

COMMON STRUCTURE FOR HIGH FIDELITY SIMULATION SCENARIO

SCENARIO TITLE

**Polytrauma. Compressive pneumothorax. Tibia fracture. External bleeding.
Scalp wound.**

SCENARIO OVERVIEW

HEALTHCARE SERVICE:

TARGET GROUP¹: general medicine students

ESTIMATED SCENARIO DURATION: 45 minutes

SCENARIO SUMMARY²:

Cyclist, 21, is hit by a car on the side. He is brought to emergency with thoracic pain and in lower right limb, bleeding wound on scalp.

EDUCATIONAL OBJECTIVES

GENERAL OBJECTIVES:

- The participants should be able to work in team, to assign roles and to appoint a team leader.
- To identify the seriousness of the situation and establish the priority of actions to perform.
- To be able to perform several actions at the same time.
- To know and use the necessary material for actions required by this scenario.
- To know the steps of primary care for trauma.
- To know the steps of secondary care for trauma.
- To understand the main life-threatening wounds that can appear in a trauma.

SCENARIO-SPECIFIC OBJECTIVES:

- To understand the main life-threatening wounds in the first minutes of a trauma.
- To know the sign and differential diagnosis of pneumothorax.
- To know the main treatment modalities of external bleeding.
- To know the signs and symptoms of a fracture.
- To know ATLS protocol.
- To know and handle material necessary to perform specific emergency manoeuvres within the framework of this scenario.

¹ Skill level and number of participants

² Scenario key words

- To be able to perform necessary manoeuvres: monitoring, oxygen therapy, venous catheter, pneumothorax drainage, with a needle and pneumothorax drain tube.
- To know how to immobilise a fracture.
- To know how to perform haemostasis during a trauma.

PARTICIPANTS' ROLE

STUDENT	Medicine students	3-4	
PROFESSIONAL			
TRAINERS ³	Doctors	1-2	<ul style="list-style-type: none"> - Present the scenario - Present the different parts of the scenario - Control the dummy settings - Correct, gradually and during debriefing

EQUIPMENT LIST⁴

Medical supplies:

- Airway: non-rebreather mask, oropharyngeal airway of several dimensions, nasopharyngeal airway of several dimensions (Robertazzi), laryngoscope with several blades (Macintosh, Miller, MacCoy, airtraq), video laryngoscope, intubation tubes of several dimensions, mandrel for tracheal intubation tube, spark plug, sterile gel, Magill forceps, fixation for tracheal intubation tube, 20 ml syringe, sterile kits, hand sanitiser, sterile gloves, mobile aspirator with aspiration tubes: Yankauer and flexible, of several dimensions.
- Breathing: Ambu bag with oxygen reservoir, masks of different dimensions for the Ambu bag, antibacterial filter, mechanical fan with nozzle, oxygen bottle/vial, Heimlich valve, thoracic drain of several dimensions, collecting jar.
- Circulation: peripheral venous catheters of various dimensions, 3-way cock, catheter fixation, non-sterile compresses, tourniquet, disinfectant, non-sterile gloves, perfusion kit, drip solution vial. ECG screen with standard monitoring wires, pulse oximeter, blood pressure monitor, capnography. AED with patches and paddles. Stethoscope. Sterile kits with: coat, compresses, stitching case, scalpel.
- Miscellaneous: Syringes of several dimensions, needles, adhesive electrodes for ECG monitoring, band aids, compresses, disinfectant. Dummy, straps to immobilise several parts of the body, neck collar, plastic board with devices to immobilise head, ultrasound probe: convex for abdomen and heart, flat for soft tissues, scissors to cut clothes.

Medicines and solutes:

- Drip solution vials: NaCl, Voluven
- Adrenalin, Atropine, Amiodarone
- Propofol, Etomidate, Ketamine, Fentanyl, Xylene, Suxamethonium, metamizole, paracetamol

Documents: **monitoring sheet, patient's medical documents**

³ Control of dummy setting / Debriefing/ Dummy voice/ Facilitator/ Disruptive element/ external stakeholder (phone speaker)

⁴ Prefer Check-list for quick check-up

Accessories: work bench, stretcher

Environment: bed in emergency / intensive care, with all devices mentioned above.

