432 Surgery Team

16 Trauma Care

Done By:
Lama Al Tawil

Reviewed By:
Fahad AlShayhan

جامعة الملك سعود
King Saud University

COLOR GUIDE: • Females' Notes • Males' Notes • Important • Additional

Objectives

1. Importance of Trauma Care
2. Principles of primary and secondary assessments.
3. Establish management priorities

The Need:

- The leading cause of death in the first four decades of life.
- More than 5 million trauma-related deaths each year worldwide.
- Motor vehicle crashes cause over 1 million deaths per year.
- Injury accounts for 12% of the world's burden of disease.

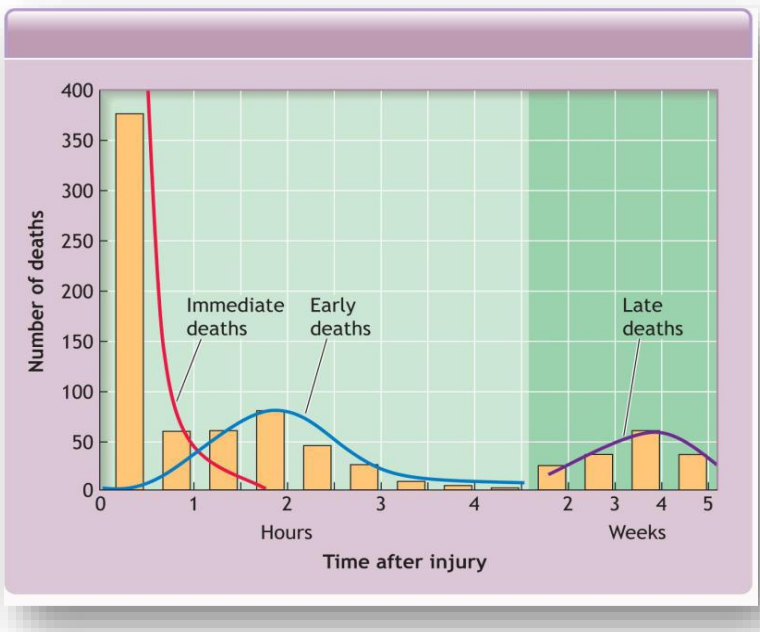
Note(s):

1-Road Traffic Accident is now termed Road Traffic Collision, as it's a preventable cause of death.
2-Trauma is the leading cause of death in those aged beneath 40 years.
3- In Saudi Arabia 60-70% of its population are beneath 40 years (i.e. the population of high risk of death due to trauma or more specific RTA).

The Beginning:

"When I can provide better care in the field with limited resources than my children and I received at the primary facility, there is something wrong with the system and the system has to be changed." Jaymes Styner,MD,FACS,1977

Trimodal Death Distribution:



Note(s):

From this graph remember that in RTA death can happen at three peaks:

1-Immediate:

This is avoided by primary prevention (e.g. putting the seatbelt, wearing a helmet, and setting systems such as Saher).

2-Within hours of the injury (at the hospital level)

This is avoided by training the general practitioners an ATLS course, opening trauma centers (in Riyadh we have the National Guard Hospital).

Getting the patient taken care of within the **Golden hour.**

3-**Late within weeks or months**

This is due to a complication (e.g. DVT, PE, Pneumonia, Bedsores, Infection, and Multi-organ Failure) of severe disabling injury (e.g. paraplegia, coma, or brain injury) which requires a prolonged hospital stay. This is avoided by fixing 1and2

Advanced Trauma Life Support (ATLS) Concepts:

1. ABCDE approach to evaluation and treatment

- **A**irway with c-spine protection
- **B**reathing / ventilation / oxygenation
- **C**irculation: stop the bleeding!
- **D**isability / neurological status
- **E**xpose / **E**nvironment / body temperature

2. **Treat greatest threat to life first**
3. **Definitive diagnosis not immediately important**
4. Time is of the essence (The Golden Hour)
5. Do no further harm

ATLS Objectives:

- Apply principles of primary and secondary surveys
- Identify management priorities
- Institute appropriate resuscitation and monitoring procedures
- Recognize the value of the patient history and biomechanics of injury
- Anticipate and manage pitfalls

Standard Precautions:

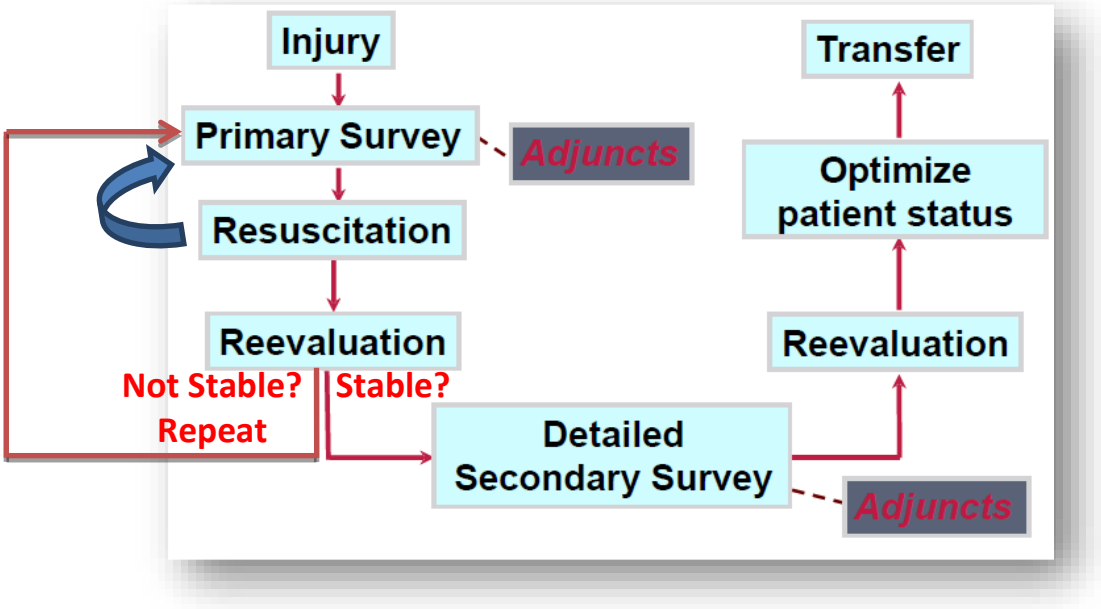
- Cap
- Gown
- Gloves
- Mask
- Shoe covers
- Goggles / face shield

- N.B This is the first step in any survey protect yourself from possible infections such as HIV or HBV to protect your family and patient.
-

Initial Assessment

*Primary survey and resuscitation of vital functions are done simultaneously using a team approach. However, ATLS was originally designed to be run by one doctor and one nurse.

The Concepts of Initial Care and Management:



Quick Assessment:

1- What is a quick, simple way to assess a patient in 10 seconds?

- Identify yourself
- Ask the patient his or her name
- Ask the patient what happened

Note(s):

1-The ATLS concept is applicable on every type of trauma you may come across regardless of the mechanism (e.g. RTA, plane crash, drowning, falling from a building etc...)
2- In the Figure above:
- The primary survey means looking for the life threating condition and dealing with it immediately
-Resuscitation is part of the primary survey.
-The secondary survey is done once you've insured the patient is stabilized, where you go ahead and do the routine clinical assessment (i.e. history, examination, investigation and treatment .Otherwise, if primary survey is still not achieved keep on doing it till the patient is stable.
-The transfer is when you take the patient to a well-equipped hospital for definitive treatment.

Note(s):

Basically ask about Person, Place, and Time…don't ask what their name is as you don't know what the true name is

2- An appropriate response to the previous question confirms the following:

- A– Patent's Airway
- B–Sufficient air reserve to permit speech
- C– Sufficient perfusion to permit cerebration
- D-Clear sensorium

Primary Survey:

Special considerations:

- Trauma in the elderly: for example, you need to know if the MI was the reason for the injury, because this means you will have to address the underlying condition first or is it the trauma itself and not the patient's illness.
- Pediatric trauma.
- Trauma in pregnancy: The mother's life is the number one priority, but you need to save the fetus as much as possible.

A-Airway with c-spine protection:

- Establish patent airway and protect c-spine
- Basic Airway Techniques:

1. **Chin-lift Maneuver**
2. **Jaw-thrust Maneuver**: better than (1) because it doesn't involved moving the cervical spine.

- N.B by doing these maneuvers and lifting the mandible the tongue will no longer occlude the airway.

