INTERHOSPITAL TRANSPORT OF PATIENTS

GENERAL PRINCIPLES AND
RECOMMENDED STANDARDS

Royal Flying Doctor Service of Australia
Western Operations
The following notes form an introductory set of guidelines for the interhospital transport of patients. They are by no means a complete and authoritative document but attempt to establish basic and somewhat didactic principles for secondary transport as borne out by practical experience.

Some specific comments are made on transport of certain types of cases. These examples are likewise not exhaustive but serve also as a framework for the development of further standards.

It seems appropriate for the RFDS, as the pre-eminent aeromedical service provider in Australia, to establish a set of draft national principles and guidelines for patient transport, with a particular emphasis on aerial and remote area evacuation.
CONTENTS

1. Personnel
2. Transport vehicles
3. Equipment
4. Communications
5. Authorisation & Co-ordination
6. Responsibility and Documentation
7. Review and Quality Assurance
8. Organisation, Integration and Liaison
9. Specific Principles
1. **PERSONNEL**

1.1. Patients should be accompanied by medical and/or nursing personnel experienced in patient transport.

**Medical personnel**

1.2. Medical staff need not necessarily be specialists (in intensive care, emergency medicine, obstetrics, neonatology etc.) provided they have the essential clinical skills to manage patients during transfer. Experience in transport and practical experience outside the hospital environment is in most cases more appropriate.

1.3. There is no place for junior hospital medical staff in retrieval of seriously ill patients.

1.4. Medical personnel should be comfortable in their surroundings (aircraft, road vehicle) and be familiar with all equipment available for their use.

1.5. Medical personnel should preferably work regularly in the transport environment and with the associated paramedical staff involved.

1.6. Medical staff should communicate effectively with associated paramedical staff, be aware of their roles, responsibilities and experience, and be able to work in a team environment.

1.7. Transport personnel should have the authority and experience to be decisive, and able to compromise when necessary.

1.8. Transport personnel must appreciate the need for adequate pre-transport stabilisation but be aware of the overall "big picture" - their role is to transport the patient and not necessarily provide definitive management on site.

1.9. With deteriorating patients, the medical team must be able to balance additional time on site against benefits available from rapid transport to the receiving centre.

1.10. The provision of appropriate staff in remote areas is preferable to relying solely on metropolitan retrieval teams. This allows patients to reach city centres before city teams can reach rural centres. (Specific arrangements will depend on individual state and regional resources.)

**Nursing personnel**

1.11. Nursing staff should be experienced in the transport role with similar criteria to medical staff.

1.12. There is no place for the use of inexperienced nurses or enrolled nurses as escorts for seriously ill patients.

**General**
1.13. Staff should have adequate orientation and ongoing training in their role.

1.14. Staff should be specifically selected for the transport role not just randomly designated.

1.15. There should be adequate insurance cover for personnel involved in patient transfer: both professional indemnity and personal accident/death cover.

2. TRANSPORT VEHICLES

2.1. Transport vehicles should be adequate for the purpose. Preferably they should be dedicated to patient transport not multi-role.

2.2. They should be safe for passengers and crew both in design and standards of maintenance and operation.

2.3. They should be comfortable for patients and crew.

2.4. They should be suitably outfitted. This requires:
   • good illumination;
   • adequate oxygen, suction and appropriate electrical power;
   • good seating and restraint for crew, patients and equipment;
   • adequate patient access;
   • sufficient stowage space; and
   • clean and hygienic interior.

2.5. They should have a suitable range and speed for the distances involved and the method chosen.

2.6. They should be readily identified as medical transport vehicles.

2.7. In not all situations are circumstances ideal, especially remote Australia. In these instances, the best available means of transport will necessarily have to do.

3. EQUIPMENT

3.1. There should be an adequate supply of medical equipment and consumables for each transfer. Requirements should take into account the duration of the journey and the nature of the medical condition being managed.

3.2. Where a medical officer is carried they will be ultimately responsible for ensuring that appropriate and sufficient equipment is carried to accomplish a satisfactory transfer. Those practitioners who regularly work in a transport environment will be able to delegate responsibility to appropriate nurses or paramedics.
3.3. Supply of equipment and consumables will depend on local arrangements and may be the referring or receiving hospital, ambulance service or other transport organisation.

3.4. Electronic medical devices should be appropriate to the pre-hospital and transport roles. They should:

- be of size and weight suitable for transport;
- have power supplies that will exceed the predicted duration of the transfer;
- preferably have a backup power source;
- be suitable to work both in the transport vehicle and out of it, whilst loading and unloading;
- be certified as suitable to work in the environmental conditions to be encountered, such as changes in barometric pressure, heat, vibration or humidity;
- be reasonably rugged and durable;
- have suitable alarms to warn of internal malfunctions or significant alterations in the patient's status;
- have alarms which are both audible and visual in nature and of sufficient intensity to be noticed in the noise and illumination of the transport environment.

