Intensive Care Society

Standards and Guidelines

Guidelines for the transport of the critically ill adult (3rd Edition 2011)

Intensive Care Society 2011

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EXECUTIVE SUMMARY

This is the 3rd edition of the Intensive Care society guidelines on the transport of the critically ill adult and as with previous editions the intention is to provide colleagues with up to date advice and to promote high standards of care during the transfer of critically ill patients.

Following a systematic literature review, the guidelines have been extensively updated in order to reflect current practice. We have attempted to grade the quality of the evidence and the strength of the recommendations made, however this has been hampered by a lack of high quality published evidence, possibly reflecting the difficulty of conducting good quality research in this field.

One significant change from previous editions is a greater emphasis on the transfer of the level 2 critically ill patients. Evidence seems to suggest that whilst the number of level 3 patients transferred between hospitals has remained largely unchanged in recent years the number of level 2 patients transferred may have increased. Whilst some of these patients may be reasonably stable and at low risk of deterioration during transfer, others will be less stable and at significant risk. We have therefore attempted to introduce a framework for risk assessment prior to transfer to ensure that staff with the appropriate competencies accompany the patient.

SUMMARY OF RECOMMENDATIONS
[NUMBER IN BOLD INDICATES PARAGRAPH NUMBER IN GUIDELINES]

Organisation within networks

- Healthcare commissioners should ensure that sufficient funds continue to be made available to support managed critical care networks**. [6.4.1]**

- Each network should have a lead clinician and manager whose responsibilities include the development of referral pathways, transfer protocols and quality assurance programmes. **[6.4.2]**

- Regional bed bureaux should be developed / utilised to help to identify the locality, numbers and types of beds available within a network. Systems should also be in place to locate beds beyond the network boundaries when necessary**. [6.4.3]**

Organisation within trusts

- All acute hospitals should nominate a lead consultant for critical care transfers with responsibility for guidelines training and equipment provision. This individual should report to the critical care board or equivalent**. [7.4.1]**

- All acute hospitals must have systems and resources in place to resuscitate, stabilise and transport critically ill patients when required. Plans should encompass all critical care areas including intensive care and high dependency care areas, acute wards and emergency departments**. [7.4.2]**

- Each trust should have arrangements in place to ensure that transfers for capacity reasons alone occur only as a last resort**. [7.4.3]**

- Where necessary transfer should be to the most appropriate hospital for the clinical needs of the patient, while taking account of bed availability, transfer distance and designated transfer group. **[7.4.4]**

Role of dedicated transport teams

- Critical care networks should consider whether the development and use of dedicated transport teams is appropriate to best meet the transport needs of their patient population**. [8.5.1]**

- Whatever transport arrangements critical care networks develop, all acute hospitals must have systems and resources in place to resuscitate and stabilise critically ill patients and carry out time critical transfers when required**. [8.5.2]**

Standards for ambulances

- Critical care networks should liaise with local ambulance providers to determine how best to meet the transport needs of the network**.[9.4.1]**

- Expert advice should be sought from local ambulance providers and / or commercial air ambulance providers regarding the planning of air transport services**.[9.4.2]**

Prioritisation of transfers

- All networks and ambulance providers should agree a framework for prioritisation of transfers and appropriate response times in keeping with the nationally agreed protocol. **[10.2.1]**

Training and competencies

- All staff potentially involved in the transport of critically ill patients should receive appropriate training in transfer medicine, and have the opportunity to gain experience in a supernumerary capacity **[11.7.1]**

- All staff involved in transfers must be able to demonstrate the range of competencies appropriate to their role**. [11.7.2]**

Equipment

- All acute hospitals responsible for transferring critically ill patients must have access to a CEN compliant transfer trolley**. [12.9.1]**

- All monitoring and equipment must be suitable for use in the transfer environment and mounted on the trolley in such a way as to be CEN compliant. **[12.9.2]**

- Ideally all equipment within a critical care network should be standardised to enable the seamless transfer of patients without, for example, interruption of drug therapy or monitoring due to incompatibility of leads and transducers. **[12.9.3]**

Governance Arrangements

- Network lead clinicians, must ensure that adequate governance arrangements are in place across the network and that all patient transfers are subject to audit, critical incident reporting and review. **[13.3.1]**

- Trust lead clinicians for transfer should ensure that the movement of critically ill patients within hospitals (intra-hospital transfer) are subject to similar governance arrangements. **[13.3.2]**

- A mechanism for capturing the numbers of critical care transfers occurring nationally, indications, incidents and outcome should be developed**. [13.3.3]**

Transfer decisions and ethics

- The decision to transfer a patient to another hospital, must be made by a responsible consultant, in conjunction with consultant colleagues from relevant specialities in both the referring and receiving hospitals. **[14.4.1]**

- The decision to accept a transferred patient should be made by a consultant in the receiving unit. **[14.4.2]**

Selection of transport mode

- The decision to carry out a transfer by road or air will depend on local circumstances, patient factors and staff training and availability. **[15.5.1]**

- Arrangements for air transport should be agreed with local ambulance control or air carriers specialising in medical transfers. Contact numbers should be available in all ICUs and Emergency Departments. **[15.5.2]**

Accompanying personnel and risk assesment

- Prior to the transfer of any critically ill patient, a risk assessment must be undertaken and documented by a consultant or other suitably experienced member of medical staff to determine the level of anticipated risk during transfer**. [16.4.1]**

- The outcome of the risk assessment should be used to determine the competencies of the staff required to accompany the patient during transfer. **[16.4.2]**

Preparation for transport

- Patients should be appropriately resuscitated and stabilised prior to transfer to reduce the physiological disturbance associated with movement and reduce the risk of deterioration during the transfer. **[17.12.1]**

- Pre-departure check lists should be used to help to ensure that all necessary preparations have been completed.**[17.12.2]**

Monitoring during transport

- Minimum standards of monitoring should be applied in every case**.[18.6.1]**

- Monitoring must be continuous throughout the transfer. All monitors Including ventilator displays and syringe drivers should be visible to accompanying staff**. [18.6.2]**

- A written record of observations and events should be maintained**. [18.6.3]**

Safety during transport

- Patients should be secured to the transport trolley by means of appropriate restraint. (E.g. 5 point harness / straps). Pressure areas (including neurovascular bundles) should be appropriately protected. Warming / insulting blankets should be used to keep the patient warm unless otherwise contraindicated. Indwelling lines and tubes should be secure and visible / accessible. **[19.6.1]**

- All equipment (including transfer bags) must be securely stowed. Equipment should be either fastened to the transport trolley or securely stored in appropriate lockers in the ambulance. When this is not possible, equipment should be placed on the floor against the bulkhead wall. Under <u>no circumstances</u> should equipment (e.g. syringe pump) be left on top of the patient trolley . This may become a dangerous projectile in the event of a sudden deceleration. Gas cylinders must be held in secure housings**. [19.6.2]**

- Staff should remain seated at all times and wear the seat belts provided. Adequately resuscitated and stabilised patients should not normally require any significant changes to treatment during transport. If, however, despite meticulous preparation, unforeseen clinical emergencies arise and the patient requires intervention, this should not be attempted in a moving ambulance. The vehicle should be stopped appropriately in a safe place before administering treatment**. [19.6.3]**

- High speed journeys should be avoided except where strictly necessary. ‘Blue lights and sirens’ may be used to aid passage through traffic to deliver a smooth journey**. [19.6.4]**

Aeromedical considerations

- Staff without appropriate training should not undertake aero-medical transfers. Minimum requirements include safety training, evacuation procedures for the aircraft, and basic on board communication skills (particularly for helicopters). More advanced training in aero-medical transfer is however desirable. **[20.5.1]**

Documentation and handover

- Standardised documentation should be developed across networks and should be used for both inter-hospital and intra-hospital transport. This should include a core data set for audit purposes and the transport team should be able to retain a duplicate for such purposes. **[21.4.1]**

SECTION 1. INTRODUCTION, STANDARDS OF CARE, AND SCOPE OF GUIDELINES

1. INTRODUCTION

1.1. Following initial resuscitation and stabilisation in hospital, critically ill patients frequently require transfer to another hospital. Indications for such transfers include specialist investigation or treatment not available in the referring unit, lack of availability of a staffed critical care bed and repatriation.

