PATIENT ASSESSMENT

Objectives

After reading this chapter you will be able to answer the following questions:

- What is the systematic approach to the assessment and treatment of a severely injured patient?
- Know do I apply these rules to the rural and remote trauma settings?

Approach to the patient

Trauma Rule

☞ Assume the worst and proceed accordingly[1]

This rule applies not only to the injuries that should be anticipated, but to the risks that will be present for the carer.

Outside hospital the carer must ensure his own safety, and secure the scene to prevent others who are approaching from becoming part of the incident: these take precedence over the safety of the casualty. The **SAFE** approach is advocated:

S Shout for help
A Approach with care
F Free from danger
E Evaluate ABC

Multiple hazards may threaten the carer including fire, unstable wreckage, broken glass and metalwork, and the elements. These are in addition to assuming that all patients are a potential risk for blood-borne infectious diseases (hepatitis B, hepatitis C, AIDS).

The scene may hold clues to the pattern of injury sustained. In a motor vehicle accident a few seconds taken to 'read the wreckage' may direct the carer to exclude occult injuries.

Thinking Point☻

Consider for a moment the pattern of injury you would anticipate following a motor vehicle accident with

- ☞ Head on impact
- ☞ Side impact

The rules in this chapter are taken from: Hodgetts T. Deane S, Gunning K, **Trauma Rules**,London, BMJ Publishing

In hospital the infectious risk remains and adequate precautions should be taken to protect staff, the minimal requirements being:

- impervious gown or apron
- protective gloves

Eye protection is also recommended. Hypoxia may produce a combative patient: physical restraint is less important than treating the cause of hypoxia. Radiation is a consistent hazard in the resuscitation room and those who remain with the patient should wear lead gowns.

Systematic approach

A systematic approach is recommended for all patients. Anxiety can promote memory loss in the carer, but effectiveness will be assured if the carer can remember simple steps to identify and treat life threatening injuries. The systematic approach for patient assessment and treatment is:

- PRIMARY SURVEY
- RESUSCITATION
- SECONDARY SURVEY
- DEFINITIVE TREATMENT

Within the Primary survey the systematic approach is:

- AIRWAY with cervical spine control
- BREATHING with oxygen
- CIRCULATION with control of external blood loss

Primary survey and resuscitation

The **Primary survey and Resuscitation** go hand in hand. Life threatening injuries must be treated as they are found. This means that an airway obstruction should be treated before moving on to assess and treat the 'breathing', or a tension pneumothorax should be treated before moving on to assess and treat the 'circulation'.

This discipline is important when you are working on your own (bush nurse) or as a pair (RFDS doctor and nurse; ambulance crew) when the case is said to be managed 'vertically'. In a hospital setting with multiple doctors and nurses several tasks will be performed simultaneously, and the case is said to be managed 'horizontally'. Nevertheless, the same 'ABC' priorities must be respected.

Trauma Rule

☞ Life-threatening injuries are treated as they are found

Airway

Hypoxia is a common cause of avoidable trauma death, and simple positional airway obstruction as a result of temporary loss of consciousness is an important cause of hypoxia. There are three steps in the management of the airway'

1. OPEN the airway
2. CLEAR the airway
3. SECURE the airway

The airway is **opened** manually by jaw thrust or by chin lift. As the tongue is attached to the floor of the mouth pulling the jaw forward will also pull the tongue forward and relieve the airway obstruction.

The head flit that is taught in basic life support (cardiopulmonary resuscitation) is avoided following trauma as it may compromise an unstable cervical spine. However, a patient will always die of an airway obstruction and the cervical spine is immobilized because of only the potential injury that exists (unless the patient has symptoms of neurological deficit, in which case the damage has already been done). It is important to keep the right perspective that the airway is always more important than the cervical spine.

Trauma Rule

☞ The airway is always more important than the cervical spine

The airway can be **cleared** by a finger sweep (not recommended in small children as the soft palate is easily damaged), or more effectively by suction which may be hand-held, foot operated, battery operated, or driven by piped air.

The airway is secured initially with a simple adjunct such as an oropharyngeal (Guedel) or nasopharyngeal airway. The correct size of oropharyngeal airway is the one who's length is equivalent to the distance between the corner of the mouth and the angle of the jaw. In an adult it is inserted concave upwards, then twisted through 180 degrees. Complications include worsening the obstruction (when too short) and laryngospasm (when too long).

