
Clinical Guidance

PICU: Aeromedical Transfer

Summary

Guidance for aeromedical retrieval of critically ill children

Document Detail	
Document type	Clinical Guideline
Document name	PICU: Aeromedical Transfer
Document location	GTi Clinical Guidance Database and Evelina London Website
Version	2.0
Effective from	<i>September 2017</i>
Review date	<i>September 2020</i>
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Approved by, date	Paediatric Intensive Care Unit Forum, May 2014
Superseded documents	PICU: Aeromedical Transfer v1.0
Related documents	
Keywords	PICU, Aeromedical transfer, retrieval, patient transfer, Evelina, helicopter, air
Relevant external law, regulation, standards	
<p>This guideline represents the views of STRS and was produced after careful consideration of available evidence in conjunction with clinical expertise and experience. The guidance does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient.</p> <p>This clinical guideline has been produced by the South Thames Retrieval Service (STRS) at Evelina London for nurses, doctors and ambulance staff to refer to in the emergency care of critically ill children.</p>	

Change History		
Date	Change details, since approval	Approved by

Indications

- Overseas retrieval or repatriation (air ambulance, commercial)
- Life-threatening illness requiring urgent specialised intervention
 - Head injury
 - Emergency surgery
 - ECMO
- Large distance (>60 minutes travelling time by road) to be travelled with unstable patient (consider helicopter)
- Very large distance (>120 minutes travelling time by road) to be travelled with patient requiring PICU admission (consider fixed wing or helicopter)

Choice of Aircraft

Helicopter: Shorter distance. Drop off and pick up closer to destinations. Cramped interior. Noise, vibration and climate control problematic. LOW altitude un-pressurised cabin <1000m

Fixed wing: Longer distances. More space. Better light & climate control
Air ambulance: Smaller, refueling stops required, power & gas source may be available. Check compatibility. Some medical equipment on board

Commercial flight: Self-sufficient for all equipment power. Do not delay flight. Cruising cabin altitude is 8-10 000ft (= 3000m)

Medical considerations**Airway**

- ETT position must be radiologically confirmed
- ETT adequately secured
- Uncuffed ETT is preferable or ETT cuff filled with 0.9%NaCl (ensure a small leak)
- Airway suctioned prior to moving. Take portable suction equipment. Take manual suction (foot /hand pump) for long journey.

Breathing

- Exclude pneumothorax. Any air leak, however small, must be drained for flight. Heimlich valves to all chest drains. Add drainage bag if effusion
- End tidal CO₂ monitoring essential (as auscultation not possible in helicopter)
- Portable oxygen to cover journey time (x 2) independent of aircraft (*See oxygen calculation). Check compatibility of O₂ connections
- Once airborne, anticipate fall in saturations & increased FiO₂ and ventilatory requirements
- If maximal ventilation and problematic oxygenation, discuss "sea-level" cabin

Cardiovascular

- Invasive arterial and CVP monitoring preferred
- Pressure monitoring set-up attached to pump (**not pressure bag**)
- Ensure all monitoring lines are air free (even small air bubbles will expand, coalesce & dampen trace)
- Absolute/ relative volume depletion will be unmasked during take-off. Raised ICP will be exposed at landing. Anticipate & manage pro-actively

Other

- Decompress stomach with large bore nasogastric tube
- NGT on open drainage
- Urinary catheter in situ on drainage. Catheter bulb filled with saline/water
- Any air-filled devices (e.g. air filled immobilisation splints) must be decompressed before take-off) Plaster casts must be split.
- Vacuum mattress must be re- vacuumed at altitude
- Temperature control measures prior to flying. Temperature will fall in dry, cool atmosphere of high altitude

Remember

- All equipment to have **adequate battery power** independent of the aircraft (store spare batteries separately to avoid leakage, take screw driver/equipment needed to change battery).

Equipment

- Equipment **CANNOT** be plugged in to a commercial airliner.
- Check air ambulance **power supply**. It may be possible to use this power source.
- All equipment must be entirely self-sufficient on **own battery source** for the entire duration of the flight
- **All equipment must be securely strapped down during the flight including oxygen cylinders**
- All equipment taken must be **approved by the airline/** aircraft for use (some electronics affect the airplane avionics)
- **Air filled equipment: Volume 30% greater at 8000ft. 100% greater at 18000ft.**
 - Deflate and remove/ open BP cuff after use
 - Vacuum mattresses will lose their vacuum at altitude. Useful as an air-filled mattress in flight or re-vacuum.

***Oxygen calculations**

Oxygen requirement dependent on

total journey time (minutes) x ventilator or flow meter usage of oxygen (l/min)

Journey time calculation:

Hospital to ambulance
Ambulance to airport
Airport check- in and waiting time
Flying time (including refuelling time)
Deplaning to ambulance
Ambulance to accepting hospital
TOTAL minutes

Ventilator usage of oxygen (dependent on pressures and oxygen concentration)required)

babypac	5-11 l/min
ventipac & oxylog 1000	10 -15 l/min

Cylinder size & weight

Size	Useable capacity	4l/min	6l/min	8l/min	10l/min	Full weight
CD	460L	1h55	1h17	0h58	0h46	3.5kg
D	300L	1h15	0h50	0h35	0h30	5kg
E	600L	2h30	1h40	1h10	1h00	7.3kg
G	1000L	4h10	2h45	2h50	1h40	14.6kg
Q	2000L	8h20	5h30	4h10	3h20	32.7kg
H	6500L	27h00	18h00	13h30	11h00	69.8kg

Quick check oxygen consumption/ CD cylinder size/ /time table

Time in use	5 hrs	10hrs	15hrs
8l/min (baby pac)	6 cylinders	11 cylinders	16 cylinders
15l/min (oxylog)	10 cylinders	20 cylinders	30 cylinders

ALWAYS TAKE DOUBLE THE CALCULATED VOLUME OF OXYGEN REQUIRED

Emergencies in the air

- Pneumothorax with ventilatory compromise
 - Pulmonary bullae/ emphysematous lung with ventilatory compromise
 - Obstructed bowel with ventilatory compromise, pain or perforation
 - Obstructed sinuses with pain or rupture of tympanic membrane
- Air in monitoring lines or giving sets will expand and coalesce**

- Dampen monitoring trace, cause loss of waveform
- Cause irregular/ inaccurate delivery of infused drugs

Air in cuffs will expand

Cause pressure necrosis of tracheal mucosa /skin

Acceleration/ deceleration during take-off and landing can

- Unmask relative/ absolute hypovolaemia causing hypotension
- Apply large directional forces on all equipment and passengers

Staff: DO NOT fly if you are unwell
Warm clothing (jacket & change of clothes)
Food & water for return journey
Money & mobile phone for return journey

CONTACT PHONE NUMBERS
TCAA (helicopter) 08454 130983
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