

Trauma

Objectives

- Mention the epidemiology of trauma.
- Discuss the mechanism of trauma (Penetrating, Blunt trauma).
- Explain the prehospital care in trauma.
- Discuss the triage and scoring for severity in trauma cases.
- Describe the emergency department management per “ATLS” protocol.
- Discuss the primary survey (diagnosis of the problems and immediate management).
- Recognize the adjuncts to primary survey
- Discuss the secondary survey

Colour Index

- Main Text
- Males slides
- Females slides
- Doctor notes
- Textbook
- Important
- ★ Golden notes
- Extra

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Trauma

Types of Trauma:

Major trauma:

in physical medicine, is a **severe** physical injury caused by an external source.

Psychological trauma:

a type of damage to the psyche that occurs as a result of a severely distressing event.

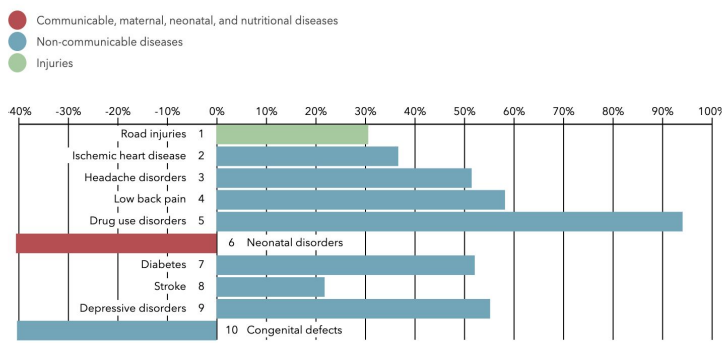
Traumatic injury:

sudden physical injury caused by an external force, which does not rise to the level of major trauma.

Stats:

- Leading cause of death for individuals up to the age of 45.
- **Fourth** leading cause of death overall for all ages.
- More than 5 million trauma-related deaths worldwide each year.
- Road traffic crashes kill 1.2 million people annually around the world (3242 people a day).
- **Estimated cost:** \$518 billion globally.
- **Leading causes of death & disability in Saudi Arabia:**

What causes the most death and disability combined?



Top 10 causes of disability-adjusted life years (DALYs) in 2017 and percent change, 2007-2017, all ages, number

10 Leading Causes of Death by Age Group, United States – 2004

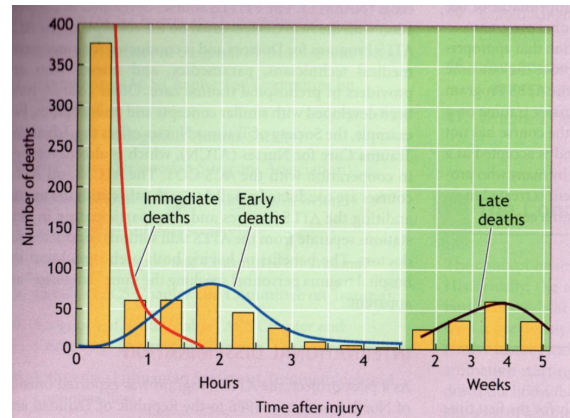
Rank	Age Groups										Total
	<1	1-4	5-9	10-14	15-24	25-34	35-44	45-54	55-64	65+	
1	Congenital Anomalies 5,823	Unintentional Injury 1,441	Unintentional Injury 1,106	Unintentional Injury 1,449	Unintentional Injury 1,932	Unintentional Injury 14,111	Malignant Neoplasms 49,520	Malignant Neoplasms 96,009	Heart Disease 533,302	Heart Disease 650,498	
2	Short Gestation 4,942	Congenital Anomalies 568	Malignant Neoplasms 328	Malignant Neoplasms 493	Stroke 5,885	Stroke 2,974	Malignant Neoplasms 14,723	Heart Disease 37,556	Heart Disease 63,813	Malignant Neoplasms 353,388	
3	SIDS 2,348	Malignant Neoplasms 599	Congenital Anomalies 490	Stroke 283	Stroke 4,316	Stroke 4,495	Heart Disease 12,925	Unintentional Injury 16,147	Chronic Low Respiratory Disease 11,254	Cerebrovascular Disease 150,074	
4	Maternal Pregnancy 1,753	Stroke 377	Stroke 122	Stroke 267	Malignant Neoplasms 1,709	Malignant Neoplasms 3,833	Stroke 6,838	Liver Disease 7,456	Diabetes Mellitus 10,790	Chronic Low Respiratory Disease 127,847	
5	Unintentional Injury 1,147	Heart Disease 137	Heart Disease 83	Congenital Anomalies 162	Heart Disease 1,938	Heart Disease 3,103	HIV Disease 6,965	Stroke 9,966	Cerebrovascular Disease 65,313	Alzheimer's Disease 112,212	
6	Pneumonia 1,042	Influenza & Pneumonia 119	Chronic Low Respiratory Disease 81	Heart Disease 162	Congenital Anomalies 483	HIV Disease 1,468	Stroke 2,384	Cerebrovascular Disease 6,181	Alzheimer's Disease 9,211	Diabetes Mellitus 53,956	
7	Respiratory Disease 875	Septicemia 54	Benign Neoplasms 41	Chronic Low Respiratory Disease 78	Cerebrovascular Disease 211	Diabetes Mellitus 599	Liver Disease 2,799	Diabetes Mellitus 5,587	Liver Disease 8,549	Influenza & Pneumonia 52,260	
8	Bacterial Sepsis 827	Perinatal Death 61	Septicemia 58	Influenza & Pneumonia 49	HIV Disease 191	Cerebrovascular Disease 547	Cerebrovascular Disease 2,361	HIV Disease 4,422	Stroke 4,811	Nephritis & Nephrosis 59,854	
9	Neonatal Hemorrhage 616	Benign Neoplasms 53	Cerebrovascular Disease 54	Benign Neoplasms 43	Influenza & Pneumonia 165	Congenital Anomalies 420	Diabetes Mellitus 2,028	Chronic Low Respiratory Disease 3,211	Nephritis 3,963	Unintentional Injury 31,455	
10	Cholera 503	Chronic Low Respiratory Disease 48	Influenza & Pneumonia 33	Cerebrovascular Disease 43	Chronic Low Respiratory Disease 179	Septicemia 328	Influenza & Pneumonia 891	Septicemia 2,251	Septicemia 3,745	Septicemia 33,373	

Source: National Vital Statistics System, National Center for Health Statistics, CDC. Produced by: Office of Statistics and Programming, National Center for Injury Prevention and Control, CDC.

