Transfer of the critically ill adult patient

Ian Macartney FRCA
Peter Nightingale FRCA FRCP

The transfer of critically ill patients between hospitals has been the subject of a number of reviews recently and remains very much at the political forefront. There are few hard data describing the exact number of such transfers; many of the quoted figures are based on estimates. However, there is evidence that the number of adult transfers between general, neurosurgical and cardiac units in the UK now exceeds 11,000 per annum. Data from the North West region (Fig. 1) show an inexorable increase in the number of adult transfers.

Types of transfer

‘Primary’ transfer usually refers to ambulance transfers from home or the street to an Accident and Emergency Department and ‘secondary’ transfers are intra- or inter-hospital. Critically ill patients are transferred daily within hospitals. All admissions to an ICU initially involve transfers from other wards and departments within the hospital and a significant number of patients will be transferred to and from the operating theatres or Department of Radiology during their illness. However, this article will concentrate on adult inter-hospital transfers. Table 1 describes 4 categories of such transfers.

Category 1–3 transfers will always be needed. However, it is category 4 patients that have received most attention within the medical profession, Department of Health and national press.

Dangers of transfer

The dangers of transferring a critically ill patient are summarised in Table 2. In 1981, Gentleman and Jennett reported on 150 patients with serious head injuries transported to a regional neurosurgical centre. Of these, 41% suffered untoward incidents in the ambulance journey that could cause secondary brain damage. The most common were arrhythmias, hypotension, hypoxia and hypercarbia. The incidence and type of critical incidents obtained from an audit in the North West Region of 1023 adult transfers are shown in Table 3.

A number of observational papers have confirmed the effects of transportation on the physiology of the critically ill patient. Despite

---

**Table 1** Categories of adult inter-hospital transfers

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category 1</td>
<td>Transfers for upgrade of care requiring specialist support or investigation, e.g. burns, cardiothoracic, liver, neurosurgery, paediatric</td>
</tr>
<tr>
<td>Category 2</td>
<td>Transfers for upgrade of care where a particular type of organ support is not available locally, e.g. renal replacement therapy</td>
</tr>
<tr>
<td>Category 3</td>
<td>Transfers where a patient is moved nearer to their home; this includes repatriation to the UK from abroad</td>
</tr>
<tr>
<td>Category 4</td>
<td>Transfers due to a local lack of available critical care beds</td>
</tr>
</tbody>
</table>

**Table 2** Dangers of transferring critically ill patients

<table>
<thead>
<tr>
<th>Adverse physiological responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hostile and unfamiliar environment</td>
</tr>
<tr>
<td>Limited resources</td>
</tr>
<tr>
<td>Equipment problems</td>
</tr>
<tr>
<td>Failure of continuity of care</td>
</tr>
</tbody>
</table>

**Table 3** Incidence and type of critical incidents obtained from an audit in the North West Region of 1023 adult transfers

<table>
<thead>
<tr>
<th>Critical incidents during transport</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypotension (systolic pressure &lt; 90 mmHg)</td>
<td>29 (2.8)</td>
</tr>
<tr>
<td>Desaturation (SpO₂ &lt; 90%)</td>
<td>5 (0.5)</td>
</tr>
<tr>
<td>Hypotension and desaturation</td>
<td>7 (0.7)</td>
</tr>
<tr>
<td>Hypotension and bradycardia (heart rate &lt; 40 bpm)</td>
<td>2 (0.2)</td>
</tr>
<tr>
<td>In cardiac arrest on arrival</td>
<td>2 (0.2)</td>
</tr>
<tr>
<td>Total</td>
<td>45 (4.4)</td>
</tr>
</tbody>
</table>
increased compliance with current standards for the care of the critically ill patient during transfer, a significant number of patients demonstrate adverse physiological responses to the journey. Though little is published on the mechanisms of these responses, it seems likely that postural changes and inertial forces may be involved. Similarly, there is a paucity of data with respect to the incidence of hypothermia during transfer.

As well as the dangers of the adverse effects of transportation on physiology, moving critically ill patients out of hospital exposes them to a hostile environment. The supporting clinical team during transportation will be smaller and isolated from the supporting resources of the hospital. Therefore, the team must be self-sufficient for the period of the journey.

Many transfers use land ambulances and the team may not be familiar with working in this difficult environment. It is generally accepted that it is almost impossible to perform any practical resuscitation procedure in a moving ambulance. Reliable monitoring of vital signs is crucial during transportation. However, movement artefact can blind the observer to important changes in heart rhythm and non-invasive blood pressure. The routine use of capnography for ventilated patients is recommended, though in practice this still seems to be the exception rather than the rule.

Although most electro-medical equipment provided for transferring patients has been designed specifically for this purpose, critical incident reporting shows that equipment failure does occur (Table 4). However, there are few hard data to link such equipment failure with morbidity.

Frequently, staff who are asked to transfer a critically ill patient have become involved relatively late on in the care of that patient. They may feel pressurised to proceed without delay. However, continuity of care is vitally important; the transferring team must ensure that they are fully appraised of the history of the patient’s illness, not only in order to plan the transfer, but also to enable them to maintain continuity of care when handing over to colleagues in the receiving hospital.
Organisation of a transfer

Transportation of a critically ill patient should not be undertaken lightly; it requires organisation and structure. ACCEPT (Assessment, Control, Communication, Evaluation, Prepare and package, Transport) is a useful acronym to remember some of the key steps in the organisation of a transfer.

