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**Minimum Standards for Transport of  
Critically Ill Patients**

**INTRODUCTION**

Safe transport of the critically ill patient requires accurate assessment and stabilisation of the patient before transport. There should be appropriate planning of transport and optimum utilisation of communications. Safe transport requires the deployment of appropriately trained staff with essential equipment, and effective liaison between referring, transporting and receiving staff at a senior level.

**Clinical management during transport must aim to at least equal management at the point of referral and must prepare the patient for admission to the receiving service.**

**1. ADMINISTRATIVE GUIDELINES**

Administrative guidelines held by each establishment engaging in patient transport should cover all aspects of transport of the critically ill. These may include guidelines for such matters as insurance, budgeting and personnel. Staff safety and protection are the responsibility of the employing authority, who should carry appropriate insurance for all contingencies related to patient transport activities and should also provide personnel with personal protective equipment and instruction.

**1.1 Initiation and Response**

Medical transport services using road ambulance, fixed and rotary wing aircraft must be coordinated for prompt, rapid, efficient and safe transport of critically ill patients on a 24 hour basis.

Initiation of patient transport should be simple, with clear guidelines and communication channels. Ideally, the referring doctor should have to make only one telephone call to initiate retrieval or patient transfer.

In all situations requiring transport of the critically ill, rapid response of the transport system and minimal delays are paramount. In emergency interhospital transports, dispatch of the medical transport team to the referring hospital should not be delayed pending the identification of a receiving hospital.

## **1.2 Coordination and Communication**

Coordination of transport services for the critically ill should be centralised to ensure optimum utilisation of resources. Designated individuals need to be available immediately for consultation and planning.

Reliable communication must be available at all times between the transport team and the referring and receiving hospitals and ambulance services. At the time of first contact, clinical advice can be provided to referral staff and sought from senior specialty receiving staff as well as allow for appropriate planning, advice and preparation by the retrieval team.

## **1.3 Responsibility**

The chain of responsibility must be clear throughout the transfer. Responsibility for patient care during transport must be vested in an appropriately qualified medical practitioner. Formal handover from referring doctor to retrieval doctor and from the latter to the receiving hospital doctor is essential.

## **1.4 Documentation**

The clinical record should document the patient's clinical status before, during and after transport, relevant medical conditions, environmental factors and therapy given.

## **1.5 Audit, Quality Improvement and Teaching**

Organisations involved in medical transport should have an effective quality management system which can monitor and audit performance and make recommendations for appropriate improvements.

There should be a system for regular review of cases to assess the level of care provided, transport processes and logistics.

A means of patient follow-up after transport should be available as feedback to the clinical staff involved and to assist in evaluating the performance of the organisation and system overall. There should be opportunities for peer review within the organisation. Such audit activities should involve all members of the retrieval team (medical and non-medical), as well as administrators. (General

principles of quality activities are outlined in the College of Intensive Care Medicine of Australia and New Zealand policy document IC-8 *Quality Improvement*).

Provision should be made for feedback to the referring centre. The system should also provide an educational function for all components for the transport service.

## **2. CATEGORIES OF TRANSPORT**

Transport of critically ill patients is necessary in two sets of circumstances, namely, prehospital transport and interhospital transport.

Intrahospital transport is the subject of the joint document PS39 *Minimum Standards for Intrahospital Transport of Critically Ill Patients*.

### **2.1 Prehospital Transport refers to:**

Transport of a critically ill patient from an accident or illness location to hospital. Standards for non-medical prehospital transport are determined by ambulance and emergency services and are not covered by this policy document. Where prehospital transport is carried out by medical personnel, the same standards apply as for interhospital transport.

### **2.2 Interhospital Transport may be:**

#### *2.2.1 Emergency Interhospital Transport:*

For acute life-threatening illnesses emergency interhospital transport may be needed due to either lack of diagnostic facilities, lack of staff and/or facilities for safe and effective therapy in the referring hospital.

#### *2.2.2 Semi-urgent Interhospital Transport:*

For transport of the critically ill patient, either to a higher level of care or for a specialty service.

## **3. STAFFING**

Personnel engaging in transport of critically ill patients should be selected for the transport role, be trained in the various aspects of patient transport that they would be expected to be involved with and participate in the organisational quality activities (1.5 above). Senior staff must also be regularly involved in these activities and be available for instruction and supervision of junior staff. Ability to communicate effectively, and to function as part of a team is essential.