1.2. In 1997 it was it was estimated that over 11,000 critically ill patients were transferred between hospitals in the UK each year.[1] Figures of the number of such transfers carried out currently are difficult to obtain as there is no national reporting system.

1.3. Data from the Intensive Care National Audit and Research Centre (ICNARC) case mix programme, indicates that there were 94,149 intensive care admissions to 183 participating general units during 2009.[2] (The last complete year for which data was available). There were 2,293 transfers in to participating units from level 3 or combined level 2 / 3 critical care units in other acute hospitals and 2,483 transfers out from participating units to level 3 or combined level 2 / 3 critical care units in other acute hospitals. Based on 73% coverage of adult general critical care units in England, Wales and Northern Ireland, the data can be extrapolated to provide an estimate of the total number of transfers occurring (Appendix 1). The estimated figure of 4,500 excludes transfers between specialist units, and critical care transfers originating outside of a critical care unit. It is likely therefore to be an underestimate of the total number of critical care transfers taking place.

1.4. Data from one regional bed information service, (Northwest Intensive Care Bed Information Service) covering the period 2000-2010 indicates a fairly consistent rate of critical care transfers over the past 10 years (average 1682 / year, range 1550 - 1828), although there was a significant fall in level 3 transfers in 2009-10[3]. The reasons for this fall are not clear, but may reflect better escalation policies following planning for the predicted influenza pandemic.

1.5. Data from the Scottish audit of Inter Hospital Transfers of Acutely Ill Adults undertaken between November 2007 and March 2008 demonstrated a large number of transfers of acutely ill patients (2396) of these however only 248 were ventilated[4].

1.6. Differences in geography, population density, local NHS organisation and infrastructure make it difficult to extrapolate data to estimate the numbers of transfers occurring nationally. It is clear however that large numbers of critically ill patients are still being transferred between hospitals and that the ventilated level 3 patient, may only be the 'tip of the iceberg' with large numbers of non-ventilated, (but none the less critically ill) patients being transferred.

2. STANDARDS OF CARE

2.1. The Intensive Care Society (ICS) first published guidelines on the transport of the critically ill adult in 1997[5] and these were revised in 2002.[6] Both these documents attempted to rationalise advice from a number of sources to encourage improvement in standards of care during transfer of critically ill patients in the UK.

2.2. In preparing this revised edition of the guidelines, a systematic literature review was carried out in September 2009 to identify relevant articles published since 2000, relating to current clinical practices and standards of care during the transport of critically ill patients. Forty eight articles were selected for review including eight sets of guidelines published by other groups and thirty eight articles relating to the process of patient transfer. The search strategy used is included as Appendix 2.

2.3. The number of journal articles published over the period demonstrates that there is still considerable interest in the process of patient transfer. Much of the data cited is from single centre audits and case series which are thought to provide the weakest level of evidence, such that their validity and wider applicability should be interpreted with caution. The evidence seems to suggest however that compliance with existing guidelines is poor and that concerns over the standards of many transfers remain.

2.4. A survey of risk management strategies practised by NHS hospitals when transferring critically ill patients, found that only 29.3% of hospitals reported using a dedicated transfer trolley and only 28.8% provided staff with some elements of personal protective equipment, suggesting that NHS hospitals fall short of national guidelines.[7]

2.5. One regional audit from the North of England (n=114), reported that 61% of inter-hospital transfers happened between 17:00 and 9:00 and that in over half of these (58%), the patients were accompanied by SHOs.[8] This audit was updated following the introduction of a regional training programme, but there was little improvement in the grade of accompanying doctor, despite an increase in the number of transfers taking place out of hours. Critical incidents occurred during 20% of the transfers.[9]

2.6. Critically ill and injured patients transferred from Emergency Departments (EDs) represent a significant proportion of the total number of inter-hospital transfers. Looking specifically at the organization of transfers from EDs, there are also widespread deficiencies in equipment provision, patient monitoring facilities, staff training and transfer documentation. Only 44% of EDs were aware that they belong to a critical care network, whilst only 57% had transfer guidelines available in the department.[10]

2.7. Concerns about the transfer of critically ill patients are not just confined to the UK. Several articles evaluated the process of transfer in Australia. In one review of incident reports, 91% of incidents occurring during inter hospital transfer were preventable and 59% of critical incidents resulted in harm to the patient.[11] Similarly, an audit from the University Hospital in Lausanne, Switzerland, showed that although compliance with local transfer guidelines was improving, it still remained below 100%, with particular concerns about the availability of resources at weekends.[12] In a prospective audit from the Netherlands of 100 consecutive patients transferred to a unit adverse events occurred in 34% of transfers and 70% of these events were considered to be avoidable. More than one third of patients arrived during the night shift, and only 57% were accompanied by a physician.[13]

3. SCOPE OF GUIDELINES

3.1. The paucity of evidence highlighted by the systematic literature review illustrates the difficulty of performing high caliber research in this area, which consequently presents a challenge to those looking to compile evidence-based guidelines.

3.2. None the less this revised edition of the Intensive Care Society Guidelines for the transport of the critically ill adult is intended to provide members with up to date guidance, in order to improve the standards of care during transport of critically ill adults in the UK.

3.3. The guidelines are intended to apply to the secondary transfer of all critically ill adult patients in the UK, transferred outside of a normal critical care environment.

3.4. They apply both to patients transferred between hospitals (inter-hospital transport) and to those transferred between departments within a hospital (intra-hospital transport)) since the same level of preparation, supervision and care is required for each.

4. DEFINITIONS

4.1. There is no universally accepted definition of the term ‘critically ill’. A recent paper by Fried et al describing an audit of inter-hospital transfers of acutely ill patients highlighted the large number of interhospital transfers of non ventilated acutely ill patients.[2] For the purpose of these guidelines ‘critically ill’ is defined as requiring a level of care greater than that normally provided on a standard hospital ward, i.e. ICS Levels Of Care 1-3.[14]

4.2. Use of the term ‘non clinical transfer’ to mean a transfer carried out for the purposes of receiving treatment or investigation normally provided at the referring hospital but not available at the time

(e.g. lack of staffed level 2-3 critical care bed) may be misleading and should be avoided. Although such transfers may be carried out due to lack of capacity, they may none the less be clinically necessary and potentially time critical. Clinical priority and indication for transfer should therefore be clearly separated.

4.3. Throughout these guidelines the term 'clinical' is used to mean transfer for specialist treatment / investigation not provided at the referring hospital, and the term 'capacity' is used to mean transfer for specialist treatment / investigation which is normally provided at the referring hospital but which is at the time of transfer unavailable. A glossary of terms used is provided in appendix 3a.

5. GRADING OF RECOMMENDATIONS

5.1. During the development of these guidelines we attempted to use the GRADE system.[15] to rate the quality of the available evidence (high, moderate, low, very low) and the strength of the recommendations based on that evidence (strong, weak). The definitions / descriptions used for these terms have been adapted from other sources[15 16] and are provided in Appendix 3b.

5.2. Much of the available published evidence relating to transfers however, comes from small observational studies and case series, including audit and this is generally held to provide the lowest quality of evidence. This may reflect the difficulty of performing high quality research in the transfer setting however without exception the quality of evidence available to inform the guidelines was rated as low or very low.

5.3. As a consequence, all recommendations are made, based on a combination of available published evidence and expert clinical opinion. All the recommendations made are considered as 'strong' based on the definitions / descriptions used.

SECTION 2: ORGANISATION AND PLANNING

6. ORGANISATION WITHIN NETWORKS

6.1. The Department of Health's publication 'Comprehensive Critical Care'[17] made planning for inter-hospital transfer of the critically ill mandatory at local regional and national level, with transport services organised and co-ordinated to deliver safe, efficient, and timely inter-hospital transfer of all critically ill or injured patients and not just those from within traditional high dependency or intensive care units.

6.2. To facilitate this, managed critical care networks were established with responsibility for the co-ordination and development of transfer services within defined geographical areas.

