The safe referral and transfer of patients to major trauma centres

Background

Polytrauma patients sustain multiple injuries that frequently require staged management in more than one hospital, depending on the clinical scenario and available resources.

While the initial resuscitation is conducted at the nearest emergency department, depending on the injuries sustained, these patients frequently require transfer to major trauma centres for definitive treatment by pelvic, neurosurgical and plastic surgery teams. The transfer of these patients is potentially hazardous if poorly executed and associated with poor outcomes that can be avoided if simple and sound principles are adhered to (Intensive Care Society, 2002; The Association of Anaesthetists of Great Britain and Ireland, 2006, 2009).

Poor communication, incomplete documentation of history, examination and investigations, and inadequate preparations for the transfer are all commonly observed errors and risk sub-optimal patient care. While earlier publications have provided guidelines regarding the transfer process there are no published guidelines regarding referral. This article recommends key practical points for efficient referral and ongoing safe management of patients requiring an inter-hospital transfer to a major trauma centre (*Figure 1*).

Initial management

Goal: identify time-critical conditions

Time-critical conditions, such as intracranial, thoracic, abdominal, pelvic or severe limb haemorrhage, require immediate surgery (American College of Surgeons, 1997). If this surgery can be performed at a local hospital then one should proceed as soon as possible, for example an emergency laparotomy, the application of an external fixator to the pelvis or long bones, the insertion of chest drains, embolization and, depending on surgical teams available, thoracotomy. If the necessary surgery for a time-critical condition cannot be performed at the local hospital, then the team should expedite emergency transfer to the nearest available trauma centre. Most thoracic and neurosurgical interventions require a transfer.

A subsequent secondary survey should identify all significant but non-time criti-

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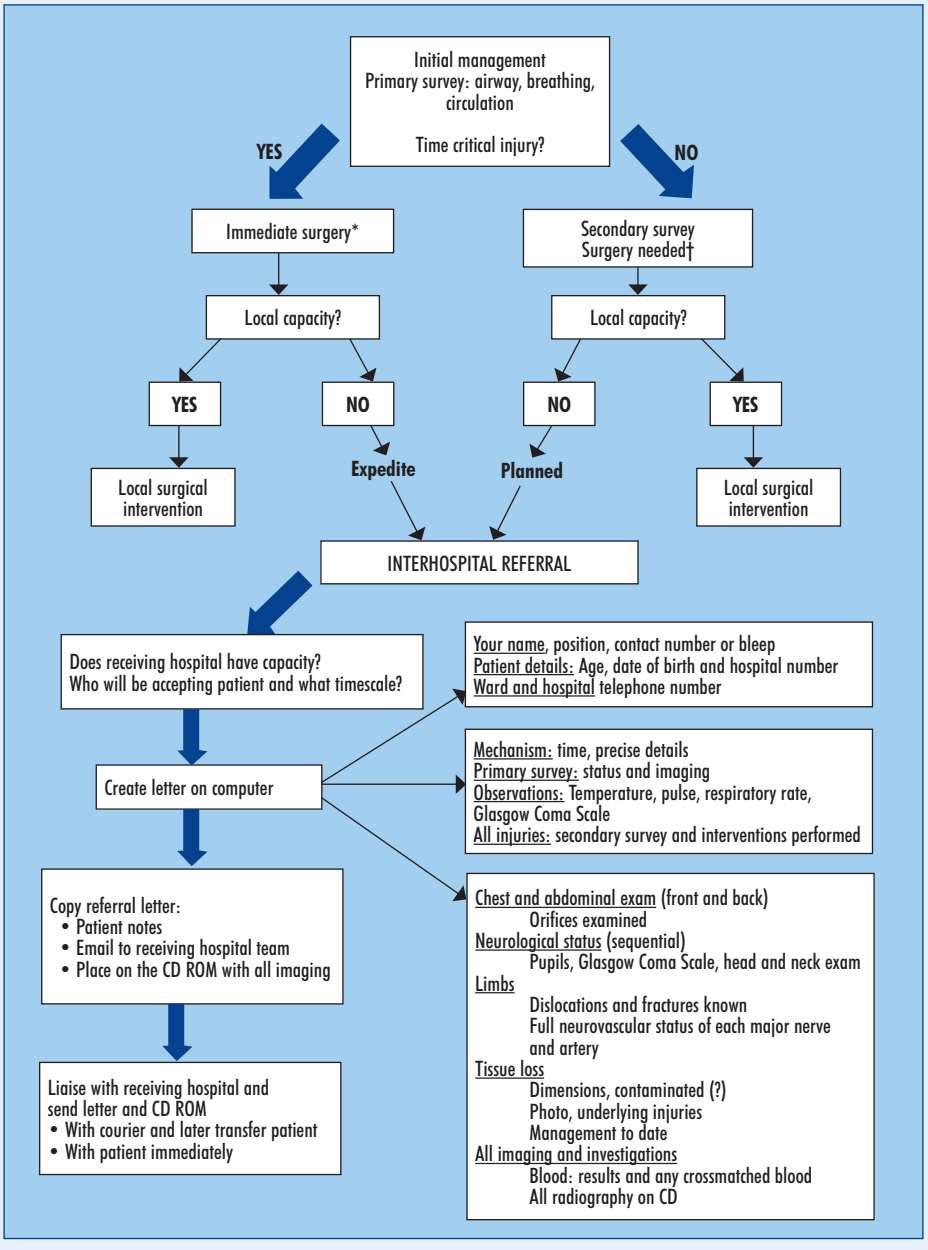
Figure 1. Flow diagram for interhospital transfer. * = Intracranial, thoracic, abdominal, pelvic or limb haemorrhage. † = Plastic or burns surgery, maxillofacial, pelvic or acetabular reconstruction, neurosurgical or cardiothoracic.



