Patient Assessment Scenario "M"

Comprehensive Guide

M

SCENARIO SETTING AND PATIENT INFORMATION

Setting

Community hospital with surgical and critical care services. However, the only abdominal surgeon is involved in an emergency procedure and will not be available for two hours. Portable x-ray and ultrasound are available. There are 4 units of O negative blood and 2 units of fresh frozen plasma available in the blood bank. The nearest referral center is 30 miles (50 km) away. Ground transportation is available. Air transport is unavailable.

Personnel

- ATLS Learner is the only advanced care clinician available
- Two Emergency Department Registered Nurses (2)
- Respiratory / Ventilation Technician (use appropriate term for region)
- Radiology Technician
- Pharmacy Technician
- Laboratory Technician
- Three Emergency Medical Technicians (One in Emergency Area and 2 from ambulance that transported patient)

Incident History

M	A 42-year-old climbed an electrical pole to free a kite and contacted a high-voltage wire with the left forearm. The patient fell approximately 15 ft. (5 m) to the ground and landed on the left back. The patient was unconscious and without a pulse. Bystanders performed CPR for 5 min with return of spontaneous circulation by the time of ambulance arrival.
I	A burn is present on the left forearm. The patient reports difficulty breathing and pain in the back, lower left chest, and left upper arm.
S	BP 90/60, HR 120, RR 24, SpO_2 90% with 6 L/min oxygen via mask.
T	No defibrillation or cardiac medications were administered. Supplemental oxygen at 6 L/min via mask. One 14 G IV in the right antecubital vein. Spinal motion restriction with a semirigid cervical collar and a long spine board (change to region appropriate terms). Estimated time of arrival is 10 minutes

INJURIES AND INJURY MANIFESTATIONS

PHYSICAL FINDINGS	INJURIES	SKILLS
Central cyanosis, decreased breath sounds with hyperresonance over the left chest, tracheal deviation to the right	Left tension pneumothorax	Thoracostomy (Needle / Finger and Tube)
Tenderness over the left lower ribs, ecchymosis of the left chest, and subcutaneous emphysema	Fractured left ribs 2-9	Thoracostomy
Cardiac dysrhythmia	Dysrhythmia secondary to electrical injury	Cardiac rhythm monitoring
Burns on left forearm and right hip	Electrical burns	Initiate volume resuscitation at 4 cc/kg/%TBSA burn / 16
Swollen left forearm and wrist, cool hand with cyanotic fingertips, absent left radial pulse	Electrical burn and compartment syndrome of left forearm	Emergent referral for compartment release
Hematuria and myoglobinuria	Rhabdomyolysis	Volume resuscitation to obtain urine output of 100 cc/hr
Left upper quadrant pain and tenderness, referred pain to left shoulder	Splenic injury	Emergent surgical consultation, possible transfer

Imaging

- Slide 1: Chest x-ray – left pneumothorax, multiple left rib fractures, subcutaneous emphysema
- Slide 2: Chest x-ray – left tube thoracostomy, resolution of pneumothorax, multiple left rib fractures, subcutaneous emphysema
- Slide 3: Pelvic x-ray - no pelvic fractures present
- Slide 4: Lateral cervical spine x-ray – without abnormalities
- Slide 5: FAST (left upper quadrant) – intra-abdominal fluid is present
- Slide 6: eFAST (left chest and left upper quadrant) – intra-abdominal fluid is present

Patient Assessment Scenario "M"

Comprehensive Guide

M

INITIAL ASSESSMENT

Pre-arrival Huddle

The Learner should mention they would assemble personnel to the Emergency Department based on the hospital's trauma activation system, then assign roles and responsibilities.

Personal protective equipment should be donned by all responders. Hypothermia treatment measures should be described.

The Learner should anticipate that transfer may be indicated and may prompt the administrative support technician to initiate contact with the referral center prior to patient arrival.

Primary Survey

x-ABCDE

The Learner will perform the initial assessment and should instruct other personnel to assist with procedures such as airway manipulation, intravenous access, placement of physiologic monitors, clothing removal, and application of warm blankets.

