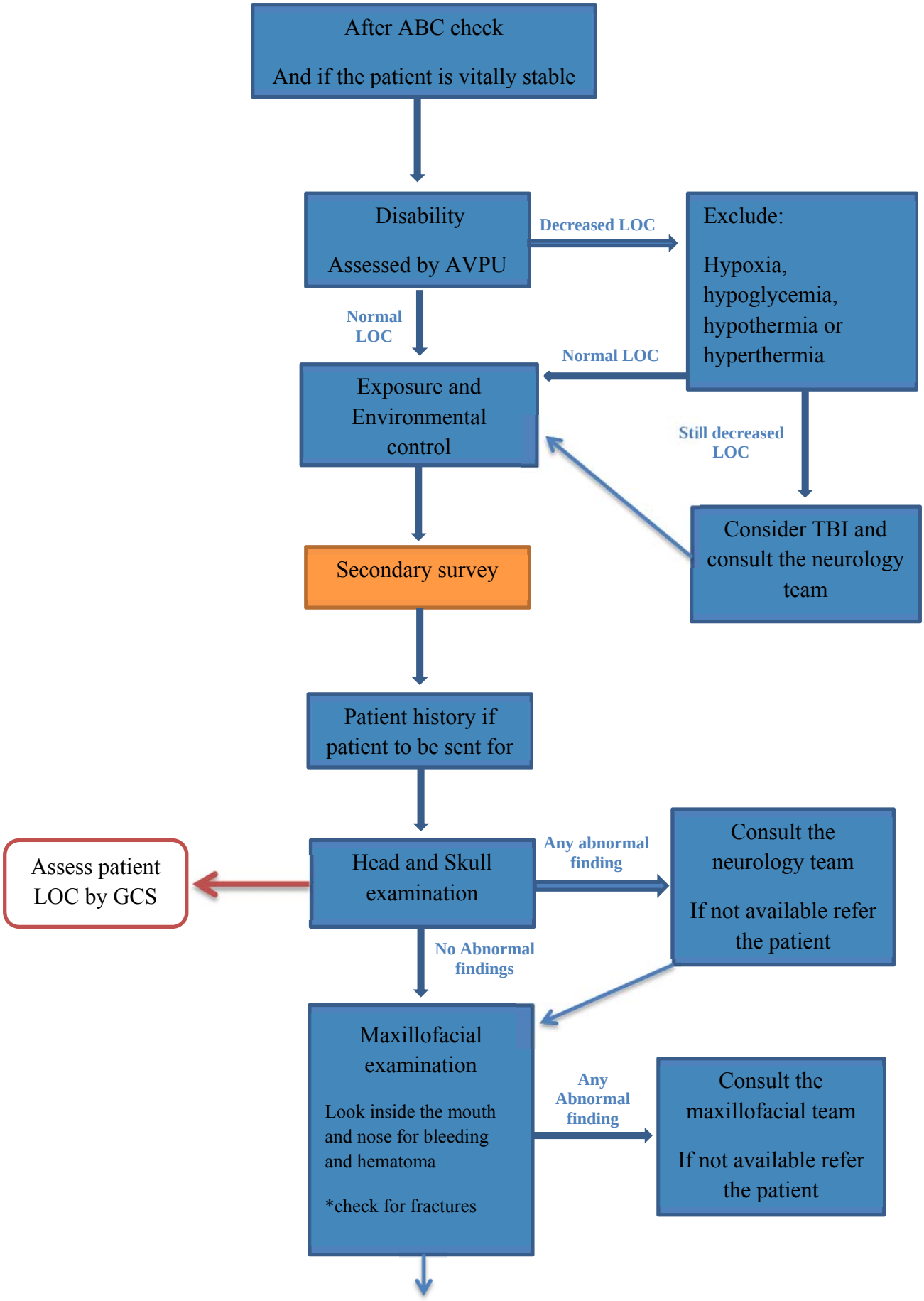
Infants and children usually only have respiratory arrest (stopped breathing) and may only need the A & B (Airway and Breathing). The infant or child's airway may be blocked by food, a small object such as a coin or toy or fluids such as water (in drowning), saliva, or blood.