6.3. There is little published evidence as to the value of critical care networks. One study has suggested that there is a general lack of awareness of networks by clinicians[18], and a recent unpublished audit demonstrated that there is little consistency in the transfer related activity of networks with some having no functional network at all. Anecdotal evidence from regions with well established networks however supports the role and value of managed networks.

6.4. Recommendations

6.4.1. Healthcare commissioners should ensure that sufficient funds continue to be made available to support managed critical care networks.

6.4.2. Each network should have a lead clinician and manager whose responsibilities include the development of referral pathways, transfer protocols and quality assurance programmes.

6.4.3. Regional bed bureaux should be developed / utilised to help to identify the locality, numbers and types of beds available within a network. Systems should also be in place to locate beds beyond the network boundaries when necessary.

7. ORGANISATION WITHIN TRUSTS

7.1. Within each network, individual Acute NHS Trusts are required to define those geographically related hospitals to which they transfer patients for capacity reasons alone.

7.2. These 'Transfer Groups' are specific to each Trust and arrangements may not be reciprocal. Acute Trusts at the boundaries of network areas may include Trusts from neighbouring networks in their

transfer group, and if appropriate, use a different tertiary referral centre from their parent critical care network. Close co-operation between adjacent critical care networks is therefore a necessity.

7.3. Transfer of any patient outside of a predefined transfer group for capacity reasons is considered a critical incident by the DOH and must be sanctioned by the Chief Executive (or nominated deputy) of the transferring NHS trust, to ensure that all escalation policies have been followed. These transfers must then be reported to the SHA / DOH within 24 hours using the approved reporting system.

7.4. Recommendations

7.4.1. All acute hospitals should nominate a lead consultant for critical care transfers with responsibility for guidelines training and equipment provision. This individual should report to the critical care board (or equivalent).

7.4.2. All acute hospitals must have systems and resources in place to resuscitate, stabilise and transport critically ill patients when required. Plans should encompass all critical care areas including intensive care and high dependency care areas, acute wards and emergency departments

7.4.3. Each trust should have arrangements in place to ensure that transfers for capacity reasons alone occur only as a last resort.

7.4.4. Where necessary transfer should be to the most appropriate hospital for the clinical needs of the patient, while taking account of bed availability, transfer distance and designated transfer group.

8. ROLE OF DEDICATED TRANSPORT TEAMS

8.1. There is some evidence that the use of dedicated transport teams improves the outcome of critically ill patients transferred between hospitals

8.2. In a comparison of 168 transfers arriving at a single centre via a specialist retrieval team, with 91 transfers performed by a team from the referring unit, significantly more patients from the latter group were acidotic (pH < 7.1; 11% vs. 3% p<0.008) and hypotensive (MAP <60 mmHg; 18% vs. 9% p<0.03) upon arrival compared to the former.[19]

8.3. A systematic review examining whether use of specialist retrieval transport personnel improved outcome of critically ill patients, however, concluded that the current evidence was insufficient to answer the question. Six cohort studies were identified involving 4534 patients, however the

authors were unable to carry out meta-analysis because of significant methodological differences between the studies[20] .

8.4. Despite this lack of evidence there may be logistical and practical advantages in the use of dedicated transport teams. These teams may be based at a centrally located tertiary referral centre (retrieval team), affiliated to an individual critical care network (regional transport team) or be based in individual hospitals. Arrangements will depend upon geographical area, funding and demand.

8.5. Recommendations

8.5.1. Critical care networks should consider whether the development and use of dedicated transport teams is appropriate to best meet the transport needs of their patient population.

8.5.2. Whatever transport arrangements critical care networks develop, all acute hospitals must have systems and resources in place to resuscitate and stabilise critically ill patients and carry out time critical transfers when required.

9. STANDARDS FOR AMBULANCES.

9.1. Standards for road ambulances are stipulated in British and European Standards document 1789-2007.(commonly referred to as CEN regulations). [21] Section 4.5.9. of these standards, requires that without exception, '*all persons and items e.g. medical devices, equipment and objects normally carried on the road ambulance shall be restrained, installed or stowed to prevent them becoming a projectile when subjected to acceleration / deceleration forces of 10g in the forward, rearward left, right and vertical directions*''.(See Equipment and Safety during transfer, below).

9.2. The standards also require that emergency ambulances carry a minimum of 2000 litres of oxygen. Most vehicles are now being equipped with 2 F size cylinders (total 2720 litres). In addition a national specification for new emergency vehicles has been agreed, which will include DC / AC power inverters, making them ideal for critical care transfers.

9.3. All aspects of the provision and safe operation of air ambulances are governed by the Civil Aviation Authority.

9.4. Recommendations

9.4.1. Critical care networks should liaise with local ambulance providers to determine how best to meet the transport needs of the network.

9.4.2. Expert advice should be sought from local ambulance providers and / or commercial air ambulance providers regarding the planning of air transport services.

10. PRIORITISATION OF TRANSFERS.

10.1. A framework for the prioritisation of secondary transfers by ambulance providers has recently been agreed by the National Ambulance Clinical Conveyance Group[22]. The Inter-hospital transfer protocol, (adapted from an algorithm originally developed by the West Yorkshire Critical Care Network / Yorkshire Ambulance service), is based on the clinical priority of the patient. [Appendix 4]

10.2. Recommendations

10.2.1. All networks and ambulance providers should agree a framework for prioritisation of transfers and appropriate response times in keeping with the nationally agreed protocol.

11. TRAINING AND COMPETENCIES

11.1. Evidence suggests that significant numbers of transfers are still being undertaken by inexperienced and inadequately trained staff and this is likely to be responsible for the continuing high rate of avoidable critical incidents.

11.2. In a survey of speciality trainees in years one and two in the Wessex Region (n=31), 88% had undertaken an inter-hospital transfer alone, whilst 94% had transferred a patient on their own within the hospital. 65% had received some transfer training, but only 33% had been on a specific transfer course. 39% (n=12) had been asked to undertake a transfer when they did not feel they had adequate experience to do so.[23] In an older survey of trainees in the North West, the majority of SHOs had 3 months or less ICU experience at the time of their first solo transfer. Only a small number (22%) had received formal training in the transfer of critically ill patients, and up to 45% rated their training as either useless or largely deficient.[24]

11.3. Transfer competencies are included in the new Intensive Care Medicine CCT produced by the Faculty of Intensive Care Medicine and in the Anaesthesia CCT produced by The Royal College of Anaesthetists. The European Society of Intensive Care Medicine has also produced competencies.

11.4. The core competencies required for all staff involved in transfer of critically ill patients are summarised in Appendix 5a.

11.5. Additional competencies required by medical staff involved in the transfer of critically ill patients are summarised in Appendix 5b. Not all the competencies listed will be required in every case depending on the nature of the underlying illness, co-morbidity, level of dependency and risk of deterioration during transfer. (See Accompanying Personnel and Risk Assessment section 3).

11.6. Additional competencies required by a second attendant (nurse / paramedic) accompanying a level 2 / 3 patient are summarised in appendix 5c.

11.7. Recommendations

11.7.1. All staff potentially involved in the transport of critically ill patients should receive appropriate training in transfer medicine, and have the opportunity to gain experience in a supernumerary capacity

11.7.2. All staff involved in transfers must be able to demonstrate the range of competencies appropriate to their role.

12. EQUIPMENT

12.1. The National Patient Safety Agency (NPSA) collates reports of untoward incidents submitted voluntarily by healthcare staff in England and Wales. During the period 1 August 2006 and 28 February 2007, 55 incidents associated with critical care transfer equipment were reported. This included six reports of battery failure associated with portable monitors. Other transfer-related incidents involved a lack of availability of end-tidal carbon dioxide monitoring, accidental disconnections of breathing systems and infusion lines, and damage to equipment during transfer.[25] In the same time period, 5% of medication-related incidents reported by critical care staff were associated with poor communication during transfer from theatre or recovery. [26] The voluntary nature of the NPSA reporting system suggests that number the incidents reported probably only represents a fraction of the true number of incidents occurring during transfers.

