

Transfer of the critically ill adult patient

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Abstract

Patient transfer has resource ramifications and is an important public health issue. With increasing centralization of specialist services and the advent of regional trauma networks the requirement for patient transfer is ever present. Every year in the UK over 11,000 intensive care patients are transferred and the majority of these transfers are facilitated by a team from the transferring hospital as opposed to being carried out by a dedicated retrieval team.

Transferring a critically ill patient is a process involving inherent risk, so prior preparation around planning for a safe transfer is essential both in terms of anticipating potential problems, mitigating against them and ensuring clear and timely communication with the accepting hospital and respective specialties responsible for the patient. In the longer term, training of staff is essential in order to reduce instances of harm to patients. This article provides an overview of the different types of patient transfer, the associated hazards, human factors around decision-making, communication, equipment and organization.

Keywords Centralization; communication; decision-making; organization; preparation; risk; training

Introduction

The requirement for patient transfer is an inevitable consequence of the centralization of acute services and increased utilization of highly specialized services such as extracorporeal membrane oxygenation (ECMO). Rarely, transfers can occur if locally available resources are exhausted or temporarily unavailable but this should, of course, be avoided unless absolutely necessary as it is clearly not in the best interests of a patient to undergo a potentially avoidable transfer. The over-arching aim of the vast majority of transfers should be to achieve a higher level of care for the patient. The benefit of transfer for specialized treatment is well established for trauma and cardiology patients but it has taken a long time to achieve widespread acceptance of this in the UK, particularly with regards to the former patient group. It has also been demonstrated that the benefits of transfer to a specialist centre are not always related to receiving the intervention for which the transfer was initiated.¹ The transfer team strives to ensure that the care a patient receives in transit is equivalent to that they receive in an intensive care unit. Taking into

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consideration the objective risks of transporting a critically unwell patient this is often difficult to achieve and requires an experienced and well-trained transfer team as a starting point. Generally speaking in the UK the vast majority of transfers are carried out by junior anaesthetists who will typically have received limited transfer training and will often have little in the way of transfer experience. This has both patient safety and resource implications.

Types of transfer

There are three main categories of patient transfer, as follows.

1. **Primary transfer** to hospital is normally undertaken by land ambulance crews. For trauma patients who warrant a response from a helicopter emergency medical service (HEMS), this phase may involve critical care interventions and transport by helicopter with an advanced medical practitioner.
2. Following initial resuscitation and stabilization, **secondary transfer** occurs when specialist care is required and not available locally. This would normally occur by land ambulance, but could utilize a helicopter or fixed-wing aircraft depending on the distance involved, weather, urgency, traffic and the location of suitable landing sites among other factors. There are longstanding guidelines available for the transfer of patients via aeromedical means. A secondary transfer may also have to occur if locally available resources become overwhelmed or are temporarily unavailable.
3. **Tertiary transfers** occur for non-clinical reasons and should be avoided unless absolutely necessary. This type of transfer is usually for patients wishing to be repatriated for social reasons, such as being closer to friends and family and those who face funding issues and those who are injured abroad and need to be repatriated to the UK.²

Transfers can be further subdivided into two subcategories: intra- and inter-hospital. This article will focus only on inter-hospital transfer although the same guiding principles will apply to intra-hospital transfers also.

Decision-making and human factors

Clear communication is required early on in the process of transfer. Sadly, disjointed planning and communication is a common occurrence during patient transfers leading to adverse incidents. To help avoid this it is essential that consultants are involved in inter-hospital critical care transfers. It has already been said that a transfer should only occur if it is likely to result in an improvement in the patient's overall condition, so it is vital that the risks and the benefits are evaluated by an experienced clinician with advice from the receiving specialists. The reason for the transfer should be established and, if it is for anything other than an improvement in patient care, this becomes, in part, an ethical decision which should be clearly communicated to the patient, if they have capacity, and their family.

After the decision to transfer has been made delays and complex organizational issues can occur. One study from Australia has demonstrated that, on average, 4.7 telephone calls are required to be made per patient, which when one considers the requirement for concurrent patient resuscitation is a significant burden of responsibility.³

Where is the patient going?

This point is critical and must be clearly articulated between the transfer team and the receiving hospital. The resuscitation room of the emergency department should ideally be avoided, but does provide possibilities for stabilization should the patient have deteriorated prior to onward movement. There should be no delay in transfer to an area for definitive treatment such as a specialist intensive care unit or operating theatre. All parties must be clear about the exact destination requiring an accurate description of the location to be communicated to all parties including the patient's family. The receiving hospital should be made aware of the patient's departure, updated about any issues that occur in transit and informed prior to the patient arrival with an estimated time of arrival to allow for tasks such as a trauma call to be put out or specialists to be summoned to theatre.

