TRANSPORTATION OF THE CRITICALLY ILL PATIENT

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Transportation of the critically ill patient is an unavoidable aspect of patient management, but the risks and benefits involved are unique to each case. I wish to outline some of the factors that need to be considered. The reasons for patient transport are multiple but can in many cases be grouped together. These broadly correspond with: transfer from ward environment to ICU (retrieval), transfer from ICU to ICU (e.g. referral to tertiary centre) and transfer for investigation or operation. In addition patients sometimes need to be transferred because the local intensive care unit is full.

A common set of guidelines can be applied almost universally to these situations. These revolve around staff (both in terms of experience and numbers), patient stabilisation, communication, planning, choice of transportation method and timing. Almost any movement of an intensive care patient will be associated with a significant risk of deterioration in their physiological condition. The aim of premovement stabilisation is to optimise the patient’s condition. This entails close attention to airway safety, fluid management (including insertion of additional venous access or central lines), inotrope use, invasive blood pressure monitoring and oxygen dependency. We must also ensure that they are stable on transport equipment such as ventilators. All these factors may need to be balanced with the need to transfer if the underlying injury has a time-critical component.

Standards for personnel and equipment have been produced by national bodies, and have included guidelines on the management of transfers. Within the northwest of England each episode of inter-hospital transfer is audited by the intensive care bed information service (icibs) to check how closely the standards are adhered to.

Dedicated transfer teams should ideally be available and these should originate from the receiving hospital. This is the case in continental Europe, Australia, Canada, New Zealand and USA. Within the UK these teams are limited to paediatric centres or occasional large conurbations. Whilst it has been proposed that they should be more widely available in the UK there has been little enthusiasm. Thus the individual hospitals are required to train and equip their teams. Anaesthetists are the usual accompanying medical staff when the patient is intubated and ventilated. Ideally, they are accompanied by an appropriately-trained nurse or technician.

Training courses are available to train staff, e.g. safe transfer and retrieval course (STAR) offered by the Advanced Life Support Group in Manchester, but for many departments there are other priorities for educational budgets. Staff training, therefore, is undertaken in-house. The Intensive Care Society, which acts to set standards within the UK intensive care community, recommends that medical staff should have two years’ experience, nursing staff two years’ ICU experience and technicians should be experienced. No ideal staff mix is specified.

The transfer equipment used will always end up being a compromise between fully-fledged ICU equipment and the equivalent of a simple bag-squeezing ventilator. Increasingly sophisticated equipment that is compact and lightweight is becoming available: invasive and non-invasive pressure measurement, temperature, end tidal carbon dioxide concentration and ECG can all realistically be measured. Portable ventilators capable of increasingly advanced modes of ventilation are now available. This allows ventilation strategies developed in the ICU to be continued during transfer. Equipment carried during transfers will always be determined by individual departments. Enough equipment should be available to deal with common emergencies and routine patient care. Each patient should be assessed to check whether additional specialist equipment needs to be carried, e.g. tracheostomy tubes. No list is exhaustive but simple application of the Airway/Breathing/Circulation system should allow structuring of equipment used.

Many problems associated with transfers can be traced to poor communication. This may be between team members, between hospitals or between hospitals and the ambulance service. Most of Lancaster’s front-line paramedic ambulances have mobile phones so contact with the receiving hospital or base hospital can be achieved at almost any time. Pre-warning of your arrival at a hospital allows for a reception committee to be organised for optimum handover as well as an escort through the hospital if you do not know where you are going. Good communication also relates to notes: a full copy of the patient’s hospital notes provides an invaluable reference but a concise summary is worth its weight in gold. Transfer documentation including clinical observations and changes to therapy should be left with the patient (icibs provides forms in triplicate).

Whilst we concentrate on discussing transfer details with other hospitals, it should not be forgotten that the patient’s relatives will wish to visit. Information such as contact phone numbers or directions to hospitals will always be welcome. Once patients arrive at their destination hospital it
ROAD AMBULANCE

**Advantages**
- Prompt
- Familiar
- Easily stopped & rerouted
- Decreased vibration
- Good patient access

**Disadvantages**
- Slow
- Other traffic

AIR AMBULANCE

**Advantages**
- Fast once airborne

**Disadvantages**
- Cramped
- Noisy
- Vibration
- Poor patient access
- Multiple transfer to and from landing sites which may not be close to hospital
- Poor safety record
- Difficult to re-route
- Weather
- No night time flying

often takes several hours to settle them and this needs to be explained to avoid unnecessary anxiety over long waits. Planning for transfers predominantly relates to training, equipment and contingencies to cover for nursing and medical staff whilst they are absent. Planning during a transfer needs to be much more structured. Staff, equipment, notes and drugs have to be prepared. Receiving hospitals need to be contacted with details of the patient’s condition. We must not forget that when a patient is going to an intensive care unit either physicians or surgeons at that hospital need to be contacted for continuation of care. The ambulance service needs to be contacted: for elective transfer this should be done the day before but in many cases transfers are conducted on an urgent basis and all that is required is a call to ambulance control with the request for an ambulance for an urgent transfer once the patient is ready for transport.

How do we transport the patient? Within hospital this is relatively easy - you push the bed, but will it fit into the lift? Can we get it into the scan room? Or had we better go on a trolley? You have to know where you are going and what obstacles lie in your way. Outside hospital we can go by road or air ambulance. There are sometimes no clear answers. You have to take each hospital and assess the options. If you need to transfer a patient at very high speed because they are unstable or deteriorating you probably should not be transferring them.

What can happen during a transfer? Realistically anything is possible but if we consider the mechanical events associated with patient movement we can predict some of the changes. During transport patients’ bodies are accelerated and decelerated both longitudinally and transversely. Blood will move in association with this and pool at one end of the patient or the other, which decreases venous return and blood pressure. All this will decrease cardiovascular stability. Changes in pulmonary blood flow will alter oxygcnation and decrease oxygen saturation, necessitating increased inspired oxygen concentration. Unstable or unixed fractures will move, increasing broad loss and in the conscious patient, increase pain. Patients become cold despite being wrapped up in blankets and this exacerbates other cardiovascular and respiratory changes. If aircraft transfer is utilised remember to ensure gas-containing cavities are drained, including checking endotracheal cuff pressure during ascent and descent.

In addition to the physiological events, intra-vascular lines fall out or become blocked, endotracheal tubes obstruct or become dislodged, movement artefacts decrease the reliability of ECG electrodes and pulse oximeters and physical examination is impossible due to the background noise. These events will happen on a short trip to the CT scanner as well as a three-hour, long-distance transfer.

Care of staff is important. Transfers usually involve people missing meal breaks or not getting home on time. Many people get travel sick especially when travelling sitting sideways, so prophylactic anti-emetics can be useful. Returning to the base hospital can be long and tortuous. It is always worthwhile remembering to take money, a credit card, mobile phone and always take a warm jacket. The ambulance service is supposed to return equipment to the originating hospital, which can sometimes take a while to organise or may involve taxis. Personal accident insurance for individuals injured during transfers is a thorny issue. The only cover offered to many people is their basic NHS pension which is not a great deal. Currently members of the Intensive Care Society and Association of Anaesthetists have more comprehensive levels of insurance cover included as part of their membership fee. For NHS transfers medical indemnity is provided as part of NHS cover.

In summary, transfer of critically ill patients is a regular event. Careful thought about the advantages and disadvantages of patient movement must be made. Rushing transfers invariably results in sub-optimal performance and, potentially, a worse outcome for the patient. It must be remembered that the transfer of a patient may be the most risky part of their intensive care stay. The decision to move a patient is never taken lightly.

FURTHER READING