1. Clear and open the airway.
2. If necessary, administer abdominal thrusts by straddling the child's legs, position your hands by placing the heel of one hand on the middle of the abdomen just above the umbilicus with your fingers pointing toward the child's head and the one hand on top of the other.
3. Confirm that the infant/child is unconscious: attempt to rouse by shaking and shouting.
4. Call for help if available.
5. Position the infant/child so that they are lying flat, on his or her back and on a level surface. CPR does not work as well if the infant/child is sitting up or is on a soft surface like a mattress.
6. Confirm the absence of spontaneous breathing then, tilt the infant/child's head back (to avoid getting air in the stomach),use the pediatric bag mask valve or close the infant/child's mouth and seal your mouth around the infant/child's nose. Breathe SLOWLY into the infant/child just enough to make the chest rise.
7. Give 5 initial breaths. Each breath should last about 1 second.
8. Check pulse and confirm absence, and begin chest compressions. For an infant, use 2 fingertips; for a child, use the palm of one hand. Place your fingers/palm of the hand on the breast bone in the middle of the infant/ child's chest. Give 15 chest compressions.

9. The 15 chest compressions should take about 9 seconds to administer.
10. Continue this cycle of 15 compressions and 1 breath for about 1 minute, and then recheck pulse and breathing. Check every few minutes (at least every 5 minutes).
11. If pulse is absent, continue CPR until help arrives or the infant/child is declared dead by the physician.

Algorithm: Assessment of Polytraumatized Patient




After ABC check
And if the patient is vitally stable
Disability
Assessed by AVPU
Decreased LOC
Exclude:
Hypoxia, hypoglycemia, hypothermia or hyperthermia
Normal LOC
Normal LOC
Exposure and Environmental control
Still decreased LOC
Consider TBI and consult the neurology team
Secondary survey
Patient history if patient to be sent for
Assess patient LOC by GCS
Head and Skull examination
Any abnormal finding
Consult the neurology team
If not available refer the patient
No Abnormal findings
Maxillofacial examination
Look inside the mouth and nose for bleeding and hematoma
*check for fractures
Any Abnormal finding
Consult the maxillofacial team
If not available refer the patient

