BATLS

Battlefield Advanced Trauma Life Support (BATLS)

SUPPLEMENT NO 1 PAEDIATRIC TRAUMA

Aim

1. On successfully completing this topic you will understand:

- The important differences in the anatomy and physiology of a child that affect trauma management.
- The similarities between children and adults in the assessment and management of trauma.

Introduction

2. In terms of assessment and management following injury, children cannot simply be regarded as small adults. There are important anatomical, physiological, and psychological differences that must be considered in the **A B C D E** routine during the primary survey and resuscitation phases.

Anatomical differences

Airway

Differences	Associated problems
● A large tongue in babies and small children.	● Airway obstruction from the tongue.
● A relatively high anterior larynx.	● Difficulty in visualising the vocal cords.
● A large floppy leaf-shaped epiglottis.	● Need to modify tracheal intubation technique.
● Poor support for the upper trachea other than the cricoid ring.	● Contraindication to surgical cricothyroidotomy under 12 years old.

Breathing

An elastic chest wall.	A tendency to underestimate severity of internal injuries in the absence of chest wall injury, particularly following blunt injury.

Circulation

Difficult intravenous access.	Peripheral venous access can be particularly difficult in tiny children, or in any child if there is peripheral shut down. The intraosseous needle technique is a rapid, safe and effective alternative, or peripheral venous cut-down may be used.

Disability

Difference	Associated problems
Under 4 years old, inability to speak fluently.	The Glasgow Coma Scale score cannot be used. The Paediatric Coma Scale score must be used instead. (See paragraph 15 of this Supplement).

Physiological differences

Airway

Difference	Associated problems
Small children are obligate nasal breathers.	Nasal obstruction is poorly tolerated.

Breathing

The respiratory rate and tidal volume vary with age.	An adult ventilation bag can be used, but with only enough tidal volume to make the chest rise. An adult face mask can also be used, but often gives a better seal if rotated through 180°.

Circulation

The pulse rate and systolic blood pressure vary with age. As a rule, the normal systolic blood pressure for a child is systolic BP=80+(age x 2)mmHg. The normal ranges of childhood pulse rate, blood pressure and respiratory rates are shown opposite:	Age (yrs)	Pulse	Systolic BP	Respiration
	<1	110-160	70-90	30-40
	2-5	95-140	80-100	20-30
	5-12	80-120	90-110	15-20
	>12	60-100	100-120	12-15
The circulating blood volume in a child is relatively large than in an adult – 80-90 ml/kg.	A child can lose up to 40% of circulating blood volume before the blood pressure falls. Do not be caught out by an injured child who is normotensive.			

Psychological differences

Difference	Associated problems
Soldiers injured in battle can be remarkably ambivalent towards their injuries. This has something to do with their inherent camaraderie and concern for each other, and perhaps because injury heralds a temporary respite from the continual exposure to the stress of war.	An innocent child injured in conflict is unlikely to have this perception and will be in pain, frightened by his injuries and anxious about separation from a parent.

Primary Survey and Resuscitation

3. The primary survey and resuscitation follows the same systematic approach as in adults, the A B C D E routine.

Airway

4. The airway in children is opened by the chin-lift or jaw-thrust manoeuvre. A blind finger sweep should not be attempted, as the delicate tissues of the oropharynx can be damaged and the foreign body further impacted in the upper airway. To clear the airway use an oropharyngeal (*Guedel*) airway, *but this must be correctly sized*; if it is too large the glottis will be stimulated causing retching (with a rise in intraranial pressure), vomiting and aspiration. In children, the airway is inserted the *right-way-up*, not *upside-down and rotated by 180°*, as in adults. A nasopharyngeal airway can be improvised by cutting a tracheal tube to the appropriate length (from the nostril to the angle of the jaw). *The correct size of nasopharyngeal airway is one that just fits inside the nostril without causing blanching of the nasal skin.* Care must be taken not to cause bleeding from the nose.

5. Tracheal intubation remains the *gold standard* for securing a child's airway. The correct tube size is calculated by the formula: (age in years ÷ 4) + 4 = internal diameter in millimetres. *The correct internal diameter for the tracheal tube is the one that will just accept the child's little finger.* The tube length is important; the tracheal tube should be passed just below the vocal cords but no further. The short trachea makes endobronchial intubation likely. The position of the tracheal tube should be carefully checked by auscultating in both axillae. An *uncuffed* tracheal tube must be used in all children under the age of puberty.