cal condition injuries and, by liaising with the local and trauma centre surgical teams, injuries that cannot be managed locally must be clarified and arrangements begun immediately to transfer the patient to an appropriate unit.

Planning the referral to major trauma centre

Goal: collate all information relevant to referral

Once a decision has been made to refer the patient one should immediately collate all relevant information to facilitate this. The hospital most suitable to managing the patient may not be the nearest geographically. Find out who to contact, commonly the medical team of a particular consultant, the on-call team or a dedicated nurse practitioner. A major trauma centre will be used to receiving referrals and will be able to redirect you if necessary. Ensure you have all the details available when discussing the patient, so have to hand the patient notes, any imaging (e.g. X-rays, computed tomography scans) and up-to-date blood and urine results.

Informing the tertiary centre

Goal: impart information in a safe and ordered manner

The basics

Initially it is important to identify who you are, where you are calling from, your contact telephone number, bleep or email, and that you wish to make a referral. Make sure you give the full patient name, age, date of birth and hospital number. Include the current location of the patient, ward or department, and which local consultant the patient is under.

A detailed mechanism of injury is needed including date, exact time and location, the speed of any accident, whether the patient was restrained and if extrication was necessary.

Make a clear and concise list of all the injuries, particularly neurosurgical, orthopaedic or plastic surgery injuries that necessitate the transfer.

Document the current status of the primary survey:

A: Is the patient talking or intubated?
Is the cervical spine protected?
B: Does the patient require ventilator support?
Rate and depth of breathing
Oxygen requirement
Air entry and breath sounds
C: Pulse, blood pressure, peripheral tissue perfusion and urine output
D: Glasgow Coma Scale
Are both pupils reactive to light?

Further details

The accepting team from the major trauma centre may request specific details that may influence future management.

History and organization: The accepting teams need to clarify the key clinical facts and diagnoses and whether all the clinical findings are stable. This will clarify which patients need transferring, to which team and the degree of urgency. The bed managers of the respective hospitals will then need to ensure there is sufficient capacity to accept the patient and who will be the responsible consultant(s) for the patient.

Clinical findings: Injuries to all systems need to be documented precisely. Chest and abdominal injuries require clinical examination both front and back, ensuring that all orifices have been checked. All neurological injuries should be assessed using sequential Glasgow Coma Scale and pupil examination, in conjunction with an appropriate head and neck examination.