CTD The Learner should identify injuries and subsequent physical and x-ray findings in proper sequence and institute resuscitative measures.

x: eXsanguinating eXternal Hemorrhage

- No external bleeding is present.

A: Airway

CTD
- The Learner assesses the airway. The upper airway is not obstructed. The patient demonstrates acute respiratory distress with cyanosis and labored respirations. The patient reports chest pain and says, "I can't breathe."
- The Learner should remove the cervical device to assess the neck and airway. This must be performed while manually restricting cervical spine motion. The trachea is deviated to the right and the neck veins are distended.

CTD
- The Learner must not hyperextend the neck. If the Learner hyperextends the neck, the patient no longer moves the extremities.
- The Learner should connect a pulse oximeter. If this is done, the SpO_2 is 90%.
- The Learner should continue administration of supplemental oxygen and assess the cause of respiratory distress. The airway is not obstructed, and the Learner should progress to assessment of Breathing.
- If the Learner elects to perform intubation prior to recognizing and treating the left tension pneumothorax, the patient objects and resists. Cardiac arrest occurs if RSI medications are administered. The Learner may then perform a left thoracostomy. If this is completed, the tension pneumothorax will be released, and spontaneous circulation returns. However, patient remains intubated and unable to respond to exam for the remainder of the scenario.

B: Breathing

CTD
- The Learner should examine the chest. The left hemithorax does not expand compared to the right. There is ecchymosis over the left chest and crepitus on palpation. The Learner should auscultate the chest. Breath sounds are present on the right but not on the left. The trachea is deviated to the right. Percussion of the left chest reveals hyperresonance. The nurse reports that the blood pressure is 85/55.

CTD
- The Learner should diagnose a tension pneumothorax and perform left thoracostomy (tube / finger / needle) based on clinical findings. The Learner should not wait for a chest x-ray image. If the Learner requests a chest x-ray, this may be obtained. However, if the Learner pauses evaluation to wait for results, the blood pressure decreases further with progression to cardiac arrest if further delays occur. The Learner may then choose to perform a left thoracostomy. If this is completed, the tension pneumothorax will be released, and spontaneous circulation returns. If a chest x-ray was requested, it is available after thoracostomy is performed. The image is present on Slide #1 and demonstrates left rib fractures, subcutaneous emphysema, and a left pneumothorax. The Instructor may present the image later in the scenario.

CTD
- The Learner should indicate the appropriate thoracostomy anatomic landmarks and accurately describe the procedure. Following either finger or tube thoracostomy, an audible release of air occurs, and a small amount of blood is evacuated. If a needle or finger thoracostomy is performed, air is released but tension physiology recurs. The Learner should then perform a tube thoracostomy, indicate the appropriate landmarks, and accurately describe the procedure. Following tube insertion, the Learner should connect the thoracostomy tube to an underwater seal drainage system.
- A pulse oximeter should be connected to the patient, if not done previously. SpO_2 is 98% with high flow supplemental oxygen by mask.
- The Learner should request a chest x-ray to assess thoracostomy tube placement. The Instructor will present the image (Slide #2) later in the scenario.
- Blood gas determination may be requested. To provide a more realistic scenario, the Instructor may delay reporting the result until assessment of Circulation is completed. For Instructor reference, the values at this point in assessment are pH 7.30, PaO_2 94 mm Hg (12.5 kPa), $PaCO_2$ 32 mm Hg (4.3 kPa), SpO_2 97%, and BD 10 mEq/L.

C: Circulation

CTD
- The Learner should indicate that a cardiac rhythm monitor is connected, if not already done. The cardiac rhythm is irregular with frequent premature ventricular extrasystolic beats and sinus tachycardia. HR is 120. The Learner should recognize the importance of continued cardiac monitoring due to the arrhythmia and obtain an EKG because of the electrical injury and cardiac arrest. The Learner should request a new blood pressure which is 90/60.

CTD
- The Learner must recognize the presence of shock and indicate that two large-caliber IVs be inserted, while simultaneously obtaining blood for type and crossmatch and routine laboratory determinations. If the Learner asks for the results, the Instructor should indicate that the results will be available in 20 minutes. The Learner should avoid placing an IV in the left forearm due to the electrical burn and edema.