Staff must be briefed on emergency procedures such as vehicle evacuation by the authority operating the vehicle. Staff undertaking patient transport must be aware of

the limitations of available equipment and capabilities, the working transport environment and at the referral site prior to dispatch.

### **3.1 Prehospital Transport**

Medical officers and/or nurses who are deployed to provide prehospital treatment and transport must have received training that is in keeping with their expected pre-hospital role (eg. scene organisation and safety, patient assessment, treatment and extrication, mass casualty and chemical, biological and radiological incidents etc.). They should be familiar with local pre-hospital ambulance and emergency service protocols, roles responsibilities and equipment. EMST training for medical personnel undertaking this role would be ideal.

Medical staff should also be familiar with the range of communication devices used.

### **3.2 Interhospital Transport**

Interhospital transport of critically ill patients must be performed by an appropriately qualified retrieval team including an experienced medical practitioner. On extended journeys, sufficient staff should be carried to allow maintenance of high standards of patient care, and to allow for staff rest periods.

Where it would be immediately lifesaving, the transport of expert medical assistance e.g. a neurosurgeon, to the referring hospital should be considered.

Specifically trained personnel are required for the transport of neonates, infants and young children.

Special considerations are also required for long-haul/international patient retrievals – not detailed in this document.

## **4. TRANSPORT**

Mode of transport used will depend partly on clinical requirements, on vehicle availability and on conditions at the referring and receiving sites.

### **4.1 Choice of transport vehicle will be influenced by:**

- nature of illness
- possible clinical impact of the transport environment
- urgency of intervention
- location of patient
- distances involved
- number of retrieval personnel and volume of accompanying equipment

- road transport times and road conditions
- weather conditions and aviation restrictions for airborne transport
- aircraft landing facilities
- range and speed of vehicle

#### **4.2 Transport Vehicle Requirements**

Vehicles should be appropriate to the task in terms of design (including cabin environment) and equipment. Regular inspection and servicing of vehicles and on-board equipment is required. Particular requirements relate to:

- safety of both patient and staff
- adequate space for patient access and to perform acute medical interventions
- adequate power and gases for life support systems
- adequate suction
- easy access for safe embarkation and disembarkation
- adequate lighting and internal climate control
- restraints for stretcher, equipment and passengers
- acceptable noise and vibration levels and noise protection for passengers
- adequate speed and response times
- good communication systems, both internal and external
- auditory patient monitoring alarms routed through attendants' headsets where noise is unavoidable, in addition to usual visual alarms
- impaired gravity drip of fluids

In general, medical fittings to aircraft, and bulky items carried need to have approval of the aviation authorities.

#### **4.3 Air transport exposes patients and crew to particular risks including:**

- reduced oxygen partial pressure
- the need for pressurisation to sea level when clinically indicated
- risk of rapid depressurisation
- expansion of air filled cavities, such as endotracheal tube cuff, middle ear, air-filled spaces under airtight dressings etc.
- limb swelling beneath plaster casts
- worsening of air embolism or decompression sickness

- danger from agitated patients
- limited space, lighting and facilities for interventions
- noise
- extremes of temperature
- extremes of humidity
- acceleration, deceleration and turbulence
- vibration
- electromagnetic interference between avionics and monitoring devices
- danger from loose, mobile equipment.

**4.4 With all modes of transport, stabilisation of vital signs, provision of a secure airway and IV access, securing of all catheters and provision of appropriate monitoring before departure is fundamental to safe transport.**

## **5. EQUIPMENT**

Equipment carried should be appropriate for each transport. The duration of transport, the patient's diagnosis and severity of illness and the level of therapeutic intervention required should be taken into account. In choosing equipment, attention must be given to size, weight, volume, battery life, oxygen consumption and durability, as well as to suitability for operation under conditions of transport.

Equipment should be adequately restrained, and continuously available to the operator. Patient stretchers should be capable of being adequately secured within the transport vehicle. Electrical and gas supply fittings of all equipment must be compatible with those of the transport vehicle. All equipment to be used in aircraft must be assessed for compliance with regulatory requirements.

Specialised equipment is required for neonatal and paediatric transport.

