

Chapter 1

INTRODUCTION TO PAEDIATRIC HIGH DEPENDENCY CARE

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Introduction

The care of critically ill children has received some attention over the past 10 years, and many of the recommendations from reports relating to the provision of paediatric intensive care (PIC) have been implemented (Department of Health (DH) 1997a, 1997b). However, paediatric high dependency care (HDC) is only just beginning to emerge as a speciality in its own right, with a distinct body of knowledge, clinical skills and its own organisational and educational concerns. With the increase in the dependency of children admitted to hospital over the last 5 years (Haines 2005), there is now an urgency to review the provision and development of paediatric HDC within the United Kingdom in much the same way as PIC services have been reviewed.

This chapter explores HDC definitions and current models of care, reviews current standards for the development of high dependency (HD) services and explores the concept of 'critical care without walls'. Also considered will be the ethos behind the development and growth of the early warning scoring systems and the utilisation of outreach services. There will be some consideration of the holistic nature of HDC of children and, in order to ensure the quality of care provision, an appraisal of the educational and support needs of staff that care for these children and their families.

High dependency care – an elusive concept

Wright (2006) points out that HDC is not a new concept because, as individuals become sicker and more dependent, a higher level of care and attention is required. HDC has been recognised informally for many years. HDC remains an elusive concept in terms of its nature and degree of patient dependency and the preventative and therapeutic services provided within it. HDC has come a long way since Nightingale's description of it in 1852 (Jennet 1990) as a valuable area where post-operative and other patients requiring close attention can be watched. Despite this vision the lack of formalised and nationally agreed admission and discharge criteria for HDC has resulted in a diversity of therapeutic and preventative treatments offered in HDC units which differ between hospitals (McDonald 1999). One of the key issues is the criteria used to define HDC.

In some hospitals HDC is defined by levels of technology and treatment; however, in order to provide these dynamic forms of treatment in a safe environment, human resource issues need to be considered (Baur 2001). Sheppard and Wright (2000) believe that although 2:1 nursing care ought to be the minimum aim for staffing in HD units, there is not a linear relationship between levels of patient anxiety and severity of illness. Should managers aim to resource HD units at 1:1

just like intensive care? This approach recognises that HD can be defined in relation to a number of different but interrelated factors:

- The physiological stability/instability of the child
- The level of observation or therapeutic intervention required; and/or
- The acuity of the child in relation to patient dependency and nursing workload

Within the last 5 years there has been a political drive to develop paediatric HD services within some acute hospitals across the UK (DH 2006). However, significant work still needs to be undertaken to determine the focus of HDC and how it should be delivered. PIC nursing can now defend its staffing levels by arguing that 1:1 nursing care is essential for the safe delivery of, e.g. invasive positive pressure ventilation (DH 1997a). If the defining attribute of critical care nursing in the PIC environment is determined by the technological level of nursing care, then what defines HDC? If health-care personnel are to offer a service that is fair and equitable to all children and adolescents then close consideration of the meaning of HDC is required.

What is HDC?

A common understanding of HDC is the provision of a service that is suitable for those patients who are too sick for the general wards but not unwell enough to merit admission to an intensive care unit. An alternative interpretation may include care for patients who are no longer receiving intensive therapy but still require close observation/monitoring. However, this assumes that HDC is uniform throughout the UK. Sheppard and Wright (2000) believe that HD will not be uniform throughout the UK as wards and intensive care units differ from hospital to hospital and that it would be wrong to be overly prescriptive or restrictive. Accordingly one might infer that HDC is whatever one considers it to be.