Organization of the transfer

It is useful to refer to a checklist or mnemonic in order to mitigate the risk of pivotal steps in the process being missed. It has repeatedly been demonstrated that human factors, particularly around communication and other organizational issues, result in safety incidents and adopting this type of protocolized management helps to reduce avoidable incidents.

The Association of Anaesthetists of Great Britain and Ireland (AAGBI) and the Intensive Care Society (ICS) have produced useful pre-departure checklists which can be viewed online.^{4,5} The authors find the following list useful:

- Is the transfer agreed by ITU consultants at both the receiving and transferring hospitals?
- Is the transfer agreed by both the receiving and transferring surgical/medical consultant?
- Is the receiving sister in charge of ITU aware of the patient being transferred?
- Are the patient (if possible) and their family aware?
- Is the patient resuscitated and stable for transfer and is intubation indicated as part of an expectant management strategy?
- What is the urgency and the most suitable type of transport to request?
- Is the level of experience and composition of the transfer team appropriate and are they properly equipped with suitable personal protective equipment?
- Have the patient's eyes and pressure points been protected?
- Have the ventilator and transfer bag been checked?
- Is there a sufficient supply of oxygen and batteries for the journey?
- Are the AAGBI minimum monitoring standards being adhered to including capnography?
- Is there an adequate supply of appropriate drugs?
- Documentation: letter, notes, X-rays (image linked if possible), blood results and drug chart.
- Cross-matched blood and blood products if indicated.
- Does the transfer team have money/bank cards/mobile phone?
- Call to inform the receiving hospital prior to departure

- Perform an arterial blood gas 15 minutes before departure and check the patient is adequately resuscitated before departure.

To retrieve or transfer?

Retrieval teams are advocated by the Department of Health.⁶ A team from University College London compared outcomes of patients transferred by a specialist retrieval team (group A) and those transferred by standard means, a team from the referring hospital, (group B). There were no differences in demographic characteristics or severity of illness between the two groups. However, significantly more patients in group B than in group A were severely acidaemic (pH <7.1: 11% vs. 3%, $p < 0.008$) and hypotensive (mean arterial pressure (MAP) <60: 18% vs. 9%, $p < 0.03$) on arrival. There were more deaths within the first 12 hours after admission with 7.7% deaths (7/91) in group B transfers vs. 3% (5/168) in group A.⁷ A university hospital in the Netherlands conducted a prospective study comparing patient physiology in those patients transferred by their newly established mobile intensive care unit (MICU) with prospectively collected data on patients transferred by ambulance in 2005 in the same region. Distribution of differences in arterial blood gases during transfer in 2009 versus 2005 showed significantly better values for the variables pH, paO_2 and paCO_2 in the patient group transferred by MICU, using the Independent-Samples *t*-test ($\alpha < 0.05$). There was also a significant increase in the number of patients who were transferred conventionally that required emergent advanced respiratory support immediately on arrival in the receiving ITU.⁸ The retrieval model has a much stronger body of evidence for the transport of paediatric patients and is much more widely practised and it would seem intuitive that at least some of this experience should be transferable to adult patients.

What is the urgency?

The National Ambulance Services' Clinical Conveyance Group inter-hospital transfer protocol 2011 sets out guidance for patient prioritization. Those patients that are deemed to require an immediate time-critical, life-saving intervention are classed as priority 1 and transport should arrive within 8 minutes. Those that require a life- or limb-saving treatment are priority 2 and should be transferred in less than 1 hour. Priority 3 patients have a clinical reason for transfer but do not fall into either of the previous two categories and transport should arrive in less than 4 hours. For those patients being transferred for non-clinical reasons less than 8 hours is the set target.⁹

Close attention to detail during the preparation phase is paramount. A study from Canada found that a longer time spent preparing the patient for transfer was associated with a shorter ITU admission (RR, 0.97; 95% CI, 0.95–0.99).¹⁰

Personnel and patient dependency

The use of patient categorization can be a useful communication tool but is open to variable interpretation. In the UK critical care patients are categorized as level 1, 2 and 3 respectively, the characteristics of each respective group can be seen in [Table 1](#).

In adherence with the ICS guidelines all critically ill patients should be accompanied by two experienced and suitably trained

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