

THE PAEDIATRIC INTENSIVE CARE SOCIETY



APPENDICES TO STANDARDS FOR THE CARE OF CRITICALLY ILL CHILDREN

Version 2
Drawn up by a Multidisciplinary Working Group
June 2010

The Paediatric Intensive Care Society
21, Portland Place
London
W1B 1PY

These Standards may be reproduced and used for the purpose of improving the care of critically ill children in the United Kingdom. Other organisations and individuals wishing to reproduce any part of the Standards should contact the Paediatric Intensive Care Society.

Whilst the Paediatric Intensive Care Society has taken reasonable steps to ensure that these Standards are fit for purpose, this is not warranted and the Paediatric Intensive Care Society will not have any liability to service providers, service commissioner or any other person in the event that the Standards are not fit for purpose. The provision of services in accordance with these Standards does not guarantee that the service provider will comply with its legal obligations to any third party, including the proper discharge of any duty of care, in providing these services.

Review by: June 2015 at the latest

LIST OF APPENDICES

1.	<u>Levels of Care & Patient Dependency</u>	4
2.	<u>Regional Audit Data Collection (includes Paediatric Critical Care Minimum Dataset - High Dependency Care & Intensive Care)</u>	7
3.	<u>Drugs and equipment for resuscitation and stabilisation areas</u>	11
4.	<u>Knowledge & Skills requirements for Nurses caring for Children in DGH HDU & ICU environments</u>	16
5.	<u>Paediatric Resuscitation Training & Updating</u>	18
6.	<u>Guidelines on Referral to a PICU</u>	19
7.	<u>Retrieval: Example of essential referral information</u>	20
8.	<u>Retrieval & Transfer: Safety Protocol</u>	21
9.	<u>Facilities and support for Families of Critically Ill Children.</u>	23
10.	<u>Provision of Play for Children in Hospital</u>	25
11.	<u>Design of Paediatric Intensive Care Units</u>	27
12.	<u>PICU Medical Workforce Planning</u>	35
13.	<u>PICU Nurse Workforce Planning</u>	41
14.	<u>PICS Recommendations for PIC Nurse Education Programmes</u>	45
15.	<u>PICS Recommendations for Practical Assessment in PIC Nurse Educational Programmes</u>	51
16.	<u>Pharmacy Guidelines for Paediatric HDU, General ICU & PICU</u>	53
17.	<u>Required PICU Bed numbers</u>	58
18.	<u>Bibliography and General Guidance on Services for Children</u>	60

LEVELS OF CARE & PATIENT DEPENDENCY

Paediatric Intensive Care Society (Clinically Based)

Level I (incorporating Dept of Health recommendations, 1996)
High Dependency Care requiring nurse to patient Ratio of 0.5:1 (1:1 if in a Cubicle)

Close monitoring and observation required but not requiring acute mechanical ventilation. Examples would also include the recently extubated child who is stable and awaiting transfer to a general ward; the child undergoing close post-operative observation with ECG and pulse oximetry and receiving oxygen. Children requiring long term chronic ventilation (with tracheostomy) are included in this category, as are CPAP and non-invasive ventilation.

The dependency of a Level 1 patient increases to Level 2 if the child is nursed in a cubicle.

General Situations:

1. Patients requiring single organ support (excluding advanced respiratory support) – see below.
2. Patients requiring more detailed observation/monitoring than can safely be provided on a general ward.
3. Patients who no longer need intensive care but are not well enough for a general ward.
4. Post-operative patients who need close monitoring for more than a few hours.

Specific single organ support requiring high dependency care:

- 1 **Basic Respiratory Monitoring and Support**
 - a. The need for more than 40% oxygen via a fixed performance mask.
 - b. The possibility of progressive deterioration to the point of needing advanced respiratory support.
 - c. The need for physiotherapy to clear secretions at least 2-hourly, whether via a tracheostomy, mini tracheostomy, or in the absence of an artificial airway.
 - d. Patients recently extubated after a prolonged period of intubation and mechanical ventilation.
 - e. The need for CPAP or non-invasive ventilation.
 - f. Patients who are intubated to protect the airway, but needing no ventilatory support and who are otherwise stable.

