

INTER-HOSPITAL TRANSFERS

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QUESTIONS

Before continuing, try to answer the following questions. The answers can be found at the end of the article, together with an explanation. **Please answer True or False:**

1. The following are suitable attire for an inter-hospital transfer:

- Scrubs, clogs and a high visibility jacket
- Scrubs and clogs
- Coveralls, boots and high visibility coat
- Jeans, warm jumper, trainers and high visibility coat

2. A secondary transfer is:

- Movement of a patient to a secondary care facility from the scene of injury/illness
- Movement of a patient between secondary care facilities
- The second transfer a patient undergoes from the point of injury/illness
- A transfer required to move a patient from a helicopter landing site into hospital

3. Fatigue for the team during transfer can be induced by :

- Heat
- Cold
- Vibration
- Motion sickness

4. The following are suitable attire for an inter-hospital transfer:

- An end tidal capnograph
- A self-inflating bag valve mask
- A spare laryngoscope and endotracheal tube
- A working defibrillator

Key Points

- The timing of a transfer will depend on the clinical needs of the patient, available staffing levels and time of day
- By anticipating problems before they occur and having a plan in place to deal with them, transfers can be made substantially safer and less stressful
- Transfer equipment should always include a bag-valve-mask as in the event of an oxygen failure this device will allow you to continue to ventilate the patient, albeit with only 21% oxygen

INTRODUCTION

Most doctors will not regularly undertake transfers as part of their day to day role and this, combined with the inherent difficulties of moving an unwell patient from one location to another, whilst often in unfamiliar surroundings, makes transfers challenging. By preparing well and planning adequately for complications before they occur, the hazards associated with transfers can be minimised.

REASONS FOR TRANSFER

There are a variety of reasons why patients may require inter-hospital transfers. Some may require transfers for specialist care to hospitals offering burns, neurosurgical or transplant services. Others may require repatriation from a specialist unit or from a hospital overseas. Table 1 below contains a transfer classification system.

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Classification of Transfers	
Primary Transfers	Moving the patient from the pre-hospital setting to the receiving hospital
Secondary transfers	Hospital to hospital transfers, including to tertiary centres
Tertiary transfers	Moving from secondary or tertiary hospitals to a national centre of expertise
Quaternary transfers	International transfers

Table 1: Commonly used classification for transfers

TIMING OF TRANSFER

The timing of a transfer will depend on the clinical needs of the patient, available staffing levels and time of day. Ideally transfers should take place during daylight hours but for reasons of clinical urgency this is not always possible. Transfers at night and at weekends are more hazardous due to team fatigue, the technical difficulties associated with driving or flying at night and, often, lower staffing levels of hospitals. The loss of a doctor or nurse from the transferring hospital may have a significant impact on a hospital with already reduced weekend or night-time staffing levels.

Clinical urgency sometimes dictates that a transfer must take place as soon as possible. A typical example would be a traumatic brain injury requiring immediate surgical intervention such as the evacuation of an intracranial haematoma at a neurosurgical centre. In all cases a balance needs to be struck between optimising the patient prior to transfer and transferring promptly. In some cases, such as burns or trauma, it may not be possible to fully stabilise the patient prior to transfer. Senior staff at both the transferring and receiving hospitals must be involved in decision making about potential transfers and the timing of a transfer must be based on the risks and benefits to the patient of immediate or delayed transfer.

CHOICE OF TRANSPORT

Urgency, the distance to be travelled and the time of day all influence the choice of transport for transfer, as well as cost and availability. The principle modes of transport used include land ambulance, rotary aircraft (helicopters) and fixed wing aircraft (aeroplanes). Each mode of transport comes with its own unique advantages and disadvantages.

- **Land ambulances** are normally available 24 hours per day and can transport the patient door to door. However, they are often slower and less smooth than other forms of transport.
- **Air ambulances** are relatively fast and can provide virtually door to door transport. However they may be unable to fly in poor weather conditions or at night and internal space is limited, making patient care more challenging.
- **Larger helicopters**, such as those used by the military or civilian Search and Rescue organisations, provide more internal space, are able to fly at night and in most weather conditions. They are relatively fast and smooth. Due to the size of the craft, landing sites are more limited so an ambulance may be required to transport the patient to and from the landing site and hospital. These helicopters tend to be relatively dark inside, even in the daytime. They are also frequently cold inside, resulting in an increased risk of hypothermia to the patient.
- **Fixed wing aircraft** are often used for longer distance transfers or where transfer by road or helicopter is not practical such as international transfers. Depending on the size of the aircraft there can be greater space for patient care. Landing sites are even more limited and an ambulance transfer to and from the hospital and the airfield will be required. Loading and unloading of the patient stretcher can be challenging due to the combined weight of the patient and with weight and equipment.

PREPARATION

Preparation is the most important step in the transfer process. Even a simple issue like the loss of an intravenous cannula can represent a major problem. Replacing a cannula in a moving vehicle with limited access to the patient is extremely difficult and the problem becomes more serious if the cannula had been used for important infusions such as vasoactive or sedative agents.