In 1996, a report of the National Confidential Enquiry which examined adult peri-operative deaths (Royal College of Anaesthetists and Royal College of Surgeons 1996) concluded that there was an inadequate provision of HDC units across the country and that this impacted on performing major surgery on patients who were physiologically compromised as there were insufficient facilities to recover them post-operatively. Although HDC, in this case, was considered an extension of the operating theatre recovery room, its value was recognised. The document 'Guidelines on Admission to and Discharge from ICU and HDU' (DH 1996), although designed for adults, identified four main categories of patient for whom HDC was appropriate. These are:

- Patients who require single organ support
- Patients who require more detailed observation/monitoring
- Patients who no longer require intensive care but are not well enough for the general ward
- Post-operative patients who require close monitoring for more than a few hours

If these categories are accepted, HD units could be perceived as extensions of the intensive care unit. These guidelines are open to interpretation. The medical interpretation of a patient's needs varies and frequently differs from that of nurses in relation to calculating the patient's actual dependency scores. Single organ support is vague; it could mean the administration of low-grade oxygen to promote tissue oxygenation or it could mean the administration of inotropes to prevent blood pressure from falling. The ramifications of each of these treatments significantly affect the ability of the nursing staff in HD units to deliver safe care in the face of strict resource constraints.

These issues are reflected in 'A Bridge to the Future' (DH 1997b) and the Bristol Royal Infirmary Inquiry (Kennedy 2001) in which PIC provision and care was the subject of national debate following a series of incidents. The enquiries

following each incident outlined problems inherent within the NHS, and in particular ‘A Bridge to the Future’ focused upon the ability of PIC services to cope with peaks in demand (DH 1997a).

Three levels of intensive care are defined but HDC is only ascribed one. Level 1 care (HDC) is described as ‘care provided to a child who may require closer observation and monitoring than is usually available on an ordinary children’s ward’, although much of this care is already provided, with higher staffing levels than usual, in such locations. Examples of the type of observations undertaken and the medical conditions involved include:

- Continuous monitoring of the heart rate
- Non-invasive blood pressure monitoring
- The child requiring single organ support
- Moderately severe croup
- Suspected intestinal obstruction
- Suspected poisoning

Doman *et al.* (2004) argue that this definition is too vague and leads to confusion as to which children meet the criteria for this level of intervention, so there is difficulty in obtaining accurate information about the numbers of children requiring HDC. Indeed accurate auditing of numbers of HD admissions and where these children are located has become the ‘Holy Grail’ of health professionals particularly since the introduction of payment by results, health care resource groups and the NHS financial restraints which potentially impinge on staffing levels. This is pertinent considering Doman and Browning’s (2001) concerns that children with HD needs are still being nursed on general wards without an increase in staffing levels. With this fixation on hospitals and acute settings, can these definitions be applied to support the care planning of stable but highly dependent children with a myriad of complex needs to return them to the community?

Day (2005) suggests that the DH definition is flexible enough to encompass all children with HD needs, but five sub-categories within the level 1

Table 1.1 Breakdown of level 1 definitions.

Sub-divisions	Descriptor
Level 1a	Children who trigger an early warning scoring system and clinical condition and demonstrate a trend of deterioration
Level 1b	Children who trigger an early warning scoring system but demonstrate a trend of improvement
Level 1c	Children who require more frequent observations than every 60 minutes who have undergone an elective procedure, e.g. liver biopsy
Level 1d	Children requiring long-term ventilation
Level 1e	Children who are time-consuming in terms of manpower

definition are required to ensure effective and appropriate location of care, care delivery and funding. This breakdown is certainly sufficiently flexible to consider community care (see Table 1.1).

Despite attempts at defining HDC, it can be argued that current descriptions remain superficial and offer little practical assistance to nursing staff that are managing and delivering HDC on a daily basis. The DH in their report ‘High Dependency Care for Children – Report of an Expert Advisory Group for the Department of Health’ (DH 2001) commented on the lack of clarity with the previous definition of HDC (DH 1997a) and attempted to identify children in need of HDC in acute and speciality hospitals. This attempt used illness classifications to identify children in need of HDC and made specific reference to diabetic ketoacidosis (Chapter 7), meningococcal septicaemia (Chapters 4 and 6) and bacterial meningitis (DH 2001). However, it cannot be assumed that children requiring HDC do so as a result of the classification of their illness. Although illness classification may identify children who require HDC during their hospital stay it cannot provide information on the duration of the HDC need. Such detailed information is required for service planning. A child may be

admitted and discharged with the same diagnosis yet move between all three levels of care. Without a clear definition it becomes impossible to determine the number of these children and the duration of time that they receive HDC. Because of this lack of clarity there has been a move over the last 5 years to look at other ways of capturing the exact nature of HDC by developing patient acuity and dependency scoring tools and HDC measurement tools.