**Assessment** should include not only an initial assessment of the patient, but also the situation as a whole; lines of responsibility should be identified.

**Control** of the situation requires someone to manage the transfer and its team. The team leader may change over time as more senior staff become available. Communication is essential during the organisation of a transfer. Not only must there be excellent communication within the team, but it is also essential to communicate effectively with other healthcare professionals who have been, or will be, involved in the care of the patient. The need for sensitive communication with the relatives must not be forgotten. Communication skills are vitally important in ensuring that information is exchanged in concise and unambiguous terms. Evaluation is a dynamic process that starts with the first contact with the patient and includes continuous assessment of the effectiveness of the resuscitation and stabilisation process. Evaluation includes the following:

1. Level of care required, is an ICU appropriate for this patient?
2. Need to transfer
3. Best location to undertake further stabilisation
4. Degree of urgency to transfer
5. Level of expertise required to stabilise and transfer the patient

**Prepare and package** not only includes the preparation of the patient but also preparation of equipment, supplies, accompanying medical and nursing personnel. Preparation of the patient starts with initial resuscitation and proceeds to a period of stabilisation. An ABCD approach should be adopted. The question ‘what if...?’ should be asked for a number of possible problem scenarios to ensure that the appropriate action will be taken if problems do occur en route. Preparation and correct selection of equipment is essential. Staff must be familiar with the checking and setting up procedures of each item, be able to detect rapidly any malfunction and have fall-back plans in case of equipment failure. Sufficient supplies of drugs, fluids and oxygen must be available to cope with extraordinary delays. Preparation of the transfer team includes attention to suitable footwear, warm clothing, mobile telephone and ‘get-you-home’ money!

Packaging of the patient is vitally important. Endotracheal tubes and vascular access lines must be well secured. However, staff must have easy access for suctioning and administration of drugs and fluids. Fractures, and suspected fractures, must be immobilised with attention paid to the prevention of pressure damage. Heat loss during assessment and stabilisation can be compounded during transportation; ‘mummy wrapping’ techniques not only limit heat loss, but also add to the general security of tubes and lines.

**Transportation** problems may be minimised if the patient has been meticulously stabilised. Clinical intervention in a moving vehicle is almost impossible – if it is required, serious consideration should be given to stopping the vehicle. The transporting team should dictate the speed of the transfer; the ride should be smooth and steady rather than fast and rocky!

The planning and organisation of a transfer may be complex, and it is easy for even the most experienced clinician to miss some detail. The use of a transfer master, or check list, as an aide-memoir is recommended.

**Documentation and audit**

Clear documentation of the assessment, evaluation and transportation of critically ill patients is essential, not only as a permanent record for the receiving hospital, but also as an audit tool and safeguard in case of litigation. There is increasing interest in the use of transfer forms that can be used for clinical audit. These document experiences and critical incidents which can be fed back into training programmes.

**Training for transfer**

Transfer of the critically ill requires a considerable degree of planning and organisation in order to limit morbidity and mortality. In order to facilitate planning, a systematic approach should be adopted. The approach/framework outlined above is currently being used in a dedicated training course in our region. This multidisciplinary course adopts an ALS style approach and encourages the development of a structured method of planning and organising transfers.

**Transfer teams**

There is certainly an argument for the use of transfer teams to undertake the retrieval of complex critically ill patients to tertiary referral centres, especially when time is not a critical factor. These teams are well established in paediatric practice. However, if reliance were placed on the use of transfer teams
for more general use, there would inevitably be times when the team was swamped with requests. Hospitals would then have to fall back on local expertise that may well have become deskilled through lack of practice. There is some debate as to the value of regional or area-wide transfer teams and the ideal configuration has yet to be determined.

**National developments**

There are efforts in place to reduce the number of category 4 transfers. The Department of Health has recognised the need for an increase in the number of critical care beds and the National Bed Register, whose primary role is to facilitate the finding of a locally available ICU bed, is to become more heavily involved in the collection of real-time data about numbers of transfers and occupied ICU beds.

**Staff insurance**

Following increasing concerns about the level of personal accident insurance cover for staff involved in the transfer of critically ill patients, the Intensive Care Society and the Association of Anaesthetist of Great Britain and Ireland have organised additional cover for its members.

**Summary**

Transfer of critically ill patients between hospitals is a fact of life. Though strenuous efforts should be made to reduce the number of Category 4 transfers, all staff that are likely to be involved in these transfers must be aware of the dangers and the need for meticulous planning prior to transportation. The importance of training and supervision in transportation medicine cannot be over emphasised.

**Key references**

- Tatman A, Brunner H, Stokes M. Premature failure of battery-powered syringe pumps. *Anaesthesia* 1996; 51: 1041–2
- STaR Course. *Safe Transfer & Retrieval: The Practical Approach*. Advanced Life Support Group, Second Floor, The Dock Office, Trafford Road, Salford Quays, Manchester M5 2XB