6. Surgical cricothyroidotomy is contraindicated in children under 12 years old. A needle cricothyroidotomy, using an 18 gauge cannula, may be performed on a child under 12 years old for immediate resuscitation prior to tracheostomy (see page 4-25).

Breathing

7. All children who have been seriously injured require oxygen. A high flow rate and non-rebreathing reservoir mask should be used when available. Gastric distension is common with high flow oxygen, this distension may promote gastric regurgitation and aspiration and splint the diaphragm. A nasogastric or orogastric tube should be considered early in resuscitation. Chest trauma has the same spectrum of injuries and is managed in exactly the same way as for adults, using appropriately sized equipment.

Circulation

8. Fluid resuscitation is in milliletres per kilogram. This dosage begs the question *How do you work out the weight of a child?* There are four simple methods when scales are not available:

- Ask the parent.
- Use the formula (age in years + 4) x 2 = weight in kilograms (accurate up to ten years old).
- Use a resuscitation guide such as a modified *Oakely* Paediatric Resuscitation chart.
- Use a *Broselow* tape (this correlates the length of a child with a list of appropriate drug doses and tube sizes).

9. The following fluid resuscitation protocol is recommended for a child:

- 20 ml/kg crystalloid, as a bolus, reassess; then if no response

- 20 ml/kg colloid, as a bolus, reassess; then if no response
- 10ml/kg blood

Consider surgery, especially if the vital signs – pulse rate and blood pressure – do not improve after fluid therapy. All fluid should be warmed. Children have a larger surface area-to-volume ratio than adults and will cool more quickly when exposed. Hypothermia is a real threat and will be made worse by the use of cold resuscitation fluids.

10. Peripheral venous access can be attempted first but, if this is unsuccessful, move rapidly on to the intraosseous route. This is a rapid, safe and effective alternative for children under seven years old. A 16 gauge cannula is preferable, or a special intraosseous needle. The primary site is 1 to 2 cm below and medial to the tibial tuberosity. Any drug can be given by this route; remember that fluids must be syringed in, not just left to drip in. The needle can be stabilised by packing dental swabs between the skin and the flange and by supporting the limb in a splint. The intraosseous route is regarded as a resuscitation procedure and should be replaced by peripheral or central venous access for ongoing intravenous fluid. Osteomyelitis is rare (less than 0.5%).

Disability

11. The disability assessment in the primary survey is the same as in adults. Ask yourself – is the child;

- **A**lert?
- **V**oice – responding to?
- **P**ain – responding to?
- **U**nresponsive?

Assess the:

- Pupils for size and inequality.
- Posture for signs of severe brain injury (decorticate or decerebrate) which may present intermittently following painful stimuli.

Exposure

12. Exposure is necessary to make a complete examination (secondary survey), but remember that hypothermia is a real risk; consider exposing the child in stages. The head is an important site of heat loss.

13. It is worth including an additional step in the primary survey for children – this is *blood glucose* estimation. A stick test from a heel or finger prick is adequate. Children have small glycogen stores that are rapidly metabolised following the stress of an injury. A reduced level of response or consciousness may simply be due to hypoglycaemia, which is readily reversible with 2 ml/kg 10% dextrose, intravenously.

Secondary Survey and Definitive Treatment

14. A head-to-toe examination is essential to identify all injuries. These injuries are then sorted into priorities for definitive treatment. The examination, injuries and priorities are as in adults with some important differences described below.

Head injury

15. Head injury is the most common cause of death from blunt trauma in children surviving to reach hospital. Scalp lacerations can bleed profusely and, unlike the general rule for adults, haemorrhage may be sufficient to produce hypotension. The Glasgow Coma Scale cannot be applied to children under four years old; the Paediatric Coma Scale, which has a modified verbal response component, must be used in this age group:

5 points = Smiling.
4 points = Crying but consolable.
3 points = Crying and intermittently consolable (moaning).
2 points = Crying and inconsolable (irritable).
1 point = No response.

Abdominal injury

16. Isolated visceral abdominal injuries are sometimes managed conservatively in children. This is only possible when an accurate diagnosis can be made (for example with ultrasound or CT scanning) and the surgeon is experienced. There needs to be an adequate monitoring and round-the-clock surgical support. Diagnostic peritoneal lavage is not appropriate if the intention is to manage these injuries conservatively, as the presence of blood alone will not be an indication for surgery.