All limb injuries must be documented, noting any limb deformity, dislocations and include a full neurovascular examination (incorporating peripheral nerves rather than dermatomes or myotomes), limb perfusion and all relevant pulses. This may require Doppler examination. Reports of significant tissue loss should include the size, anatomical location and depth of any wound, and a digital photograph (a hard copy and/or digital copy on CD ROM) is very useful.

Interventions already performed: All surgical or medical interventions should be clearly detailed. Are there any conditions that have not yet been definitively managed?

Investigations: Clarify which investigations, including blood tests and radiography, have been done and if any further investigations are needed. Remember that correctly taken plain X-rays are very useful, e.g. Judet oblique views for acetabular fractures, or inlet and outlet views for pelvic ring injuries and be aware of the local arrangements for transferring images onto CD ROM.

Transfer back: Ensure the mechanism(s) are in place to transfer the patient back to his/her local hospital following treatment at the major trauma centre.

Documentation and logistics

Goal: ensure information is actually safely transferred

Transfer letter

Always use a computer and printer since it is clear and copies can easily be put in the notes at both hospitals. Copy these letters in email, CD ROM and paper forms to allow several people to be aware of the precise details of the transfer. It is useful to also include a copy of the letter on the CD ROM which contains the imaging.

When writing the letter ensure the following points are covered:

- Know exactly who and where to address the letter to – either electronically or hard copy
- Bullet points are easier and quicker to scan than text
- Detail the points highlighted in the basics (see above)
- Add any details of any further information requested
- Give contact details of teams, consultants and nursing staff involved.

Imaging

Images are often transferred on a CD ROM, but ensure the data are not encrypted. Include all plain X-rays, even if computed tomography or magnetic resonance imaging scans were subsequently obtained.

Courier information

While the speed and security of a courier for dispatching documents justifies the cost, it is also good practice to check that the trauma centre actually receives them.

Transfer

Goal: safe and efficient patient transfer

Detailed published guidelines exist for safe patient transfer (The Association of Anaesthetists of Great Britain and Ireland, 2006, 2009) with the key points highlighted below.

The decision to transfer a patient must be made by a consultant and then the following should be considered:

Selection of transport method

Options include ambulance by road or air. The decision will depend on the urgency, availability, distance, cost, and the traffic and weather conditions. Road has the benefit of having fast mobilization time, more familiarity and low cost. Air transfer can be quicker over longer distances but one must take into account the inter-vehicle transfers at each end of the transfer. They are noisier (so harder to examine the patient), cramped and more expensive.

Personnel

There should be at least two personnel undertaking the transfer. It is usual for one to be a doctor trained in airway, ventilator management and resuscitation, together with a nurse. The doctor accompanying the patient is usually an anaesthetist, but this may vary depending upon the exact nature of the injuries and local policies and resources.

Airway

If there are any concerns over either the integrity of the airway or ventilation then the airway should be secured and protected before transfer.

Resuscitation before transfer

Hypovolaemic patients tolerate being moved very poorly and so the patient should be adequately resuscitated. The exceptions to this include injuries such penetrating trauma or aortic tears where a 'scoop and run' approach may be more appropriate. Secured venous access is mandatory with at least two wide bore cannulae inserted. If a pneumothorax is present or suspected then a chest drain should be inserted before transfer and must not be clamped during transfer.

Monitoring

The standard of monitoring should be at least as good as the base hospital would provide. This should include an electrocardiogram, non-invasive blood pressure, oxygen saturations and end tidal carbon dioxide measurement in ventilated patients.

Final checks

Before departure the receiving hospital should be contacted and the availability of the bed should be confirmed with named medical and nursing staff. An update on the patient's condition should be given along with an estimated time of arrival. Some hospitals have a pre-transfer checklist which should be completed to ensure that all necessary preparations have been undertaken before departure. Ensure that copies of all investigations are transferred with the patient. If blood has been crossmatched, it is essential to bring this, especially if the patient is likely to require it during the journey or is undergoing surgery within 4 hours of arrival at the receiving hospital.