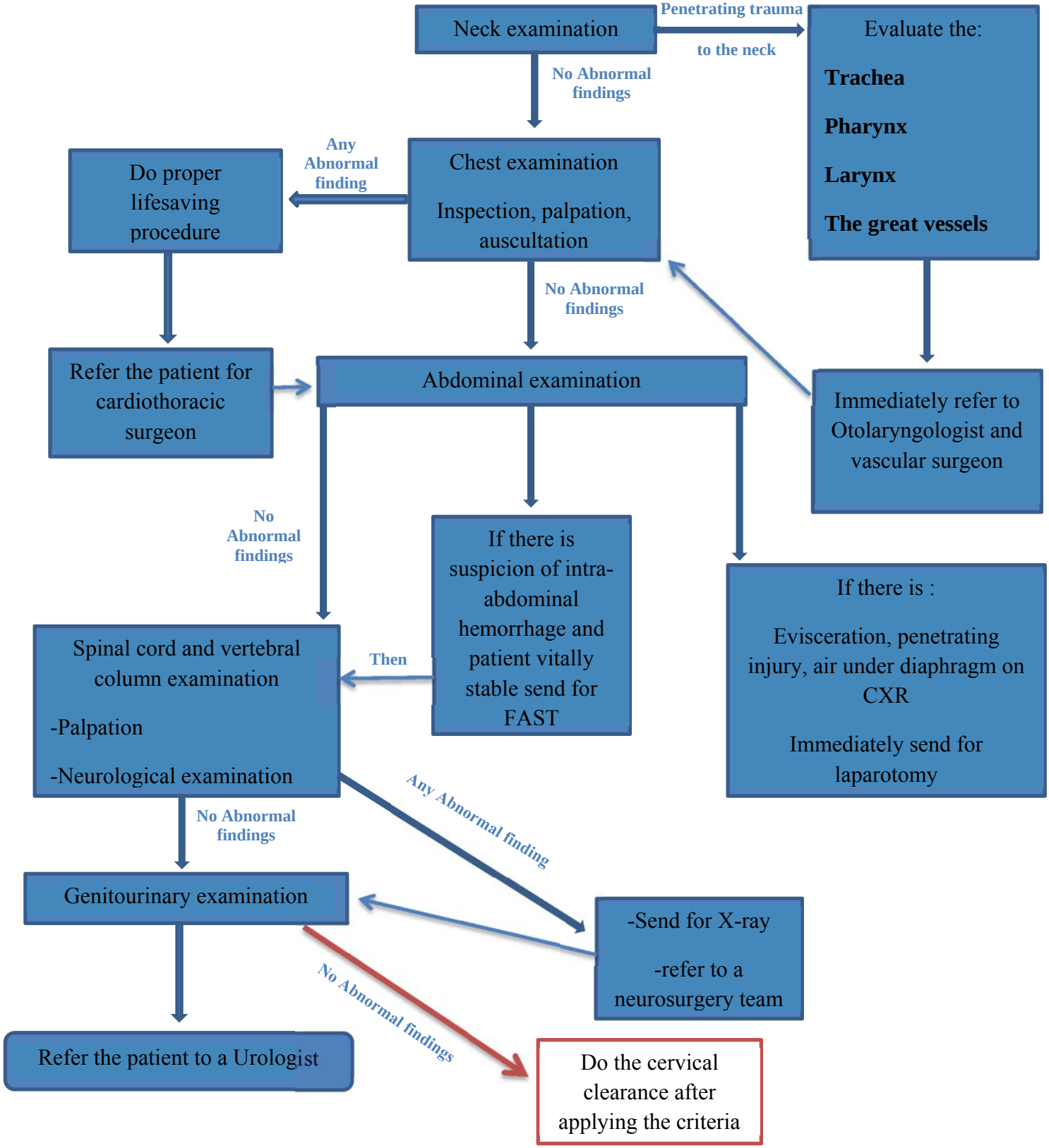


Figure 1: Algorithm of Assessment of polytraumatized patient

Transport of Critically Ill Patients

Transporting patients has risk. It requires good communication, planning and appropriate staffing. Any patient who requires transportation must be effectively stabilized before departure. As a general principle, patients should be transported only if they are going to a facility that can provide a higher level of care.

Planning and preparation include consideration of:

- The type of transport (car, land rover, boat etc.)
- The personnel to accompany the patient
- The equipment and supplies required en route for routine and emergency treatment
- Potential complications
- The monitoring and final packaging of the patient.

Effective communication is essential with:

- The receiving center
- The transport service
- Escorting personnel
- The patient and relatives.

Effective stabilization necessitates:

- Prompt initial resuscitation
- Control of hemorrhage and maintenance of the circulation
- Immobilization of fractures
- Analgesia.

Remember: if the patient deteriorates, re-evaluate the patient by using the primary survey, checking and treating life-threatening conditions, then make a careful assessment focusing on the affected system.

Annex 1: Glasgow Coma Scale

The Glasgow coma scale (GCS) is a reliable and universally comparable way of recording the conscious state of a person. Three types of response are measured, and added together to give an overall score. The lower the score the lower the patient's conscious state. The GCS is used to help predict the progression of a person's condition.