3.5. Basic aids to measure the vital signs of blood pressure and temperature, in addition to pulse rate and respiratory rate, should be available for all patients irrespective of diagnosis or severity.

3.6. Basic resuscitation equipment to enable control of the airway (oropharyngeal airways and self-inflating bag-mask as a minimum) and intravenous access (intravenous cannulae, giving sets and fluids) are mandatory on all transport vehicles. It is expected that a higher level of resuscitative equipment will be available, commensurate with the expertise of the transport staff.

3.7. Monitoring equipment should be appropriate to the medical condition of the patient and any expected complications. The requirements for a range of specific conditions are covered in "Specific Principles", however in the 1990's in Australia, these would reasonably include an ECG monitor and pulse oximeter as a minimum for any seriously ill patients.

3.8. Therapeutic equipment would similarly reasonably include a defibrillator, intravenous infusion controlling device and simple transport ventilator in transfers of seriously ill patients.

3.9. The precise specifications of such equipment and its adequacy for the task will be based on local requirements, however the transport team should be fully familiar with its operation.

4. COMMUNICATIONS

4.1. Good communication is the key to success.
4.2. There should be an effective means of communication with the transport team at all times.

4.3. The crew should have ready access to clinical or operational advice when required.

4.4. The transport team should keep the co-ordinating authority informed of any delays or problems and, as appropriate, seek advice from the receiving institution.

4.5. The co-ordinating authority should keep the transport team informed of any delays or problems brought to its attention.

4.6. The referring and receiving institutions should be given accurate ETAs as soon as they are available.

4.7. Adequate pre-transport assessment of the patient is essential to determine the requirements for personnel, equipment and mode of transport.

4.8. Adequate consultation and pre-transport advice is also usually essential to minimize deterioration and ensure adequate stabilisation of the patient prior to transfer.

4.9. Good advice on preparing the patient for transport will also reduce time "on the ground" when the transport team arrives, thereby speeding up the overall process.

5. AUTHORISATION AND CO-ORDINATION

5.1. Authorisation of patient transfers should ultimately be by medical practitioners to ensure appropriate and efficient utilisation of limited resources.

5.2. It is beneficial if there is an independent coordinating authority to pass messages and ensure that all appropriate agencies and services involved are kept informed at appropriate stages.

6. RESPONSIBILITY AND DOCUMENTATION

6.1. Assessment and treatment of patients during transfer should be clearly but concisely documented and adequate medical records retained by the responsible authority.

6.2. The following information should be recorded:

- basic identifying and demographic details of the patient;
- the names and roles of all attendants and at regular intervals during transfer:
  - basic vital signs;
  - conscious state;
  - fluid balance;
  - equipment used;
  - drugs administered and
  - response to treatment.
Additional notes and comments from the senior member of the team are also desirable.

6.3. Drugs administered during transport should be clearly documented with the authorising practitioner's name and signature of the person administering.

6.4. All notes made during transport should be signed and dated appropriately.

6.5. Adequate clinical notes should be forwarded by the referring institution with the patient to the receiving institution as well as relevant radiographs, pathology specimens and reports. The needs of the patient should not be outweighed by the record keeping needs of the referring institution. If necessary, copies should be made and sent.

6.6. All clinical notes and specimens should be clearly and unambiguously labelled with the patient's name and date (and other relevant details).

6.7. Responsibility for patient management should be clearly defined. Where a medical practitioner accompanies the patient this responsibility should rest with that doctor from the time the patient is handed over to them, till they formally pass responsibility to another medical officer.

6.8. Where no medical practitioner accompanies the patient, responsibility for the patient rests with either the referring doctor or medical authority of the transport service (as agreed locally). The chain of responsibility should be clear throughout the transfer.

6.9. Medical practitioners have ultimate authority in directing paramedical personnel in relation to clinical requirements, providing it does not conflict with operational/safety matters (e.g. aircraft flight rules.)

7. REVIEW AND QUALITY ASSURANCE

7.1. Organisations involved in medical transport should have an effective medical advisory committee which can review performance and make recommendations for appropriate clinical management of patients.

7.2. There should be a process to regularly review records made during transfer, to assess the level of care provided.

7.3. There should be a process to investigate delays in transfer and any specific incidents.

7.4. A means of patient follow-up after transfer should be available as feedback to the clinical staff involved and to assist in evaluating the performance of the organisation overall.

7.5. There should be opportunities for peer review within the organisation.
8. ORGANISATION, INTEGRATION AND LIAISON WITH HOSPITALS AND OTHER AGENCIES

8.1. There should be clear lines of communication and liaison with associated services to ensure the overall efficiency of the transport system and to deal quickly with misunderstandings or difficulties.

8.2. Funding should be predominantly supported by state government agencies as compensation for lack of medical services in the referring centre. Patients should not be disadvantaged or prevented from interhospital referral due to personal financial limitations.