12.2. The transport of equipment in a land ambulance is governed by the CEN regulations (see also section 9 above) which require equipment to be mounted in such a way that it will withstand a 10G deceleration in 6 different directions [21].

12.3. Currently only one manufacturer in the UK produces a transfer trolley that meets this standard. These trolleys can be configured to carry monitors, syringe pumps, ventilators, and reserve oxygen cylinders and have secure anchorage for patient harnesses / restraints etc. All equipment should be mounted below the level of the patient. This lowers the centre of gravity, improving stability of the trolley and at the same time allows unhindered access to the patient.

12.4. All equipment used during transfer should be specified by the manufacturer as suitable for use in the transport environment and be mounted in such a way as to be CEN compliant. Equipment which may suitable for use in road vehicles may not have Civil Aviation Authority (CAA) certification for electrical safety on board an aircraft. (These CAA certificates are specific to each individual piece of equipment and matched to specific aircraft type).

12.5. Portable monitors should have a clear illuminated display and be capable of displaying ECG, oxygen saturation (SaO_2), non-invasive blood pressure, two invasive pressures, capnography ($EtCO_2$) and temperature. Alarms should be visible as well as audible in view of extraneous noise levels.

12.6. Portable mechanical ventilators should have as a minimum, disconnection and high pressure alarms, the ability to supply positive end expiratory pressure (PEEP) and variable inspired oxygen concentration (FIO_2), inspiratory / expiratory (I/E) ratio, respiratory rate and tidal volume. In addition, the ability to provide pressure controlled ventilation, pressure support and continuous positive airway pressure (CPAP) is desirable.

12.7. Additional equipment for securing and maintaining the airway, intravenous access, etc should also be available [Appendix 6].

12.8. Accompanying staff should wear suitable warm and protective clothing including appropriate footwear. High visibility jackets should be worn and these should be provided by the employer. A mobile telephone, and contact telephone numbers should be available for liaison with the base and / or receiving unit.

12.9. Recommendations

12.9.1. All acute hospitals responsible for transferring critically ill patients must have access to a CEN compliant transfer trolley.

12.9.2. All monitoring and equipment must be suitable for use in the transfer environment and mounted on the trolley in such a way as to be CEN compliant.

12.9.3. Ideally all equipment within a critical care network should be standardised to enable the seamless transfer of patients without, for example, interruption of drug therapy or monitoring due to incompatibility of leads and transducers.

13. GOVERNANCE ARRANGEMENTS.

13.1. The principles of good clinical governance are well established. Critical care networks and individual trusts should have governance arrangements in place to ensure standards for the transfer of critically ill patients are maintained. This will include the use of audit and critical incident reporting and review meetings.

13.2. Procedures should be in place to enable the immediate notification of major critical incidents to other members of the critical care network and to national organisations where appropriate. The development of a national framework for communication between networks and the establishment of a national database of transfers of critically ill patients would support this.

13.3. Recommendations

13.3.1. Network lead clinicians, must ensure that adequate governance arrangements are in place across the network and that all patient transfers are subject to audit, critical incident reporting and review.

13.3.2. Trust lead clinicians for transfer should ensure that the movement of critically ill patients within hospitals (intra-hospital transfers) are subject to similar governance arrangements.

13.3.3. A mechanism for capturing the numbers of critical care transfers occurring nationally, indications, incidents and outcome should be developed.

SECTION 3: CLINICAL GUIDELINES

14. TRANSFER DECISIONS AND ETHICS

14.1. Little is known about clinician decision-making around the inter-hospital transport of the critically ill and selecting which patient to send has been described as 'an ad hoc process'.[27] Evidence is also lacking about the factors determining the transportability of patients. In a national survey of intensive care physicians in the Netherlands however, the availability of suitable transport personnel and facilities were considered the most important in determining whether to transfer a severely critically ill patient.[28]

14.2. A contentious issue which sometimes arises when a transfer is necessary because there are no available intensive care beds, is whether to transfer a new and potentially unstable patient or an existing and more stable patient who is less likely to deteriorate. In general, no patient should be subjected to an intervention that is not in their best interest. It could therefore be considered unethical, to transfer one patient out of a critical care unit for the sole purpose of making room for another. This may on occasion however, be the most pragmatic approach.

14.3. The decision to transfer a patient is always the joint responsibility of the referring and receiving clinicians. The medical staff at the receiving unit may offer specialist advice on patient management, however responsibility for the patient always lies with the clinician in attendance who may, if circumstances change, decide not to transfer the patient.

14.4. Recommendations

14.4.1. The decision to transfer a patient to another hospital, must be made by a responsible consultant, in conjunction with consultant colleagues from relevant specialities in both the referring and receiving hospitals

14.4.2. The decision to accept a transferred patient should be made by a consultant in the receiving unit

15. SELECTION OF TRANSPORT MODE

15.1. Selection of transport mode will take into account the nature of the illness and urgency of transfer, availability of transport and mobilisation times, geography, traffic, weather conditions and cost.

15.2. Road transport has the advantage of low overall cost, rapid mobilisation time, less limitation by adverse weather conditions, less potential for physiological disturbance and easier patient monitoring. Staff are also more familiar with this environment.

15.3. Air transport may be considered for longer journeys, where road access is difficult, or when for other reasons, it may be quicker. Perceived speed of air transport must however be balanced against organisational delays and inter-vehicle transfers at either end of the journey.

15.4. Helicopters vary in size, accommodation and range. They generally provide a less comfortable, more cramped environment than a road ambulance or pressurised fixed wing aircraft. Vibration and acceleration / deceleration forces significantly adversely affect patient haemodynamics and monitoring. In addition, they are expensive and have a poorer safety record. Due to expense, they are not usually available to return staff and equipment to the base hospital and alternative arrangements have to be made. Fixed wing aircraft, are typically considered for transfer distances greater than 150 miles.

15.5. Recommendations

15.5.1. The decision to carry out a transfer by road or air will depend on local circumstances, patient factors and staff training and availability.

15.5.2. Arrangements for air transport should be agreed with local ambulance control or air carriers specialising in medical transfers. Contact numbers should be available in all ICUs and emergency departments.

16. ACCOMPANYING PERSONNEL & RISK ASSESSMENT

16.1. Critically ill patients should normally be accompanied by two suitably trained, experienced and competent attendants during transfer. The background of the staff (Medical / Nursing / other) and the competencies required will depend on the nature of the underlying illness, co-morbidity, level of dependency and risk of deterioration during transfer.

16.2. Whilst the ICS Levels Of Care provide an indication of dependency, they do not correspond directly to the level of risk during transfer for any individual patient. Determining the level of risk requires a detailed risk assessment to be undertaken by an experienced clinician prior to the transfer. The risk assessment should take in to account the following :

- Patients current clinical condition (Assessed using a physiological track and trigger score and other physiological parameters relevant to the patient's condition)
- Specific risks related to the patient's condition
- Risks related to movement / transfer
- Likelihood of deterioration during transfer
- Potential for requiring additional monitoring / intervention
- Duration and mode of transfer

16.3. Based on the risk assessment, the competencies of staff required to accompany the patient can be determined. Most level 1 patients, and some level 2 patients, will only need to be accompanied by an ambulance technician / paramedic and a nurse (or other registered practitioner). Some level 2 patients will require both a nurse and medical escort, although the medical practitioner may be from the patient's parent team. The reminder of the level 2 patients and all level 3 patients will require a nurse and medical escort, with the medical practitioner being from an anaesthetic or critical care background. An example of a pre-transfer risk assessment / stratification system[29] is included in appendix 7.

16.4. Recommendations

16.4.1. Prior to the transfer of any critically ill patient, a risk assessment must be undertaken and documented by a consultant or other suitably experienced member of medical staff to determine the level of anticipated risk during transfer.

16.4.2. The outcome of the risk assessment should be used to determine the competencies of the staff required to accompany the patient during transfer.

