



Transport of the trauma patient

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Abstract

The transport of the seriously injured patient is associated with risk and requires particular expertise and attention. The aim of this review is to provide a historical overview of transport services available to trauma patients in the UK, describe the various transport platforms that are used, identify risks from a system and disease perspective and how they may be mitigated, and make international comparisons. The transfer of patients requiring medical attention has developed over the years and now includes complex undertakings that undoubtedly confer a degree of risk on the patient. A number of different transport platforms are in regular use in the UK, and a number of different health-care professions of varying training, experience, and seniority undertake these transfers. The general principles are to provide no worse care en route than has been provided at the departure destination and to transport patients to a destination capable of delivering whichever intervention the patient is deemed to require. When deciding to transport an injured patient, there are risks, and appropriate mitigation must be in place, particularly if primary transfer to a major trauma centre involves bypassing a nearer facility. It is clear that those clinicians who undertake medical transfers must be appropriately trained and must have access to local or national guidelines. Medical transfers must be the subject of ongoing research, both to ensure that best practice is in place and to continue to understand the safest way of achieving essential transfers effectively.

Key words: transfer; trauma

Introduction

The transport of the seriously injured patient is associated with risk and requires particular expertise and attention.^{1–3} The aim of this review is to provide a historical overview of transport services available to trauma patients in the UK, describe the various transport platforms that are used, identify risks from a system and disease perspective and how they may be mitigated, and make international comparisons.

Different transport platforms

In the UK, it is the responsibility of the National Health Service (NHS) to transport patients who need urgent trauma care. There are 11 ambulance services in England operating as independent NHS Trusts. Scotland and Wales also operate national ambulance services. While the responsibility for the movement of patient lies with the NHS, the practical movement of patients may be subcontracted to private sector

ambulance services for both scene and interhospital work. With the exception of the Scottish Ambulance Service, which has a selection of helicopter and fixed-wing aircraft, the UK NHS ambulance services transport patients in ground ambulances. Police, military, or charity-run aircraft may undertake aeromedical transfers, working in association with the ambulance services.

Working alongside the NHS response, there is a network of rotary-wing (helicopter) air ambulances throughout the UK, with 35 helicopter air ambulances, operated by 24 air ambulance organizations.⁴ The majority of helicopter air ambulances undertake only primary transfers from the scene of accidents to the referring hospital, although some, such as the Emergency Medical Retrieval Service in Scotland, are primarily focused on the interhospital movement of patients.⁵ There are also specialized land-based transport services that are focused on the transport of children, such as the Children's Acute Transport Service in London.⁶

Editor's key points

- Primary transfer is the movement of the trauma patient from the scene of the accident to a hospital.
- Trauma services in the UK aim to achieve primary transfer to a trauma centre within a transfer time of 45 min.
- Secondary transfer is the movement of patients from one facility to another.
- Transfer between centres is associated with increased mortality but is inevitable in some instances.
- A number of guidelines regarding patient transfer are available, including those of the UK Intensive Care Society.

International movement of trauma patients for repatriation purpose is not the responsibility of the NHS and is dependent on funding through either insurance or private donation. Such international repatriation of trauma patients occurs in large fixed-wing aircraft, some using seats or sections of seats on commercial flights, others using dedicated air ambulances. Since the war in Afghanistan, the UK has seen military patients repatriated to the UK in aircraft capable of moving up to 30 ventilated, injured patients.

In addition to organized transport services, it should be recognized that a proportion of seriously injured patients arrive at hospital on private and public transport, and in extraordinary circumstances, such as multiple or mass casualty incidents, trauma patients with minor injuries can arrive by public transport buses commandeered for the purpose.

What type of platform should be used for transporting a trauma patient is multifactorial and depends on availability, prevailing weather and daylight conditions, distance, and terrain. Whatever platform, the crew background and training of the transporting clinician must be appropriate to manage any ongoing or predicted clinical needs of the patient.