Prior to transfer, all lines, endotracheal tubes, drains and monitoring should be attached securely to the patient. Back-up equipment and infusions should be available, along with contact details for the transferring and receiving hospitals in case of any delays or problems during the journey. Doses of important drugs, for example mannitol, should be calculated prior to departure. If their use is likely, consider drawing these drugs up in advance. Many hospitals utilise checklists to ensure that nothing is missed during the preparation stage and the UK Intensive Care Society (ICS) publish such a system which most units use in the UK. By anticipating problems before they occur and having a plan in place to deal with them, transfers can be made substantially safer and less stressful.

PACKAGING

Packaging is how you physically prepare the patient for transfer. The aim is to minimise the risk of lines, tubes and equipment becoming disconnected and also to ensure the patient is kept safe during transport. The process of packaging should be considered layer by layer.

The inner layer includes items physically attached to the patient such as ECG leads, pulse oximeters and endotracheal tubes. A systematic ABC approach should be used. The airway should be secure, endotracheal tube length should be documented and position confirmed both clinically and radiologically prior to transfer.

Changing the patients' position may alter the position of the tube and this should be kept in mind if there is deterioration in ventilation or oxygenation en-route. ECG dots should be covered with adhesive dressings to keep them attached to the patient and, where possible, ear probes should be used for pulse oximetry as these are more accessible and also more reliable if the patient's hands get cold.

Prior to departure large bore IV access should be obtained and secured with two adhesive cannula dressings. Arterial lines should be sutured and covered with a large adhesive dressing. When siting central lines these should ideally be placed in the internal jugular vein for accessibility during transfer. However, delaying a time-critical transfer in order to site a central line is most often neither necessary nor best practice. Femoral lines may be difficult to access once the patient is fully packaged and wrapped in blankets and if an air ambulance is the mode of transport they may be inaccessible due to the patients' position within the cabin. If this is the only available route, extension lines with an accessible three-way tap and flush bag should be in place so as to allow bolus administration of drugs.

The next layer includes sheets and blankets. Creases in sheets should be avoided as these may leave pressure marks on a patient's skin. Ensure that no debris has been left in the sheets, for example packaging, needle sheaths or even grit from the pre-hospital scene. Blankets are important to help avoid hypothermia; at least two are needed and even then hypothermia can still be a risk, particularly if travelling by military helicopter or when the patient is taken outside to board the transport vehicle. Blankets should be placed neatly to avoid catching lines and wires and the patient should be wrapped from chin to toes to conserve the maximum amount of heat.

The final layer is the transport layer. This encompasses the scoops, stretchers, vacuum mattresses, splints and associated belts and securing devices. A scoop stretcher is the device of choice as it provides spinal protection and a means of lifting the patient. A vacuum mattress may also be used and is particularly useful for journeys greater than 1 hour in duration. Spinal boards (otherwise known as long boards) should not be used for transporting patients. They should only be used for extrication (e.g. from a wrecked vehicle) and perhaps transferring a patient between stretchers. If patients remain on a spinal board for any period of time, even as little as 30 minutes, there is a high risk of pressure damage to the skin. In conscious patients spinal boards are also very uncomfortable.

Once the patient is fully packaged and ready for transfer they should be secured to the trolley. This is done by first securing the trunk, then the legs and finally the head and neck. This order is important - if the head were secured first and the patient moved or slid from the stretcher this would risk severe cervical spine trauma. Where there is concern regarding the cervical spine, three-point immobilisation is vital.

EQUIPMENT

The equipment for transfer should be familiar to the user, fully charged and in good condition. Spare batteries and additional backup equipment should be taken in case of failure or malfunction. Where possible equipment should be rationalised to save space and reduce the battery and mains power required. For example using boluses of the opiate drug being used rather than an infusion means you need one less pump to transfer the patient. One spare pump should be taken for every two that are used. An additional spare pump should be brought for each critical infusion, such as vasoactive agents. Non-invasive blood pressure cuffs use a lot of battery power so, where possible, arterial lines should be sited prior to transfer. As well as saving power they are also more accurate and allow continuous blood pressure monitoring. Immediately prior to leaving on a transfer it is important to think through potential complications and critical incidents that could occur, such as accidental extubation, and ensure that the equipment required to deal with these scenarios is readily available.

Another important consideration is how much oxygen the patient will require for the journey. This should be accurately calculated with allowances made for delays during the journey and any additional oxygen requirements to drive the ventilator itself (known as the "bias flow"). The oxygen requirements for a straightforward transfer should be calculated and then this figure should be doubled. Always calculate using an FiO_2 of 1.0 as this simplifies the calculations and offers the additional capacity to increase the oxygen delivery in case of deterioration en route. The total suggested oxygen that is required can be calculated using the equation shown below:

$$\text{Litres of oxygen required} = 2 \times [(\text{minute volume} + \text{bias flow}) \times \text{duration of transfer in minutes}]$$

Transfer equipment should always include a self-inflating bag-valve-mask. In the event of ventilator or oxygen failure this device will allow you to continue to ventilate the patient with at least 21% oxygen.