Spinal injury

17. Spinal injuries are uncommon in children and spinal immobilisation in an anxious child is often difficult. Adequate spinal immobilisation is still important until the injury has been excluded clinically and, where necessary, radiologically. If the child is very agitated it is better just to apply a semi-rigid collar and not tie the head down with tape and sand bags, as the rest of the body will continue to thrash about causing rotational stresses to the cervical spine. Pseudosubluxation of C2 on C3 is noted in 9% of X-rays of children under eight years old, with up to 40% of these showing tendencies towards this X-ray finding. If in doubt, the spine should be immobilised until the cervical spine X-ray has been assessed by a suitably qualified doctor.

Pain relief

18. Pain relief should be considered early once the primary survey has been carried out and resuscitation has been performed. The

following can be used:
● *Reassurance*. This costs nothing. A parent in the room can be as useful as any analgesic drug.
● *Splintage*. Fractured limbs should be splinted.
● *Entonox*. A 50:50 mixture of oxygen and nitrous oxide that is inhaled. This is useful for short painful procedures if the child will co-operate.
● *Morphine*. The dose in children is 0.1 to 0.2 mg/kg titrated slowly intravenously according to response. Intramuscular morphine should be avoided in the presence of shock.
● *Ketamine*. This is a useful analgesic for short, painful procedures, such as emergency manipulation of fractures or dislocations to restore a distal pulse. The analgesic dose is 0.5 to 1 mg/kg intravenously and up to 5 ml/kg intramuscularly. The onset of effect is five to ten minutes after intravenous administration and longer after intramuscular administration, so wait for an effect before you perform any painful procedure.

Ketamine is contraindicated in head injuries. In larger doses it is an anaesthetic and should only be used by experienced doctors with appropriate facilities available.

Summary
● The principles of trauma management in children and adults are the same although there are important anatomical, physiological and psychological differences between children and adults.

● Remember the **A B C D E** routine.

SUPPLEMENT NO 2 HELICOPTER EVACUATION

Introduction
1. After initial BATLS resuscitation, casualties requiring surgery have to be moved out from the RAP to a forward surgical team or a field hospital. After intial surgery has been performed at these facilities, casualties may need to be moved again for further surgery. These transfers may involve military helicopters. Aeromed trained personnel of the RAF normally evacuate casualties, but operational situations may preclude the use of these escorts and untrained personnel may have to be utilised in the best interest of the casualty.

2. It is strongly advised that if untrained personnel are utilised for the transportation of casualties by helicopter, the organising medical officer contacts the Aeromedical Evacuation Co-ordinating Officer (AECO) or the Aeromedical Evacuation Liaison Officer (AELO) for advice. In normal circumstances a field hospital will have an AELO, who will be responsible for co-ordinating casualty preparation and evacuation.

3. Aim to become confident and proficient about working around and with helicopters before you have to prepare a casualty for flight, escort a casualty in flight or work with aircraft in an emergency.

Golden rules to be observed when working with helicopters
Approaching the helicopter
● Do not approach within 30 metres (100 feet) of a helicopter, or leave the aircraft without a clear signal from the aircrew to do so. A *thumbs up* by day, *one flash of light* (by torch) by night.
● Always approach the aircraft from the correct direction. In general, this is the 2-3 o'clock position, except for the Chinook, which is approached from the 4-5 o'clock or 7-8 o'clock position.
● Particular care is to be taken when working on sloping or uneven ground. Remember, on an uphill slope the rotor blades will be nearer the ground.
● Casualties may have to be loaded while the rotor blades are still turning. Because of the downwash created by the rotor blades, all headgear is to be removed and loose articles secured, before approaching the aircraft.

General safety
● No smoking inside or within 15 metres (50 feet) of the aircraft.
● Personal belongings must be kept to a minimum.
● All personal weapons should be unloaded and the magazine removed before approaching the aircraft.
● Do not enter the inside of the cabin unless instructed to do so.
● Do not touch anything while inside the cabin unless instructed to do so.

Be particularly careful of those areas painted with black and yellow stripes. These are emergency controls.