The nasopharyngeal airway is often under used, perhaps because of the over publicised side effect of nasal hemorrhage, which is rare when inserted correctly (perpendicularly to the face). This airway is effective and is tolerated at a higher level of response than the oropharyngeal airway.

If definitive airway protection is required an endotracheal tube should be placed. However, unless the patient is profoundly unresponsive this will require anaesthesia and drug induced paralysis to achieve.

Recently, advanced airway adjuncts have been introduced which offer a high degree of airway protection (although less than an endotracheal tube), the ability to ventilate the patient through the device, and no requirement to position the airway or use a laryngoscope for their insertion.

These devices are:

- Laryngeal mask airway
- Pharyngo-tracheal lumen airway / Combitube

The laryngeal mask airway in particular has been shown to be an effective airway and ventilation device when used by nurses in a cardiac arrest.

In some circumstances it will not be possible to secure the airway by simple adjuncts or intubation. This may be because there is;

- Foreign body obstruction
- Oedema from burns
- Swelling from facial trauma
- Anaphylaxis (eg from drugs such as penicillin)

With facial disruption it is sometimes possible to secure the airway by placing a transverse tongue suture and pulling the tongue forward. With midface fractures the face may be held forward by traction on the patient's upper incisors. Otherwise a cricothyroidotomy should be considered. This procedure is discussed in the practical section at the end of this book, and is demonstrated on the Rural Trauma Course.

Trauma Rule

☞ When all else fails consider cricothyroidotomy

Cervical spine

A high index of suspicion of cervical spine injury should be maintained following blunt multi-system trauma, particularly when there is a reduced level of response or when there is identifiable significant trauma above the level of the clavicles. The stages of immobilisation are;

1. manual immobilisation
2. semi-rigid collar + manual immobilisation
3. semi-rigid collar + 'sand bags and tape

Stage 2 is acceptable in hospital, but is a relatively poor use of a trauma team member, who can be released if sand bags and tape are applied.

"Sand bags and tape", with the tape applied across the forehead and the body of the collar, is one method of securing the 0-spine. Sand bags may have to be improvised (padded bricks, or intravenous fluid bags). The commercially available 'head box' uses foam blocks with straps that secure the blocks to a long spinal board.

The neck
Before applying a semi-rigid collar take a few seconds to examine the neck. Vital information may otherwise be missed until the secondary survey when the collar is removed.

T	Trachea	Is it deviated (tension pneumothorax)?
W	Wounds	Any wounds compromising the airway?
E	Emphysema	Indicating laryngeal injury, or pneumothorax
L	Larynx	Is it intact ?
V	Veins	Distended neck veins (tension pneumothorax; cardiac tamponade)

Every time!

Breathing
Breathing is assessed by:

- LOOK
- FEEL
- LISTEN

Are there visible signs of chest injury (bruising, imprint sign, flail chest)? Is the chest moving equally on both sides? Is there chest wall tenderness, or surgical emphysema? Can you hear breath sounds, or an altered percussion note? The clinical signs are assimilated to exclude one of five life-threatening chest conditions that requires immediate treatment:

- Tension pneumothorax
- Open pneumothorax
- Massive haemothorax
- Cardiac tamponade
- Flail chest

The assessment and management of these conditions is discussed later in this book.

All victims of severe trauma should receive high concentration oxygen via a tight fitting face mask with attached reservoir. The flow rate is adjusted to ensure the reservoir remains inflated during respiration (10-15Lminute). Pulse oximetry can be used as an adjunct to identify adequate oxygenation, although early changes in ventilatory function are often missed if high concentration oxygen is being given.

Trauma Rule
☞ All patients are dying for oxygen

Circulation

The circulation is assessed by:

- LOOK
- FELL
- LISTEN

What is the patient's colour? Is the capillary return delayed? Can a radial pulse be felt (implies >90mmHg systolic blood pressure), or if not a femoral pulse (>8OmmHg SBP), or if not a carotid pulse (>70mmHg SBP)? Can the blood pressure be auscultated?

In general the pulse rises linearly with increasing blood loss, until a state of critical hypovolaemia when bradycardia may occur. The systolic blood pressure will remain constant until up to 30% of blood volume has been lost and as such is a poor indicator of early blood loss. However, the diastolic blood pressure is seen to rise to meet the systolic pressure with a consequent narrowing of the pulse pressure (force driving the blood around the body). After 30% blood volume loss systolic and diastolic blood pressure fall in tandem.