Handover

On arrival there should be a formal handover between the transfer team and the receiving medical and nursing staff who will assume responsibility for the patient's care. Any scans or X-rays should be handed over to receiving staff.

Major trauma centre management

The referring team at the local hospital should be aware of the overall management plan once the patient has been transferred.

The referral will often be accepted with a proforma detailing standard information being completed. This ensures there are no omissions, initiates the appropriate care at the major trauma centre and allows good patient follow up, audit and research. The definitive care will involve a staged management protocol often using several specialties.

Following a reassessment of the primary survey, including any adjuncts already in situ, the time-critical conditions take priority triggering emergency laparotomies, thoracotomies or pelvic external fixation for shock, with craniotomy and intracranial pressure monitoring for intracranial haemorrhage.

Non-time-critical conditions often necessitate several planned surgical procedures. The timing of these can vary depending on the complexity of concurrent pathology and the potentially deleterious effects of a massive inflammatory response (Keel and Trentz, 2005).

Audit and research

Clinical audit is vital to improve the standard of care and is especially important for the management of complex polytrauma patients. Completion of specific proformas should be encouraged to facilitate the evaluation of the efficiency and safety of the transfer process by both the sending and receiving teams.

Clear documentation facilitates clinical audit and all major trauma centres continually review and audit their practice. Numerous scoring systems exist to help with triage and outcome prediction:

- Glasgow Coma Scale
- Trauma Score: up to 16 points are awarded according to respiratory rate and effort, capillary refill, systolic blood pressure and Glasgow Coma Scale. Survival at 8–9 points is 50%, outcome is worse with lower scores
- Injury Severity Score: points awarded for different systems affected including respiratory, cardiovascular and central nervous systems, abdomen, extremities and skin (out of 75). The highest three scores are squared and added, and survival is 50% with a score of 30–40 points depending on age
- Trauma Revised Injury Severity Score: a combination of Trauma Score, Injury Severity Score and age
- Mangled Extremity Severity Score: assesses skeletal and soft tissue injury, limb ischaemia, shock and age.

Owing to the nature of these injuries clinical follow up is important to monitor outcomes and identify any long-term complications. The opinions and satisfaction of the patient and family should also

KEY POINTS

- The safe referral and transfer of patients needs clear decision making by both the transferring and receiving teams to prioritize treatment.
- The trauma centre should be contacted early with clear documentation dispatched as required.
- The logistics of the transfer, including the necessary personnel and equipment, should be carefully planned.
- Clear and precise communication of verbal and written information, and imaging, is vital to ensure an efficient and safe transfer.

be evaluated and outpatient review provides an ideal opportunity for this.

Education

Numerous courses cover the management of polytrauma patients such as Advanced Trauma Life Support, care of the critically ill surgical patient and systematic training in acute illness recognition and treatment for surgery. It is important that clinicians involved in trauma keep their knowledge and skill up to date, and they may need to provide evidence of such for revalidation.

Conclusions

Clear and precise communication, both verbal and written, is vital for the safe referral and management of polytrauma patients. The points highlighted in this article (*Figure 1*) help to eliminate common errors that occur which risk patient safety when patients are referred and transferred between hospitals. **BJHM**

Conflict of interest: none.

American College of Surgeons (1997) *Advanced Trauma Life Support. Student Course Manual.* 6th edn. American College of Surgeons, Chicago

Intensive Care Society (2002) *Guidelines for the transport of the critically ill adult.* Intensive Care Society, London

Keel M, Trentz O (2005) Pathophysiology of polytrauma. *Injury* **36**: 691–709

The Association of Anaesthetists of Great Britain and Ireland (2006) *Recommendations for the safe transfer of Patients with Brain Injury.* The Association of Anaesthetists of Great Britain and Ireland, London

The Association of Anaesthetists of Great Britain and Ireland (2009) *AAGBI Safety Guideline – Interhospital Transfer.* The Association of Anaesthetists of Great Britain and Ireland, London