● All helicopters are extremely noisy aircraft. This noise is to be considered a hazard and hearing protection is to be worn when in their vicinity (including casualties).
● Do not move about the aircraft during flight, especially the Puma and Wessex without first informing the crew.

Casualty considerations
● The aircrew must be informed of any flying restrictions imposed by the casualty's clinical condition prior to the flight.
● Casualties on stretchers are to be brought to the aircraft feet first, except for the Chinook, when casualties are to be brought to the aircraft head first.

Emergency procedures
4. Obey all orders given by the aircrew. In an emergency situation the instructions of the

aircrew *must always* be carried out *immediately.*

5. In the event of an emergency, the aircrew will brief you. Ensure that you are strapped in correctly (your casualties should be strapped in at all times). Brace yourself in readiness for impact and above all *keep calm.* On landing, wait until the rotors have stopped, unfasten casualties and make good your's and the casualty's escape.

6. In a ditching situation (emergency landing on water) remain calm, fit your life jacket (do not inflate until you have completely exited the aircraft). Brief conscious casualties on how and when to release their harness. Identify the nearest exit. Following impact with the water, the helicopter may begin to tumble. Hold your breath and wait for the aircraft to come to rest, then vacate through the exit and rise to the surface. If the airframe remains afloat, follow the instructions of the aircrew.

Military Helicopters

7. Military helicopters have two methods of carrying casualties in the Air Ambulance role:

- Rapid reaction (hot extraction).
- Multi-stretcher fit (aeromedical transportation).

8. As the aeromedical evacuation squadron will always undertake the aeromedical transportation, this section will concentrate on the rapid reaction method of transportation, where in unusual circumstances it may become necessary for untrained personnel to escort casualties.

The Puma

9. The Puma is a single main rotor, twin engine helicopter. Its main role is to provide tactical support but is often used in a casevac role. This extremely versatile aircraft, when conditions dictate, can accommodate usually two stretchers (but can take three) or six walking casualties (or a combination between the two maximums) in the rapid reaction role (see Fig Suppl 2.1).

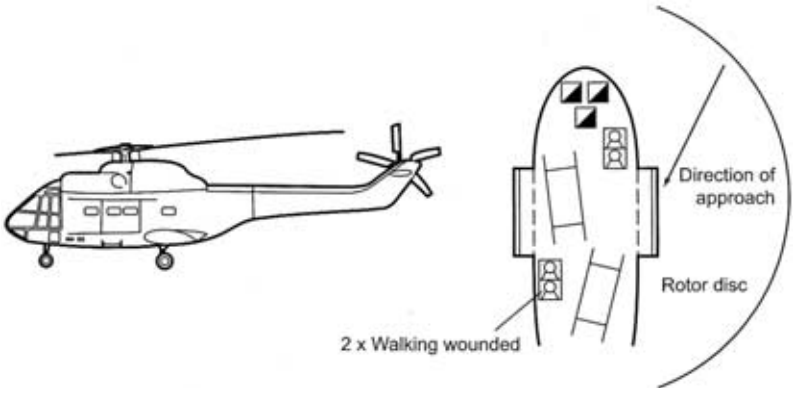

Fig Suppl 2.1 Puma helicopter.

Danger points

10. *Main rotor.* The main rotor is 15.8 metres (49.5 feet) in diameter and drops to a low point of 3.65 metres (12 feet) approximately on level ground.

11. *Tail rotor.* The tail rotor is 3.05 metres (10 feet) in diameter and reaches a low point of 2.05 metres (6.75 feet) on level ground.

12. *Fragile windows and doors.* The main cabin doors, the cockpit access door and the co-pilot's jettisonable panel are all made of light-alloy and transparent materials. Use care when operating the cabin door and stay well clear of these areas when in flight.

Loading sequence

13. The *ready position* is 30 metres (100 feet) out from the helicopter at the 2 o'clock position.

14. *Emplaning.* Approach the helicopter only when signalled to do so by the aircrew. The approach is from the ready position to the starboard cabin door. Casualties are loaded feet first and are secured with their heads forward (except when contraindicated by the casualty's injuries, particularly those with head injuries who, whenever possible, should not fly in a head-down position).

15. The stretchers are loaded in the following sequence.

- Port rear.
- Starboard rear.
- Port centre.