Tools to measure work load and dependency

The Yorkshire HDC measurement tool

This tool was developed following a large regional research study which audited nursing and medical staffing and ward activity within 36 paediatric ward areas from 10 hospital trusts across West, North and East Yorkshire over a 7 month period in 2005 (Rushforth 2006). The patient activity proformas returned ($n = 24\,540$) helped inform the development of the tool. Work to validate the tool is ongoing. The measurement tool is designed for staff to mark the appropriate boxes for interventions performed for a child every 12 hours during a patient episode of care and should be completed retrospectively at the end of a shift. There are 36 interventions which are divided into three groups A, B or C with a score assigned to each (see Table 1.2).

The total score for the child is calculated by adding up all the individual scores for all the

Table 1.2 Yorkshire HDC measurement tool, partial exemplar.

Group	Intervention	Score
A	External ventricular device or cardiopulmonary resuscitation	6 points
B	Use of airway adjunct, sedation during/after a procedure	4 points
C	Airway suction greater than once an hour, hourly urine measurement	2 points

boxes ticked – a child is categorised as HD with a score of 6 or above. Personal experience suggests that this tool is simple and easy to use, requires a relatively simple database and, with further development, can provide consistent measurement of HDC across a variety of ward environments. This tool does exactly what it set out to do, which is to identify children within the ward environment that have HDC needs. What it does not do is attribute a nurse/patient dependency ratio to the score calculated. However, a label of HD assumes a requirement for staffing levels above that which would normally be required on a children's ward.

The Great Ormond Street paediatric dependency and acuity scoring tool

This tool which has been developed over the last 3 years uses a wider range of interventions in order to identify a wider range of dependency levels (Great Ormond Street Hospital 2005a, 2005b). The tool consists of the following:

- A data collection tool consisting of 47 elements of care which are based on DH (2001) criteria has been refined and added to during the pilot phase of the project and through consensus opinion of experts. These elements have been organised into nine colour-coded categories to ease data collection.
- Patient dependency levels have been defined and, through consensus, opinions assigned to each of the 47 elements of care. These dependency levels are based on recommendations from the Royal College of Nursing and the Department of Health (DH 1997b; RCN 2003). There are five levels: 1 = ward intensive care, 2 = HDC, 3 = normal ward dependency (children over 2 years), 4 = normal ward care (children under 2 years), 5 = bed empty.
- A detailed Microsoft[®] Excel database has been developed to allow (with the appropriate scanning hardware and software) the data from the completed data collection forms to be scanned in directly.

Data is collected on all children every 12 hours and this enables a more detailed picture of the dependency of all children from normal dependency through to intensive care to be captured. Additionally, Excel automatically calculates patient numbers in each dependency level as data are entered and determines the number of nursing staff required to care for them. Potentially this is a powerful workforce planning tool, but the current data set is complex. It would need modification for successful use in district general hospital (DGH) settings and consideration must be given to the need for additional manpower and finance in order to utilise the tool. It would appear that the development of such tools is highly dependent on what it is hoped that the tool will achieve and on the local context.

Ball *et al.* (2004) is critical of the concepts of patient dependency and nursing workload because they fail to address the knowledge, skills and experience of nurses and consequently could not acknowledge the risk presented by critically ill patients. Although dependency tools help to measure workload and dependency in terms of nursing numbers required, they do not address the element of risk associated with the care and management of the critically ill by nurses (Garfield *et al.* 2000; Adomat and Hicks 2003). For example, although a ward may have sufficient numbers of staff to care for the acuity of the children, if these nurses do not have the experience, knowledge and skills to care for a child, for instance, with a chest drain then that child could be at risk of having suboptimal care. Experience, education and training of professionals is fundamental to good outcomes in caring for children with HD needs. This is reflected in the practical nature and content of this book.