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LOGISTICS

There are numerous logistical points to consider when organising and conducting a transfer, many of which revolve around communication. Members of the team at the transferring hospital need to be aware that staff are leaving to go on a transfer and calls should be redirected as appropriate. The receiving hospital also needs to be aware of the expected time of arrival, to ensure that they are ready. The appropriate form of transport needs to be requested and the crew need to be aware of where they are transferring the patient from and to which destination. Plans for the return journey should be made to ensure that there is transport back to the base hospital. A charged mobile phone in case of problems and money for a taxi or refreshments is advisable.

DURING TRANSFER

Space can be limited during transfer. In a land ambulance, it is generally advised to sit to one side of the patient. However, this can make access to the patients' opposite side difficult and this should be considered when positioning cannulas. In an air ambulance, access to the patient's lower body is often difficult due to the tail portion of the cabin, so the use of femoral lines should be avoided.

In all forms of transport, noise, vibration and motion make patient monitoring more difficult. Visual checks of the patient, monitoring and equipment must be performed at regular intervals. To facilitate this attach pumps, ventilators and monitors to the trolley or equipment bar (if available) so they are clearly visible. The ability to auscultate, palpate and percuss may also be severely reduced by noise and vibration. This makes reliable monitoring such as arterial lines, pulse oximetry and capnography very important.

In the ambulance or aircraft additional equipment and drug bags should be securely stored to prevent them moving and becoming an obstacle or trip hazard. During transfer, aim to complete any interventions or examinations of the patient whilst seated, as this reduces the chance of injury. If it is necessary to move, aim to do so when the vehicle is steady and kneel rather than stand, as this is a more stable position.

All forms of transport can cause motion sickness and fatigue which may affect both patient and crew. Motion sickness may develop when focus is being directed at monitoring equipment and the patient rather than external visual cues and added to by vibration from engines or rotors. When travelling by air, flicker from rotor blades or strobe lights used for navigation can be a source of fatigue and in susceptible individuals may even lead to seizures. It is important to be aware of the impact that motion sickness may have on your performance. If motion sickness becomes an issue looking out of the windows of the ambulance regularly and trying to keep the environment cool may help. Antiemetics may be necessary.

DOCUMENTATION

Documentation is crucial during transfer; it provides a legal record of the patient's condition, the care provided and any complications encountered during the journey. During transfer the patient's vital signs and details of any medications or infusions administered should be recorded. A set of observations prior to transfer should be documented so that trends can be assessed. By providing a clear and concise written record of the patient's condition and current status, the chance of anything being missed when handing over to the receiving hospital is reduced. A photocopy of the patient's medical and nursing records should also be given to the receiving team and any clinical imaging should be made available. Copies of the transfer records should be kept by both the receiving and transferring hospital.

SAFETY

Safety is important during transfers and this applies not only to the patient, but to all the staff transferring the patient. The first aspect to be considered is appropriate clothing for transfer. Clogs and scrubs are not suitable transfer wear as they are neither safe nor practical. Transfer clothing should be warm and, for safety, a hi-visibility jacket should be worn along with sturdy shoes. Ideally coveralls should be worn and if travelling by air a helmet may also be required. Safety on transfer also involves using common sense and trusting your instincts; if you feel a situation is unsafe discuss it with the ambulance or aircrew. Despite all steps being taken, accidents do still happen and it is important that you protect yourself by taking out personal accident insurance. Membership of some professional bodies such as the UK ICS includes such cover.

SUMMARY

Transfers are a hazardous but necessary intervention in order to provide patients with the right care. A number of transport options are available, each with their own advantages and disadvantages. Preparation and planning are essential elements in ensuring the success of a transfer. Individuals conducting transfers should respect the knowledge and skills of the team members and should also have a plan in place to respond to any adverse incidents that may occur during the journey.

Answers to questions

1.

- a) **False**. Scrubs and clogs are not suitable attire as they are neither warm nor practical, even with a high visibility jacket.
- b) **False**. Scrubs and clogs are not suitable attire for inter-hospital transfers
- c) **True**
- d) **True**

2.

- a) **False**. This describes a primary transfer.
- b) **True**
- c) **False**. The term secondary transfer does not refer to the number of transfers the patient has undergone
- d) **False**. A secondary transfer describes the movement of a patient between secondary care facilities

3.

- a) **True**. All these factors can contribute to fatigue for the transferring team
- b) **True**.
- c) **True**.
- d) **True**.

4.

- a) **False**. Although important, capnography is not the single most important piece of equipment
- b) **True**. This is essential – if all other equipment fails this ensures that the patient can be ventilated
- c) **False**. Although important, spare intubation equipment is not the single most important piece of equipment
- d) **False**. The single most important piece of equipment is a bag-valve mask



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