CTD
- The Learner must recognize shock and initiate appropriate resuscitation. The Learner may initiate 1 L of isotonic crystalloid. However, blood products are available, and the Learner should relate that blood product administration is initiated as soon as possible. The Learner should transfuse warmed blood products and indicate the need for balanced blood product resuscitation at a 1:1:1 ratio of PRBCs:FFP:Platelets. The Learner should initiate a massive transfusion / hemorrhage protocol, if present in the facility. The Learner should indicate that crossmatched blood will be transfused as soon as it is available.

If blood products are not routinely available in the Learner's practice environment, the Learner may administer warmed crystalloid solution. However, the Learner must report that blood would be the optimal product if available.

CTD • The Learner should recognize the potential for rhabdomyolysis following an electrical burn and understand that continued fluid administration is indicated after initial resuscitation.

CTD • The Learner should request new vital signs after administration of blood or crystalloid. The BP increases to 100/65 and HR decreases to 100. If requested earlier, the ABG results are pH 7.30, PaO_2 94 mm Hg (12.5 kPa), $PaCO_2$ 32 mm Hg (4.3 kPa), SpO_2 97%, and BD 10 mEq/L.

CTD • The Learner should recognize the potential for hemorrhagic shock and assess five locations for a source of uncontrolled hemorrhage.

- **External (the floor)** – There is no external bleeding.
- **Thoracic cavity** – The Learner should evaluate thoracostomy tube output and request a chest x-ray (if not previously requested). There is no further output. Chest x-ray image is ordered. The Instructor will present the image later in the scenario (Slide #2).
- **Peritoneal cavity** – The Learner should request either FAST, eFAST, or DPL. If FAST, right upper and left upper quadrant intra-abdominal fluid is present. Pericardial and pelvic fluid are not detected. The included FAST and eFAST images (Slides #5 and #6) of the right upper quadrant may be shown to the Learner to interpret. If DPL, 15cc of blood returns on aspiration.
- **Retroperitoneal Space** – The Learner should assess the pelvis for ecchymosis, displacement, external rotation of the femurs, and pain. A test for mechanical stability is not performed. There are no contusions on the pelvis. There is no pain with palpation and hip movement. A pelvis x-ray should be requested. The image will be presented by the Instructor later in the scenario (Slide #3).
- **Long Bone / Soft Tissue Compartments** – The Learner should examine the extremities for long bone fractures, muscle compartment swelling, and extensive soft tissue contusions / swelling. There is swelling in the left forearm. There are no deformities of extremities. There are burn wounds on the left forearm and right hip.

CTD • The Learner should conclude that the major source of hemorrhage is within the abdomen and request emergent surgical consultation. As the local surgeon is not available, the Learner should initiate transfer.

D: Disability

CTD • The Learner should mention progression to Disability evaluation. The Learner should perform a neurologic exam by requesting results of GCS evaluation, pupil reactivity, motor exam, and sensory exam.

- The eyes open spontaneously. E = 4.
- The patient is alert and oriented. V = 5.
- The patient follows directions to move the extremities. M = 6.
- The GCS score = 15 (E4, V5, M6).
- Both pupils react briskly to light.
- The patient moves both upper and lower extremities. However, left arm movement is restricted to the upper arm and is very painful.
- Sensation is intact except for lack of sensation in the left forearm.
- The Learner should indicate that these responses are reassuring that a severe TBI is not present. However, the Learner should indicate that neurologic status should be reevaluated frequently.

E: Environment/Exposure

CTD • If not done previously, the Learner should direct removal of all clothing to permit a complete inspection. A logroll should be performed to remove the backboard and examine the back. A rectal examination is optional. No new life-threatening injuries are diagnosed. Rectal tone is present. Rectal blood is not present.

CTD • During examination and logroll, the Learner should mention measures to preserve patient privacy and to prevent hypothermia, such as covering with warm blankets, increasing the room temperature, and providing warmed IV fluids. Spinal motion must continue to be restricted.