Mechanism of injury

Relatively few patients die after the first 24 hours following injury. Rather, the majority of deaths occur either at the scene or within the first four hours after the patient reaches a trauma center.

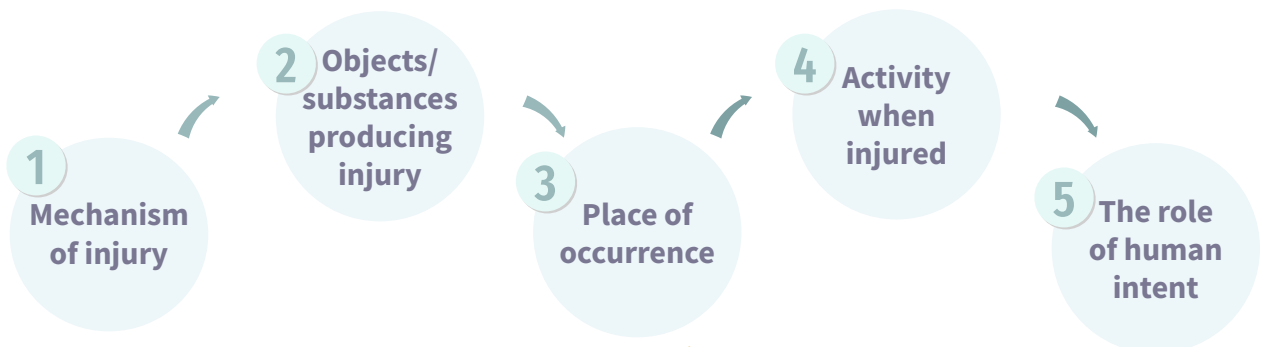
late death usually occur in weeks and mostly due to multiple organ failure (MODS) and infection (Sepsis)



Trimodal Death Distribution ¹

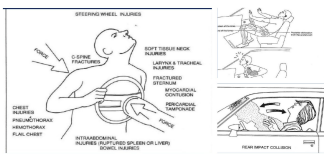
Classification of Injury:

The World Health Organization (**WHO**) developed the International Classification of External Causes of Injury (**ICECI**). Under this system, injuries are classified by:



Blunt Injuries

- Motor Vehicle Collisions (**MVC**)²
- Fall from height



Penetrating Injuries

- High velocity: (gun shot, or shrapnel)
- Low velocity: (stabbing, or falling on shattered ice)

1. It is often quoted that trauma deaths have a trimodal distribution. **The first peak** 'immediate deaths', represent deaths (unsurvivable injuries: ruptured aorta) occurring immediately after or within a few seconds of injury, contributes up to 50% of the total. This peak is impacted by increased trauma preventive measures which is done at level of the government. **The second peak** 'early deaths', up to 4 hours after injury and accounts for 30% of deaths (This peak is the golden hour of care, and is impacted by early hospital care), and the final 20% occur in the **third peak** 'late deaths' and it takes place (usually in an intensive care unit) days or weeks after the event (usually caused by sepsis and multiorgan dysfunction syndrome). This peak is mainly impacted by optimal early care and trauma center management.

2. When reporting a MVC it's very important to describe the details of the event, you report where they were riding (driver or passenger seat? And if passenger, back seat or front seat?), wearing seatbelt or not? The type of collision, Was it a Head on collision? Side impact collision? Rear impact ("whiplash")? Rollover? Pedestrian hit/run over by a car?

if not belted, the first thing that the patient would hit is the steering wheel, resulting in steering wheel injuries which are: soft tissue & neck injuries, larynx & tracheal injuries, fractured sternum, myocardial contusion, pericardial tamponade, intra abdominal injuries (ruptured spleen or liver, bowel injuries), C-spine fractures, chest injuries (pneumothorax, hemothorax, flail chest) chest injuries will be further explained in the following slides.

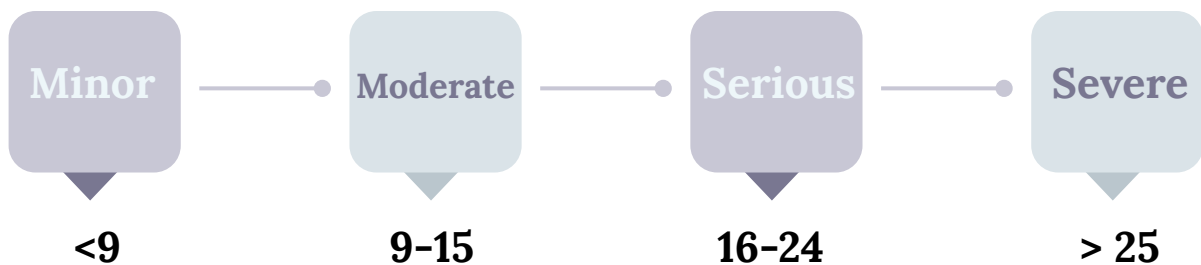
if the patient sled forward (top picture on the right) that'd lead to long bone injury, fracture of the femur and injury/dislocation of the knee.