17. PREPARATION FOR TRANSPORT

17.1. Once the decision has been made to transfer a patient, arranging the transfer may prove complex. Craig describes the challenges faced in organising the transfer of a series of critically ill patients out of a rural hospital in Australia. The process involved on average 4.7 phone calls per patient, with a mean time to transfer acceptance of almost one hour.[30] Similarly in a review of case notes from another rural Australian hospital, time delays were a prominent feature in the process and 73% of patients arrived at the receiving hospital outside of normal working hours.[31]

17.2. A further study from Canada, retrospectively examined the records of patients and looked at the association between the time taken to complete different stages of the transfer process and subsequent ITU and hospital length of stay, The results were mixed, and the authors admit that

because of missing data they drew on a ‘relatively small number of useable records’. A longer time spent in preparation for transfer appeared however to be associated with a shorter length of ICU stay (RR, 0.97; 95% CI, 0.95-0.99).[32]

17.3. Meticulous resuscitation and stabilisation of the patient before transport is the key to avoiding complications during the journey, although the time taken to achieve this has to be balanced against the need for immediate transfer for specialist life saving intervention. [see exceptions below].

17.4. Prior to departure, transport attendants who have not been involved in the initial care of the patient should take time to familiarise themselves the patient’s history and with the treatment and investigations already undertaken. A full clinical assessment including a physical examination should be performed

17.5. The airway should be assessed and if necessary secured and protected. Intubated patients should normally be sedated paralysed, and mechanically ventilated. Inspired oxygen should be guided by oxygen saturation (SaO_2) and ventilation by end tidal carbon dioxide ($EtCO_2$). Following stabilisation on the transport ventilator, at least one arterial blood gas analysis should normally be performed prior to departure to ensure adequate gas exchange. Inspired gases should be humidified using a disposable heat and moisture exchanging (HME) filter.

17.6. If a pneumothorax is present or likely, chest drains should be inserted prior to departure. Underwater seal drains may be used provided they are kept upright and below the level of the patient. Chest drains should <u>not</u> be clamped during transfer.

17.7. Secure venous access is mandatory and at least two intravenous cannulae (central or peripheral) are required during transfer. A suitably secured indwelling arterial cannula is ideal for blood pressure monitoring.

17.8. Hypovolaemic patients tolerate moving poorly. Continuing sources of blood loss should be identified and controlled. In the absence of contraindications (e.g. penetrating trauma, ruptured aortic aneurysm or active bleeding), efforts should be made to restore the circulating volume to near normal prior to transport. This may be guided by central venous pressure and / or cardiac output measurement. If inotropes or other vasoactive agents are required to optimise haemodynamic status, patients should be stabilised on these before leaving the referring unit.

17.9. A nasogastric / orogastric tube and urinary catheter should be passed and free drainage allowed into collection bags.

17.10. Conscious patients should be kept informed of the transfer and all other relevant information. Relatives should similarly be kept informed of travel arrangements but should not normally travel with the patient.

17.11. Before departure, named medical and nursing personnel at the receiving unit should be contacted to update them on the patient's condition and to provide an estimated time of arrival. The means of return to base hospital for the medical and nursing staff (and equipment) accompanying the patient should be established.

17.12. Recommendations

17.12.1. Patients should be appropriately resuscitated and stabilised prior to transfer to reduce the physiological disturbance associated with movement and reduce the risk of deterioration during the transfer.

17.12.2. Pre-departure check lists should be used to help to ensure that all necessary preparations have been completed. [Appendix 8 & 9].

18. MONITORING DURING TRANSPORT.

18.1. The standard of care and monitoring during transport should be at least as good as that at the referring hospital or base unit. The minimum standards of monitoring required are shown below.

- Continuous cardiac rhythm (ECG) monitoring
- Non-invasive blood pressure
- Oxygen saturation (SaO_2)
- End tidal carbon dioxide (in ventilated patients)
- Temperature

18.2. Intermittent non-invasive blood pressure measurement is sensitive to motion artefact and is unreliable in a moving vehicle. It is also a significant drain on the battery supply of monitors. Continuous, invasive blood pressure measurement, through an indwelling arterial cannula should normally be used.

18.3. Central venous catheterisation is not essential but may be of value in optimising filling status prior to transfer or may be required for the administration of inotropes and vasopressors

18.4. Although the use of pulmonary artery catheters has declined in recent years, where these are in situ, the pulmonary artery pressure trace should be continuously displayed on the transport monitor.

If this is not possible, the catheter should not be left in the pulmonary artery during transport but withdrawn to the right atrium or superior vena cava for central venous pressure (CVP) monitoring.

18.5. In mechanically ventilated patients the oxygen supply, inspired oxygen concentration (FiO_2) ventilator settings and airway pressure should be monitored.

18.6. Recommendations

18.6.1. Minimum standards of monitoring should be applied in every case.

18.6.2. Monitoring must be continuous throughout the transfer. All monitors Including ventilator displays and syringe drivers should be visible to accompanying staff.

18.6.3. A written record of observations and events should be maintained.

19. SAFETY DURING TRANSFER

19.1. Whilst minor accidents and collisions involving ambulances are not uncommon, accidents causing injury to the occupants of road ambulances are relatively rare. Department of Transport statistics reveal that between 1999 and 2008, 81 passengers in ambulances (i.e. not including the driver) were injured and required admission to hospital for treatment of their injuries.[33]

19.2. In general, the occupants of ambulances, (which weigh approximately 5,700 Kg), fare better when in collision with other vehicles, than the occupants of those other vehicles. Nevertheless, the prime concern during transport must be to ensure the safety of all those involved in the transfer, together with that of other road users and pedestrians. A major issue in this respect is speed of travel.

19.3. For the majority of cases high speed travel is not necessary. Blue lights and sirens can be used to aid the progress of the ambulance through areas of high traffic density, e.g. junctions, without requiring the ambulance to be driven at high speed. This approach delivers a smooth journey with the minimum of delay. Where a high speed journey is undertaken, staff could be required to justify the decision and should understand the relevant legislation.

19.4. The Road Traffic Regulation Act 1984 permits a vehicle that is used for ambulance purposes to exceed the speed limits provided that the observance of speed limits would hinder the use to which that vehicle is being put on that occasion. This is clearly not a blanket exemption but each case must be judged on merit

19.5. The Traffic Signs Regulation and General Directions 1994, Pelican crossing regulations and general directions 1987, allow emergency vehicles including ambulances to vary the requirements of certain signs including traffic lights and pelican crossings provided that the vehicle does not proceed at any time in a manner likely to cause danger to pedestrians or other vehicles

19.6. Recommendations

19.6.1. Patients should be secured to the transport trolley by means of appropriate restraint. (E.g. 5 point harness / straps). Pressure areas (including neurovascular bundles) should be appropriately protected. Warming / insulting blankets should be used to keep the patient warm unless otherwise contraindicated. Indwelling lines and tubes should be secure and visible / accessible.

19.6.2. All equipment (including transfer bags) must be securely stowed. Equipment should be either fastened to the transport trolley or securely stored in appropriate lockers in the ambulance. When this is not possible, equipment should be placed on the floor against the bulkhead wall. Under no circumstances should equipment (e.g. syringe pump) be left on top of the patient trolley. This may become a dangerous projectile in the event of a sudden deceleration. Gas cylinders must be held in secure housings at all times.

19.6.3. Staff should remain seated at all times and wear the seat belts provided. Adequately resuscitated and stabilised patients should not normally require any significant changes to treatment during transport. If, however, despite meticulous preparation, unforeseen clinical emergencies arise and the patient requires intervention, this should not be attempted in a moving ambulance. The vehicle should be stopped appropriately in a safe place before administering treatment.

19.6.4. High speed journeys should be avoided except where strictly necessary. Blue lights and sirens may be used to aid passage through traffic to deliver a smooth journey.

20. AERO-MEDICAL CONSIDERATIONS

20.1. Whether using helicopters or fixed wing aircraft, the transport of patients by air presents medical escorts with many problems unique to this mode of travel. Staff involved in aero medical transport must have both a high level of expertise, specialist knowledge and practical training. The information below is therefore intended only to highlight issues which may be relevant for those preparing a patient for air transfer.

20.2. A fall in barometric pressure results in a reduction in alveolar partial pressure of oxygen and may lead to hypoxaemia. Increased inspired oxygen concentration is mandatory for all aero-medical transfers.