- Burn surface area may be calculated at this stage or during the Secondary Survey. If performed, the Learner should estimate the partial and full thickness burned surface area to calculate appropriate rate of fluids for continued resuscitation. The left forearm burn is near circumferential (approximately 9% BSA) and the left hip burn is approximately the size of the patient's hand (1%). Therefore, the total estimated burn surface area is 10%. The Learner should recognize the need for transfer for burn care, if not already done.

ADJUNCTS TO THE PRIMARY SURVEY

Monitoring Devices
Monitoring devices, including an ECG monitor and a pulse oximeter should be applied, if not performed previously.

Chest and Pelvic X-rays, FAST and eFAST Exams
The chest and pelvic x-rays are adjuncts to the Primary Survey. The Learner should have previously requested these x-rays during Breathing and Circulation assessment. The x-rays are obtained and being developed. The Instructor may present the images just before or after either the Secondary Survey or the transfer report. The Learner should indicate that restriction of spinal motion is continued and may elect to obtain a cross-table lateral c-spine x-ray (the image is on Slide #4). If not mentioned during Circulation assessment, the FAST/eFAST exam is demonstrates intra-abdominal fluid. Pelvic and pericardial fluid are not detected. If not shown previously, the included FAST and eFAST images of the right upper quadrant (Slides #5 and #6) may be shown to the Learner to interpret. If requested, other eFAST demonstrates normal lung sliding on the right and is equivocal on the left due to subcutaneous air.

Urinary Bladder Catheter
CTD • The Learner should indicate that after examination for blood at the meatus or perineal ecchymosis an indwelling urinary catheter should be inserted to monitor urine output and assess for myoglobinuria. There is no urethral meatus blood and there is no perineal ecchymosis. Dark red urine (100 mL) returns, consistent with myoglobinuria and rhabdomyolysis.

Gastric Decompression
Gastric decompression is not indicated.

Arterial Blood Gases
Arterial blood gases (or repeat) may be obtained. Results after the xABCDEs and volume resuscitation are pH 7.34, PaO_2 98 mm Hg (13.1 kPa), $PaCO_2$ 38 mm Hg (5.1 kPa), SpO_2 97%, and BD 5 mEq/L.

These are improved from the ABGs which may have been requested at the end of Breathing assessment, which were pH 7.30, PaO_2 94 mm Hg (12.5 kPa), $PaCO_2$ 32 mm Hg (4.3 kPa), SpO_2 97%, and BD10 mEq/L.

Blood Tests
Blood should have been sent to the laboratory for type and crossmatch, coagulation profile, electrolytes, renal function, and other determinations.

Case Status after Primary Survey and Adjuncts
- The Learner should perform a tactical pause and reevaluate the xABCDEs before proceeding to the Secondary Survey. Instructor reports vital signs: BP 100/60, HR 110, RR 24, and SpO_2 98% with supplemental oxygen by mask. Lips are not cyanotic. Capillary refill (except for left hand) is < 3 seconds. Left fingertips remain cyanotic. There are no changes on xABCDE re-assessment. The infusion of warmed blood and blood products should be continued, and the pulse oximeter and ECG monitored. Fluid rate should be calculated based on 4 mL/kg/%TBSA due to electrical burn injury. This value is then divided by 16 to obtain the hourly rate. For ease of calculation, an 80 Kg patient would have a fluid rate of 200 mL/hr. Fluid rate is adjusted to maintain a urine output of 100 mL/hr due to myoglobinuria. Once the urine is clear, the fluid rate can be adjusted to maintain an output of 0.5-1.0 mL/hr. Vital signs should be monitored during the Secondary Survey. If not mentioned earlier, the Learner may state that transfer to another facility capable of managing the burn, chest, and abdominal injuries is indicated.
- The x-ray images are available. The Instructor shows these to the Learner, who should identify these findings:
  - Slide #1 Chest x-ray prior to thoracostomy - left pneumothorax, multiple left rib fractures, subcutaneous emphysema.
  - Slide #2 Chest x-ray following thoracostomy - left tube thoracostomy, resolution of pneumothorax, multiple left rib fractures, subcutaneous emphysema.
  - Slide #3 Pelvic x-ray - no pelvic fractures present.
  - If requested, Slide #4 illustrates a lateral cervical spine x-ray without abnormalities.
  - If not reviewed during Circulation assessment, Slide #5 illustrates FAST of left upper quadrant with intra-abdominal fluid is present and Slide #6 illustrates eFAST of the left chest and left upper quadrant with intra-abdominal fluid present.