Rear impact collision leads to the famous **whiplash injury**. Whiplash is an injury that occurs to a person's neck following a sudden acceleration-deceleration force that causes unrestrained, rapid forward and backward movement of the head and neck

Triaging and scoring ¹

Comparing and describing:

- The Abbreviated Injury Scale (**AIS**) has been the most used anatomic system of injury classification since 1971.
- In 1974, Baker and colleagues presented the Injury Severity Score (**ISS**), calculated by summing the squares of the AIS severity codes for the three most severely injured body regions.
- ISS **scores** “injury severity grouping”:



- Revised Trauma Score (RTS).
- **Glasgow Coma Scale** (GCS). neurological assessment of the CNS, it is a score where we rely on eye, verbal and motor response. You won't be asked about the details or to calculate the ISS

AIS FIRST DIGIT	BODY REGION
1	Head
2	Face
3	Neck
4	Thorax
5	Abdomen
6	Spine
7	Upper extremity
8	Lower extremity
9	Unspecified

severity is graded from 1 “minimal severity” to 6 “fatal”

Glasgow Coma Scale Score	13-15	4
	9-12	3
	6-8	2
	4-5	1
Systolic Blood Pressure (mm Hg)	3	0
	>89	4
	76-89	3
Respiratory Rate (breaths/min)	50-75	2
	1-49	1
	0	0
	>29	3
Total Revised Trauma Score	6-9	2
	1-5	1
	0	0
		0-12

1. The importance of this scoring system is to facilitate triage decision and transport patients to optimal trauma centre.

Two types of classification are used in assessing injury severity:

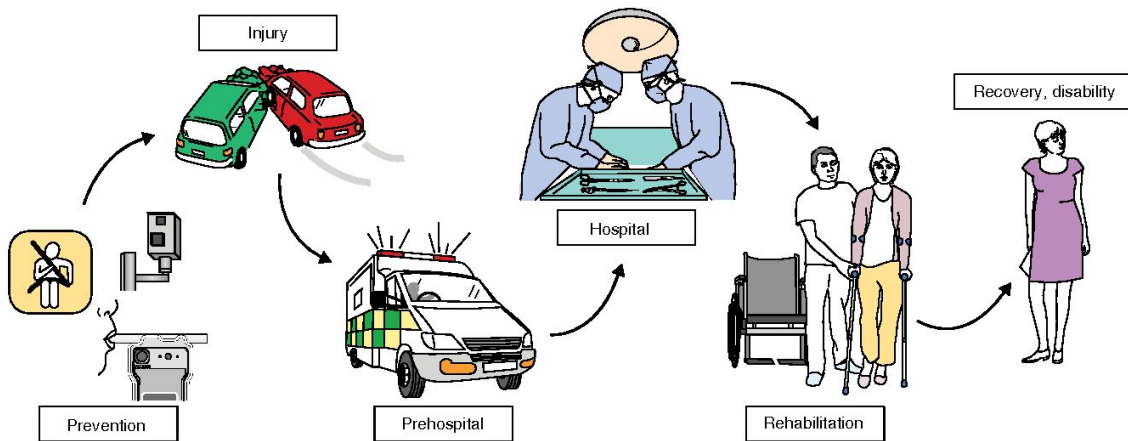
- Anatomical assessment:** The most commonly used system is the Abbreviated Injury Scale (AIS). Once the patient's injuries have all been identified (this may only be possible at discharge or autopsy), each separate injury is assessed from a scoring 'dictionary' and awarded a numerical score. The Injury Severity Score (ISS) is then derived from summing the squares of the three highest AIS scores within six body areas (head and neck, abdomen and pelvic contents, bony pelvis and limbs, face, chest and body surface). ISS provides an internationally recognized objective evaluation of anatomical injury. AIS is used to identify patient injuries according to their regions. A number is given to each category from 1-6 where 1 is minimal and 6 is fatal. ISS summarise multiple injury in the patient using AIS square value Example : Chest (3), Abdominal (2), extremities (4). $ISS = (9)+(4)+(16) = 29$ Severe.
- Physiological assessment:** The best known physiological scoring system is the **Glasgow Coma Scale** which is used to assess the neurological state of injured patients objectively, and it also has a prognostic value. The Glasgow Coma score (GCS), in conjunction with two other physiological recordings, systolic blood pressure and respiratory rate, can be used to produce the 'Revised Trauma Score'. The GCS is a three-point scale used to describe the level of consciousness in patients with head injury. The highest score is 15 (normal) and the lowest score is 3 (deep coma or death). The patient is assessed on ability to open eyes, motor responses and vocalisation. A patient of GCS 8 or less is considered to be in coma and intubation is indicated



Prehospital care

➤ Trauma Systems:

- Trauma systems include the entire care continuum, starting at the time of the injury, with a patient's access to care, and extending through the rehabilitation process
When the injury occurs we need a transportation system (الهلال الاحمر), then depending on the amount of injury or disability that will occur the patient may require rehabilitation or physiotherapy



➤ Prehospital Care ¹: scoop and run



- The goal is to move a patient to a location capable of providing definitive injury management **as quickly as possible**.
- The approach to the injured patient in the prehospital setting includes four key priorities:

01 Evaluate the scene

02 Perform an initial assessment

03 Make triage-transport decision if the patient has GCS of 8 > intubate immediately
GCS below 8 → intubate. it rhymes :)

04 Initiate critical interventions and transport the patient

★ The objective of prehospital care is to prevent further injury, initiate resuscitation and transport the patient safely and rapidly to the most appropriate hospital.

1. when communicating about an injury ask about: the type of injury, speed of the car (highway speed (>120km/h) or downtown speed (40-80 km/h), how much indentation is on the car (significant damage is at 20 cm), time needed for extraction (taking the victim out of the car) and death at the scene.