Trauma Rule

☞ Systolic blood pressure is a poor indicator of early blood loss

The first priority when treating blood loss is to arrest further hemorrhage. Direct pressure and elevation is usually adequate, although a tourniquet may be used if all else fails.

Trauma Rule

☞ Every drop of blood on the floor is forever lost to the patient

Fluid replacement should be by wide bore cannulae (14g or l6g) placed in a large peripheral vein (eg antecubital fossa). Traditionally it has been suggested that fluid therapy should be aggressive, but this dogma has been questioned by research which shows those with penetrating chest trauma have a better chance of survival if resuscitation is delayed until the operating theatre. In rural and remote trauma there must be a pre-hospital compromise. Blood volume must be maintained to a sufficient degree to keep vital organs perfused, while avoiding the risk of rebleeding with aggressive infusion. Aim to keep the systolic blood pressure at or about 90mmHg.

In answer to the question "Which fluid should be used?" there is no simple answer. Crystalloid (normal saline; Hartmann's) should be replaced 3:1 for blood lost and has a short intravascular time. Colloid is replaced 1:1 for blood lost and is retained longer in the circulation. Logistically it would make sense for a remote practitioner to carry colloid, but it should be remembered that at the time of injury the patient may be crystalloid depleted because of the hot climate, and requires some crystalloid to restore interstitial fluid. Remember, the best fluid to replace blood is blood and expeditious transport to hospital is the overriding concern.

Squeeze the nailbed for five seconds. If it takes more than two seconds to refill it is abnormal(unreliable in the cold or the dark). in small children lift the foot up and press on the heel.

When it is not possible to place a large bore cannula the rural practitioner should consider rewiring a small gauge cannula with a rapid infusion device, or placing an intraosseous needle. The intraosseous needle should be considered in children under 6 years where two attempts at intravenous access have failed (see chapter on Pediatric Trauma). Adult needles are available, but infusion rates are slow and the site of insertion is changed to above the medial malleolus.

Ideally all fluid used in trauma resuscitation should be warmed. Blood can be warmed in a Level I blood warmer (very fast), a coil warmer (slow), or in a bowl of warm water (slow). Colloid and crystalloid can be stored in a warm cabinet in the emergency department. As a last resort crystalloid can be warmed in a microwave oven (but do not do this with dextrose, which becomes toffee, or colloid, which becomes glue, or blood, which becomes black pudding).

Disability
The disability (neurological response) is assessed in the Primary survey with the AVPU scale and an assessment of pupil size. A dilated pupil is assumed to reflect an expanding intracranial haematoma on the same side.

A Alert
V Responds to Voice
P Responds to Pain
U Unresponsive

Exposure
Clothes must be removed in order to make a full examination. This may be staged to prevent embarrassment or unnecessary exposure to the elements, and pre-hospital will be limited by time and practicality.

It is important that the whole of the body is examined to exclude life threatening injuries on the back. This is particularly important for penetrating trauma where a second knife wound or the exit gunshot wound may otherwise be missed.

Trauma Rule
☞ Every patient has a front, a back, two sides, a top, and a bottom

Primary survey X-rays
Following blunt multi-system trauma it is difficult clinically to exclude a cervical spine injury, subtle intrathoracic injury (small pneumothorax, small hemothorax), or a stable pelvic fracture. For this reason a series of three X-rays is performed at the end of the primary survey:

AR chest
lateral cervical spine (excludes 85% of pathology)
AP pelvis

Other X-rays can usually wait to be performed in the radiology department where radiation doses are smaller than on portable equipment, and picture resolution is better.

Secondary survey

The secondary survey is a complete head-to-toe examination to identify all injuries and to prioritise them for further investigation and definitive treatment. This is unlikely to be practical, nor is it appropriate, that this is comprehensively performed outside a hospital.

During this phase of patient management it may be appropriate to provide intravenous analgesia; to insert a urinary catheter, or a nasogastric tube; or to perform diagnostic peritoneal lavage (see chapter on *Abdominal trauma*).

Definitive treatment

The definitive treatment of penetrating trauma will usually involve surgical exploration, under local or general anaesthesia. The definitive treatment of blunt trauma often involves no surgical intervention, although may require a period of intensive care. If secondary transfer is required to a hospital with specialist surgical facilities (such as neurosurgery) it will be important to first stabilise all life-threatening general surgical (eg splenic or liver hemorrhage) and orthopaedic (eg unstable pelvic fracture) injuries.