Provision of HDC

Following the reorganisation of PIC services and publication of guidelines for the HDC of children (DH 1997a, 2001) there has been increased interest in setting up designated areas to care for

children with HDC needs within DGH's and specialist children's units and hospitals. This type of model has definite benefits because it:

- Ensures children with similar HD needs are based in one discrete geographical area
- Allows scarce manpower, expertise and equipment to be used cost effectively
- Promotes the development of staff with good HD skills and knowledge

Children attend a wide range of departments and geographical areas within the acute hospital setting and theoretically any one child could unexpectedly deteriorate and become highly dependent and possibly require transfer to an internal/external HD or critical care facility. HDC can occur in many different areas within the acute hospital setting, be they formally established for this purpose or otherwise (Wright 2006). Additionally, with the increasing dependency and complexity of children admitted to hospital over the past 5 years (Haines 2005) and the increased demands placed on staff caring for the acutely unwell child in ward environments there is an urgent need to develop a more holistic model for providing HDC which does not just look at the physical environment or equipment needs.

Organisational model of HDC

There is a need for a model of HDC that transcends purely the physical environment (Thorne and Hackwood 2002; Richardson *et al.* 2003; Day *et al.* 2005). This model would ensure that every child, wherever he or she was geographically, would have access to a high quality service which would provide him or her with HDC. The model would require the following components:

- A designated area for delivering HDC which is appropriately staffed and equipped. Alternatively an area that allows assessment and stabilisation of a critically ill child prior to transfer or retrieval to an HD or critical care facility

- Provision of education, training and skill development for staff that have contact with children who have HDC needs
- Utilisation of a recognised tool or system to detect the deteriorating child (early warning scoring tools)
- Provision of an outreach service or access to a designated team of professionals expert in the stabilisation of the critically ill child
- Development of locally agreed admission and transfer policies and access either internally or externally to an HD or intensive care facility
- A system that is sufficiently flexible to ensure continuity of HDC, to allow stable, highly dependent children with complex needs to return to the community, live at home, experience education and enjoy good quality life
- The ability to carry out regular research and audit of services and collect data on patient activity and outcomes

The physical environment and continuum of care

HDC should not be seen as a completely segregated or isolated facility but rather as a continuum of care for children. An important function of HDC is to provide a 'step up' facility (i.e. for patients who become too sick for a general ward, yet are not sick enough for intensive care) and a 'step down' facility (i.e. for children who progress to the point where intensive care is no longer required but they are still too sick for a general ward). Children may also need to be admitted directly to HDC from the community if they have open access and it is appropriate.

At the time when the Department of Health was very much 'hands on', the expert advisory group for paediatric HDC (DH 2001) stipulated that all hospitals providing care for children (including those only providing dental or surgical care either as an elective, day case or emergency patient) should have arrangements in place for HDC. These arrangements should include 24 hours availability of medical staff (with the appropriate

competency in advanced paediatric life support). The physical layout of HD facilities will, as stated in the report, vary according to ward design, size and layout and whether the facility is in a DGH or children's hospital with specialist PIC/HDC facilities (DH 2001). Additionally the need for HDC may at times arise, suddenly and unpredictably, within a variety of locations, e.g. a paediatric ward within a DGH or specialist children's hospital, theatre recovery or an emergency department. As a consequence, there are a variety of models for the provision of HDC. These include the following:

- A designated area in a DGH (e.g. emergency department, paediatric ward or theatre recovery), which is able to provide resuscitation and stabilisation facilities prior to transfer of the child to a designated HD or intensive care facility
- A designated HD unit attached to a paediatric ward within a DGH
- A stand-alone HDC unit which is separate to the PIC unit or a combined PIC/HDC unit within a children's hospital

Because of the number of models that spread across a wide geographical area with different working environments, it is difficult to be too prescriptive about design and equipping of the facilities. However, it is essential that all hospitals caring for children should have a designated lead clinician for HDC who is responsible for overseeing the establishment and running of the service. This person should also lead a multidisciplinary users group, because the clinical issues relating to HDC will be different from hospital to hospital, and inform the individual design of the HD facility. The Department of Health (2001) stipulated that HD facilities should include the following:

- Availability of appropriate facilities
- Provision of appropriate equipment and drugs
- Availability of trained and suitably skilled staff

- Development of protocols for the management of common conditions
- Agreed arrangements for transfer to a PIC unit
- Procedures to be followed in the event of bed/staff/equipment shortage
- Close liaison with the relevant PIC unit, and with other departments within the hospital (especially the emergency department and intensive care)
- Training and audit
- Provision of adequate support and accommodation for parents

The current DH position is one of setting policy direction and commissioning. Local providers are responsible for determining how policy is implemented.

Recommended minimum equipment

The expert working group for HDC recommends the following minimum equipment for an HD area:

- Piped medical gases – oxygen and air – and vacuum
- Multi-module monitor (compatible with ICU/theatres) providing, ECG/respiration monitor with apnoea alarm, invasive pressure monitoring, pulse oximetry, non-invasive blood pressure with a variety of cuffs, end tidal CO₂ and temperature monitoring
- Hand ventilation circuit
- Syringe pumps
- Infusion pumps
- Suction units
- Oxygen analyser
- Defibrillator
- Resuscitation trolley
- Head box for oxygen administration
- Easy access to continuous positive airway pressure (CPAP) driver and anaesthetic machine

Within the DGH, easy access to a ventilator is essential to facilitate the initiation of level 2

intensive care and stabilisation of a child requiring level 2 care and a stock of disposables, not usually available, i.e.

- Central venous pressure lines
- Arterial lines
- Chest drains
- Circuits for ventilator and CPAP driver
- Cricothyroidotomy set

A fully equipped transport box should be available, containing everything needed to transfer a sick intubated child safely. Although practice will usually involve the PIC service retrieval team, this will still be needed as a reserve option.

Lastly, a list of available drugs should be agreed with colleagues.

Outreach and paediatric early warning scoring systems

Several adult studies (Franklin and Mathew 1994; Rich 1999) have demonstrated that patients in hospital exhibit premonitory signs of cardiac arrest, which may be observed by nursing and medical staff but are frequently not acted upon. Similar findings have been observed in relation to deterioration in patients' conditions prior to admission to adult intensive care units (McQuillan *et al.* 1998; Goldhill *et al.* 1999a), with the suggestion that early recognition and treatment of these signs may prevent the necessity for some intensive care admissions. This situation has been attributed in part to sub-optimal care owing to the lack of knowledge regarding the significance of findings relating to dysfunction of airway, breathing and circulation, causing them to be missed, misinterpreted or mismanaged (McQuillan *et al.* 1998). Several strategies for reducing the occurrence of suboptimal care have been proposed, which focus on the identification of patients at risk of critical illness and the provision of some form of critical care

outreach service to provide expert advice in the management of these patients (Lee *et al.* 1995; Audit Commission 1999; Goldhill *et al.* 1999b; DH 2000).

During the last 5 years there has been an increase in the paediatric literature supporting the use of outreach and early warning scoring systems and a corresponding development of paediatric early warning scoring tools and outreach services (Tume and Bullock 2004; Monaghan 2005; Haines *et al.* 2006). Although there appears to be a consensus that outreach and early warning scores can contribute to improving outcomes and quality of care, Tume and Bullock (2004) are cautious, suggesting that, rather than just adapting adult tools, the profession needs to utilise primary audit and research data in order to develop valid and reliable tools. It would be true to say that currently there is no national co-ordination for developing these tools and, rather than concentrating on researching a few tools, there appears to be a desire to develop tools in isolation.

Track and trigger

Early warning scoring systems are based upon the allocation of points to physiological observations, the calculation of a total score and the designation of an agreed calling trigger level. Some early warning systems use calling or referral criteria, based upon routine observations, which are activated when one or more variables reach an extreme value outside the normal range (DH and Modernization Agency 2003). The use of physiological track and trigger warning tools therefore seeks to enhance equity and quality of care by giving:

- Timely recognition of all children with potential or established critical illness irrespective of their location
- Timely attendance to all such children, once identified, by those possessing appropriate skills, knowledge and experience

Table 1.3 Physiological track and trigger warning systems classification (DH 2003).