16. Unloading is the reverse of loading.

The Chinook

17. The chinook is a tandem rotor, medium lift helicopter designed to operate in all weather conditions. It is designed for trooping, tactical support, internal/external freight carrying, parachuting, rescue and aeromedical roles. In tactical conditions, up to ten stretchers cases can be secured directly to the helicopter floor, the extra space required to achieve this is obtained by detaching the seating from floor points and folding them back (see Fig Suppl 2.2).

Danger points

18. *Twin rotors.* The twin rotors are 18.3 metres (60 feet) in diameter and the forward rotor can drop to a low point of 1.34 metres (4.5 feet) on level ground.

19. *Engine and auxillary power unit (APU) exhaust.* The exhaust gases from the engines and APU are blown to the rear of the aircraft. These gases are extremely hot and care must be taken when emplaning.

20. *Engine noise.* The Chinook is an extremely noisy aircraft and it is essential that hearing protection be worn in and around

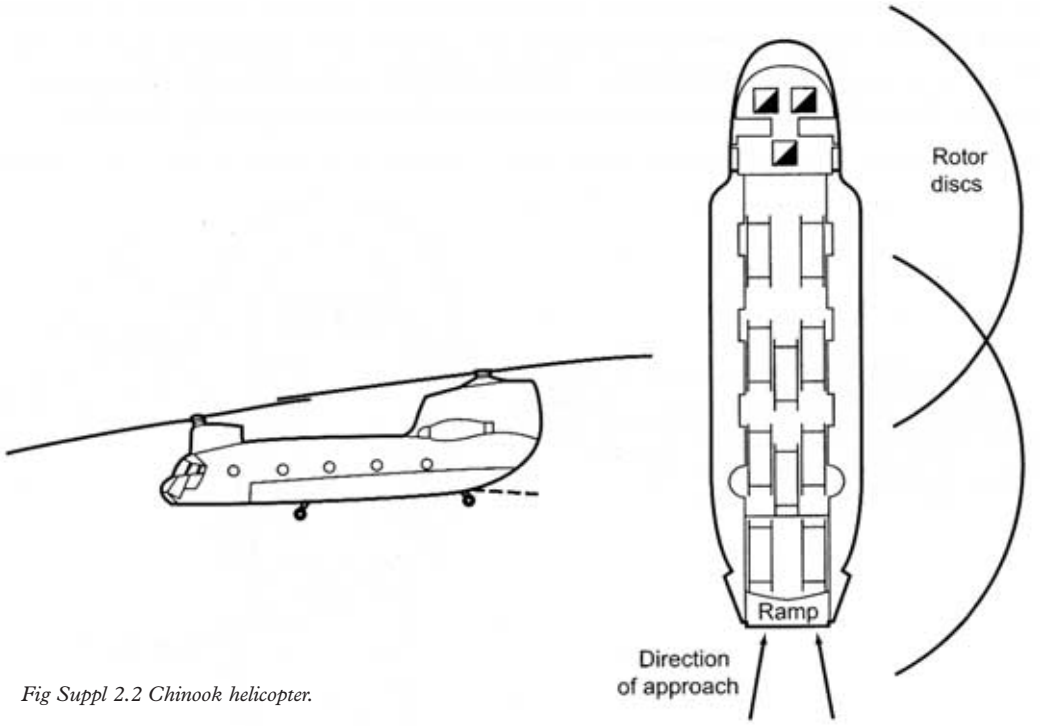

Fig Suppl 2.2 Chinook helicopter.

this aircraft. Failure to do so is likely to cause permanent hearing damage.

Loading sequence

21. The *ready position* is 30 metres (100 feet) out from the helicopter between the 4/5 o'clock and 7/8 o'clock positions.

22. *Emplaning.* The approach to the aircraft is from the ready position to the edge of the ramp (when loading and unloading casualties, only the ramp is to be used). Casualties are to be carried headfirst onto the aircraft and positioned with their heads forward, this includes those with head injuries. A member of the aircrew will control the loading and securing of the casualties.

The Sea King

23. The Sea King is a single main rotored, twin engined, all weather tactical support helicopter. This aircraft is extremely versatile but is primarily used for troop transport, carriage of underslung loads and search and rescue. In the rapid reaction role, up to six stretchers can be secured to the floor. This layout is heavily dependent on the aircraft's configuration and the theatre of operation. In a combat zone, it will be more likely to carry four stretchers (see Fig Suppl 2.3).