SCENARIO PREPARATION

SIMULATOR PREPARATION:

- Setting: corresponding to initial state (cf. table)
- Positioning: prepare material and dummy, 10-15 minutes
- Accessories:

ENVIRONMENT PREPARATION:

- prepare the dummy
- prepare monitoring devices
- prepare devices for respiratory tracts: oxygen, suction, Ambu bag, material for thoracic drainage
- prepare material for peripheral venous catheter
- prepare medication

PREPARATION OF ADDITIONAL EXAMINATIONS:

- **patient's medical history**
- arterial astrup

PREPARATION OF STUDENTS/LEARNERS: professional outfit

- Introduce the room in which the scenario takes place
- Safety principles during simulation: defibrillator, needles
- Present simulation possibilities
- Present the available material
- Briefly describe the scenario evolution (the fact there are several possibilities of patient evolution, depending on therapeutic decisions)

BRIEFING

TIME:

SITUATION: Cyclist, 21, is hit by a car on the side while crossing the street. The cyclist was wearing a helmet. He was thrown to the ground. He is brought to emergency by ambulance. The cervical spine has been immobilised on site with a collar neck, the scalp wound has been temporarily bandaged. A peripheral venous catheter and an oxygen mask have been put. The patient is under basic monitoring. On arrival in ER, he complains about thoracic pain and in lower right limb. Moreover, he has a bleeding wound on the scalp.

DOCUMENTS: N/A.

PATIENT DATA⁵

Surname: Ion

Age: 55

Name: **Cătălin**

Weight: 65

Date of birth: 2-07-1962

Height: 1.7

⁵ Care record layout or if not necessary to the scenario, voice memo for the trainer

Allergies: no known allergies
Gender: M
History: viral and toxic mixed hepatic cirrhosis. Average bleeding oesophageal varices
Medical history: Propranolol, Silymarin, Ramipril, Indapamide
Surgeries: no surgery, endoscope evaluation in his recent history
Personal treatment: Propranolol, Silymarin, Ramipril, Indapamide

FRAMES OF REFERENCE / EXPERTS RECOMMENDATIONS

ERC European resuscitation council guidelines for resuscitation 2015. Section 3. Adult advanced life support.

ERC - European resuscitation council guidelines for resuscitation 2015. Section 4. Cardiac arrest in special circumstances

SFAR - Société Française d'Anesthésie et de Réanimation

Advanced Trauma Life Support - American College of Surgeons

Textbook of Critical Care - J.L.Vincent et al., 2017, Elsevier

DEBRIEFING IDEAS

- Rapid and secondary ABCDE evaluation
- Quickly recognise life-threatening wounds
- Quickly heal wounds, during evaluation
- Set priority of manoeuvres
- Basic principles to take care of traumatised patients
- Set priority of medication
- Good communication within the team
- Know ATLS protocol
- Treat suffocating pneumothorax
- Haemostasis techniques
- Traumatised patient immobilisation and transport techniques

SCENARIO PROGRESS

Monitor setting	Patient dummy	Students' interventions (what we would like to see...)	Messages
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Beginning time of scenario:

<p>Initial state:</p> <p>AP: 140/60 HR: 120 RR: 30 SpO₂: 85% Fi O₂: 80%</p> <p>ECG curve: sinus tachycardia</p> <p>Clinical signs: - eyes: open spontaneously - pupils: symmetrical, intermediary, reactive - pulmonary auscultation : difficult phonation due to inhaling dyspnea. - VM, unilateral, absent on right side</p>	<p>Symptoms, voice</p> <ul style="list-style-type: none"> - agitated patient - GCS: 4, 6, 5 - moist teguments, piloerection - Free respiratory tract, possible phonation - Trachea deviated to the left - superficial, rapid breathing, using accessory muscles - tympanism during sounding of right hemithorax, Subcutaneous emphysema - CRT < 3 s. 	<ul style="list-style-type: none"> - Patient ABCDE evaluation – <p>Primary evaluation</p> <ul style="list-style-type: none"> - Manoeuvres to perform simultaneously: - Basic monitoring: SpO₂, AP, ECG - Venous catheter – at least 2 large PVC 14-18G with in initiation of volume resuscitation - Oxygen therapy – mask with reservoir – FiO₂ as close as possible to 100% <p>A – Airway – with spine protection (neck collar)</p> <ul style="list-style-type: none"> - airway patency - immobilisation continued during evaluation <p>B – Breathing – Ventilation and oxygen</p> <ul style="list-style-type: none"> - throat and thorax examination: trachea deviated to the left - breathing pattern: right hemithorax impossible to immobilise - palpation: subcutaneous emphysema - Sounding: tympanism - Auscultation: respiratory silence on the right side - Echography: bar-code pattern, stratospgere sign in right hemithorax <p>Care:</p> <ul style="list-style-type: none"> - administer oxygen in large quantity - administer analgesics - emergency pneumothorax decompression with a needle, puncturing space 2 ic, mid-clavicle or space 5 ic on mid-axillary on prior local anaesthesia 	<ul style="list-style-type: none"> - Importance of evaluation and manoeuvres on airways with head kept in axis, through manual immobilisation - Show the correct way to immobilise cervical spine and to choose the right neck collar size - Basic monitoring during traumatism - Importance of ECG monitoring during thorax traumatism - Importance of fast imaging examination - Discuss about pneumothorax signs and symptoms - Discuss about manoeuvre to drain pneumothorax with a needle - Discuss about haemorrhagic shock classification
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<p>Initial state':</p> <p>AP: 140/60 HR: 100 RR: 20 SpO₂: 92% Fi O₂: 90%</p> <p>ECG curve: sinus tachycardia</p> <p>Clinical signs: - eyes: open spontaneously - pupils: symmetrical, intermediary, reactive - pulmonary auscultation : difficult phonation due to inhaling dyspnea. - VM, unilateral, decreased on right side</p>	<p>The patient gradually Symptoms, voice</p> <ul style="list-style-type: none"> - agitated patient - GCS: 4, 6, 5 - moist teguments, piloerection - Free respiratory tract, possible phonation - superficial, rapid breathing, using accessory muscles - Subcutaneous emphysema - CRT < 3 s. 	<ul style="list-style-type: none"> - After pneumothorax decompression, right hemithorax movements resume and saturation increases, with later decrease of ventricular rate <p>C – Circulation and control of bleeding</p> <ul style="list-style-type: none"> - identify quickly the possible sources of bleeding - local haemostasis of scalp - AP, HR, VA, peripheral pulse, CRT, tegument colour - Heart auscultation - Fast evaluation of abdomen in case of internal bleeding - Blood test: group, Rh, astrup - Peripheral venous catheter, start volume resuscitation, prevent hypothermia <p>D – Disability</p> <ul style="list-style-type: none"> - GCS - Pupils - Signs <p>E – Expose</p> <ul style="list-style-type: none"> - Fully undress the patient, cutting his clothes with special scissors <p>FAST examination – echography during traumatism</p> <p>Multimodal analgesia</p>	<ul style="list-style-type: none"> - differential diagnosis of the causes for severe respiratory failure - discuss in brief the physiopathological mechanisms involved in case of traumatism - Good cooperation within the team - Share tasks - Constant patient monitoring - Frequent reevaluation - know the material necessary for a venous catheter, pneumothorax drainage with a needle - Astrup results: slightly decreased PaO₂, respiratory alkalosis, hypocalcaemia - Emphasise the importance of early follow-up, blood typing; start transfusion ASAP - Importance of fast echography examination
<p>State 2:</p> <p>AP: 120/70 HR: 110 RR: 15 SpO₂: 90%</p> <p>ECG curve: sinus tachycardia</p> <p>Clinical signs: - eyes: closed - pupils: symmetrical, intermediary, reactive - pulmonary auscultation : bilateral VM, no added wheezing</p>	<ul style="list-style-type: none"> - patient conscious - Perspirations stopped - No piloerection - Free airway, possible phonation - superficial, rapid breathing, using accessory muscles - Subcutaneous emphysema still present 	<p>Secondary evaluation</p> <ul style="list-style-type: none"> - Consciousness - Pupils - Head: scalp wound: cleaning and primary stitching - Maxilofacial - Neck: evaluate cervical spine, need to keep neck collar, X-ray evaluation. Evaluate the front of the neck - Thorax: evaluate the thorax, inspection, palpation, sounding, pulmonary and cardiac auscultation. Echography and X-ray <ul style="list-style-type: none"> - Thoracic drainage - Abdomen: evaluation using inspection, palpation, sounding, echography +/- CT - Pelvis: evaluate pelvis stability, external genitalia - Spine: mobilisation in axis, followed by inspection and palpation of spine - Evaluate the extremities: 	<ul style="list-style-type: none"> - Discussion about: attending to the wounds, possibilities to perform haemostasis, importance of scalp wounds - Discussion about spine traumatism and NEXUS criteria - Discussion about thoracic drainage, collecting jar; how to handle them during patient transport - Discussion about examination: abdomen during a traumatism, ecography, CT scan, peritoneal lavage - discussion about limbs fracture; immobilisation techniques; importance of extremity examination

		<ul style="list-style-type: none"> - identification right leg fracture - Evaluate the limbs - Immobilise fracture - Radiology examination 	- Present FACTS: Function, Artery, Capillary refill, Sensation
<p>State 3:</p> <p>AP: 120/60 HR: 80 RR: 15 SpO₂: 95%</p> <p>ECG curve: sinus tachycardia</p>	Patient stable from a neurological, respiratory and haemodynamic point of view	<ul style="list-style-type: none"> - Patient transport to X-Ray service - Patient immobilisation during transport - Analgesia 	- Discuss about patient transfer to a service for final treatment
End time of scenario:			

SCENARIO EVALUATION

POSITIVE ASPECTS:

TO IMPROVE:

REALISM:

USED PROTOCOLS:

PROTOCOLS TO IMPLEMENT:

SCENARIO ORGANIGRAM