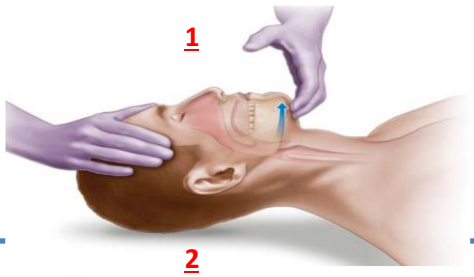
- Advanced Airway Techniques: orotracheal intubation

-N.B after three trials fail you shift to either emergency cricothyroidotomy, or tracheostomy

- **Pitfalls (Unexpected difficulties):**

I. Occult airway injury
II. Progressive loss of airway
III. Equipment failure
IV. Inability to intubate

1



2

B-Breathing:

Assess and ensure adequate oxygenation and ventilation:

- Respiratory rate
- Chest movement
- Air entry
- Oxygen saturation (most important , and has to be >90% saturated), (Last thing we do from this list because the patient might have pneumothorax despite his saturation is normal)

-N.B, here you are assessing bleeds, wounds, bruises, tracheal deviation, subcutaneous emphysema, tenderness, crepitation, hyper-resonance.

Pitfalls (Unexpected difficulties):

- Airway versus ventilation problem?
- Iatrogenic pneumothorax or tension pneumothorax

THE IMMEDIATE LIFE THREATENING INJURIES: for detailed explanation refer to lecture "Mechanisms of Trauma"

- Laryngeotracheal injury / Airway obstruction
- Tension pneumothorax
- Open pneumothorax
- Flail chest and pulmonary contusion
- Massive hemothorax (> 1.5 L) ⓘ
- Cardiac tamponade (unlike the medical one, this needs sternotomy not merely a needle aspiration)

MANAGEMENT From Raslan

- **Where to insert chest tube?**
  - *5th intercostal space, anterior to the mid axillary line.*
- **How to manage tension pneumothorax?**
  - Needle to the 2nd intercostal space at the mid axillary line (needle thoracostomy) followed by Chest tube!

? How to manage open pneumothorax?

- *Placement of dressing secured on 3 sides to create (flutter-valve) Because securing on 4 sides will cause tension pneumothorax, a chest tube distant from injury must then be placed.*

- **How to manage hemothorax?**
  - *Chest tube, if the bleeding didn't stop, the patient must be taken to the OR*
- **How to manage cardiac tamponade in trauma?**
  - *Heart injured, needle pericardiocentasis or pericardial window can be immediately life-saving. Thoracostomy is the definitive treatment with repair of injury*

C-Circulation:

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

N.B

- Hypotension in ATLS is when 40% of the blood is lost

- remember the main DDX for bleeding and hypotension in trauma is “on the floor and four more”:

- Chest →Dx: by Examination & X-ray
- Abdomen →Dx: Fast(Focused Assessment with Sonography for trauma) , DPL(Diagnostic Peritoneal Lavage), abdominal distention
- Pelvis →pelvis is moving with hypotension!
- long bone(femur can bleed out 5L),
- skin laceration. External bleeding, or bleeding at the site of trauma

-remember head or scalp bleed is not the one causing the death, rather it’s the brain compression

Management:

Control hemorrhage

- Restore volume
  - By placing 2L of fluid in peripheral IV lines (faster and easy access), however if you know there is clear bleeding you must replace with blood because the real issue is to stop the bleeding.
- Reassess patient
- **Lethal triad: [Hypothermia, Coagulopathy and Acidosis]** ⓘ

Pitfalls (Unexpected difficulties):

- Elderly
- Children
- Athletes
- Medications

D-Disability

- Baseline neurologic evaluation
- Glasgow Coma Scale Score
- Pupillary response and light reflex
- Look for pupillary dilation whether uni/or bilateral on time arrival or during care delivery both are bad signs indicated brain compression that is pressing on the 3rd cranial nucleus
- Observe for neurologic deterioration

***memorize the GCS, it will come in the exam**

Table 21.21 Glasgow Coma Scale

	Score
Eye opening (*E*)	
Spontaneous	4
To speech	3
To pain	2
No response	1
Motor response (*M*)	
Obeys	6
Localizes the pain	5
Withdraws to pain	4
Flexion(Decorticate)	3
Extension(Decerebrate)	2
No response	1
Verbal response (*V*)	
Orientated	5
Confused conversation	4
Inappropriate words	3
Incomprehensible sounds	2
No response	1
Glasgow Coma Scale = *E* + *M* + *V* (GCS minimum = 3: maximum = 15)	