20.3. A fall in barometric pressure also leads to an increase in the volume of gas filled cavities within the patient. Endotracheal tube cuff pressure should be monitored or the cuff filled with saline. Pneumothoraces must be drained. Nasogastric tubes should be inserted and placed on free drainage. Pneumo-peritoneum and intracranial air are relative contraindications to air transport. Tissues may also swell, and plaster casts should be "split".

20.4. Increased altitude is also associated with a fall in temperature and additional measures may be required to keep the patient warm. Noise and vibration may cause nausea, pain and motor dysfunction. Anti-emetic pre-medication should be available for patients and ear protection provided.

20.5. Recommendation

20.5.1. Staff without appropriate training should not undertake aero-medical transfers. Minimum requirements include safety training, evacuation procedures for the aircraft, and basic on board communication skills (particularly for helicopters). More advanced training in aero-medical transfer is however desirable.

21. DOCUMENTATION AND HANDOVER.

21.1. Clear records should be maintained of all stages. These should include details of the patient's condition, reason for transfer, names of referring and accepting consultants, clinical status prior to transfer and details of vital signs, clinical events and therapy given before and during (and after) transport. [Appendix 10].

21.2. On arrival at the receiving hospital, there should be a formal handover between the transport team and the receiving medical and nursing staff who will then assume responsibility for the patients care.

21.3. Handover should include a verbal and written account of the patient's history, vital signs, therapy and significant clinical events during transport. X-rays, scans and other investigation results should be described and handed over to receiving staff.

21.4. Recommendations

21.4.1. Standardised documentation should be developed across networks and should be used for both inter-hospital and intra-hospital transport. This should include a core data set for audit purposes and the transport team should be able to retain a duplicate for such purposes.

22. INSURANCE & INDEMNITY.

22.1. While safety is of paramount importance during transfer, there is always the possibility of an ambulance being involved in an accident. Whilst serious accidents resulting in death or serious injury are rare, it is recommended that all staff involved in transporting patients ensure that adequate financial arrangements are in place for themselves and their dependants in the event of a serious accident.

22.2. The Intensive Care Society and the Association of Anaesthetists of Great Britain and Northern Ireland have negotiated insurance for all their members involved in the transport of critically ill patients. Details of this are available from the Society's offices. The key points are as follows.

- Cover for all members regardless of membership category
- Cover from leaving home to return if called in to undertake a transfer
- Cover anywhere in the world
- Cover for any form of transport by road or air ambulance (helicopter or fixed wing)
- Cover for death or severe disability resulting in member being unable to resume normal occupation

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Appendix 1:

Transfers to / from adult, general critical care units in England, Wales & Northern Ireland, 2009

Originating unit type	Receiving unit type	Classification	Observed in CMP, n (%*)		Extrapolated, n† (%*)
			Transferred in[1]	Transferred out[2]	
General	General	Planned	675 (0.7)	539 (0.6)	960 (0.7)
General	General	Unplanned	816 (0.9)	933 (1.0)	1290 (1.0)
General	General	Repatriation	392 (0.4)	175 (0.2)	520 (0.4)
Specialist	General	Planned	99 (0.1)	--	140 (0.1)
Specialist	General	Unplanned	55 (0.1)	--	80 (0.1)
Specialist	General	Repatriation	256 (0.3)	--	350 (0.3)
General	Specialist	Planned	--	782 (0.8)	1080 (0.8)
General	Specialist	Unplanned	--	49 (0.1)	70 (0.1)
General	Specialist	Repatriation	--	5 (0.0)	10 (0.0)
				TOTAL	**4500**

* Percentage of total admissions to adult general critical care units as recorded in the Case Mix Programme 2009.

[1] Number of patients transferred in to a general critical care unit returning data to the Case Mix Programme.
[2] Number of patients transferred out of a general critical care unit returning data to the Case Mix Programme.
Some patients transferred between general units will be represented in both columns where both the originating and receiving unit participate in the Case Mix Programme, whilst others, transferred to / from a non participating unit will only be recorded once.

† Estimated total number of transfers between critical care units in England, Wales and Northern Ireland in 2009. For general to general unit transfers the higher of the two figures (transferred in / transferred out) has been used as the best estimate of transfer numbers to extrapolate the total.

Acknowledgement

These data derive from the Case Mix Programme Database. The Case Mix Programme is the national, comparative audit of patient outcomes from adult critical care coordinated by the Intensive Care National Audit & Research Centre (ICNARC). These analyses are based on data for 94,149 admissions to 183 adult, general critical care units based in NHS hospitals geographically spread across England, Wales and Northern Ireland. For more information on the representativeness and quality of these data, please contact ICNARC.

Appendix 2 Systematic Literature Review: Search Strategy.

A systematic search was carried out to identify articles relating to the transfer of critically ill patients. Four electronic databases (MEDLINE, EMBASE, CINAHL and Web of Science) were systematically searched using the MESH term '*patient transfer*' in combination with the terms '*critical care*', '*intensive care*', '*intensive care units*' and '*critically ill*'.

Related articles were identified using the PubMed related articles feature and the reference lists of papers were checked for further references. The internet search engine Google was searched using the same terms to identify additional grey literature.

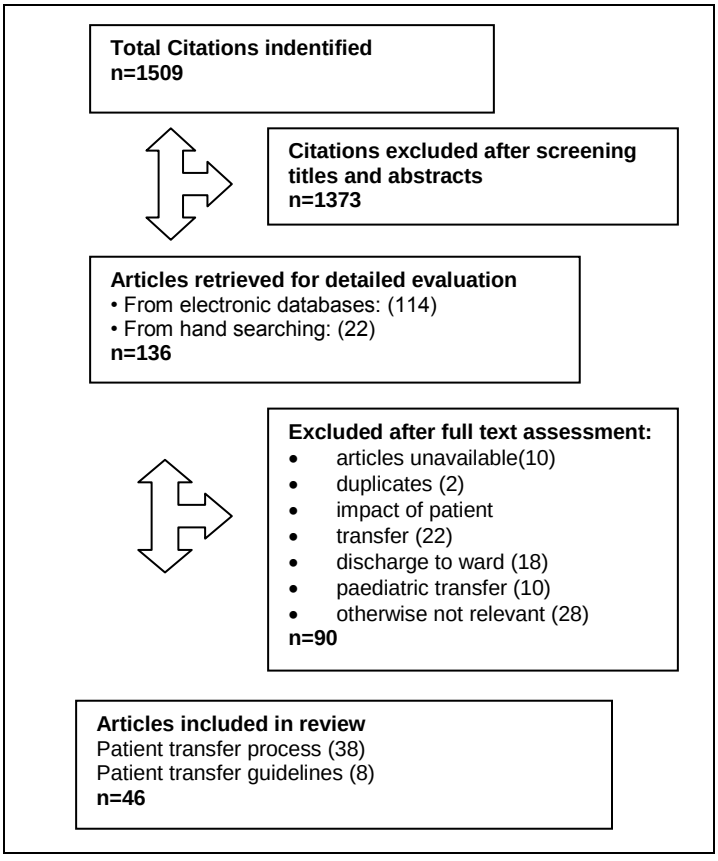
Eligibility criteria were defined prior to the search. Only English language articles published since 2000 were included. Research articles, local or national published audits and policy documents were included. Articles were initially identified by title and abstract and then full text articles obtained for review.

To focus the review, only papers relating to the general process of adult patient transfer were considered; it was not possible to review the literature relating to the transfer of specific groups of patients, such as those with severe head injuries.

Results:

136 full text articles were identified for further analysis. 10 were excluded because the full text article was unobtainable, 2 papers were duplicates and 78 did not meet the inclusion criteria. 48 articles were reviewed. These included 8 transfer guidelines documents published by other groups and 38 articles relating to the process of transfer of critically ill adults.

Figure 1: Search results and selection of articles.