The three responses measured are:

Best motor response - maximum score of 6

Best verbal response - maximum score of 5

Eye opening - maximum score of 4

The lowest score for each category is 1, therefore the lowest score is 3 (no response to pain + no verbalization + no eye opening).

A GCS of 8 or less indicates severe injury, one of 9-12 moderate injury, and a GCS score of 13-15 is obtained when the injury is minor

Grades of Best Motor Response

6 Carrying out request ('obeying command') -patient does simple things you ask.
5 Localising response to pain.
4 Withdrawal to pain - pulls limb away from painful stimulus.
3 Flexor response to pain - pressure on nail bed causes abnormal flexion of limbs - decorticate posture.
2 Extensor posturing to pain - stimulus causes limb extension - decerebrate posture.
1 No response to pain.

Grades of Best Verbal Response

5 Oriented - patient knows who and where they are, and why, and the year, season and month.
4 Confused conversation - patient responds in conversational manner, with some disorientation and confusion.
3 Inappropriate speech - random or exclamatory speech, with no conversational exchange.
2 Incomprehensible speech - no words uttered, only moaning.
1 No verbal response.

Eye Opening

4 Spontaneous eye opening.
3 Eye opening in response to speech - that is, any speech or shout.
2 Eye opening in response to pain.
1 No eye opening.

Annex 2: Traumatic Brain Injury

What is Traumatic Brain Injury?

Traumatic brain injury (TBI), a form of acquired brain injury, occurs when a sudden trauma causes damage to the brain. TBI can result when the head suddenly and violently hits an object, or when an object pierces the skull and enters brain tissue. Symptoms of a TBI can be mild, moderate, or severe, depending on the extent of the damage to the brain. A person with a mild TBI may remain conscious or may experience a loss of consciousness for a few seconds or minutes. Other symptoms of mild TBI include headache, confusion, lightheadedness, dizziness, blurred vision or tired eyes, ringing in the ears, bad taste in the mouth, fatigue or lethargy, a change in sleep patterns, behavioral or mood changes, and trouble with memory, concentration, attention, or thinking. A person with a moderate or severe TBI may show these same symptoms, but may also have a headache that gets worse or does not go away, repeated vomiting or nausea, convulsions or seizures, an inability to awaken from sleep, dilation of one or both pupils of the eyes, slurred speech, weakness or numbness in the extremities, loss of coordination, and increased confusion, restlessness, or agitation.

Is there any treatment?

Anyone with signs of moderate or severe TBI should receive medical attention as soon as possible. Because little can be done to reverse the initial brain damage caused by trauma, medical personnel try to stabilize an individual with TBI and focus on preventing further injury. Primary concerns include insuring proper oxygen supply to the brain and the rest of the body, maintaining adequate blood flow, and controlling blood pressure. Imaging tests help in determining the diagnosis and prognosis of a TBI patient. Patients with mild to moderate injuries may receive skull and neck X-rays to check for bone fractures or spinal instability. For moderate to severe cases, the imaging test is a computed tomography *(CT)* scan. Moderately to severely injured patients receive rehabilitation that involves individually tailored treatment programs in the areas of physical therapy, occupational therapy, speech/language therapy, physiatry (physical medicine), psychology/psychiatry, and social support.

What is the prognosis?

Approximately half of severely head-injured patients will need surgery to remove or repair hematomas (ruptured blood vessels) or contusions (bruised brain tissue). Disabilities resulting from a TBI depend upon the severity of the injury, the location of the injury, and the age and general health of the individual. Some common disabilities include problems with cognition (thinking, memory, and reasoning), sensory processing (sight, hearing, touch, taste, and smell), communication (expression and understanding), and behavior or mental health (depression, anxiety, personality changes, aggression,

acting out, and social inappropriateness). More serious head injuries may result in stupor, an unresponsive state, but one in which an individual can be aroused briefly by a strong stimulus, such as sharp pain; coma, a state in which an individual is totally unconscious, unresponsive, unaware, and unarousable; vegetative state, in which an individual is unconscious and unaware of his or her surroundings, but continues to have a sleep-wake cycle and periods of alertness; and a persistent vegetative state (PVS), in which an individual stays in a vegetative state for more than a month.