-What is the number one cause of airway obstruction? The tongue, so they need to secure the airway by putting a tube in the windpipe.
-They will put the patient on C collar to prevent him from moving if he has a neck injury, they will put him on a spinal board

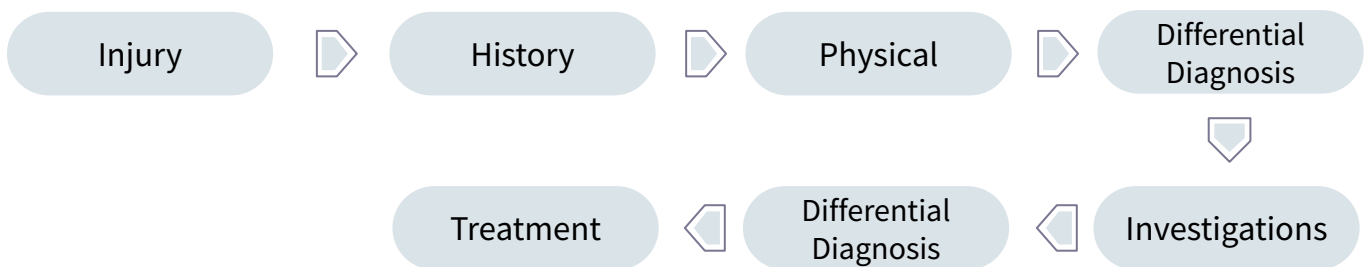
The Approach to Trauma Patient

Standard concept (Advanced Trauma Life Support 'ATLS'):

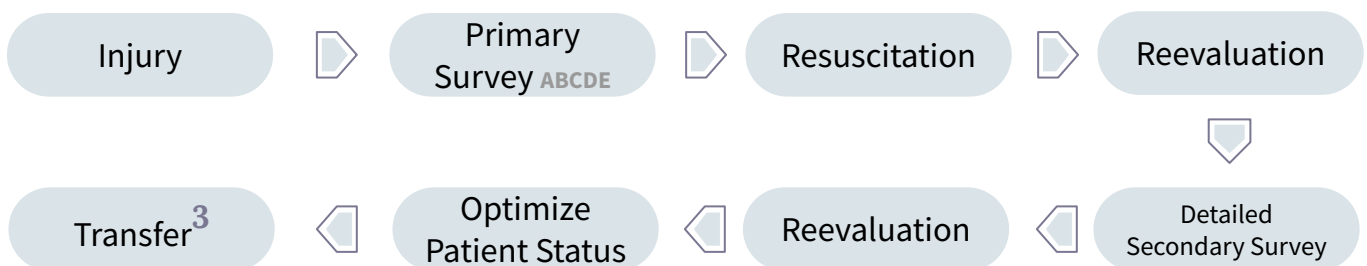
- **ABCDE** approach to evaluation and treatment.
- Treat greatest threat to life first.
- Definitive diagnosis not immediately important. *First secure the patient ABCDE before the diagnosis*
- Time is of the essence.
- Do no further harm.

The most important part of the ATLS is primary survey

Regular Medical Assessment ¹:



Initial Assessment and Management for Trauma Patients ²:



1. The routine approach used for regular patients is called a **secondary survey** in trauma settings. A trauma patient would die before receiving treatment if we approach him this way.

2. In trauma patients we start with the **primary survey** first to save the patient's life (will be further explained in the following slides). Then once we've secured the primary survey, we do secondary survey and detailed assessment.

3. When you are in a faculty that has Limited resource thinking about transferring the patient should occur early while you are doing your primary survey

3. There is a history we need to know in a trauma patient. It's **AMPLE**: **A**llergy, **M**edications **P**ast surgical/medical, **L**ast meal, **E**vent

The Approach to Trauma Patient

Case:

24-year-old male involved in a motorcycle crash in to a truck, Not wearing a helmet, Arrives at hospital with the red crescent:

- BP 80/40 (hypotensive), P140 (high, to compensate and improve the cardiac output), RR 33 (high, normal RR= 12-20), and central cyanosis (a clear indication that there's an issue with ventilation and oxygenation).
- C-collar, Oxygen at 8L/min, Dressing to forehead & thigh soaked in blood (indicates active bleeding).
- Has a wrist splint & is on a spinal board.



How do we deal with this case? ¹

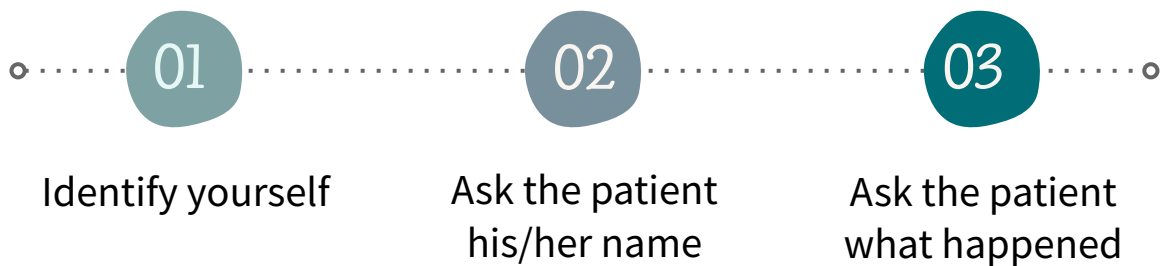
First thing we should do is applying PPE

Standard Precautions (PPE) ²:

- Cap, Gown, Gloves, Mask N95 especially during the COVID-19 pandemic, Shoe covers, Goggles/face shield. (All personnel must be appropriately immunized for hepatitis B.) to protect against communicable diseases

The Quick Assessment ³:

- It's a quick, simple way to assess the patient in 10 seconds



Appropriate response⁴ confirms:

- ✓ **A** → Patent airway.
- ✓ **B** → Sufficient air reserve to permit speech.
- ✓ **C** → Sufficient perfusion to permit cerebration.
- ✓ **D** → Clear sensorium we need adequate cardiac output to ensure clear sensorium.

