

## ORIGINAL ARTICLE

## Emergency department organisation of critical care transfers in the UK

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*Emerg Med J* 2005;22:795-798. doi: 10.1136/emj.2004.017822

**Objectives:** Transport of the critically ill patient to or from the emergency department (ED) is a frequent occurrence. This study was designed to determine whether UK EDs currently have appropriate equipment, monitoring, staff training systems, and processes of care for transportation of the critically ill patient.

**Methods:** A postal questionnaire regarding ED transfer patients was sent to 247 UK EDs, followed by repeat mailing and telephone follow up of non-responders.

**Results:** In total, 139 EDs (56%) responded. An estimated 20-30 critically ill patients are transferred from and <20 are received by each ED annually. Processes of care are poorly developed; only 79 EDs (56%) have transfer guidelines available. Audit of transfers is ongoing in 59 EDs (42%), and critical incident reporting is ongoing in 122 (88%). There is a lack of immediately available transport equipment; for example, 17 EDs (12%) have no transport ventilator, 9 (6%) have no transport monitor, and 9 (6%) have no syringe pump. Transport equipment is invariably not standardised. Anaesthetic staff of specialist registrar (74 doctors; 53%) or senior house officer (36 doctors; 26%) grades carry out the majority of ED transfers accompanied by a D or E grade nurse. Both invariably have no formal transfer training.

**Conclusions:** This study highlights inadequacies in provision of equipment and monitoring during interhospital transfer from the ED. Training and processes of care for transport of the critically ill are also suboptimum. Many departments are currently reviewing these processes to formalise and improve transfer training procedures and protocols.

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Accepted for publication 7 January 2005

The recent Department of Health document *Comprehensive Critical Care*<sup>1</sup> has emphasised the need for specialities and hospitals to have a common standardised response to the management of the critically ill and injured across a regional network. One aspect of the document was the development of systems for the interhospital transportation of critically ill patients. The Intensive Care Society<sup>2</sup> has also recently updated its standards for the transportation of the critically ill. A recent regional study<sup>3</sup> suggests that the emergency department (ED) is one of the most common sources of critically ill patients requiring transfer and is also commonly the initial reception department at the receiving hospital.<sup>4</sup> Previous publications have suggested that standards of care are suboptimum.<sup>5-7</sup>

While previous studies have analysed, for example, head injury transfers from an anaesthetic perspective,<sup>8</sup> there is a lack of available data on current levels and standards of transfer specific equipment in UK EDs. Similarly, there is little information on the current organisation and processes of care, staff training systems, and documentation for transportation of the critically ill to and from UK EDs.

This study examined whether appropriate processes of care are in place for the secondary transport of the critically ill patient in UK EDs. The study also aims to determine whether EDs meet current standards for equipment and monitoring for the secondary transportation of the critically ill and injured.

## METHODS

A postal survey regarding ED critical care transfers was distributed to all UK EDs receiving "999" (emergency) ambulance patients (n=247) as listed in the British Association for Accident and Emergency Medicine directory 2001/2002. For the purposes of this study, the term "critically ill patient" was not defined.

Questionnaires were posted and received and telephone follow up undertaken between November 2002 and June 2003.

## Data collection and analysis

The questionnaire was piloted in 10 EDs. The questionnaire was then posted to the lead emergency medicine consultant in every UK ED who responded, based on their knowledge and observations of critical care transfers within their own department. A stamped return envelope and an information sheet were included with the questionnaire. A further questionnaire and return envelope were sent to the non-responding departments if there had been no reply within 4 weeks. Telephone follow up was undertaken if there had been no reply after a further 4 weeks unless a response had been received stating that the department did not wish to participate in the survey. A centre was designated a non-responder if there was no contact after three follow up phone calls.

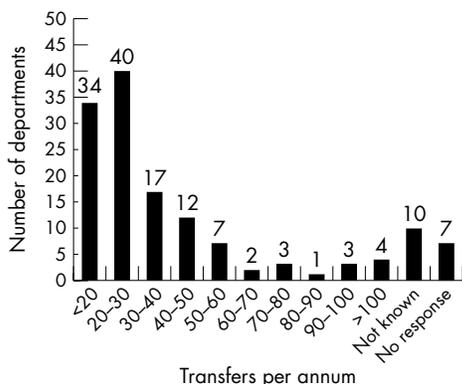
Data collected from the questionnaires was entered onto a database (Microsoft Access 2000) and analysed using this database and a spreadsheet program (Microsoft Excel 2000).

## RESULTS

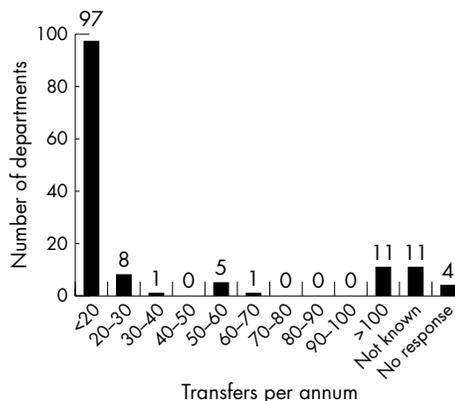
In total, 247 UK EDs were identified and mailed. A total of 139 EDs (56%) completed and returned the questionnaire. No analysis was made of the size or geographical location of EDs that responded.

The estimated number of critically ill patients transferred from each ED annually ranged from <20 to >100 (fig 1). The median number of transfers from each department was 20-30. The number of critically ill patient transfers received by each ED annually ranged from <20 to >100 (fig 2) with the

**Abbreviation:** ED, emergency department



**Figure 1** Estimated annual number of critically ill transfers sent from each ED.



**Figure 2** Estimated annual number of critically ill transfers received by each ED.

median number of transfers received by each department being  $< 20$ .

### Critical care networks

In total, 61 (44%) of responding EDs stated that they belong to a critical care network, while 43 EDs (31%) were not aware of belonging to a critical care network.

### Transfer guidelines and documentation

There were 68 EDs (49%) that were aware of the existence of critical care transfer guidelines for their critical care network, while 17 (12%) stated they were not aware of these existing and 32 (23%) did not know whether these were available or not.

In total, 78 EDs (56%) were aware of other local organisations or specialties having specific transfer guidelines, while 32 (23%) were not aware of such guidelines existing and 25 (18%) were unsure.

Transfer guidelines are available in 79 (57%) of the responding UK EDs; the most common available are shown in table 1. The number of UK EDs using transfer specific documentation is shown in table 2.

### Audit and critical incident reporting

Auditing is currently carried out by 60 EDs (43%) for their critically ill patient transfers. This is at local level for 33 (24%), and regional level for 34 (24%). Critical incident reporting is ongoing in 122 EDs (88%), undertaken locally for 107 (77%) and regionally for 12 (9%).

### Transfer equipment and monitoring

There is no transport ventilator for 18 EDs (13%), while 9 (6%) have no transport monitor and 9 (6%) no syringe pump. However, these items, if required, are available from another department in the hospital, usually the intensive care unit, high dependency unit, operating theatre, ambulance, or a central store. The availability and functionality of ED equipment and monitoring is described in table 3.

Transport equipment is often not standardised throughout a hospital; 51 EDs (37%) have transfer equipment that is standardised within their hospital, but only 7 EDs (5%) have transfer equipment that is standardised across a critical care network.

### Personnel/training

Most EDs (126; 91%) have access to a paediatric transfer and retrieval team. However, only 22 EDs (16%) have access to an adult regional transfer team.

Anaesthetic staff members accompany critically ill patients during transfer in 133 EDs (96%). Emergency medicine

**Table 1** Availability of critical care transfer guidelines

| Transfer guidelines        | Number of departments where specialty/local guidelines exist | Number of departments with named guideline available in ED |
|----------------------------|--|--|
| Anaesthetic department/ICU | 8  | 3  |
| Burns                      | 2  | 3  |
| Cardiothoracic             | 0  | 1  |
| ED/other local guidelines  | 13   | 16   |
| Head injury                | 44   | 13   |
| Intensive Care Society     | 2  | 2  |
| Obstetrics and gynaecology | 1  | 0  |
| Paediatric/PICU            | 11   | 3  |
| Pelvic fracture            | 1  | 0  |
| Vascular; for example, AAA | 8  | 4  |
| Other                      | 2  | 2  |

ICU, intensive care unit; PICU, paediatric intensive care unit; AAA, abdominal aortic aneurysm

**Table 2** Transfer documentation used by emergency departments

| Type of transfer documentation used by ED | No. of EDs using the documentation |
|---|------------------------------------|
| Transfer specific documentation           | 80 (55%)*                          |
| Pre-transfer check lists                  | 63 (45%)                           |
| Transfer observation charts               | 55 (40%)                           |
| Standardised referral letters             | 17 (12%)                           |

\*Local 41 (29%); regional 37 (27%).

doctors are regularly involved in the transfer of critically ill patients in 15 EDs (11%). The grade of accompanying doctor or nurse is shown in fig 3.

In 135 EDs (97%), the critically ill patient is accompanied by a doctor and a nurse, while 20 EDs (14%) indicated that the patient is accompanied by a doctor only, 3 EDs indicated a nurse only and one department stated an operating department practitioner only.

In only 5 EDs (4%) do medical staff receive formal transfer specific training, with the majority of training being carried out "in house" or in the form of supervised transfers. Supervised transfers occurred in 82 EDs (59%).

Although only 3 EDs (2%) have formal training for transfers for nursing staff, there was in house training or accompanied supervised transfer training in 89 EDs (64%).

**Table 3** Transport equipment available to UK emergency departments

| Equipment available                                 | Equipment function        | Number of EDs (%) |
|---|---------------------------|-------------------|
| Transport monitor specification                     | Invasive BP               | 121 (87%)         |
|   | CVP                       | 108 (78%)         |
|   | End tidal CO <sub>2</sub> | 113 (81%)         |
|   | Core temperature          | 82 (59%)          |
| Ventilator specification                            | Pressure display          | 92 (66%)          |
|   | Pressure alarm            | 95 (68%)          |
|   | Disconnect alarm          | 81 (58%)          |
|   | I:E ratio setting         | 75 (54%)          |
|   | PEEP                      | 74 (53%)          |
| Dedicated transfer trolley                          |                           | 18 (13%)          |
| Trolley equipment bridge                            |                           | 45 (32%)          |
| Personal protective clothing                        |                           | 82 (59%)          |
| Mobile phone for emergency use during transfers     |                           | 34 (24%)          |
| Departmental credit card for emergency use by staff |                           | 0 (0%)            |

CVP, central venous pressure; PEEP, positive end-expiratory pressure.

**Insurance cover**

Additional insurance cover for transfers is provided for medical staff in 34 EDs (24%) and for nursing staff in 24 EDs (17%). Most of the EDs (103; 74%) either did not know whether or not they had additional insurance cover in place or had none in place.

**Transport vehicles and ambulance service responses**

There is a dedicated transport vehicle for 24 EDs (17%), while in 3 (2%), these were only available for paediatric transfers. Most EDs (125; 90%) had access to a helicopter for secondary transportation, but 107 EDs (77%) stated that this facility was rarely used. Only 20 EDs (14%) have access to a helicopter with night flying capability. Helicopters are generally used in the absence of specific protocols for their use; only 24 EDs (17%) have specific protocols. In 90 EDs (65%), a secondary ambulance transfer between the helipad and the ED is necessary.

Delays in the ambulance response to a request for a transfer is frequent, with 3 EDs (2%) reporting they always experienced a delay, 26 (19%) often experiencing delays and 37 (27%) occasionally experiencing delays. Only 17 EDs (12%) reported never experiencing a delay. In this study, no attempt was made to determine whether patient outcome was affected by such delays; a separate study would be required to determine this.

The ability of the ambulance service to return staff to their base hospital after transfer is variable. The ambulance service was always able to provide transport back to 40 EDs (29%),

often able to 55 EDs (40%), only occasionally able to 27 EDs (19%), while 9 EDs (6%) stated that their ambulance service was never able to provide return transport.

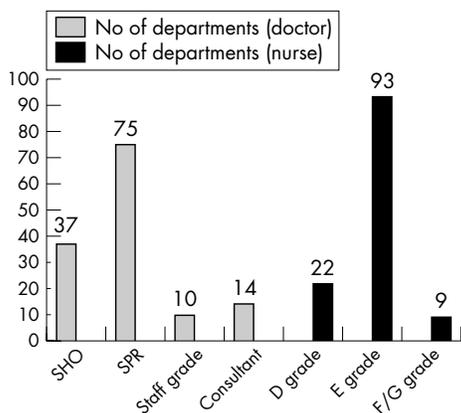
**DISCUSSION**

Recent publications, including the Department of Health document<sup>1</sup> and the Intensive Care Society guidelines<sup>2</sup> have documented the necessity for and importance of appropriate standards, equipment, procedures, and staff training when dealing with the transfer of critically ill and injured patients.

This study details the processes and organisation of critically ill patient transfers in UK EDs by assessing their current degree of adherence to standards set by, and recommendations made in these publications. The results of this study illustrate many inadequacies in these processes of care in UK EDs. It also highlights deficiencies in equipment provision, patient monitoring facilities, staff training, and transfer documentation.

Many EDs are unaware of the existence of critical care networks, which have been established according to national directives to co-ordinate and develop transfer services and protocols across a specified geographical area. Only 44% of EDs are aware of these networks. To ensure adequate standards of care, networks have been required to develop quality assurance programmes including the development of standardised network transfer documentation, critical incident reporting, and auditing. Critical incident reporting is ongoing in most EDs (88%), but audit of critical care transfers is less common (43%). Transfer specific guidelines and documentation have been developed and advocated, but they are not often available or used in UK EDs.

UK EDs often lack immediately available and appropriate transport equipment. The equipment that is available frequently lacks important functions and fails to meet the minimum standards required. Transport monitors are frequently unable to measure variables such as end tidal CO<sub>2</sub> and invasive pressures, which are essential for safe transfer of critically ill patients and are recommended as mandatory by the Intensive Care Society<sup>2</sup> and the Association of Anaesthetists.<sup>12</sup> Several previous studies have described inadequate monitoring during transfer when compared to these standards<sup>8, 13, 14</sup> often in head injury patients. Ventilators lack basic safety functions, such as disconnect alarms. Other equipment is frequently not standardised within either the hospital or network. Standard trolleys are generally unsuitable for transport of critically ill patients because of difficulty in securely mounting all the necessary medical equipment. A dedicated transfer trolley is seldom available. Ideally, all transport equipment should be standardised across a critical care network to enable the transfer of



**Figure 3** Seniority of accompanying medical and nursing staff during transfer.

patients between hospitals without interruption of drug therapy or monitoring.<sup>2</sup>

Most EDs (84%) do not have access to a dedicated adult transfer/retrieval team, despite evidence showing that the outcome for critically ill patients is improved by their use.<sup>4-7,9</sup> Further development of and access to such teams is required. This study shows that access to dedicated paediatric retrieval teams is much better, at 91%.

Road transport of patients is easier, cheaper, and more familiar to staff than aeromedical transport. It is interesting to note that a dedicated ambulance transfer vehicle is available to only 17% of EDs, but a helicopter is available to 90%. Helicopters are, however, used only rarely by 107 EDs (77%) and require a secondary ambulance transfer by the majority (90; 65%). The ability of the ambulance service to provide transport back to the base hospital for staff on transfers is suboptimum.

Of transfers to and from EDs, 112 (81%) are carried out by junior (senior house officer or registrar grade) anaesthetic medical staff. This correlates with previous published findings.<sup>3,10,13</sup> Both medical and nursing staff frequently receive little or no formal training prior to undertaking transfers of critically ill patients. Competency based training and assessment is now recommended, and specific staff training courses have been developed;<sup>11</sup> however, the proportion of EDs putting staff through formal training for transfers is low.

Personal equipment provision is variable. Many EDs provide personal protective clothing, but equally many do not. Staff involved in transfers frequently have no additional insurance cover other than Crown indemnity and may often be underinsured. The insurance situation in these areas can be complicated and it is therefore important that staff carrying out transfers take steps to ensure that they have appropriate insurance cover (professional indemnity and personal insurance) for any transfer duties they may perform.

While the response rate of 56% is suboptimum, every effort was made to maximise the response. Responses are based on personal observation and this may incur some limitations in data accuracy. Nevertheless, the response rate still represents the majority of UK EDs, and highlights many deficiencies in processes of care, equipment provision, and training for transfer of the critically ill patient to and from a significant number of UK EDs. The response rate therefore does not detract from the principal messages of this study, which are applicable to the UK as a whole.

While many EDs surveyed indicated that they are currently reviewing their processes for the transport of the critically ill patient, this study shows that in order to meet the standards outlined in the Department of Health<sup>1</sup> and the Intensive Care Society<sup>2</sup> guidelines. UK Emergency EDs need to develop their transport service process further. This will involve further development of specific procedures and protocols, the use of transfer specific documentation, and improved or formalised transfer specific training, backed up by a system of critical incident reporting and audit. Improved transport systems need to be developed, using more senior personnel with formal transfer training, adequate personal equipment provision, and insurance. Equipment and monitoring provision, availability, and specification in many UK EDs requires review to ensure adherence to recommended standards set for the transport of the critically ill patient and improved standards of care.

## CONCLUSIONS

This is the first study to examine, in detail, whether UK EDs currently have appropriate equipment, monitoring, staff training systems, and processes of care for the transportation of the critically ill patient.

While the level of medical training and equipment provision required for transferring a critically ill patient may depend on the individual patient, it is clear that EDs currently fail to meet standards and recommendations made by the Intensive Care Society guidelines<sup>2</sup> for transfer of critically ill patients. Many EDs remain unaware of the development of critical care networks. The availability and use of transfer specific guidelines and documentation is poor. Available, appropriate, standardised transfer equipment, documentation, and monitoring provision is inadequate in many EDs.

This is concerning when clearly resuscitation and early critical care is central to the practice of emergency medicine, and the specialty should have a key role in the organisation and delivery of the transfers of the critically ill.

## ACKNOWLEDGEMENTS

We would like to thank all departments who contributed to this study by completing the questionnaire.

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Competing interests: none declared

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*Emerg Med J* 2005 22: 795-798  
doi: 10.1136/emj.2004.017822

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