Danger points

24. *Main rotor.* The main rotor is 21.34 metres (70 feet) in diameter and drops low as the blades slow to a halt. **Do not enter the disc area during engine shut down.**

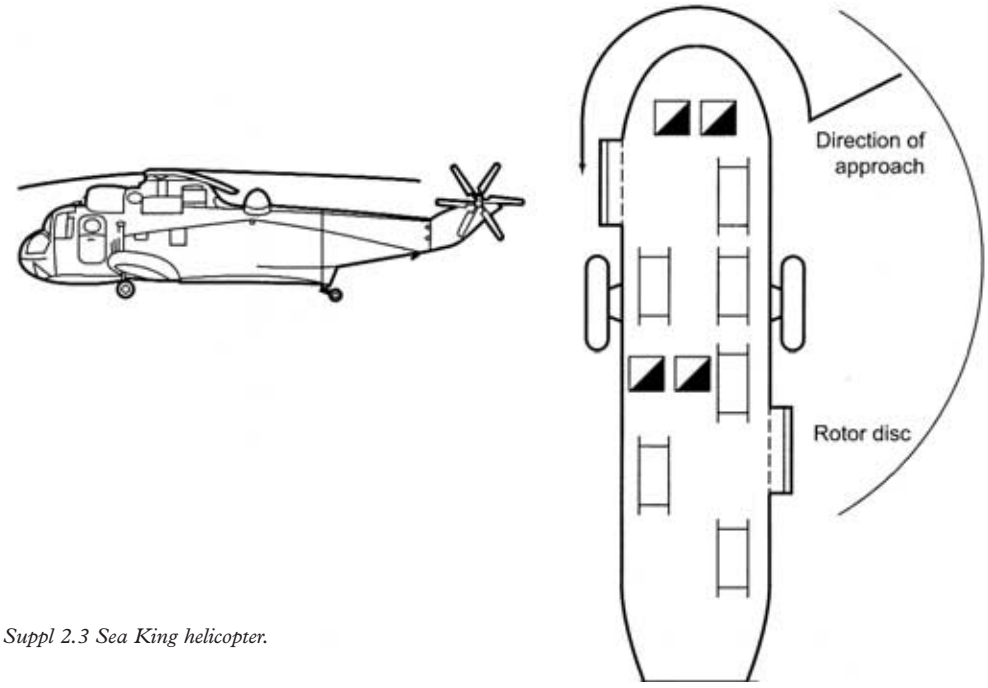

Fig Suppl 2.3 Sea King helicopter.

25. *Engine intakes and exhausts.* The engine intakes are situated above the cockpit and the exhaust gases are blown to the side and may radiate up to 8 metres from the main rotor assembly.

26. *Tail rotor.* The tail rotor is 3.96 metres (13 feet) in diameter and reaches a low point of 2.74 metres (9 feet) on level ground.

27. *Other danger areas* include the Floatation Bag Canister covers (can travel up to 60 metres (200 feet) when operated), the high frequency aerial and General Purpose Machine Gun (GPMG) where fitted. There is also an Ice Accretion Indicator at eye level on the forward port side.

Loading sequence

28. The *ready position* is 30 metres (100 feet) out from the aircraft at the 2 o'clock position.

29. *Emplaning.* The approach is from the ready position to the main starboard side door. The casualties are loaded headfirst into the cabin and positioned with their head forward, the exception again being those with head injuries.

The Wessex

30. The Wessex is a single rotored, twin engined, extremely versatile utility helicopter. In the rapid reaction role this aircraft can accommodate two stretcher casualties secured directly to the floor and up to three walking casualties. This configuration allows for a minimal amount of time spent on the ground (see Fig Suppl 2.4).

Danger points

31. *Main rotor.* The main rotor is 17.06 metres (56 feet) in diameter and drops to a low point of 2.59 metres (8.5 feet) on level ground.

32. *Engine intakes and exhausts.* The main engine intake is located in the nose of the aircraft. There are two exhaust pipes on either side of the aircraft situated just below the cockpit side windows.

33. *Tail rotor.* The tail rotor is 2.89 metres (9.5 feet) in diameter and has a maximum ground clearance of 2 metres (6.75 feet) on level ground.

Loading sequence

34. The *ready position* is 30 metres (100 feet) out from the aircraft at the 2 o'clock position.

35. *Emplaning.* The approach is from the ready position to the starboard cabin door. Stretcher cases are loaded in the following sequence.

