Transporting critically ill children

Peter-Marc Fortune

Kate Parkins

Stephen Playfor

Abstract

Increasing centralization of paediatric intensive care services and a reduction in the numbers of children cared for in adult intensive care units over the last 15–20 years has led to an increase in the numbers of critically ill children being transferred between clinical centres throughout the UK. Eighty percent of these retrievals are conducted by a specialist paediatric intensive care unit (PICU) team, 13% by a specialist non-PICU team, and only 7% by an ad-hoc, non-specialist team. Various pressures have made it increasingly difficult for PICUs to facilitate the timely retrieval of critically ill children whilst maintaining the quality of care being provided to patients already under their care. This situation has led to the development of regional, stand-alone transport teams throughout the UK over the last 5–10 years. A typical example of such a team is the North West & North Wales Paediatric Transport Service (NWTS). Utilizing the highly structured approaches advocated by the Paediatric and Neonatal Safe Transfer and Retrieval (PaNSTaR) and the Adult STaR courses; focussing on the SCRUMP (Shared assessment, Clinical isolation, Resource limitations, Unfamiliar equipment, Movement and Safety and Physiology) and the ACCEPT (Assessment, Control, Communication, Evaluation, Preparation/Packaging, Transportation) approach, regional transport teams have delivered significant measurable benefits in terms of patient outcomes and experiences when compared to previous models of service delivery.

Keywords Children; critical care transport; paediatrics

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Learning objectives

After reading this article you should be able to:

- define the extent and nature of retrievals of critically ill children conducted currently in the UK
- list the benefits of a stand-alone regional transport service such as the North West & North Wales Paediatric Transport Service
- describe the optimal structure for organizing the retrieval of a critically ill child

Regional retrieval teams

Evidence from the literature has long supported the development of specialist retrieval services; providing safer retrievals with fewer adverse events than those conducted by non-specialist teams.[1] Increasing centralization of paediatric intensive care services and a reduction in the numbers of children cared for in adult intensive care units over the last 15–20 years has led to an increase in the numbers of critically ill children being transferred between clinical centres throughout the UK.[2] Between 2010 and 2012 there were a total of 17,646 retrievals of critically ill children; 80% of these retrievals were conducted by a specialist paediatric intensive care unit (PICU) team, 13% by a specialist non-PICU team, and only 7% by an ad-hoc, non-specialist team.[3]

Changes to the structure of medical training coupled with the introduction of the European Working Time Directive have made it increasingly difficult for s PICUs to facilitate the timely retrieval of critically ill children whilst maintaining the quality of care being provided to patients already under their care. This situation has led to the development of regional, stand-alone transport teams throughout the UK over the last 5–10 years. A typical example of such a team is the North West & North Wales Paediatric Transport Service (NWTS) which was launched in November 2010. NWTS facilitates 650 PICU transfers per year, with nursing and trainee medical staff that rotate from either of the two regional PICUs in Manchester and Liverpool. Consultants and the senior nursing team are primarily based with NWTS. Staffing resources allows NWTS to provide a single team all year round, and an extra team for 12 hours/day during winter months to meet periods of high demand. The service offers specialist paediatric critical care advice using a single referral telephone number and a triage facility for all PICU referrals. A significant benefit is that once a patient is accepted for transport it is NWTS's responsibility to locate and secure an appropriate PICU bed, which allows the referring team to concentrate on stabilizing the patient. NWTS is also able to engage appropriate specialists using a conference call facility which improves communication and coordination and ensures that the referring team receives appropriate specialist advice early in the stabilization period.

Early referral to regional retrieval teams, who are able to provide immediate advice from a consultant paediatric intensivist may prevent patient deterioration and the need for PICU admission: approximately 30% of referrals to the NWTS team do not result in transfer to a tertiary centre. NWTS, like other regional transport teams, has established easy-to-access websites providing regional and national clinical guidelines and emergency on-line drug calculators (e.g. www.crashcall.net). Introduction of regional clinical guidelines for the use of non-invasive ventilation (NIV) in the management of bronchiolitis has led to an increased use of NIV before contacting NWTS from 22% to 97% and a reduction in PICU admission rates from 62% to 38%, despite national data demonstrating an increased number of admissions to PICU with bronchiolitis over the same period.

