

Impact of specialised paediatric retrieval teams

A regionally based retrieval service is warranted

EDITOR.—Joseph Britto and colleagues' study has an inherent flaw because it used a scoring system that has not been validated for use more frequently than at 24 hour intervals.¹ Nevertheless, we agree with the authors' view that critically ill children can be transferred by specialist paediatric retrieval teams with minimal morbidity and mortality. We carried out a prospective audit of 302 retrievals over 27 months, which showed only two critical incidents, both of which were detected and successfully managed by our team. Over the same period 180 patients were transferred by referring hospitals, with substantially more critical incidents during the transfer. These transfers involved a wide range of conditions for which intensive care was required (table).

Diagnostic categories for patients transferred by different teams. Figures are numbers (percentages)

Diagnostic categories	Transfers by Great Ormond Street (n=302)	Transfer by local team (n=180)
Respiratory	142 (47)	74 (41)
Sepsis syndrome	71 (24)	14 (8)
Neurological	36 (12)	40 (22)
Trauma	15 (5)	20 (11)
Other	38 (13)	32 (18)

In the commentary accompanying the paper Stuart Logan makes an evidence based evaluation of specialist paediatric retrieval teams and concludes, on the basis of only two studies, that the magnitude of the benefits is unreliable. Unfortunately, he fails to discuss other published evidence on the effectiveness of paediatric and neonatal retrieval^{2,3} and the similarities between the two processes. We agree with the practice of medicine supported by evidence and have contributed to the Cochrane Collaboration's initiative in intensive care. Randomised trials to evaluate paediatric retrieval would, however, be impractical and unethical.

A recent editorial⁴ contained a quotation stating that evidence based medicine "builds upon, rather than disparages or neglects, the evidence gained from good clinical skills and sound clinical experience." The reduction in adverse events during transfer is clear to all who are clinically involved in neonatal and paediatric transfers. In our experience, children are admitted to paediatric intensive care units because referring clinicians recognise that subsequent management is beyond their resources or capabilities in terms of facilities, support services, or experience. Such children are invariably the sickest in their ward, but they might be transferred inappropriately by inexperienced members of staff so as not to deplete local acute medical cover.

It is clear to clinicians that regional paediatric intensive care and specialist retrieval teams are needed. Their performance must be continually evaluated, but development must not be hindered for want of large randomised studies. Though agreeing that practice should be driven by evidence, we would not want to overlook a commonsense

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approach in which a sick child at risk of complications is transferred by skilled staff. Surely there remains a sound argument for a regionally based retrieval service.

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Comparison of teams is difficult

EDITOR.—Joseph Britto and colleagues' study of a paediatric retrieval team¹ closely mirrors a descriptive study performed by the specialist transport team based in our hospital's adult intensive care unit.² We agree with Stuart Logan, who says in his commentary on Britto and colleagues' paper that randomised controlled trials comparing specialist with non-specialist transfer are problematic and that evaluation of the introduction of specialist retrieval teams by the use of scoring systems should provide firmer evidence of their benefit.¹ We write to emphasise the practical difficulties of using the current scoring systems and, specifically, the problems of using them to compare different retrieval teams.

Britto and colleagues found an increase in thera-

peutic interventions during stabilisation by their retrieval team, as shown by an increase in the score obtained with the therapeutic intervention scoring system (TISS). In our study we calculated TISS scores for the 24 hours that preceded the arrival of the transport team and for the 24 hours that ended when stabilisation for transfer was complete. Britto and colleagues seem to have calculated TISS scores for successive 24 hour periods. The second score (TISS after retrieval) may therefore have included interventions performed after admission to the intensive care unit, which might increase the score. When the two teams are compared our Glasgow team (TISS score rising from 21 to 23) seems to have intervened less during retrieval than Britto and colleagues' team (TISS score rising from 18 to 30), but this difference may be more apparent than real. Neither study defined the period during which the scores were calculated sufficiently rigorously to allow valid comparison of the teams.

Similar caveats apply to the use of scores of severity of illness during the transfer of sick patients. In routine intensive care practice these scores are calculated from values obtained during the first 24 hours of intensive care. They can be used to describe the rapid physiological changes seen during retrieval of a sick patient only if they are substantially modified. Individual transport teams have modified them in different ways, making comparison impossible.

If Logan's aim of evaluating and comparing newly established retrieval teams is to be realised then details of scoring—specifically, the periods in which scoring is done and any modifications—must be more explicit. Without consensus on these details, scoring systems will not provide the clear evidence of benefit that could illuminate policy-making.

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Criteria indicating physiological morbidity were too non-specific

EDITOR.—We were interested to read Joseph Britto and colleagues' paper on the morbidity and severity of illness during interhospital transfer by a specialist paediatric retrieval team.¹ It is now generally accepted that critically ill children should be cared for in a specialist paediatric intensive care setting.² To minimise morbidity and mortality the patients should probably be transferred to such a unit by specially trained teams.

Britto and colleagues' group undoubtedly provides excellent care during transfer, as is shown by the scores for the paediatric risk of mortality before and after transfer. However, although the criteria of physiological morbidity quoted in the paper—for example, cardiac arrest, respiratory arrest, the loss of brainstem reflexes, and a score of < 7 on the Glasgow coma scale—may be appropriate to audit

paediatric transfer by non-specialists,³ surely they are too non-specific to assess the performance of a specialist team. A study by Edge *et al*,⁴ in which a specialist retrieval team did not seem to reduce physiological deterioration during transfer as assessed by these criteria, may be criticised on the grounds that the two groups were not comparable. The patients transferred by a non-specialist team were significantly older and included a higher proportion of victims of trauma. The diagnoses in the patients transferred by a specialist team were not stated. Also, although physiological deterioration occurred in 11% of the patients transferred by the specialist teams and 12% of the patients transferred by the non-specialist teams, the data from the two groups were pooled together, making further analysis impossible.

It would be interesting if Britto and colleagues' study was repeated, with more sensitive criteria being used to assess morbidity during transfer, perhaps by the inclusion of a specified percentage deterioration in physiological variables before transfer.

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Intensive care provided by local hospitals should be improved

EDITOR,—Joseph Britto and colleagues give a convincing argument for the further development of retrieval teams for critically ill children.¹ But what of the quality of intensive care provided locally? The main interventions performed by the retrieval team were maintaining an airway (57%), ventilation (26%), and obtaining vascular access (86%). These interventions, however, should have been performed at the local hospital by suitably trained paediatricians and anaesthetists.

Surely the question that needs to be asked is why these essentials of advanced life support are not being provided locally. This is particularly pertinent when the diagnostic groups are looked at closely. Bronchiolitis accounted for a quarter of the patients studied, and these patients formed the group with the biggest change in the score obtained with the therapeutic intervention scoring system. Meningococcal disease (47% of patients) is a devastating disease with rapid deterioration requiring prompt intervention.

As Stuart Logan says in his commentary on the paper, centralisation of paediatric intensive care will be driven by public and professional opinion despite little evidence to support this move. As a consequence the quality of intensive care provided locally will continue to deteriorate unless those responsible for training and accreditation acknowledge the contribution that local services can, and must, make. Local units must recognise, and be recognised for, their role in contributing to the advances being made in paediatric intensive care by the tertiary units.

Britto and colleagues should ensure that those local hospitals that seem to provide a deficient service are alerted; they should be encouraged to provide appropriate training—for example, in paediatric advanced life support. This is preferable to the more obvious conclusion reached by the

authors—that transfer of sick children is so safe that more is better.

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Transfers within hospitals can be as risky as those between hospitals

EDITOR,—As an anaesthetist frequently involved in the transfer of critically ill patients, I agree with the findings of Joseph Britto and colleagues, which show the importance of resuscitating and stabilising paediatric patients before beginning transfers between hospitals.¹ Similar advice has been published for the transfer of patients with severe head injuries.² It is important to remember that transfers within hospitals—for example, for computed tomography—can be just as risky. Comprehensive monitoring with robust equipment with a long battery life is important to reduce morbidity. Hospitals should make the necessary investment to ensure that resuscitation rooms have the appropriate equipment to achieve these standards.

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London group's findings supported by study in Leeds

EDITOR,—I was interested to read the paper describing the experience of the paediatric retrieval team at St Mary's Hospital in London,¹ having recently reported a similar study of the paediatric retrieval service based at Leeds General Infirmary.² Our study of 50 children referred for transfer by a specialist retrieval team over six months used two scores derived from the paediatric risk of mortality and the therapeutic intervention scoring system to assess the severity of illness and the need for therapeutic interventions during transfer. Critically ill children were transferred by a team consisting of a paediatric intensivist and a nurse from the paediatric intensive care unit; there was no deterioration in their clinical condition, and there were no adverse events related to equipment.

Most (32) requests for transfer were made outside normal weekly working hours. The median time from the request to the arrival of the team at the referring hospital was 105 minutes. The commonest diagnoses were respiratory failure, neurological disease, and meningococcal septicaemia. The median time taken to stabilise the child before transfer was 73 minutes (range 20 to 360). The retrieval team often needed to perform major therapeutic interventions before transfer: it intubated or reintubated 25 children and inserted 15 arterial, 14 central, and 28 peripheral venous lines. Forty four children underwent mechanical ventilation during transfer.

If paediatric retrieval teams with experienced medical staff are to develop in Britain then the costs and benefits of providing this level of care will need to be addressed directly. Good quality data will help establish priorities, and scoring systems

are useful for comparing results. As Joseph Britto and colleagues note,¹ reliable data for scoring systems such as the paediatric risk of mortality may prove difficult to collect in this setting, and a simpler system tailored to the paediatric age group is therefore required.³ The major therapeutic interventions that had to be performed by the retrieval teams studied indicate a need for better resuscitation by staff at the referring hospital. Advice on management from the paediatric intensive care unit before the arrival of the retrieval team, and the early involvement of senior paediatric and anaesthetic staff at the referring hospital, should improve this situation.

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Children are still transferred by non-specialist teams

EDITOR,—Joseph Britto and colleagues suggest that specialist teams reduce the risks of secondary insults during the transfer of critically ill children from the referring hospital to a tertiary paediatric intensive care unit.¹ As Stuart Logan points out in his commentary on the paper, however, debate remains about the effectiveness of specialist transfer services. We prospectively audited external admissions to a tertiary paediatric intensive care unit without its own transfer team. The dataset will permit the introduction of a dedicated, specialist transfer service to be evaluated.

On the child's admission to the paediatric intensive care unit the demographic details, monitoring carried out during the transfer, and accompanying staff were recorded. The immediate management and condition of the child were documented. The transfer was assessed with a modified version of the paediatric risk of mortality score and against standards for the transfer of critically ill children.²

During the eight month audit 143 children were transferred, 89 outside working hours; 75 were aged under 2. In 46 cases minimal monitoring was used,³ but in 19 monitoring was by hand and eye only. Thirty transfer teams were led by a consultant, and 27 teams consisted of more than three people. Critical incidents or serious events occurred in a third of all transfers (table).

Altogether 101 children were intubated before transfer, 89 of them orally. In many (31), however, the endotracheal tube was the wrong size or length. Of the 42 children who were not intubated before transfer, 21 required intubation either immedi-

Critical or serious incidents that occurred during transfer

	No
Physiological incidents	
Desaturation (arterial saturation <90%)	17
Hypotension	8
Cardiac arrest	4
Arrhythmia	2
Neurological deterioration	3
Mechanical problems	
Blocked endotracheal tube	2
Accidental extubation	2
Loss of battery supply	3
Exhaustion of oxygen supply	1
Problems with ventilator	1
Loss of intravenous access	5