SECONDARY SURVEY

CTD • The Learner should begin a head-to-toe examination.

Head
- The Learner should examine the head for wounds. No external injury is present. There is no drainage from the ears, nose, or mouth. Pupils are equal, round, and react briskly to light.
- The GCS score should be reevaluated. The GCS score remains 15.

Neck
- The Learner should palpate the neck while maintaining cervical motion restriction. The patient reports no pain when upper neck is palpated. The trachea is midline. The jugular veins are not distended. Imaging is not mandatory as transfer is planned. If requested, the cervical spine lateral x-ray image is on Slide #4 and is without abnormalities. The Learner should indicate that other spine fractures cannot be excluded on a single image lateral cervical spine x-ray. Resuscitation and transfer should not be delayed to obtain further spine imaging.

Chest
- The Learner should reassess the chest by inspection, auscultation, and palpation. Contusions are present on the skin of the left chest. Crepitus is present in the left chest wall and the patient reports pain during palpation. Left breath sounds are slightly diminished. The patient reports left shoulder pain (referred from the splenic injury).
- The Learner should examine the left tube thoracostomy and collection chamber for drainage. The tube is functioning adequately, and no further blood has drained. An intermittent air leak is present, indicated by bubbling in the water seal chamber of the collection device.
- A chest x-ray should be ordered, if not obtained previously.

Abdomen
- There are abrasions along the left abdomen and flank. The abdomen is tender in the left upper quadrant and is not distended. Bowel sounds are diminished.

Pelvis/Perineum
- The pelvic bones are not tender, and contusions are not present. The hips are not rotated. There is a 1% (palm sized) burn on the right hip. Contusions, hematomas, swelling, and urethral meatal blood are not present. A rectal examination may have been performed previously during logroll maneuver of the Exposure portion of Primary Survey. Rectal tone is present. Rectal blood is not present.
- A pelvic x-ray should be ordered, if not requested previously.

Musculoskeletal System
- The Learner should examine the extremities. There are no deformities of the bones. Distal pulses are intact in the lower extremities and right arm.

CTD • The left forearm has circumferential partial thickness burns and extensive distal swelling. Estimated body surface area is 9%. The patient complains of numbness in the left hand. The left radial and ulnar pulses are not palpable. The left fingertips are cyanotic. The left forearm and hand are cool with capillary refill > 4 seconds. The Learner should diagnose vascular insufficiency due to the constricting effect of the burn and potential compartment syndrome. The Learner should indicate that fasciotomy is indicated.

- The Learner may attempt burn escharotomy. This procedure is completed. However, pulses are not restored.
- Left upper extremity x-rays can be ordered if transfer will not be delayed.
- If not previously performed during the Exposure portion of Primary Survey, the Learner should examine the back utilizing a logroll technique to minimize movement. If protection is not maintained, the patient is no longer able to move the lower extremities. A rectal examination can be performed at this time, if not previously performed. No abnormal findings are present.

X-ray Examinations and Other Diagnostic Studies

- If not reviewed earlier, the Instructor may show the images to the Learner. Results are as detailed above.