Another area of improvement is in the management of patients with status epilepticus. As the result of regional clinical

Peter-Marc Fortune *BM BSc MA PhD FRCPCH is a Consultant Paediatric Intensivist at the Royal Manchester Children's Hospital, Manchester, UK. Conflicts of interest: none declared.*

Kate Parkins *MBBS MRCP FRCPCH NWTS, Newton House, Birchwood Park, Warrington, UK Conflicts of interest: none declared.*

Stephen Playfor *MBBS DCH MRCP MRCPCH DM FFICM is a Consultant Paediatric Intensivist at the Royal Manchester Children's Hospital, Manchester, UK. Conflicts of interest: none declared.*

guidelines, local education sessions and regional conferences the proportion of patients successfully extubated at the referring hospital has increased from 19% to 52% over the last 3 years. These patients are usually extubated within 2–4 hours of intubation and none has required reintubation. The NWTS team is commissioned to provide support, education and training for the local referring teams and in 2013 NWTS provided outreach training to 617 healthcare professionals in 25 centres.

Since NWTS began operations in 2010, out-of-region transfers due to lack of PICU capacity have fallen from between 50 and 100 patients per year to fewer than 20 patients per year; this has enormous benefits for patients, their families and the wider NHS.

There is a national target for regional transport teams to mobilize within 30 minutes of agreeing that a patient requires transfer to PICU and NWTS currently mobilizes within 30 minutes for 92% of retrievals. Similarly there is a national target to be at the patient's bedside within 3 hours of acceptance; a target which NWTS meets in 92% of cases.

Regional transport teams have access to dedicated equipment including specific ventilators, monitors and infusion pumps that can cope with the various sizes of paediatric patients from neonates up to 16-year-old children. Equipment is checked at the start of each shift to ensure that it is functional, and checklists are used to ensure that the team makes adequate preparation for each transport.

Infants and children must be secured safely to the transport stretcher before departure. NWTS uses the BabyPOD™ for those under 5 kg (Figure 1) and a five-point harness system for older children such as the Ambulance Child Restraint (ACR) harness (Paraid Medical, Birmingham, UK) (Figure 2). To improve the maintenance of body temperature NWTS uses either transwarmers (chemically activated warming devices) or the Inditherm™ as active heating devices especially for those under 1 year of age. All equipment must be safely secured to the ambulance trolley during transfer to prevent danger of injury to patient or staff during the journey (Figure 3).

Paediatric Intensive Care Society standards from 2010 state that 'Wherever possible and appropriate, parents should be given the option to accompany their child during transfer'. Before NWTS, unit-based PICU transport teams were unable to accommodate parents due to the restricted number of seats when using the local NHS front-line ambulances and parental stress is increased by not being able to travel with their child.[4] The NWTS service level agreement with a private ambulance provider states

Figure 1 The BabyPod™ used to transfer any infant under 5 kg.

Figure 2 The five-point Ambulance Child Restraint harness used to hold a patient securely to the trolley.

that the ambulance must have four seats to ensure that at least one parent can travel with their child. Now, 56% of NWTS transfers accommodate one parent, and 9% transfers accommodate both parents in the ambulance. Approximately 22% parents decline the opportunity, opting to travel separately using private transport. Parental feedback has been very positive: '*NWTS not only kept our daughter alive, but kept our family together at a very difficult time – thank you.*'

SCRUMP and the ACCEPT approach

The back of an ambulance or the inside of an aircraft are not easy environments to care for a sick child. The key differences to the normal hospital environment can be summed up by the mnemonic SCRUMP: Shared assessment, Clinical isolation, Resource limitations, Unfamiliar equipment, Movement and Safety and Physiology.

Shared assessment

At the very least every transfer involves two teams, one in the referring unit and one in the receiving unit. Although the transport team might be drawn from one of these, more often than not this will be a third, regional team such as NWTS. It is vital that all the teams are in agreement with the appropriateness of the

Figure 3 A transport trolley. (1) Ventilator suitable for all age groups. (2) Vital signs monitor. (3) Infusion pumps. (4) Suction device.