What research is being done?

The National Institute of Neurological Disorders and Stroke (NINDS) conducts TBI research in its laboratories at the National Institutes of Health (NIH) and also supports TBI research through grants to major medical institutions across the country. This research involves studies in the laboratory and in clinical settings to better understand TBI and the biological mechanisms underlying damage to the brain. This research will allow scientists to develop strategies and interventions to limit the primary and secondary brain damage that occurs within days of a head trauma, and to devise therapies to treat brain injury and improve long-term recovery of function.

Annex 3: Airway Management

Basic techniques

- Chin lift and jaw thrust
  The chin lift maneuver can be performed by placing two fingers under the mandible and gently lifting upward to bring the chin anterior. During this maneuver the neck should not be hyper extended. (Demonstrated in the Practical session)

  The jaw thrust is performed by manually elevating the angles of the mandible to obtain the same effect. (Demonstrated in the Practical session) Remember these are not definitive procedures and obstruction may occur at any time.
- Oro-pharyngeal airway
  The oral airway must be inserted into the mouth behind the tongue and is usually inserted upside down until the palate is encountered and is then rotated 180 degrees. Care should be taken in children because of the possibility of soft tissue damage.
- Nasopharyngeal airway
  This is inserted via a nostril (well lubricated) and passed into the posterior oropharynx. It is well tolerated.

Advanced techniques

- Oro-tracheal intubation
  If uncontrolled, this procedure may produce cervical hyper-extension. It is essential to maintain in line immobilization (by an assistant). (Demonstrated in the Practical session) Cricoid pressure may be necessary if a full stomach is suspected. The cuff must be inflated and correct placement of the tube checked by verifying normal bilateral breath sounds.

  Tracheal intubation must be considered when there is a need to:
  - establish a patent airway and prevent aspiration
  - deliver oxygen while not being able to use mask and airway
  - provide ventilation and prevent hypercarbia.

  This should be performed in no more than 30 seconds: if unable to intubate then ventilation of the patient must continue**. Remember: patients die from lack of oxygen, not lack of an endo-tracheal tube.**

Remember: patients with trauma of the face and neck are at risk for airway obstruction

- Surgical cricothyroidotomy

This is indicated in any patient where intubation has been attempted and failed and the patient cannot be ventilated. The cricothyroid membrane is identified by palpation; a skin incision that extends through the cricothyroid membrane is made. An artery forceps is inserted to dilate the incision. A size 4–6 endotracheal tube (or small tracheostomy tube) is inserted.

Emergency Care Performance Skills Assessment Checklist

This performance checklist is used with the relevant guideline to give feedback on the health care provider's performance.

The checklist contains a list of items to be observed:

★ Rate the performance each step or task using the following rating scale:

Scoring scale:

0 = is unable to perform the step or task completely or correctly or the step/task was not observed.

1 = Performance of Step or task could be performed better (needs improvement)

2 = Performs the step or task completely and correctly.

N/A = Not Applicable (the skill should not performed in the clinic)

The finding and comments are analyzed and discussed with the providers supervised. Any immediate corrective action(s) taken and further action(s) needed must be entered in the spaces provided.