1. We start by applying the standard precautions (PPE), then we do the quick assessment test and primary survey.
2. To protect the patient and the trauma team members from transmitting communicable diseases.
3. A patient that fails this test needs immediate attention
4. A patient that is able to respond we know that he has a patent airway there is no obstruction, he has a good respiratory reserve because speaking requires air to go out and when he answer appropriately and tells you what happened that means he has enough circulation to his brain to hear, analyze and respond.

The ATLS concept ¹

Advanced
Trauma
Life
Support

Overview

- | Airway with C-spine protection.
- | Breathing: ventilation oxygenation.
- | Circulation: stop the bleeding.
- | Disability: neurological status. **by using Glasgow scale**
- | Exposure /Environment/ Body temperature.
- | **We have to expose the patient completely.**
- | **F= foley catheter , G= gastric tube.**

★ > The Primary Survey (the priorities are the same for all the patients):



Airway

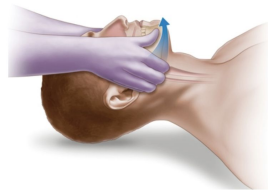
Establish patent airway and **protect c-spine with a collar** (Assume every pt has a C spine injury) (Establishing and securing the airway is always the first step in managing any patient with acute trauma or change in mental status. Altered mental status is the most common indication for intubation in trauma patients since unconscious patients can't maintain their airways).

Basic Airway Techniques

- **Chin-lift Maneuver**
(No head tilt! ²)
- **Jaw-thrust Maneuver**



Chin-lift



Jaw-thrust
(better than chin-lift)

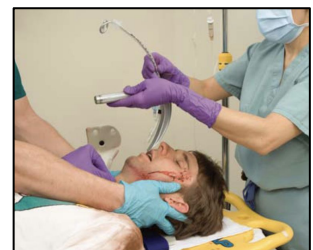
Advanced Airway Techniques³

- **Orotracheal intubation ⁴:**
The definitive airway control.
- In case of failure → surgical airway
(Cricothyroidotomy ⁵).
- **Nasotracheal intubation:** Nasotracheal intubation is indicated in any patient with spontaneous respirations or when oro-tracheal intubation is not feasible (e.g. in patients with limited mouth opening). However, it's rarely used.



Pitfalls

- Occult airway injury. **If you are suspecting progressive airway loss secure it as soon as possible.**
- Progressive loss of airway (E.g. bleeding in the neck that's slowly pressing on the trachea and with time you'll notice that the patient is having breathing difficulties.)
- Equipment failure.(E.g. you want to light up your laryngoscope but the battery is out)
- Inability to intubate. **When they have a very bad facial fracture**



1. ATLS provides a structured approach to trauma patients with standard Algorithms of care. It provides a guide for assessment and resuscitation to save the patient's life. However, judgment is required to determine which procedure is needed to save the patient from death. The goal is to provide initial care during the golden hour (window of opportunity which has the greatest impact on morbidity and mortality).

2. To avoid further damage in case the patient had a cervical injury. Bc if the patient had a C-Spine injury and you did a head tilt the patient will be quadriplegic and the innervation to the diaphragm will be lost.

- The patency of the airway is first assessed by direct inspection, identifying and removing obstructions. Noisy breathing, snoring or stridor implies airway obstruction. The most common cause of airway obstruction is a reduced conscious level, with the tongue falling back and blocking the oropharynx. Airway clearance, together with the 'chin-lift' or 'jaw-thrust' manoeuvres, will correct this.

3. Advanced airway techniques are required when: protective airway reflexes are absent (usually caused by altered consciousness), basic techniques are unable to cope with current or predicted airway compromise (e.g. major facial or burns/inhalation injury), there is a need for controlled ventilation (e.g. head and/or chest injury).

4. **Orotracheal intubation** is the advanced airway technique of choice, It protects the airway from aspiration of vomit or blood, and allows ventilation with controlled levels of oxygen and airway suctioning to remove debris. It does, however, require expertise in using anaesthetic and neuromuscular paralyzing agents.(prior to intubation, the patient is pre-oxygenated and must be carefully monitored throughout the process.)

★ 5. Surgical **cricothyroidotomy** is performed by making an incision that extends through the cricothyroid membrane and inserting a tracheostomy tube. Used for patients in whom attempts of intubation have **failed** or who are precluded from intubation due to **extensive facial injuries**.

★ - **Emergent Tracheostomy:** Is indicated in patients with **extensive laryngeal injury**.



The ATLS concept ¹

➤ The Primary Survey:



Breathing

Assess and ensure **adequate oxygenation and ventilation**¹:

- Respiratory rate.
- Chest Movement.
- Air entry.
- Oxygen saturation (you look for central cyanosis, cold periphery and the periphery of the nails). Always check for oxygen saturation. If saturation <90%, obtain an arterial blood gas (ABG) and determine likely causes of hypoxia based on the history.