'Single parameter' systems

Tracking: periodic observation of selected basic vital signs

Trigger: one or more extreme observational values

'Multiple parameter' systems

Tracking: periodic observation of selected basic vital signs

Trigger: two or more extreme observational values

'Aggregate weighted scoring' systems

Tracking: periodic observation of selected basic vital signs and the assignment of weighted scores to physiological values, with calculation of a total score

Trigger: achieving a previously agreed trigger threshold with the total score

The aim of an early warning scoring system is to provide staff with an aggregate physiological score generated from baseline recordings of vital signs. The more the child deviates from the normal parameters, the higher the scores. Clinical deterioration is subsequently detected and medical intervention can be implemented at an early stage in the child's illness. Many physiological tracking and triggering systems have been developed and modified to enable early recognition and treatment of acutely ill patients. Table 1.3 outlines the classification of these systems.

Examples of paediatric early warning scoring tools

Currently, the only published paediatric early warning scoring tool that has undergone rigorous research is the Bristol Royal Hospital tool (Haines *et al.* 2006). This tool is a single parameter system and is illustrated in Chapter 3. An earlier tool which was developed at the Royal Brighton Children's Hospital (Monaghan 2005) is an aggregated weighted scoring system (see Table 1.4).

With this tool, children are scored in relation to three parameters every time a set of observations are recorded; i.e. behaviour, cardiovascular

Table 1.4 Brighton paediatric early warning (PEW) score.

Score	0	1	2	3
Behaviour	Playing/ appropriate behaviour	Sleeping	Irritable	Lethargic/confused Reduced response to pain
Cardiovascular	Pink or capillary refill 1–2 seconds	Pale or capillary refill 3 seconds	Grey or capillary refill 4 seconds Tachycardia of 20 above normal rate	Grey and mottled or capillary refill 5 seconds or above Tachycardia of 30 above normal rate or bradycardia
Respiratory	Within normal parameters, no recession or tracheal tug	Rate of 10 breaths above mean, using accessory muscles, 30% + oxygen or 4+ L/min	Rate of 20 breaths above mean, recessing, tracheal tug, 40% + oxygen or 6+ L/min	30 above or 5 below mean, with sternal recession, tracheal tug or grunting, 50% + oxygen or 8+ L/min

and respiratory. They can score 0, 1, 2 or 3 for each parameter depending on how ill they are. Each box describes the parameters a child needs to be observed for in order to receive that score; e.g. under behaviour, if the child is irritable, he/she would score 2. The child only has to manifest one of the observations in a box and the highest score taken. So, e.g. a child who is pale and tachycardic with a rate of 20 heart beats above his/her normal rate would score 2, not 1. The three scores are then added together and this represents the child's PEW score. Additionally, the scoring system allows two discretionary points each for back to back nebulisers and persistent vomiting following surgery. The tool also provides a table of normal physiological parameters.

Clearly, the two early warning scoring systems that have been outlined are very different in their approach, which is a consequence of the development drivers. The Brighton tool developed out of an audit which looked at the recording of patient observations within an environment where observations were taken and recorded by health care assistants and qualified nurses. The Bristol tool (see Chapter 3) looked at identifying clinical and physiological triggers in children and

was developed within a large tertiary children's hospital with a large PICU. These two tools are being utilised in a number of units within the UK, following minor adaptations to suit individual environments.