Appendix 3a Definition of terms used

Adult	Patient over 18 years of age.
Critically ill	Patients requiring a level of care greater than that normally available on a standard ward. (ICS levels of care 1 -3).
Primary transfer	Movement of patient from scene of injury or illness, to the nearest receiving hospital
Extended primary transfer	Movement of a patient from the scene of injury or illness to a specialist centre or trauma centre, by-passing the nearest hospital to reach a centre more appropriate to the needs of the patient.
Secondary transfer	Movement of a patient from any hospital facility (e.g. ED/ ward / critical care facility / theatre) to another centre.
'Clinical' transfer	Patient transferred for specialist treatment or investigation not provided at referring hospital.
'Capacity' transfer	Patient transferred for specialist treatment or investigation normally provided at referring hospital - but not currently available. The use of the term 'non clinical transfer ' should be avoided. Transfers for capacity reasons may still be both clinically necessary and time critical.
Repatriation	Patient transferred back to referring hospital or to a hospital nearer the patient's home address.
Inter-hospital transfer	Transfer of a patient between hospitals.
Intra-hospital transfer	Transfer of a patient between areas / departments within the same hospital site.

Appendix 3b

Definitions / Descriptions used to rate quality of evidence / recommendations

Quality of evidence[1]	
High	Further research is very unlikely to change confidence in the estimate of an effect
Moderate	Further research is likely to have an impact on confidence in the estimate of an effect and may change that estimate
Low	Further research is very likely to have an impact on confidence in the estimate of an effect and is likely to change that estimate
Absent	Any estimate of effect is uncertain

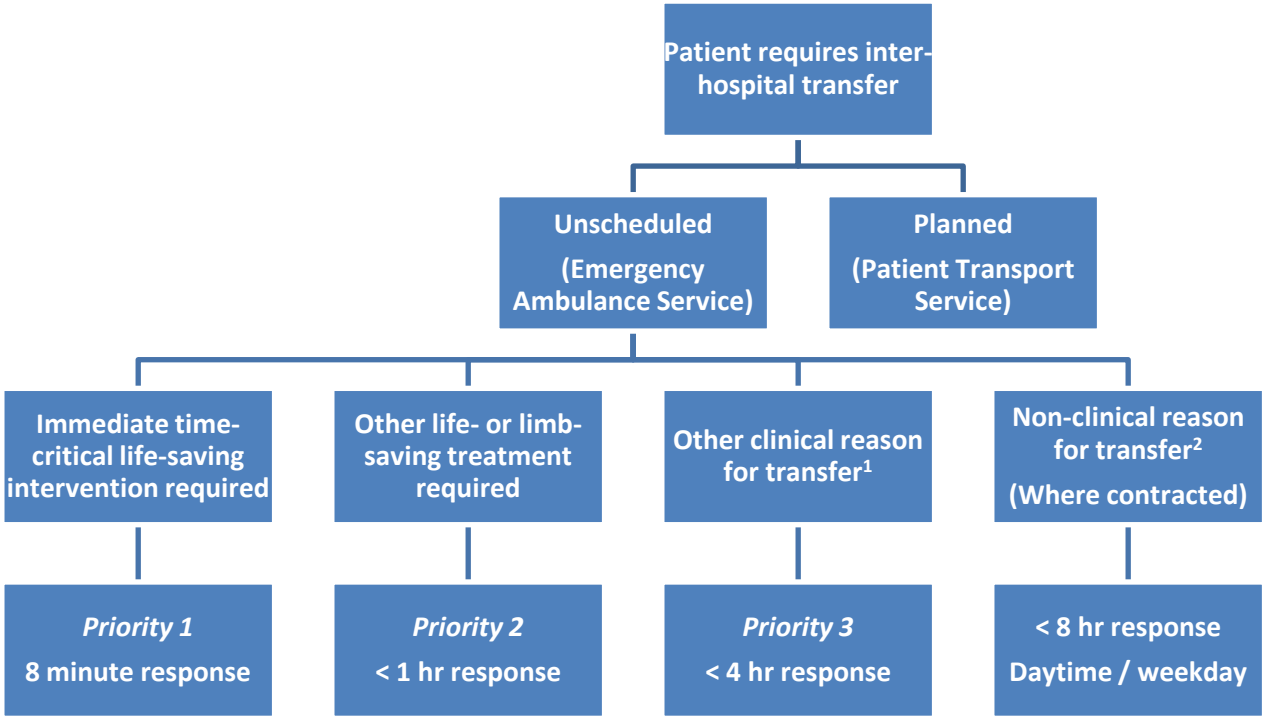
Strength of recommendations[2]	
Strong	Most people would support the recommended course of action but some would not. Most patients should receive the recommended intervention Adherence to this recommendation could be used as a quality / performance indicator
Weak	Most people would support the recommended course of action but many would not Individuals should examine the evidence (or a summary thereof) for a recommended intervention before forming a decision as to appropriate action. Adherence to this recommendation could not of itself be used as a quality / performance indicator.

[1]Guyatt GH, Oxman AD, Vist GE, Kunz R, Falck-Ytter Y, Alonso-Coello P, et al. GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. *BMJ* 2008*;*336*:*924-*6*

[2]Jaeschke R, Guyatt GH, Dellinger Phil, Schunemann H, Levy MM, Kunz R, Norris S Bion J. Use of Grade to reach decisions on practice guidelines when consensus is elusive. *BMJ 2008; 337 : 327 – 330*

Appendix 4 Ambulance Prioritisation Algorithm

From the National Ambulance Services Clinical Conveyance Group Inter-Hospital Transfer protocol 2011



For additional information and expanded description of the categories see original document.

Notes

[1.] Other clinical reason for transfer. It is recognised that there will be occasions when, in order to facilitate the unplanned admission of a patient to a critical care area, it is necessary to transfer a patient out in a timely fashion. In these instances patients may be transferred between critical care areas as Priority 2 patients.

[2] Non clinical is taken to mean repatriation after a period of critical illness.

Appendix 5. Competencies

5a. Core competencies required of all staff (levels required appropriate to role)	
Knowledge	Knowledge of Local / Network / National transport guidelines Understands the principles of safe transfer of patients Knowledge of ambulance / transfer environment and associated health and safety issues and relevant legislation Knowledge of Advanced Life Support guidelines
Skills	Use of oxygen, respiratory therapies and portable ventilator Use of basic monitoring (ECG, NIBP, Pulse oximetry Use of transport equipment, Competent to carry out advanced life support
Attitudes and Behaviour	Evidence of good team working Evidence that plans for and prevents problems during transfer Understands the benefit of pre-transfer check lists and uses these in clinical practice. Understands the need for good communication with referring & receiving institutions & teams and evidence of this in practice. Completes all required documentation including clinical notes / observations charts / audit forms. Seeks support from senior / more experience colleagues appropriately

5b. Additional competencies which may be required by medical staff to undertake level 2 / 3 transfer, depending on the clinical condition of the patient and the outcome of pre transfer risk assessment . **Note: not all competencies will be required in every case. In many cases the parent team should have the competencies required.**	
Knowledge	Knowledge of physiology of critical illness Knowledge of pharmacology of drugs including sedatives / muscle relaxants / inotropes and vasopressors Knowledge of the physiological effects of the transfer process and acceleration / deceleration forces in the critically ill
Skills	Use of a structured approach for assessment of critically ill patient prior to transfer Ability to interpret blood gases, and other clinically relevant investigations. Ability to identify potential needs of patient prior to and during transfer. Ability to respond to changes in the patient's condition during transfer including ability to undertake the following procedures if required • Basic / advanced respiratory support • Bag mask ventilation • Intubation • Emergency needle decompression / chest drainage • Resuscitation / optimisation of haemodynamic status including appropriate use of fluids / inotropes / vasopressors • Management of dysrhythmias including cardiac arrest. • Ability to care for arterial lines / central lines and other indwelling catheters and to use / access appropriately.
Attitudes and Behaviours	Ability to assume leadership role during transfer Ability to provides clear and precise structured handover to receiving unit

5c. Additional competencies required for second attendant accompanying level 2/ 3 patient	
Knowledge	Knowledge of the physiology of critical illness Knowledge of the administration of drugs likely to be required during transfer (includes sedatives / muscle relaxants / inotropes and vasopressors Knowledge of the potential problems associated with movement acceleration / deceleration forces.