★ The **Immediate** life threatening injuries are:

- Laryngotracheal injury / Airway obstruction
- Tension pneumothorax (air in the chest that's massive and may cause mediastinal shift to the other side. Needle thoracocentesis is indicated)
- Open pneumothorax (laceration to the chest causing the O₂ to move in and out).
- Flail chest and pulmonary contusion (fracture in two or more consecutive ribs, causing paradoxical movement of that region of the chest).
- Massive hemothorax (the insertion of an intercostal drain is indicated)
- Cardiac tamponade (bleeding into the pericardium space due to an injury to the myocardium, resulting in constriction of heart, decreased inflow and decreased cardiac output. Immediate needle pericardiocentesis is indicated)

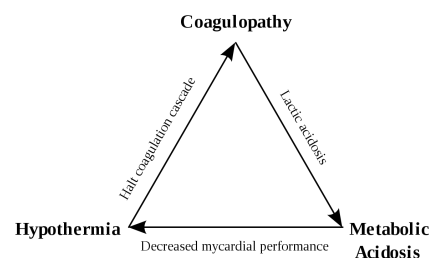


Circulation

- Level of consciousness
- Skin color and temperature
- Pulse rate and character

Circulatory Management

- Control hemorrhage²
- Restore volume By giving Crystalloids (warm to prevent hypothermia) If the patient does not stabilize (or stabilizes then deteriorates) give PRBCs.
- ★ Reassess patient is the patient responding? Still hypotensive?
- Lethal triad (**Acidosis, Hypothermia & Coagulopathy**): caused by tremendous loss of blood that's not being replaced³, this triad will assure if the patient isn't resuscitated will
- ★ Apply direct local pressure when site is visible (e.g., extremity)



1. Keep in mind that even when placing high flow O₂ on the patient, if the patient isn't breathing well it won't guarantee adequate ventilation.
- The risk of pneumothorax in patients with coexisting chest injuries is markedly increased by positive pressure ventilation (method of providing noninvasive ventilatory support). If pneumothorax is already present, tension may be induced. For these reasons, tube thoracostomy is mandatory (tube thoracostomy involves making a small incision in the chest to place a hollow tube between the ribs and into the chest to drain fluid or air from around the lungs).

2. Blood loss into the **peritoneal cavity, thorax** or **pelvis** is usually concealed, can be life-threatening, and cannot be simply controlled. Patients with **major pelvic fractures** pose a difficult management problem, as conventional splintage is impossible and massive and uncontrollable blood loss may result. The optimal approach is the application of external fixator devices in the resuscitation phase, followed, if required, by angiographic embolization.

3. Coagulopathy: when the patient's blood isn't restored, as a mechanism of defense the body will try to stop the bleeding by activating the intrinsic and the extrinsic pathways of the coagulation cascade, and the patient will reach a stage where the PT and the PTT are sky-high.
Acidosis: the patient's O₂ carrying capacity is gone and the acidosis will take over.

The ATLS concept

The Primary Survey:



Disability¹ First thing we need to know if the patient is moving or not

- Baseline neurologic evaluation
- ★ ● Glasgow Coma Scale score by calculating: eye opening response + verbal response + motor response
- Pupillary response² If there is pupils asymmetric it's called lateralizing sign: space occupying lesion somewhere in his brain causing the abnormal pupil response

Eye Opening	
Spontaneous	4
To speech	3
To pain	2
No response	1
Verbal Response	
Coos, babbles	5
Irritable cry	4
Cries to pain	3
Moans to pain	2
No response	1
Motor Response	
Follows commands	6
Localizes pain	5
Withdraws to pain	4
Decorticate flexion	3
Decerebrate extension	2
No response	1

Eyes open	
• Spontaneously	4
• To verbal command	3
• To pain	2
• No response	1
Best motor response	
To verbal command	
• Obeys verbal command	6
To painful stimulus	
• Localizes pain	5
• Flexion withdrawal	4
• Abnormal flexion (decorticate rigidity)	3
• Extension (decerebrate rigidity)	2
• No responses	1
Best verbal response	
• Orientated and converses	5
• Disorientated and converses	4
• Inappropriate words	3
• Incomprehensible sounds	2
• No response	1
Total number of points (minimum 3, maximum 15)	



Exposure / Environment

- Completely undress the patient³
- Prevent hypothermia
- ⚠ ● **Pitfalls:** Missed injuries

Special Considerations



Trauma in the elderly⁴



Pediatric trauma⁵



Trauma in pregnancy⁶

1. It's essential to identify neurological injuries in order to: A- avoid secondary brain injury B- identify surgically correctable lesions C- provide a baseline GCS to identify trends and changes throughout treatment process.

2. Check the pupils for asymmetry. If the pupils are symmetrical and reactive it's most likely that the patient doesn't have a skull injury. But if there's bleeding and pressure in one side it will press on the nerves and the muscle of the pupils making them unequal/asymmetrical and you need to start worrying about intracranial bleeding.

3. To make sure you're not missing any lesions.

4. because they're usually weak and on medications; which alters injury response. E.g. The patient may not be able to respond to hypovolemia by increasing the heart rate because of age, pre-existing cardiac disease or medications such as β -blockers or calcium channel blockers.

5. The effective resuscitation of the injured child requires an appreciation of the physiological differences that exist between children and adults. The normal cardiovascular and respiratory parameters vary with age. For example, the normal heart rate of a newborn infant is 160 beats/minute; the normal respiratory rate of a 1-year-old is about 30 breaths per minute.

6. If you lay a pregnant lady on her back, the uterus (in the 2nd & 3rd trimester) will compress and weigh down on vasculature (IVC) leading to hypotension. **To avoid this: rest her on her left side.**

Primary Survey

➤ Resuscitation ¹:

- Protect and secure airway
- Ventilate and oxygenate
- Stop the bleeding!
- Vigorous shock therapy → not responsive? Consider PRBCs
- Protect from hypothermia

➤ Adjuncts to Primary Survey ²:

01

1. ECG: when suspecting cardiac intuition.
2. Vital signs
3. ABGs (arterial blood gasses)
4. Urinary Output: to estimate the cardiac output
5. Urinary / gastric catheters: to rule out bleeding or elaboration to GI tract unless contraindicated
6. Pulse oximeter and CO₂: to make sure chest is fine, no pneumothorax.