However, any type of physiological tracking and triggering tool should be accompanied by an algorithm to ensure an early and appropriate response either from the medical team or from the outreach team on duty. The content of the algorithm should reflect the environment, staff skill mix and local clinical policies within each hospital and be agreed at Trust level. However, a basic principle of all algorithms is that any actions should be unambiguous. Such actions will depend on the availability and nature of a critical care outreach programme or reflect other systems that are in place to assist with a child who is unwell or deteriorating. At the Bristol Royal Children's Hospital, when a child triggers the algorithm staff must call the outreach team. With the Brighton tool, if a child triggers a response a variety of actions are implemented, depending on the score. These range from increasing the frequency of the observations, calling out the doctor or outreach service to assess and treat, or putting out a cardiac arrest call.

Stop and think

While early warning scoring systems are useful tools for proactively detecting children who are deteriorating, it is essential that there is:

- (a) A system in place that ensures proactive assessment and treatment of these children
- (b) A package of education that develops health care professionals' skills in recognising the deteriorating child
- (c) A system that provides support for parents
- (d) Good communication systems between tertiary children's and DGHs that allow proactive transfer of sick children.

These tools are only part of a 'package of care'. The literature states that seriously ill patients may be identified by the clinical signs of life-threatening dysfunctions of the airway, breathing or circulation. However, these signs may be missed, misinterpreted or mismanaged because of a lack of knowledge and a failure to appreciate the urgency (McQuillan *et al.* 1998). Therefore, the ability to provide a holistic quality package of care to acutely ill children within ward areas and HD units requires the additional support of outreach services, educational packages and systems of audit and research.

Discussion points

Physiological track and trigger warning systems *are not*:

- A substitute for good clinical judgement
- Predictors of the inevitable development of critical illness
- Predictors of overall outcome from critical illness
- Comprehensive clinical assessment tools
- Indicators for immediate admission to the PICU or HDU

Physiological track and trigger warning systems *are*:

- Aids to good clinical judgement
- 'Red flag' markers of potential or established critical illness
- Generally sensitive depending on their complexity

- Aids to effective communication in care of the critically ill and a means of securing appropriate help for sick children
- Indicators of physiological competence
- Indicators of physiological trends
- Valuable even in the absence of a formal critical care outreach service

Outreach services

The establishment of a critical care outreach team has been regarded as an effective way in which patient care on the ward can be improved (DH 2000). The philosophy behind outreach is the use of expert health professionals who are able to move between different ward areas and departments within a hospital and empower nursing staff to care for children with critical care needs (Day *et al.* 2005). Currently, a wide variety of level and type of outreach service is delivered because the service is dependent on the level of funding and staff resources available for critical care within individual trusts. Some services are run by a team of nurses qualified in critical or HDC and others by a mix of medical, nursing and physiotherapy personnel.

Although outreach services are being developed across the UK – in the guise of nurse-led outreach services, hospital at night services or site practitioners – only one published article has attempted to articulate a model for paediatric HDC and share the experience of setting up an outreach service (Day *et al.* 2005). What this model clearly states is that any outreach service requires clear aims and objectives and an agreed operational structure on which to base the outreach service. This is imperative in order that staff know how and when they can access the service, e.g. is it available 24/7 or is it a Monday to Friday 9 to 5 service. As a gold standard an outreach service should be able to provide the following:

- An outreach service that is provided by a team of expert nurses who are qualified in providing

high dependency/critical care nursing (either through attendance at a recognised university-based course or through in-house competency-based education)

- Ongoing competency-based training for ward staff which includes recognition of the acutely ill child, clinical assessment and when to call for assistance
- Effective systems that allow ward staff to refer children and follow-up children and their parents discharged from intensive care or HDC
- Facilitation of timely admission to intensive care or HDC
- Development of guidelines relating to clinical issues in HDC, e.g. care of the child with a chest drain
- A team of nurses who have the time to support their colleagues by working fluidly across boundaries as role models in clinical practice

Top tip

Development of an outreach service requires formulation of a robust and detailed business plan.

Pre-implementation audits and questionnaires should be undertaken to ascertain the need for such a service and to allow evaluation of the service once implemented.

The holistic approach to HDC

Boundaries between complex needs, continuing care and acute/critical care are increasingly fluid, and acute ward areas are frequently required to care for critically ill children (Haines *et al.* 2006). Treatments that were traditionally only utilised on intensive care units, e.g. nasal CPAP, are now being carried out at home or provided on wards and in HD areas either to manage episodes of critical illness or to support the respiratory needs of otherwise stable children.