- Port centre.
- Starboard rear.

36. Casualties are loaded into the cabin feet first and secured with their heads forward, except head injuries.

Universal hazards

37. Personnel on the ground should avoid looking at the IR Jammers fitted to the fuselage, eye damage may be sustained if viewed at a distance closer than 4.5 metres (15 feet). There may be chaff and flare dispensers fitted to the aircraft and close proximity to these must be avoided. HF aerial antennae must also be avoided.

Clinical criteria

General

38. In a *hot extraction* situation, particularly when there is extreme danger to the aircraft (a soft-skinned vehicle!) and personnel, a 'scoop and scoot' approach may be necessary. This will move you, the casualty and the aircraft to a safer environment *but* will almost certainly mean little by way of clinical intervention, other than clearing and maintaining an airway, can be carried out.

39. Whenever feasible, the casualty should be as stable as possible before casevac, with a secure airway and other life-saving procedures, such as chest drain insertion carried out *before* emplaning. Remember, once airborne it is extremely difficult verging on

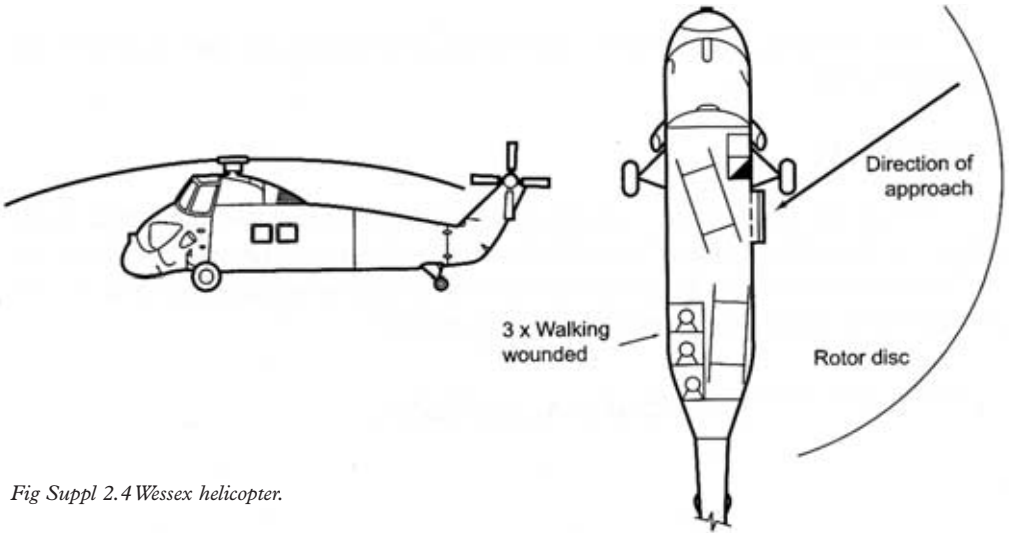

Fig Suppl 2.4 Wessex helicopter.

the impossible, to carry out these procedures. Even palpating a pulse at the cartoid may be rendered impossible due to aircraft vibration. If portable electronic monitoring aids are available, use them!

40. Although most of the following clinical criteria apply more to evacuation by fixed-wing aircraft in the aeromed role, they should still be borne in mind when helicopter evacuation is employed.

41. The medical employment of Air Transport in the Forward Area is governed by NATO Standardisation Agreement (STANAG) No 2087. This agreement defines who, how, when and where casualties can be evacuated from the battlefield.

42. The remainder of this supplement gives some broad guidance to medical personnel for the transportation of the more common battlefield injuries/conditions. There are no absolute medical contraindications to air movement, but some precautions are required with certain clinical conditons.

Surgery

43. Significant gastrointestinal dilation may occur due to gas expansion at altitude; any casualty who has undergone a laparotomy should not normally be emplaned within ten days of the operation. This interval should be extended to 21 days in the case of a thoracotomy. In an emergency, these casualties can be flown providing a sea level cabin altitude is maintained.

Head trauma/neurosurgery

44. *Raised Intracranial Pressure (ICP)*. Any casualty who presents with clinical signs of raised ICP will require a medical escort with easy access to resuscitation equipment. There is no requirement for any altitude restriction, as the altitudes at which military helicopters fly do not lead to any significant rise in ICP.