02

★ Imaging studies ³

1. Chest X-Ray
2. Pelvic X-Ray

Diagnostic tools:

1. Focused Abdominal Sonography Test (FAST).
2. Diagnostic Peritoneal Lavage ⁴ (DPL).

The DPL is a lifesaver if you don't have the resources like the US

03

Consider Early Transfer ⁷:

1. Use time before transfer for resuscitation
2. Do not delay transfer for diagnostic tests or for secondary survey

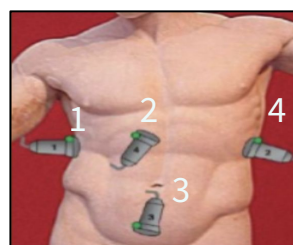
If you are in a rural area with limited resources and you received a trauma patient you need to transfer the patient.



“Open-book” fracture



Probably Hemothorax ⁵



FAST ⁶



DPL

1. Identifying and providing treatment to life-threatening conditions while resuscitating and reassessing are processes that occur during the primary survey and are performed **simultaneously**.
2. These are tools that are done selectively (depending on the spectrum of injuries and the physical response) to help you pick up unidentified injuries and to help you in resuscitation and reassessment.
3. Chest and pelvic X-Ray are mandatory for trauma patients. Previously, Lateral cervical spine imaging was included in the primary survey..but it's no longer needed (unless indicted), the reason behind this is that patients wear C-collars and other systems are needed to be assessed first.
4. A cut is made in the abdomen where a catheter is inserted and the bag is leveled on the ground to allow gravitational force to pull fluid out. In the picture illustrated, the blood is coming out meaning this test is positive.
 - Abdominal injury is commonly missed in patients with altered consciousness of whatever cause. Clinical signs are modified or absent in paralyzed and sedated patients, and so additional investigations, such as ultrasound, CT or diagnostic peritoneal lavage, are important.
5. opacity on the lower left side of the chest with blood leveling, it's probably hemothorax.
6. You look for bleeding with FAST in these 4 areas (as shown in the figure) The 4 Ps 1- pericardial 2- Perihepatic 3- Perirenal 4- Pelvic. EFAST or Extended Fast also evaluate pleural spaces (the 5th P)
7. The time to initiate the transfer process is when the need is recognised. Therefore the need to transfer must be determined early, and the sooner the need is recognised and communicated the more efficiently it occurs. In addition, the time spent waiting for transportation should be spent stabilizing the patient.
 - Reasons to transfer: no available surgeons (trauma, orthopaedic surgeons..), no available operating room, no available equipments.

Secondary Survey

When Do We Start the Secondary Survey?

The complete history and physical examination, Start after:

- Primary survey is completed
- ABCDEs are **assessed**, reassessed **and addressed**
- Vital functions are returning to normal

Components:

- History
- Physical exam: Head to toe
- Complete neurologic exam
- Special diagnostic tests
- Reevaluation

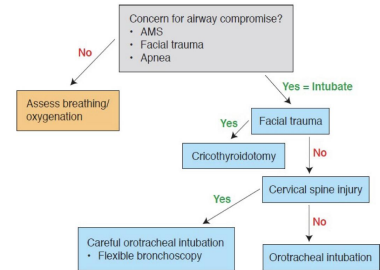


Figure 4.1: Trauma/ABC Assessment Algorithm

Summary

Recall

Q1: What are the 3 main elements of ATLS protocol? ?

A. Primary survey/resuscitation (Life threatening problems discovered during the primary survey are always addressed before proceeding to the next step) B. Secondary survey C. Definitive care

Q2: In addition to the airway, what MUST be considered during the airway step?

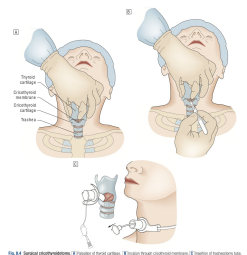
Spinal immobilization, by using a full backboard and rigid cervical collar.

Q3: What is the first maneuver used to establish an airway? If these methods are unsuccessful, what is the next maneuver used to establish an airway?

Chin lift, jaw thrust. If these methods failed → Endotracheal intubation.

Q4: If all other methods are unsuccessful, what is the definitive airway?

Cricothyroidotomy, a.k.a. “**surgical airway**”: Incise the cricothyroid membrane between the cricoid cartilage inferiorly and the thyroid cartilage superiorly and place an endotracheal or tracheostomy tube into the trachea.



Q5: What are the goals in assessing breathing?

A) Securing oxygenation and ventilation B) Treating life-threatening thoracic injuries

Q6: What are the goals in assessing circulation?

Securing adequate tissue perfusion; treatment of external bleeding.

Q7: What comprises adequate assessment of disability?

A) Mental status: Glasgow Coma Scale (GCS) B) Pupils: a blown pupil suggests ipsilateral brain mass (blood) as herniation of the brain compresses CN III C) Motor/sensory: screening exam for lateralizing extremity movement, sensory deficits.

Q8: What are the goals in obtaining adequate exposure?

Complete disrobing to allow a thorough visual inspection.

Q9: What is the “environment” of the E in ABCDEs?

Keep a warm environment (i.e., keep the patient warm; a hypothermic patient can become coagulopathic).

Quiz

Q1: Alice Brown, a 20-year-old female, presents to the emergency department with a suspected overdose.

On examination:

She opens her eyes when you say her name.

She is making short gasps and other sounds but she is not forming any clear words.

She undergoes abnormal flexion in response to a painful stimulus.

What is Alice's Glasgow Coma Scale (GCS) score?

- A) 8
- B) 9
- C) 10

Q2: A 25-year-old motorcyclist has been brought to the A&E department in a panicky state as he is unable to breathe properly and is intensely hypoxic (oxygen saturation of 90 per cent). The trachea is shifted to the right, the left hemithorax does not move and there is hyperresonance over the left chest wall. The noise in the A&E department makes listening to breath sounds difficult. What's the next appropriate line of management ?