9. SPECIFIC PRINCIPLES

9.1. Ventilated patients.

There should be an adequate standard of equipment to ventilate and monitor the patient during transport.

Medical and nursing attendants should have adequate skills to monitor the patient, adjust the ventilator settings as required and to re-intubate the patient at any stage.

There should be adequate oxygen to meet the patient's ventilatory requirements as well as that consumed by gas-driven ventilators. This should well exceed the predicted duration of transfer and allow for delays en route.

A disconnection alarm with appropriate visual and/or auditory signals should be used.

Continuous pulse oximetry and capnometry should be available.

9.2. Cardiac patients.

Continuous ECG monitoring should be available during all phases of transport.

A defibrillator should be available during all phases of transport.

Medical attendants should be capable of interpreting arrhythmias and using the defibrillator when required.

Advanced cardiac life support drugs should be available and attendants skilled in their use.

9.3. Obstetric patients.

Fetal heart rate monitoring should be available during all phases of transport either by intermittent auscultation, intermittent Doppler or continuous Doppler methods.

Attendants should be capable of handling a delivery during transfer and other anticipated complications.
There should be adequate neonatal resuscitation equipment available at all stages during transfer.

9.4. Neonatal transfers.

Medical and nursing attendants should have adequate skills to monitor and resuscitate patients during all phases of transport.

There should be an appropriate incubator, which can be powered at all times and in all vehicles used during patient transfer. It should maintain the neonate in a stable thermal environment.

An oxygen analyzer should be available to monitor the concentration of oxygen in the incubator or in the ventilator circuit.

Continuous transcutaneous oxygen monitoring or pulse oximetry should be available at all times.

The requirements for ventilated patients apply to ventilated neonates also.

9.5. Trauma patients.

There should be adequate basic resuscitation equipment available.

In particular, intravenous cannulae, giving sets and adequate supplies of crystalloid and colloid solutions should be available.

There should be adequate facilities for airway management including facilities for intubation and manual ventilation during transfer.

A stretcher with the ability to provide head-up tilt and foot-up tilt is desirable.

Access to blood for retrieval should be available.

Methods for immobilisation of the cervical spine, the whole spine and limb fractures must be available.

Attendants should be capable of managing chest drains in the relevant air or ground transport environments.


Adequate analgesia should be readily available.

There should be facilities for airway control.

There should be facilities to prevent hypothermia.

There should be facilities for intravenous fluid therapy.

9.7. Psychiatric patients.
There should be facilities to provide adequate restraint during transfer but in the least humiliating manner possible. The least restrictive management options should be used, commensurate with crew, aircraft and patient safety.

Adequate means of sedation should be available.

Appropriate escorts both with medical/nursing skills and the ability to restrain the patient, should be available. Air transfer of psychiatric patients is generally preferable by day but can be accomplished at night in specific circumstances.

Psychiatric patients transferred by air should comply with all relevant the Civil Navigation Orders, company aircraft operations manuals, as well as with statutory requirements of State Mental Health Acts.


Facilities to implement universal infection control guidelines should be available i.e. gloves, masks, gowns and protective eye wear if necessary.

Attendants should be aware of the risks of contact with body fluids and be encouraged to use the facilities available.

Caution should be exercised when transporting patients with communicable diseases in conjunction with other patients. A medical decision should be made regarding the risk of cross-infection.

9.9. Pneumothorax, haemopneumothorax and serious chest injuries.

These patients should have adequate intercostal catheter drainage in situ, especially when transported by air.

If carried by air, it should be in a pressurised aircraft.

9.10. Decompression sickness and cerebral arterial gas embolism.

A Nitrogen-free breathing gas (100% Oxygen) should be available to patients at all stages of transfer.

Transfer should be at sea level atmospheric pressure.

Appropriate posturing with head-down tilt for gas embolism patients should be available during the transfer.

9.11. Respiratory distress and upper airway obstruction.

There should be a means of providing an increased FlO2.

There should be equipment and skills available to intubate and ventilate the patient.
There should be equipment to provide an alternate means of airway control such as manual bag-mask and cricothyroidotomy.

Children with acute epiglottitis should be transported with the airway protected, preferably by nasotracheal intubation. The medical attendant for these patients must be a senior doctor with a level of experience commensurate with the difficulty of managing these airways.


Patients receiving continuous drug infusions during transfer should have automated intravenous drug infusion pumps available to ensure accurate rates of administration.

The intravenous infusion pumps should fail safe and allow a manual means of administration if necessary.


The crew, patient and all ancillary equipment should be able to be secured during take-off, landing, turbulence and in the event of emergencies.

All aircraft crew should be familiar with the safety drills of the aircraft including: operation of hatches and emergency exits, drills in the event of rapid depressurisation and methods of approaching and leaving the aircraft.

Patients and medical equipment should not block emergency exits.

Medical crew should be familiar with the "etiquette of flying" e.g. suppression of lighting during night take-offs and landings, avoiding distraction of pilot during critical phases of flight.