Skill	Score				Comment
	0	1	2	N/A	
General					
Primary survey and resuscitation					
Secondary survey and management					
Patient reevaluation					
Transfer to definitive care					
Airway					
Assessment of airway compromise					
Manual airway maneuvers (chin lift, jaw thrust)					
Insertion of oropharyngeal or nasopharyngeal airway					
Removal of foreign bodies					
Use of suction					
Assisted ventilation using bag–mask–device					
Endotracheal intubation (with in line cervical spine immobilization)					
Laryngeal mask airway (LMA) insertion					
Cricothyroidotomy					
Breathing					
Assessment of respiratory distress and adequacy					

Skill	Score				Comment
	0	1	2	N/A	
of ventilation					
Administration of oxygen					
Pulse oximetry					
Needle thoracostomy					
Tube thoracostomy					
Three-way dressing					
Circulation					
Assessment of shock					
Cardiopulmonary resuscitation (CPR)					
Direct compression for control of hemorrhage					
Arterial tourniquet in extreme situations					
Pericardiocentesis					
Splinting of fractures for hemorrhage control					
Peripheral percutaneous intravenous access					
Peripheral cutdown access					
Central venous access for fluid administration					
Intraosseous access for children under 5 years					
Use of pressors in neurogenic (spinal) shock					
Disability/Environment					
Recognize altered consciousness; lateralizing signs, pupils					
Recognition of hypothermia					
External rewarming in hypothermia					
Use of warmed fluids					
Head and Skull					
Perform Glasgow Coma Scale (GCS) assessment					
Maintain normotension and oxygenation to prevent secondary brain injury					
Monitoring and treatment of raised ICP					
Avoid overhydration in the presence of raised ICP (with normal BP)					
Maxillofacial					
Nasogastric (NG) tube					
Recognize contraindications to NG tube placement					
Neck and Cervical Spine					
Recognize platysmal penetration					
External pressure for bleeding					
Packing for bleeding					
Clinical cervical spine clearance					
Basic interpretation of cervical spine plain films					

Skill	Score				Comment
	0	1	2	N/A	
Chest					
Autotransfusion from chest tubes					
Adequate pain control for chest injuries/rib fractures					
Basic interpretation of chest plain films					
Abdomen					
Clinical assessment					
Diagnostic peritoneal lavage (DPL)					
Ultrasonography					
Pelvis					
Wrapping/binding of pelvis for hemorrhage control					
Basic interpretation of pelvic plain films					
Genitourinary					
Urinary catheter insertion					
Recognize contraindications to urinary catheter placement					
Extremity					
Recognition of neurovascular compromise; disability-prone injuries; crush syndrome; compartment syndrome					
Reduction and splinting of unstable fractures or those associated with neurovascular compromise					
Skeletal traction of femur fractures					
Basic immobilization (sling, splint)					
Treatment of amputated “parts”					
Measurement of compartment pressures					
Back, Vertebral Column, Spinal Cord					
Assessment—recognition of presence or risk of spinal injury					
Immobilization: C-collar, backboard					
Logrolling maneuver					
Monitoring of neurological function					
Maintain normotension and oxygenation to prevent secondary neurological injury					
Burns					
Assessment of depth and extent					
Sterile dressings					
Clean dressings					
Topical antibiotic dressings					
Wounds					
Assess wounds for potential mortality and					

Skill	Score				Comment
	0	1	2	N/A	
disability					
Non-surgical management: clean and dress					
Minor surgical: clean, suture					
Tetanus prophylaxis (toxoid, antiserum)					