- A) Pleural aspiration (Thoracocentesis)
- B) Order a Chest X-ray and wait for the results
- C) Chest tube drainage

Q3: A 22-year-old rugby player has been brought to the A&E department with severe left-sided chest pain following blunt injury sustained in a match about 2 h ago. He is very tachypnoeic and extremely tender over the central part of his left hemithorax. The skin over the ribs looks badly bruised and the chest wall is unstable when he coughs or tries to take a deep breath. What's the correct diagnosis?

- A) Open pneumothorax
- B) Flail chest
- C) Cardiac tamponade

Q4: Which of the following statements regarding the immediate management of a trauma patient is true?

- A) The patient should be asked a simple question such as 'What is your name?'
- B) Oxygen should be administered with great care in trauma patients who might suffer from chronic bronchitis.
- C) The physical signs of a tension pneumothorax are difficult to pick up in the resuscitation room and so it is best diagnosed by an immediate chest X-ray.

Q5: A 28-year-old male was injured in a motorcycle accident in which he was not wearing a helmet. On admission to the emergency room he was in severe respiratory distress and hypotensive (blood pressure 80/40 mm. Hg), and appeared cyanotic. He was bleeding profusely from the nose and had an obviously open femur fracture with exposed bone. Breath sounds were decreased on the right side of the chest. The initial management priority should be:

- A) Control of hemorrhage with anterior and posterior nasal packing.
- B) Obtain intravenous access and begin emergency type O blood transfusions.
- C) Endotracheal intubation with in-line cervical traction

Q6: A 15-year-old boy has been brought into the A&E department having been stabbed on the left side of his axilla. He is gasping for breath and his pulse oximeter shows a saturation of 90 per cent. There is an open wound in the region of the fifth left interspace through which a sucking sound can be heard.

- A) Massive haemothorax
- B) Tension pneumothorax
- C) Open pneumothorax

Answers

Q1	A	Q4	A
Q2	A	Q5	C
Q3	B	Q6	C

[Extra Questions](#)

Quiz

Q1: A 25-year-old man is admitted to the emergency department because of an episode of acute psychosis with suicidal ideation. He has no history of serious illness and currently takes no medications. Despite appropriate safety precautions, he manages to leave the examination room unattended. Shortly afterward, he is found lying outside the emergency department. A visitor reports that she saw the patient climbing up the facade of the hospital building. He does not respond to questions but points to his head when asked about pain. His pulse is 131/min, respirations are 22/min, and blood pressure is 105/69 mm Hg. Physical examination shows a 1-cm head laceration and an open fracture of the right tibia. He opens his eyes spontaneously. Pupils are equal, round, and reactive to light. Breath sounds are decreased over the right lung field, and the upper right hemithorax is hyperresonant to percussion. There is no jugular venous distension. Which of the following is the most appropriate next step in management?

- A) Perform an endotracheal intubation
- B) Place two large bore IV catheters and start two bags of 0.9% saline
- C) Apply a cervical collar

Q2: A polytraumatized patient who arrives to the emergency department alive but unconscious is best managed by:

- A) Endotracheal intubation
- B) Cardiopulmonary compression
- C) Intravenous fluids resuscitation

Q3: You are transporting an intoxicated patient. When you attempt to insert a nasal airway he slaps your hand away, curses at you, and sits up. When you stop, he lays down on the stretcher. What Glasgow Coma score would you assign to him

- A) 13
- B) 11
- C) 9
- D) 7
- E) 5

Q4: A 35-year-old man is brought to the emergency department by his wife 1 hour after being tackled by a bull on his ranch. Immediately after being knocked over, he had pain in his right lower thoracic region. Twenty minutes later, he became dizzy. His wife says he has no history of previous illness and takes no medications. On arrival, he barely responds to painful stimuli. His temperature is 36°C (96.8°F), pulse is 135/min, respirations are 22/min, and blood pressure is 76/62 mm Hg. No source of bleeding is seen besides small lacerations on his extremities. There is a significant ecchymosis in the right lower thoracic region and the right upper quadrant of the abdomen. Chest auscultation shows no abnormalities. Peripheral venous access is established, blood samples for crossmatching and blood gas analysis are drawn, and rapid infusion of Ringer lactate (RL) solution is initiated. A FAST scan of the abdomen discloses blood in the hepatorenal recess. After the administration of 500 mL of RL solution, the patient's blood pressure is 80/64 mm Hg. Which of the following is the most appropriate next step in management?

- A) Initiate fluid resuscitation with hydroxyethyl starch solution
- B) Transfuse O group, Rh negative packed red blood cells
- C) Perform a diagnostic peritoneal lavage

Q5: Severe head injury is defined as Glasgow Coma Score (GCS) of:

- A) 3
- B) 3-8
- C) 9-15

Q6: A 32-year-old man is brought to the emergency department 15 minutes after falling 7 feet onto a flat-top wooden post. On arrival, he is in severe pain and breathing rapidly. His pulse is 135/min, respirations are 30/min, and blood pressure is 80/40 mm Hg. There is an impact wound in the left fourth intercostal space at the midaxillary line. Auscultation shows tracheal deviation to the right and absent breath sounds over the left lung. There is dullness to percussion over the left chest. Neck veins are flat. Cardiac examination shows no abnormalities. Two large-bore intravenous catheters are placed and intravenous fluid resuscitation is begun. Which of the following is the most likely diagnosis?

- A) Cardiac tamponade
- B) Flail chest
- C) Tension pneumothorax
- D) Hemothorax

Answers

Q1	C	Q4	A
Q2	A	Q5	B
Q3	B	Q6	D

Extra
Questions

Good
Luck!



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