HDC in the community

Advances in neonatal and PIC with supportive technology and pharmacology have reduced mortality but have created a new morbidity, with a growing number of children who are medically stable but require periods of technological support. Children should not spend their entire childhood in a hospital. Regardless of location, hospital is an unsuitable environment for a developing child and an inappropriate use of resources. Community HDC care can be facilitated with appropriate support and careful planning, using the appropriate resources such as the national need assessment tool (NHS 2004). This tool was modified from the original Bradford scale and is currently used by a variety of hospitals that discharge complex needs children into the community (Bradford Community Children's Team 2002). By using such assessment methods, even long-term ventilation for children in the home is feasible (Jardine and Wallis 1998). This would allow for more normal development and for children to maximise their educational opportunities. It would also decrease their risk of a hospital-acquired infection and permit other members of the family to function as near normal as possible. As networking expands and the distance to appropriate paediatric facilities becomes greater, families will have to travel further to visit stable children in HDC. As the number of acute beds comes under pressure, individually commissioned packages of care to support children at home will be an increasingly popular solution (RCN 2007).

There is considerable interest in promoting the provision of HDC in the community for children who would benefit from such a provision. The ethos of the National Service Framework (NSF 2004) is that children need appropriate care. Families need a seamless, child- and family-centred service that addresses all types of need, provides continuity across all transitions in the child's family life and is not limited by separate agency roles. Noyes and Lewis (2005) and McConkey *et al.* (2007) indicated that a child requiring HDC

and complex care has many diverse needs; one agency cannot provide such services in isolation and a multi-agency plan would best meet the family's needs. This should be backed up with open access to a hospital for emergency treatment and management. To ensure continuity of care, communication is of principal importance. Some form of patient/parent-held record to detail the child's requirements which would accompany the usual childhood record book would be required.

The responsibilities that these parents take on and the skills that they have to master must not be underestimated (Glendinning and Kirk 2000). The need for organisation and provision of respite care to allow parents and carers to have a break is an important point and these services are being developed and expanded. With a carefully tailored assessment, a child and family could be supported by using a package comprising a combination of state, voluntary and private providers of care.

Staff educated and prepared

There remains a shortage of HD skilled and specialist children's nurses to service the needs of these HD children and their families and recruitment has been problematic. This has delayed discharge in many cases (Edwards *et al.* 2004) and as these children are stable it will probably not be possible or appropriate to use qualified in-service staff to provide care for HD children in the community. Health care workers have been prepared to perform the day-to-day routine care required (McConkey *et al.* 2007). These skills should not be unrecognised and there are programmes and qualifications available which prepare and acknowledge areas of personal development and which can build a platform for a potential career in health care (Skills for Health 2007).

Educational developments are not restricted to preparing staff to work in the community. There are ongoing requirements for HD staff in hospitals and staff on general wards to maintain their skills level. Staff working in these areas need to have access to ongoing education and support, as research suggests that acute ward staff caring for these patients often feel ill-prepared to do so. This can lead to increased anxiety and stress (Doman *et al.* 2004). Concerns regarding the clinical practice abilities of newly registered diploma nurses have been expressed and the increasing theory/practice gap continues to be highlighted as an urgent issue. Experience and the ability to apply theory to practice are essential to provide effective care for highly dependent children in acute ward areas, and clinical-based practitioners have been identified as the most important role models to help learners translate theory into practice (Gibson 1997).

Conclusion

The ability to define HDC may appear to be elusive, but our ability to provide it must not be. It remains essential that the profession continues to develop tools that help to identify the increasing numbers of children who require HDC. Paediatric HDC has become a speciality within itself and it is imperative that adequate resources and forward planning are provided in much the same way as in PIC. This chapter has outlined the important elements of the infrastructure required to ensure services that are fit for purpose and able to provide quality evidence-based care. The following chapters will discuss the underpinning nursing skills and knowledge required to support this.