Equipment that should be considered includes:

### **5.1 Respiratory Support Equipment**

- Airways (range of oral and nasopharyngeal airways and a range of laryngeal mask airways)
- Oxygen, masks, nebuliser
- Self-inflating hand-ventilating assembly, with PEEP valve available
- Suction equipment of appropriate standard
- Portable ventilator with disconnect and high pressure alarms
- Intubation set (including a range of laryngoscope blades and endotracheal tubes)

- Emergency surgical airway set
- Pleural drainage equipment
- Oxygen supply in excess of that estimated for the maximum transport time.

## **5.2 Circulatory Support Equipment**

- Monitor/defibrillator/external pacer combined unit
- Pulse oximeter
- Aneroid sphygmomanometer (not mercury-containing) with a range of cuff sizes
- Vascular cannulae, peripheral and central
- IV fluids and pressure infusion set
- Infusion pumps
- Arterial cannulae
- Arterial monitoring device (pressure transducer)
- Syringes and needles (a needleless system would be ideal)
- Pericardiocentesis equipment
- A sharps disposal container and a bag for biological refuse

## **5.3 Other Equipment**

- Nasogastric tube and bag
- Urinary catheter and bag
- Nasal decongestant spray
- Instruments, sutures, dressing, antiseptic lotions, gloves
- Thermal insulation and temperature monitor
- Splints and equipment for spinal and limb immobilisation
- Neonatal/paediatric/obstetric transport equipment when applicable
- Dressings, bandages, slings, splints and tape
- Cutting shears and portable torch
- Gloves and glasses for staff protection

## **5.4 Pharmacological Agents**

All drugs should be checked and clearly labelled prior to administration. The range of drugs available should include all drugs necessary to manage acute life-threatening medical emergencies and those specific to the patient's clinical condition.

## **6. MONITORING**

Monitoring of certain physiological variables should be carried out during transport. Some or all of these basic recommendations will need to be exceeded routinely depending on the physical status of the patient.

Clearly any monitoring method may fail to detect unfavourable clinical developments and monitoring does not guarantee any specific patient outcome.

### **6.1 Clinical Patient Monitoring**

#### *6.1.1 Circulation*

The circulation must be monitored and recorded at frequent and clinically appropriate intervals by detection of the arterial pulse, measurement of the arterial blood pressure and assessment of peripheral perfusion.

#### *6.1.2 Respiration*

Respiratory rate should be assessed and recorded at frequent and clinically appropriate intervals.

#### *6.1.3 Oxygenation*

The patient's oxygenation should be assessed at frequent and clinically appropriate intervals by observation.

#### *6.1.4 Level of consciousness by G.C.S.*

#### *6.1.5 Pain score*

#### *6.1.6 Patient comfort – even deeply-sedated patients should be provided with appropriate noise, eye and environmental protection.*

### **6.2 Equipment Monitoring**

#### *6.2.1 Pulse Oximeter and capnometer*

A pulse oximeter must be used for every critically ill patient during transport. A capnometer (preferably with a waveform display) must be used to monitor all patients receiving mechanical ventilation.

#### *6.2.2 Alarms for Breathing System Disconnection or High Pressure and Ventilator Failure*

When an automatic ventilator is in use, a device capable of warning promptly of low and high pressure in the breathing system should be in continuous operation.

### 6.2.3 *Electrocardiograph*

Equipment to monitor and continually display the electrocardiograph must be used for every critically ill patient during transport.

### 6.2.4 *Physiological pressures*

Equipment for the invasive or non-invasive recording of blood pressure, and where clinically indicated, other physiological pressures should be available for all critically ill transported patients.

### 6.2.5 *Other Equipment*

When clinically indicated, equipment to measure other physiological variables, such as temperature and point of care blood analysis should be available.

### 6.2.6 *Equipment Alarms*

Equipment should incorporate audible and visual alarms.

## **7. Training**

All new staff involved in patient transport should undergo appropriate training in all aspects of patient transport outlined in this document and undertake supervised patient transports prior to independent transport duties. In particular, training should include instruction in local retrieval systems, organisational and transport vehicle related matters and the defined team role and functions of both medical and non-medical retrieval team personnel.

Training for safety and other operational issues should occur on a regular and recurrent basis, with due consideration for occupational health and safety and infection control issues.

These guidelines should be interpreted in conjunction with the following professional document:

PS39 *Minimum Standards for Intrahospital Transport of Critically Ill Patients.*

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