Skills	Ability to carry out appropriate nursing observations and nursing care in the transport environment.
	Ability to assist with:
	• Airway support - including intubation
	• Respiratory support - including
	  ○ oxygen therapy devices
	  ○ basic ventilator operation
	• cardiovascular resuscitation
	• Fluid management including the preparation of infusions
	• The use of sedative drugs, and the use of syringe pumps

Attitudes and behaviour	Ability to provide clear and precise structured handover to receiving unit

Appendix 6

Supplementary equipment for use during transport

Airway

- Guedel airways (assorted sizes)
- Laryngeal masks (assorted sizes)
- Tracheal tubes (assorted sizes)
- Laryngoscopes (spare bulbs and battery)
- Intubating stylet / Bougie
- Lubricating gel
- Magill's forceps
- Tape for securing tracheal tube
- Sterile scissors
- Stethoscope

Ventilation

- Self inflating bag & mask with oxygen reservoir and tubing
- Spare Bodock seals (for oxygen cylinders)
- Chest drain (Seldinger type)
- Heimlich flutter valve
- Airway filters / HME.

Suction

- Yankauer sucker
- Suction catheters (or closed tracheal suction system)
- Nasogastric tubes (assorted sizes) & drainage bag.

Circulation

- Syringes (assorted sizes)
- Needles (assorted sizes)
- Alcohol & Chlorhexidine skin prep.
- IV cannulae (assorted sizes)
- Arterial cannulae
- Central venous cannulae
- Intravenous fluids
- Infusion sets / extensions
- 3 way taps
- Dressings
- Tape
- Minor instrument / cut down set

Appendix 7
Risk Assessment / Stratification prior to transfer
Adapted from The Pennine Acute Hospitals NHS Trust: Transfer Policy 2010

No transfer is so urgent as to compromise patient safety,

- The potential benefits of any transfer must be weighed against the clinical risk.
- Prior to any transfer a risk assessment must be undertaken to identify the level of anticipated risk and hence the competencies required of the staff who will accompany the patient.

Risk assessment should include the following:

- Clinical History: Are there any specific risks related to the underlying condition and / or co-morbidity which the patient might encounter during transfer?
- Current Clinical Condition: Is the patient stable and / or what is the trend? Use a recognised track and trigger scoring system (e.g. MEWS)[1] and if possible allow sufficient time for more than one observation.
- Other information available from additional monitoring (e.g. oxygen saturation) and / or specific investigations(e.g. lactate, blood glucose, base deficit, arterial pH)
- The anticipated length of the journey, mode of transport and any specific transport related issues.

Modified Early Warning Score:

Score	3	2	1	0	1	2	3
HR		<40	40-50	51-100	101-110	111-129	≥130
BP systolic	≤70	71-80	81-100	101-170	171-199	>200	
RR		≤7		9-14	19-22	23-29	≥30
Temp		≤34.9		35.0-38.3		>38.4	
CNS		New confusion agitation		Alert	Voice	Pain	Unresponsive

Risk Stratification:

Transfer Risk assessment		
Low	**Medium**	**High**
MEWS < 3 Oxygen saturation > 92% GCS > 13 Base deficit < 5 mmol /L	MEWS 3-5 or Oxygen Saturation 88-92% or GCS 13 - 12 or Base Deficit 5-10 mmol/L	MEWS > 5 or Oxygen Saturation <88% or GCS <12 or Base Deficit >10 mmol/L

The clinical risk of the transfer and the level of competence required by escorting staff will be informed by the patient's condition:

Low-score (risk) group –Low risk of clinical deterioration during transfer; though some clinical competencies may be required during transfer. E.g. administration of oxygen therapy or use of infusion pumps.

Medium-score (risk) group: Medium risk of deterioration during transfer. This group will require a more detailed pre-transfer assessment undertaken by the parent medical team to determine risk and therefore competencies of the staff required. Additional advice may be sought from anaesthesia / critical care if required; however in many cases however the parent team will have the necessary competencies to transfer the patient safely.

High-score (risk) group: High risk of clinical deterioration during transfer. This group will normally require involvement of clinicians / nurses with critical care and advanced airway skills.

[1] **The National Early Warning Score (NEWS) will be published in September 2011.**

Appendix 8

Pre transfer Check list 1. Is patient stable for transport?

Airway

- Airway safe or secured by intubation
- Tracheal tube position confirmed on chest X-ray

Ventilation

- Adequate spontaneous respiration or ventilation established on transport ventilator
- Adequate gas exchange confirmed by arterial blood gas
- Sedated and paralysed as appropriate

Circulation

- Heart rate, BP optimised
- Tissue & organ perfusion adequate
- Any obvious blood loss controlled
- Circulating blood volume restored.
- Haemoglobin adequate
- Minimum of two routes of venous access
- Arterial line and central venous access if appropriate

Neurology

- Seizures controlled, metabolic causes excluded
- Raised intracranial pressure appropriately managed

Trauma

- Cervical spine protected
- Pneumothoraces drained
- Intra-thoracic & intra-abdominal bleeding controlled
- Intra-abdominal injuries adequately investigated and appropriately managed
- Long bone / pelvic fractures stabilised

Metabolic

- Blood glucose > 4 mmol/l
- Potassium < 6 mmol/l
- Ionised Calcium > 1 mmol/l
- Acid – base balance acceptable
- Temperature maintained

Monitoring

- ECG
- Blood pressure
- Oxygen saturation
- End tidal carbon dioxide
- Temperature

Appendix 9:

Pre transfer Check list 2. Are you ready for departure?

Patient

- Stable on transport trolley
- Appropriately monitored
- All infusions running and lines adequately secured and labelled?
- Adequately sedated and paralysed
- Adequately secured to trolley
- Adequately wrapped to prevent heat loss

Staff

- Transfer Risk assessment completed
- Staff adequately trained and experienced
- Received appropriate handover
- Adequately clothed and insured

Equipment

- Appropriately equipped ambulance
- Appropriate equipment and drugs
- Pre-drawn up medication syringes appropriately labelled and capped.
- Batteries checked (spare batteries available)
- Sufficient oxygen supplies for anticipated journey.
- Portable phone charged and available
- Money for emergencies

Organisation

- Case notes, X-rays, results, blood collected
- Transfer documentation prepared
- Location of bed and receiving doctor known
- Receiving unit advised of departure time and estimated time of arrival
- Telephone numbers of referring and receiving units available
- Relatives informed
- Return travel arrangements in place
- Ambulance crew briefed
- Police escort arranged if appropriate

Departure

- Patient trolley secured
- Electrical equipment plugged into ambulance power supply where available
- Ventilator transferred to ambulance oxygen supply
- All equipment safely mounted or stowed
- Staff seated and wearing seat belts

Appendix 10:

Transport documentation

The following information should be recorded on transport documentation.

Transfer details

- Patient's Name, address, date of birth
- Next of kin, what information they have been given and by whom
- Referring hospital, ward / unit, and contact telephone number
- Name of referring doctor and contact telephone number
- Receiving hospital, ward / unit and contact telephone number
- Name of receiving doctor and contact telephone number
- Names and status of the escorting personnel

Medical summary

- Primary reason for admission to the referring unit
- History and past history
- Dates of operations and procedures
- Number of days on intensive care
- Intubation history, ventilatory support & blood gases
- Cardiovascular status including inotrope & vasopressor requirements
- Other medication and fluids
- Type of lines inserted and dates of insertion
- Recent results & MRSA status

Nursing summary

- Nursing care required with reference to the following
- Respiratory, cardiovascular, communication methods, nutrition, pain and sedation, sleep patterns, elimination, skin condition, hygiene, and social needs

Patient status during transfer

- Vital signs including ECG, blood pressure, SaO_2, $EtCo_2$, temperature, respiratory rate, peak inspiratory pressure, PEEP
- Drugs given during transfer including infusions
- Fluids given during transfer
- Summary of patient's condition during transfer signed by escorting doctor

Audit data including:

- Reason for the transfer
- Whether the transfer was within or outside the local network
- Prioritisation level for the transfer
- Time taken for transfer from time of ambulance request to completion
- Adverse events / critical incident