TRANSFER TO DEFINITIVE CARE

- At completion of the Primary and Secondary Surveys of the Initial Assessment, the Learner should request current vital signs and review the xABCDE's as part of a tactical pause. Assessment is unchanged. The patient has received 2 units of blood, the only 2 units of plasma, and 1 L of balanced crystalloid. Vital signs are BP 95/60, HR 110, RR 24, and SpO_2 98% with supplemental oxygen by mask. GCS score remains 15. Urine output is 10 mL over the past 30 minutes. There is no further thoracostomy tube drainage. The heart rhythm is sinus tachycardia with fewer premature ventricular beats.
- The Learner should continue volume resuscitation. If not discussed after the Primary Survey, the fluid rate should be calculated based on 4 mL/kg/%TBSA due to electrical burn injury. This value is then divided by 16 to obtain the hourly rate. For ease of calculation, an 80 Kg patient would have a fluid rate of 200 mL/hr. Fluid rate is adjusted to maintain a urine output of 100 mL/hr due to myoglobinuria. Once the urine is clear, the fluid rate can be adjusted to maintain an output of 0.5-1.0 mL/hr.
- The Learner should initiate transfer to a hospital capable of providing a higher level of trauma care for the burn and abdominal injuries and continue evaluation (e.g. obtain further imaging such as CT of spine due to mechanism). The receiving clinician should be contacted directly.

Pretransfer Management

The Learner should describe the aspects of management before and during transfer:

- Appropriate handover to the receiving clinician
- Provision of continuous monitoring and pain / anxiety relief.
- Administration of supplemental oxygen with continued reassessment of pulmonary status
- Monitoring of thoracostomy tube
- Adequately secure the thoracostomy tube and urinary catheter.
- Ensure continued volume resuscitation
- Define blood pressure target during transfer (90 – 100 systolic).
- Motion restriction of the spine, including a cervical motion restriction device
- Copies of all test results and images are prepared to accompany the patient

Transfer Specifics

- The Learner should indicate the specifics of the transfer to another hospital, including the personnel and equipment / supplies. If time permits, question the Learner about plans for managing changes in patient status that may occur during the transport process, such as hypoxia and ventilation abnormalities, decrease in blood pressure, and cardiac dysrhythmias.
- The Learner should use the S-xABCDE-BAR tool to provide a handover. For this scenario, the Learner should relate the following:
  - Cardiac arrest at the scene with spontaneous return of circulation following immediate bystander CPR.
  - Multiple left rib fractures with left tension pneumothorax treated by left tube thoracostomy.
  - Chest tube output is minimal. However, an air leak is present.
  - Electric burn 10% TBSA.
  - Left forearm compartment syndrome and rhabdomyolysis.
  - Hemorrhagic shock with intra-abdominal source of bleeding.

Communicating Serious News

The patient's family have arrived. The clinician should indicate that communication with the family will occur in a quiet room with ample chairs, tissue and water available, and additional support personnel (such as a translator, social worker, spiritual counselor). Following the meeting, the Learner will debrief the team and relay family meeting information to the receiving hospital. The meeting will follow the principles discussed in the Communicating Serious News chapter and Skills Station. The ABCDE's of meeting communication are:

- A. Ask what the family has been told.
- B. Begin with the warning.
- C. Concise summary.
- D. Do allow for silence. Don't speak too much. Listen!
- E. Elicit questions. End Encounter with a plan for next steps.

DIRECTIONS FOR MOULAGE

- Apply makeup to simulate shock and central cyanosis.
- Apply makeup to the left chest and upper left abdomen to simulate ecchymosis.
- Apply makeup to the left forearm and right hip to simulate partial and full thickness burns and cyanotic left fingertips. The left wrist should be covered to simulate the lack of left radial pulse.
- Have a urinary catheter bag available to demonstrate dark red urine (optional).
- Upon completion of the above, carefully apply simulated perspiration, a semirigid cervical motion restriction device, and an oxygen mask.

DIRECTIONS FOR THE PATIENT MODEL

While attempting to rescue your child's kite from an electrical pole, you touched a high voltage wire with your left arm. The exit burn is at your right hip. You fell to the ground onto the left back. You suffered cardiac arrest and bystanders were able to start CPR. You regain a pulse and are able to talk and follow directions. You have severe pain in the left forearm. Your left hand and fingers are numb. You cannot move the left fingers. If someone moves the left hand and/or fingers passively, you have severe pain. It is difficult to breathe. After the Learner places a left chest tube, you can breathe normally. If a chest tube is not placed, you will have difficulty breathing again. You have left upper abdominal and flank pain.

Notes: