



---

## **PART I**

# **Introduction**



## CHAPTER 1

# Introduction

### LEARNING OBJECTIVES

In this chapter you will learn about:

- Why unwell children are transferred between hospitals
- The issues that may adversely affect delivery of care

### BACKGROUND

In children's critical care alone there are in excess of 5500 neonatal intensive care unit (NICU) and 5000 paediatric ICU (PICU) transfers between hospitals in the UK every year. In addition to this, there are numerous HDU (high dependency unit) and non-urgent transfers between centres and countless thousands of intrahospital transfers undertaken by healthcare professionals every year. Each one of these transfers represents an episode of care that is associated with a period of increased risk for both the child and the clinical staff. These risks can at best be eliminated and at least be minimised through appropriate training.

The PaNSTaR manual, with its associated course, is aimed at a multidisciplinary audience and has been developed to provide a comprehensive introduction and overview of the process of transferring unwell neonates, infants and children. Its conception followed from the success of the adult STaR manual and course. The underpinning concepts, and in particular the ACCEPT principles, described herein, are essentially the same. However the practicalities of transferring unwell children are significantly different. It is an old adage, but in this area perhaps never more true – children are not small adults!

Throughout the text 'child' or 'children' should be taken to refer to the entire age range (neonate up to 16 years of age). Where appropriate more specific references to particular age groups will be made where practices vary according to age. 'Neonates' is used to refer to all preterm babies and also term babies who are less than 28 days old. 'Infants' refers to all those under 1 year. Parent refers to any person with parental responsibility.

In addition to the practical differences associated with transferring children, there has also been a cultural change that has occurred, in many centres, of



non-paediatricians distancing themselves from paediatric practice, triggered by the centralisation of paediatric services. Many district general hospital (DGH) practitioners, faced with a critically ill child, may now find themselves practising at the edge of their comfort zone. This is perhaps particularly true if they have to undertake a transfer.

Most NICUs and PICUs will have an associated retrieval team. However, most, if not all, of these teams are not sufficiently resourced to be able to provide a robust service 100% of the time. There will also be occasions, such as children with surgically treatable lesions after a traumatic head injury, where current practice would dictate that the referring hospital should undertake the transfer in order to minimise the time to the start of neurosurgery. At the current time these factors mean that referring centres may expect to carry out the transfer for between 25 and 30% of the children whom they refer for urgent tertiary care.

We anticipate that reading this manual and attending a PaNSTaR course will provide you with the basic strategies and background that you need to join a paediatric transfer team. It is important to note that proficiency in this area comes only with the additional training and experience that may be gained from working with practitioners already experienced in this area.

## THE APPROACH TO TRANSFER

Any transfer process may be broken down into three components:

- 1 The organisational and management strategy
- 2 The practical issues
- 3 The training required for appropriate use of the equipment on the transfer.

The course focus is on the transportation of children between hospitals. However, the same approach can, and should, be applied to the transportation of unwell children within hospitals.

The usual purpose of an interhospital transfer or retrieval is either to allow the patient to be treated more effectively or to obtain additional diagnostic information, in a geographically separate site. Transfer in itself does not constitute therapy and represents a time of increased risk. It is therefore essential always to consider the risks versus the benefits before undertaking a potentially hazardous journey.

In the neonatal population babies may be transferred acutely because they require ICU therapy that is not available at the referring NICU or SCBU (special care baby unit). There are also a significant number of neonates who may be moved for specialist examinations or opinions. Infants and older children are primarily transferred when they are acutely unwell to a central PICU or HDU. Some transfers will also occur for secondary or tertiary opinions, but most of these patients will not present a significant clinical risk and will be transported by their parents. In all the acute cases children may sometimes have to be transferred significant distances, especially at busy times such as midwinter, because beds may not be available in their nearest tertiary centre.

Box 1.1 details the wide spectrum of clinical presentations that may be encountered. Diagnostic groups are in order, from most common to least common, based on Paediatric Intensive Care Audit Network (PICANET) data. Within the groups the top specific diagnoses are similarly listed.



### Box 1.1 Clinical conditions requiring transfer

#### Neonates

- Extreme prematurity
- Hyaline membrane disease
- Congenital abnormalities:
  - cardiac
  - respiratory
  - surgical
- Hypoxic ischaemic encephalopathy
- Meconium aspiration syndrome

#### Children

- Cardiovascular:
  - ventricular septal defect
  - tetralogy of Fallot
  - transposition of the great arteries
- Respiratory:
  - bronchiolitis
  - pneumonia
  - respiratory failure secondary to chronic or acute neurological conditions
  - status asthmaticus
- Neurological: status epilepticus (usually respiratory failure secondary to treatment)
- Gastrointestinal
- Infection:
  - sepsis (non-specified)
  - meningococcal sepsis
- Trauma:
  - traumatic head injury
  - burns
- Haematological/Oncological
- Postoperative
- Metabolic:
  - DKA (diabetic ketoacidosis)
  - inborn errors of metabolism
- Substance abuse/poisoning/overdose
- Liver failure

The source of these patients also varies widely:

- Delivery suite
- Emergency department
- NICUs
- Adult ICUs
- Paediatric wards
- Operating theatres
- HDUs
- CCUs (critical care units).

Emergency departments are probably the most frequent starting place for the movement of PICU patients. Sometimes children are moved to local critical care facilities before transfer. Either way the adequacy of resuscitation and the degree of packaging that will have been undertaken, before the arrival of the transfer team, is highly variable. When dispatching a team to undertake this task it is



always best to assume they will need to do everything and therefore must have the knowledge and skills to do so.

Transfers are not infrequently associated with adverse events, which may be recorded on transfer forms. Those seen most commonly are:

- No capnography available (when clinically indicated)
- Equipment failure
- Significant hypotension
- Significant hypoxia
- Inadequate resuscitation
- Significant tachycardia
- Mechanical ventilator not available
- Delay in getting ambulance
- Ambulance getting lost en route
- Cardiac arrest in ambulance.

The number of interhospital transfers continues to rise. This is perhaps stimulated by an increasing expectation on the part of both the general public and healthcare professionals.

## SUMMARY

The course and this manual provides those who may be involved with the transfer of unwell children with a systematic approach to guide their work. It does not seek to teach or develop the clinical skills required to undertake such care but it does provide a structure that should help eliminate most of the non-clinical pitfalls. At the end of the day, there is no substitute for clinical experience, which may be gained by working with those experienced in this field.