Modern-day history of the ambulance service and patient transfer

Understanding of the history of UK ambulance helps to explain why the movement of patients is still considered a difficult and dangerous process, lacking in governance and dedicated resource. Ambulance services in the UK were the responsibility of the Home Office and county councils until the late 1960s. In 1966, the Millar report highlighted the minimal training of staff and basic equipment that was available during patient transfer.⁷ In 1974, responsibility for providing an ambulance service was shifted from local authority to central government control as part of the National Health Service Reorganisation Act (1973), and with it came a gradual standardization of training and recognition that additional skills were required. The 1980s saw development of medical interventions that could be delivered at the scene or en route to hospital, such as tracheal intubation and the use of certain i.v. fluids. In the 1990s, the registration of the term 'paramedic' was established, and in the 2000s, the opportunity for a higher education route into the ambulance profession arose with the development of the paramedic science degree.⁸ New recruits into the ambulance services in the UK are now likely to have this qualification. A few regions in the UK have seen the introduction of paramedics with advanced skills and autonomous practice, as either consultant paramedics or critical care paramedics. On the whole, these schemes are focused on the treatment and transport of injured patients from the scene to

the hospital. They do not train paramedics to undertake independent transfer of critically injured, ventilated patients, for whom a suitably qualified doctor from the referring institution is required to escort the patient. In most European, Scandinavian, and Australasian trauma systems, seriously injured patients are transferred between hospitals by specialist physician/paramedic teams. In the UK, this still requires a suitably skilled doctor from the referring hospital to undertake the transfer. Several authors have suggested that in addition to various guidelines relating to standards for transfer, more focus should be placed on ensuring that doctors who undertake transfers should have specific training in the transport of patients.⁹⁻¹⁰ In some countries, most notably the USA, teams consisting of critical care paramedics and flight nurses undertake the both scene work and interhospital transfers of patients.

Definition and types of transfers and crew configuration

There are two basic phases of patient movement: from the scene of the accident to a hospital; or from one hospital to a more specialized hospital. The skills required at each phase of transport are different. For interhospital transfers, it is important to ensure that the level of medical care that the patient is receiving in hospital is the same during the transfer. Around the world, a wide range of professional groups are involved in the transfer of patients, including emergency medical technicians, paramedics, doctors, and nurses.

Primary transfer

Primary transfer, sometimes called scene transfer, is the movement of the patient from the scene of the accident to a hospital. The level of care afforded to a patient at this stage of transport is much debated and varies around the world. In the UK, it is the responsibility of the ambulance service. This care may be provided by an emergency medical technician trained in basic life support without advanced airway skills. There is no national standard that each major trauma patient should be afforded care by a paramedic trained in advanced life support, although this is often aspirational at a local level. Recent commissioning standards have tried to improve the care provided to trauma patients by ensuring that an enhanced care team (be they physicians or critical care paramedics) are available to the trauma network.

In the UK, the recently developed trauma networks are designed to move the patient directly to the right hospital. By definition, the aim is to reduce the number of interhospital transfers. Such trauma networks are a feature of many health-care systems and are thought to reduce mortality.¹¹⁻¹³ A consequence of this is that trauma patients have longer transfer times from the scene of the accident to the major trauma centre. An arbitrary figure of 45 min has been used by the majority of regional major trauma networks in the UK as a cut-off transfer time to a major trauma centre. If travel times are estimated to be longer than this, land ambulance crews should divert to the local hospital (trauma unit). Whether this cut-off time is appropriate remains unclear. The figure was a consensus-derived number from a group of pre-hospital care experts designing the London trauma network, which went live some years before the rest of the UK, and was partly based on calculations that wherever someone lives in London, they will be less than 45 min from one of the four major trauma centres.¹⁴ It is likely, however, that some patients would benefit from longer travel times for definitive care (for example, those patients with head injuries) and others from minimal

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