Very Very Important, MCQ will come from this Schedule

E-Exposure

- Completely undress the patient
- Prevent hypothermia → might lead to coagulopathy (DIC)
- Check for missed injuries

Resuscitation:

- Protect and secure airway
- Ventilate and oxygenate
- Stop the bleeding!
- Vigorous shock therapy
- Protect from hypothermia

Adjuncts to the Primary Survey:

- **X-rays to any trauma patient:**

○ C-spine x-ray (L and AP view) → is you can do CT its better
○ Chest x-ray
○ Pelvic x-ray

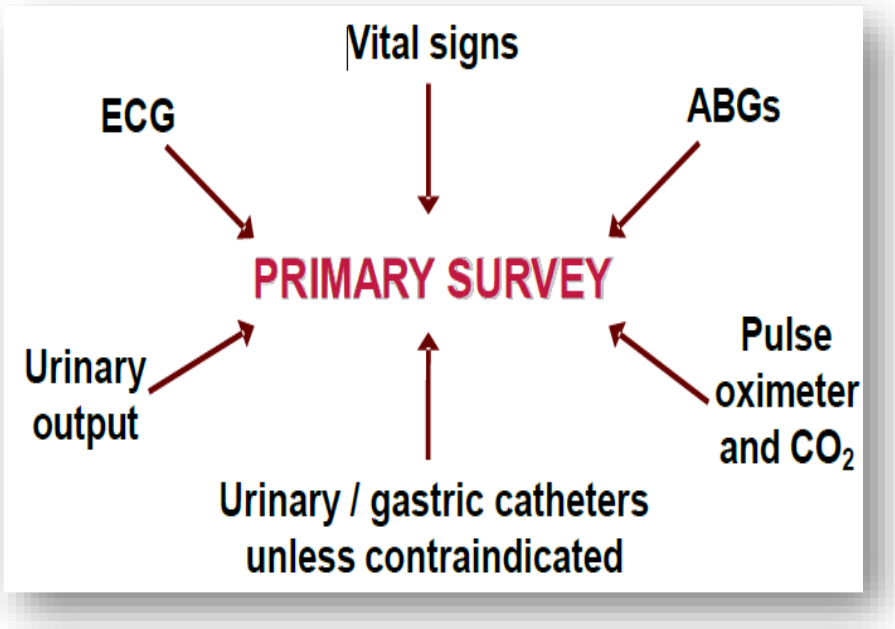
- **Diagnostic Tools:**

○ *FAST* (Focused Assessment with Sonography for Trauma)
○ *DPL* (diagnostic peritoneal lavage)

- **Consider Early Transfer**

○ Use time before transfer for resuscitation
○ Do not delay transfer for diagnostic tests

- **Primary survey should take 10 – 20 minutes**



Secondary Survey:

The **complete** history and physical examination.

When do I start the secondary survey? **"If the patient stable"**
- Primary survey is completed
- ABCDEs are reassessed
- Vital functions are returning to normal

Components of the Secondary Survey:

- History: Allergies, Medications, Past illnesses, Last meal, Events /Environment / Mechanism.
- Physical exam: Head to toe
- Complete neurologic exam
- Special diagnostic tests
- Reevaluation

Head:

- External exam
- Scalp palpation
- Comprehensive eye and ear exam
- Including visual acuity

Pitfalls:
- Unconsciousness
- Periorbital edema
- Occluded auditory canal

Maxillofacial:

- Bony crepitus
- Deformity
- Malocclusion

Pitfalls:
- Potential airway obstruction
- Cribriform plate fracture
- Frequently missed

Neck (Soft Tissue):

- Mechanism: Blunt vs penetrating
- Symptoms: Airway obstruction, hoarseness
- Findings: Crepitus, hematoma, stridor, bruit

Pitfalls:
- Delayed symptoms and signs
- Progressive airway obstruction
- Occult injuries

Chest:

Inspect

- Palpate
- Percuss
- Auscultate
- X-rays

Potential life threatening injuries:

- Blunt cardiac injury
- Traumatic aortic disruption
- Blunt esophageal rupture
- Traumatic diaphragmatic injury

Abdomen:

- Inspect / Auscultate
- Palpate / Percuss
- Reevaluate
- Special studies

Pitfalls:

- Hollow viscous injury
- Retroperitoneal injury

Indications for Laparotomy-Blunt Trauma:

- Hemodynamically abnormal with suspected abdominal injury (DPL /FAST)
- Free air
- Diaphragmatic rupture
- Peritonitis
- Positive CT

Indications for Laparotomy-Penetrating Trauma:

- Hemodynamically abnormal
- Peritonitis
- Evisceration
- Positive DPL, FAST, or CT

Perineum:

Contusions, hematomas, lacerations, urethral blood

Rectum:

Sphincter tone, high-riding prostate, pelvic fracture, rectal wall integrity, Blood

Vagina:

Blood, laceration

Pitfalls:

Urethral injury
Pregnancy

Pelvis:

- Pain on palpation
- Leg length unequal
- Instability
- X-rays as needed

Pitfalls:

- Excessive pelvic manipulation
- Underestimating pelvic blood loss

Extremities:

- Contusion, deformity
- Pain
- Perfusion
- Peripheral neurovascular status
- X-rays as needed

Musculoskeletal:

Pitfalls:

- Potential blood loss
- Missed fractures
- Soft tissue or ligamentous injury
- Compartment syndrome (especially with altered sensorium / hypotension)

Neurological:

1- **Brain:**

- GCS
- Pupil size and reaction
- Lateralizing signs
- Frequent reevaluation
- **Prevent secondary brain injury (Early neurosurgical consult)**

2- **Spinal Assessment :**

- Whole spine
- Tenderness and swelling
- Complete motor and sensory exams
- Reflexes
- Imaging studies

Pitfalls:

- Altered Sensorium
- Inability to cooperate with clinical exam

3– Spine and Cord: Conduct an in-depth evaluation of the patient's spine and spinal cord.

- N.B Early neurosurgical orthopedic consult

Adjuncts to Secondary Survey:

Special Diagnostic Tests as Indicated

Pitfalls:

- Patient deterioration
- Delay of transfer
- Deterioration during transfer
- Poor communication

How to minimize missed injuries?

- High index of suspicion
- Frequent reevaluation and monitoring

Pain management:

- Relief of pain / anxiety as appropriate
- Administer intravenously
- Careful monitoring is essential

Transfer:

Which patients do I transfer to a higher level of care?

- Those whose injuries exceed institutional capabilities:

1. Multisystem or complex injuries
2. Patients with comorbidity or age extremes

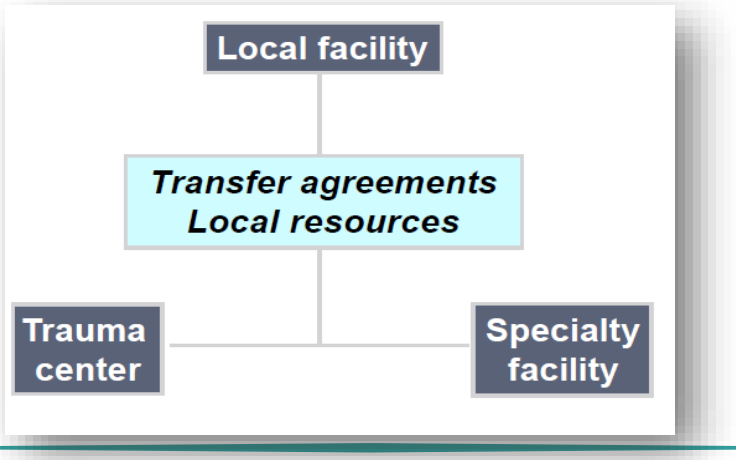
When should the transfer occur?

- As soon as possible after stabilization

Which patients do I transfer to a higher level of care?

- Airway and ventilatory control
- Hemorrhage control

Transfer to definitive care



SUMMARY

- Rapid accurate assessment
- Resuscitate and stabilize priority
- Determine the needs and capabilities
- Arrange for transfer to definitive care
- Ensure optimum care
- ABCDE approach to Trauma care
- Do no further harm
- Treat the greatest threat to life first
- One safe way
- A common language

Questions:

1-In a trauma case what should you do first?

A- Brief History
B- Quick examination
C- ABC
D- None

2- In GCS the worst state is?

A- 15
B- 3
C- 0
D- 1

3- Patient opens his eye to pain, withdraw his hand to pain and he produce inappropriate words. What his GCS score?
A- 7
B- 8
C- 9
D- 10

4- Patient opens his eye spontaneously, localizes the pain and he produce confused conversation. What his GCS score?
A- 12
B- 13
C- 14
D- 15

1:C
2:B
3:C
4:B