45. *Subarachnoid haemorrhage (SAH)*. Ideally, casualties should only be evacuated when their condition is stable and accompanied by a medical officer. No altitude restrictions apply but evacuation should be direct to a pre-arranged neurosurgical centre.

46. *Intracranial haematoma/Intracerebral haemorrhage*. The haemorrhage/haematoma should be evacuated prior to the casualty being transferred, but if this is not possible they should be accompanied by medically trained personnel with appropriate resuscitation equipment and flown in a head-up position.

47. *Fractured skull*. A casualty who has sustained a fractured skull, particularly open fractures complicated by intracranial air, should be evacuated at sea level.

Chest trauma

48. *Pneumothorax/Tension pneumothorax*. Any casualty who has sustained a pneumothorax/tension pneumothorax or has air in the pleura cannot be evacuated by helicopter unless a chest drain is in situ, attached to either a Heimlich valve or closed chest drain bag.

Orthopaedics

49. *Fractures*. Limbs may swell under fracture immobilisation casts, it is important to follow the appropriate guidelines:

- *Plaster of Paris (POP)*. A recently applied POP (less than 72 hours) must be bi-valved prior to evacuation. Older POP casts may be left, but the casualty must be escorted, with plaster shears available, to bi-valve the cast if required.
- *Synthetic casts*. Synthetic casts are virtually impossible to cut in-flight. More caution must be exercised before emplaning a casualty with such a cast. Synthetic casts must be bi-valved if the cast has been applied for less than 10 days.

Maxillofacial trauma

50. All casualties with maxillofacial trauma must have a secured airway prior to evacuation. Casualties who have had external fixation of the jaw must be accompanied by an escort who has the means of releasing the fixation (wire cutters) immediately available. (Motion sickness may cause the casualty to vomit in-flight).

Ophthalmic trauma

51. A casualty who has a penetrating eye injury or suspected penetrating eye injury is to have two sterile pads applied to the injured eye and systemic antibiotic therapy commenced prior to evacuation. The casualty may travel sitting and no altitude restrictions are required: ideally, space permitting, they should travel as a stretcher case.

52. Any ophthalmic case which has been operated on and in which the surgeon has injected air can be evacuated as a sitting case but cabin altitude must be restricted to 600 metres (2000 feet).

Summary

Preparation of casualties for flight

The vast majority of casualties will only require a *common sense* approach to their preparation for evacuation, by asking simple questions, most problems can be identified and resolved prior to the evacuation.

Ask?

- Are aeromed teams available to undertake this task? (Contact them).
- If aeromed teams are unavailable but can offer advice, talk to them.
- Where is the onward destination and are they expecting the casualty. (Check).
- Is the destination suitable for the casualty

and the aircraft type? (Check).
- What level of training is required to transfer the casualty? (Cbt Med Tech/RGN/ MO).
- Are the appropriate aeromed stretchers and harnesses available? (If not get them).
- Are all the casualty's documentation and X-rays available for transportation with the casualty? (Check).
- Does the casualty require a secure airway, intravenous access or fluid resuscitation prior to or during flight? (Ideally, the casualty must be as stable as possible prior to flight).
- Are all IV lines taped and secure. (Check them).
- Is there sufficient oxygen supply on board for the casualty's(ies) needs to complete the journey and cope with delays? This especially applies if the ventilator is air or oxygen driven.
- Has the electrical medical equipment required for transportation been cleared for use on the aircraft? (Talk to the aircrew). This equipment may be necessary for in-flight monitoring. Even simple tasks such as counting a pulse rate using the carotid artery, may be impossible in a vibrating airframe.
- How is the casualty going to be positioned on board the aircraft and does the escort have access? (Find out).
- If the flight is tactical and at night, the aircrew may be using night vision goggles, can any light be used in the cabin? (On chinooks the crew may be able to provide a blacked out area; in other aircraft torches with green filters will have to be used and monitoring undertaken by touch. Check the situation with the crew and be prepared to adapt).
- It is very difficult to care for a casualty in the air, particularly on a helicopter. It is extremely important to prepare the casualty properly prior to the flight. A few extra minutes on the ground preparing the casualty may ultimately save their life. However, the tactical situation or the condition of the casualty may dictate the *scoop and scoot* approach, rather than *stay and play.*