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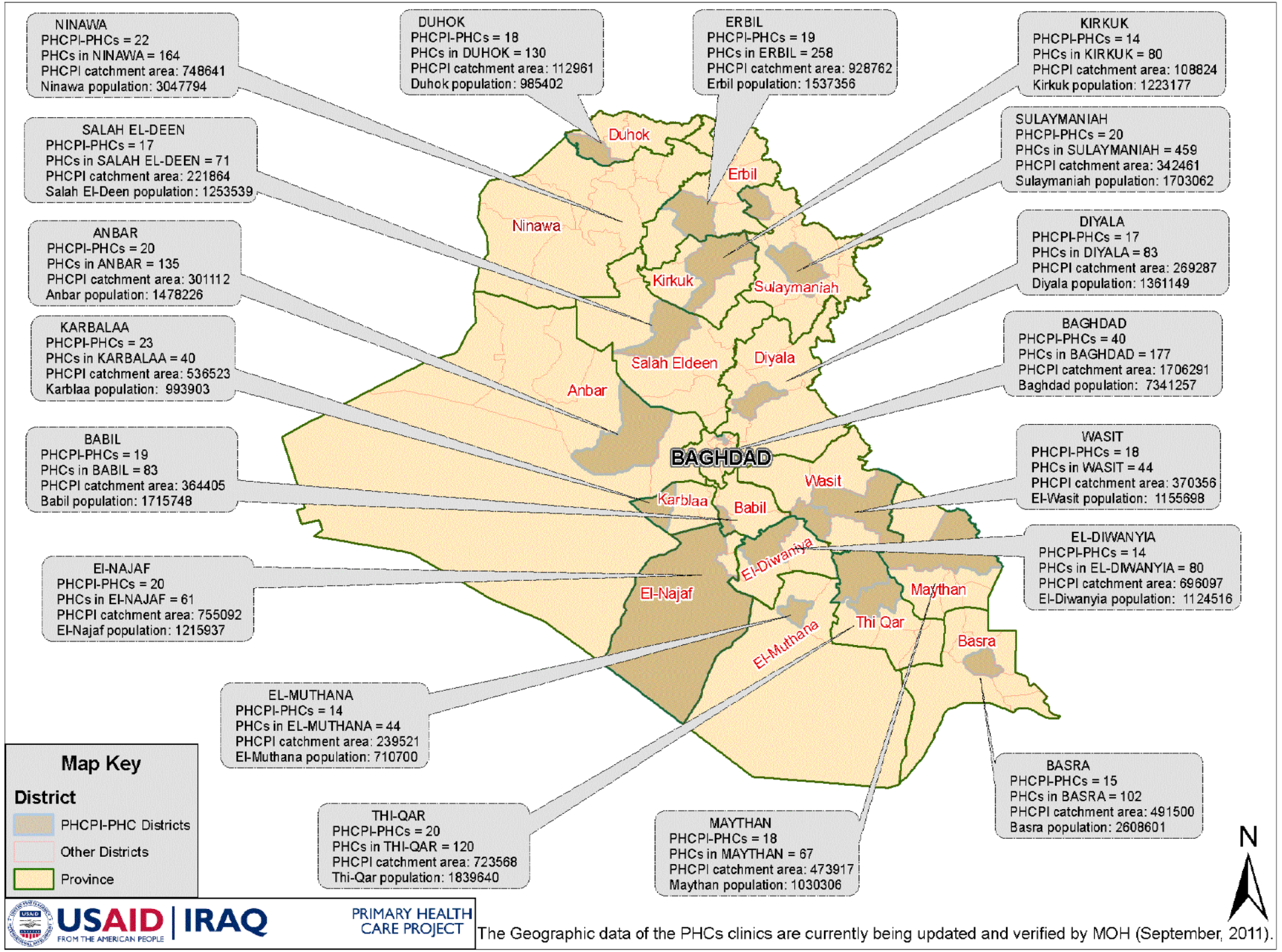
Steering Committee members involved in the Guideline for Early Management and Life Support of Trauma in PHC Centers

- **Dr. Ahmed Shaker / Ministry of Health**
- **Dr. Baraa Hameed / Ministry of Health**
- **Dr. Hassanain Ismael Malak / Ministry of Health**
- **Dr. Sameer Falah Jado / Ministry of Health**
- **Dr. Shatha Mustafa Mohammed Salih / Ministry of Health**
- **Dr. Sarah Darwish / Primary Health Care Project**

PHCPI-PHCs population mapped to IRAQ population



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PRIMARY HEALTH CARE PROJECT

The Geographic data of the PHCs clinics are currently being updated and verified by MOH (September, 2011).

U.S. Agency for International Development
Primary Health Care Project In Iraq
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www.usaid.gov