2 **Circulatory Support**

- a. The need for vasoactive drugs to support arterial pressure or cardiac output.
- b. Support for circulatory instability due to hypovolaemia from any cause and which is unresponsive to modest volume replacement.
- c. This will include, but not be limited to, post-surgical or gastrointestinal haemorrhage or haemorrhage related to a coagulopathy.
- d. Patients resuscitated following cardiac arrest where intensive or high dependency care is considered appropriate.

3 **Neurological Monitoring and Support**

- a. Central nervous system depression, from whatever cause, sufficient to prejudice the airway and protective reflexes.
- b. Invasive neurological monitoring.

4 **Renal Support**

- a. The need for acute renal replacement therapy (haemodialysis, haemofiltration or haemodiafiltration).

Level 2

Intensive Care requiring nurse to patient ratio of 1:1

The child requiring continuous nursing supervision who is usually receiving advanced respiratory support, i.e intubated and ventilated or receiving BiPAP

Also the unstable non-intubated child, for example some cases with acute upper airway obstruction who may be receiving nebulised adrenaline.

The dependency of a Level 2 patient increases to Level 3 if nursed in a cubicle.

Level 3

Intensive Care requiring nurse to patient ratio of 1.5:1

The child requiring intensive supervision at all times who needs additional complex therapeutic procedures and nursing. For example, unstable ventilated children on vasoactive drugs and inotropic support or with multiple organ failure.

The dependency of a Level 3 patient increases to Level 4 if nursed in a cubicle.

Level 4

Intensive care requiring a nurse to patient ratio of 2:1

Children requiring the most intensive interventions such as particularly unstable patients, Level 3 patients managed in a cubicle, those on ECMO, and children undergoing renal replacement therapy.

**Health Care Resource Groups
(Department of Health - Accounting Based)**

HRG1 – High Dependency (HD1)

HRG2 – High Dependency Adv (HD2)

HRG3 – Intensive Care Basic (IC1)

HRG4 – Intensive Care Basic Enhanced (IC2)

HRG5 – Intensive Care Advanced (IC3)

HRG6 – Intensive Care Adv Enhanced (IC4)

HRG7 – Intensive Care – ECMO / ECLS (IC5)

The derivation of these levels is complex but in graphic form can be accessed at:
<http://www.isb.nhs.uk/docs/appendix-c-wp203-s11-hrg-flowchart-v0-9.pdf>

Return to [List of Appendices](#)

REGIONAL AUDIT DATA COLLECTION

Appendix 2

Example of Data Collection for monitoring **HDU** critical care episodes within a Region incorporating the 'Paediatric Critical Care Minimum Dataset'

AUDIT FORM FOR WARD/HDU BASED PAEDIATRIC PATIENTS
[Incorporating Paediatric Critical Care Minimum Dataset]

***PLEASE ENTER* 16 digit unique PATIENT IDENTIFIER**

Form cannot be processed unless this section is completed
1st 3 letters of **first name**, **1st** 3 letters of **surname**, Date of **Birth** in 6 digit format, **1st** part of **post code** eg:
 JOHSMI030995GL2- (Enter a dash (-) if box is blank)
DO NOT AFFIX PATIENT STICKERS

GENDER

MALE ☐

FEMALE ☐

Hospital Number

SWACIC STUDY No

(Office use only)

NAME OF **HOSPITAL**: THIS **WARD/DEPARTMENT AREA**:

DATE&TIME OF ADMISSION TO THIS AREA/...../..... HRS

SPECIALITY OF CONSULTANT **ADMISSION TYPE**: EMERGENCY ☐ ELECTIVE ☐

ADMITTED FROM: HOME ☐ GP ☐ OPD ☐ A&E ☐ HDU ☐ THEATRE ☐

ITU/PICU ☐ ASSESSMENT AREA OF WARD ☐ WARD ☐ **NAME OF WARD**

IF FROM ANOTHER HOSPITAL, ENTER **OTHER HOSPITAL NAME+WARD AREA**

INCOMING TRANSFER TEAM: DGH team ☐ SPECIALIST TEAM ☐

	Intervention and diagnostic criteria [Complete adjacent boxes for all applicable criteria]	From Date+Time	To Date+Time
09	Supplemental oxygen Therapy		
73	Continuous Pulse Oximetry		
59	Severe Asthma requiring intravenous bronchodilator, or continuous nebulisers		
57	Upper airway obstruction requiring nebulised adrenaline		
58	Apnoea requiring intervention in past 24 hrs (>3 stimulation or bag-mask)		
55	Nasopharyngeal* or Guedal* airway		
52	Invasive Ventilation via tracheostomy		
51	Invasive Ventilation via endotracheal tube		
53	Non invasive ventilation / CPAP / BIPAP		
50	Continuous ECG monitoring		
20	Cardiac arrhythmia – excluding sinus bradycardia/tachycardia		
07	>10 ml/kg volume bolus at any time		
63	>80 mls/kg volume boluses in 24 hours		
06	Continuous vasoactive infusion		
62	CVP monitoring		
60	Arterial monitoring		
68	ICP monitoring		
69	Intraventricular catheter or external ventricular drain		
70	DKA requiring continuous insulin infusion		
71	Intravenous thrombolysis (tPA, streptokinase)		
11	Surfactant administration		
61	Temporary pacing		
64	CPR in last 24 hrs		
66	Haemodialysis* 05 Peritoneal dialysis* 22 Haemofiltration* 67 Plasmapheresis*		
04	Exchange transfusion		
22	Burns >10%		
17	Glasgow Coma Score < 12		
18	Acute Renal Failure ie Urine output <1ml/kg/hour for >6 hours		
19	Prolonged (eg: > 20 minutes) or recurrent convulsions		
16	Meningococcal Septicaemia (Clinically diagnosed)		
15	Bacterial Meningitis (Proven or suspected)		
24	Pre or post-operative patients following complex surgery (eg: spinal or multi trauma) and/or requiring complex fluid /analgesia management.		
25	The patient with intractable pain eg: acute pancreatitis or oncological conditions		
23	Poisoning/substance misuse with the POTENTIAL for significant problems		
74	Isolation in a side room		

Example of Data Entry for monitoring **HDU** critical care episodes within a Region incorporating the 'Paediatric Critical Care Minimum Dataset'

DIAGNOSTIC DETAILS

Primary diagnosis

Secondary diagnosis

Co-morbidity

Operative procedure (Enter detail and date)

Investigations (CT, MRI etc)

DISCHARGE INFORMATION

Was there a **delay** in discharge? NO ☐ YES ☐ If YES, why?

If requested, was ICU admission **refused**? YES ☐ NO ☐ N/A ☐

If YES, why?

DATE/TIME of Discharge/...../..... :.....hrs

DIAGNOSIS ON DISCHARGE

DESTINATION:

Was the patient's condition discussed with **BCH PICU** at any time? YES ☐ NO ☐

TRANSFER DETAILS – please complete if child is transferred to another hospital

Transferred by your hospital team? YES ☐ NO ☐ Retrieval by BCH PICU? YES ☐ NO ☐

Retrieval by other team? YES ☐ NO ☐ Name of other PICU retrieval team

If YES, was this because:

BCH PICU full? ☐ BCH PICU team unavailable? ☐ BCH PICU team not requested? ☐

Other reason

OUTCOME: ALIVE ☐ DIED ☐ Enter date and time of death...../...../..... :.....hrs

Mode of Death: Treatment Withdrawn ☐ Treatment Limited ☐ Failed CPR ☐

Was there a "Do not Resuscitate" order in place for this patient? YES ☐ NO ☐

Please indicate if any of the following were performed:

Brain Stem Death ☐ Tissue/Organ Donation? ☐ Post Mortem? ☐

***** To be signed by a Clinician to verify the patient required high dependency care (form will not be processed unless this section has been signed)**

Signed Date/...../.....

Please ensure that **ALL SECTIONS** of the form have been completed before return and complete a new form for each admission episode.

DO NOT SEND WITH PATIENT NOTES

THANK YOU FOR YOUR HELP AND CO-OPERATION.

Please return all COMPLETED forms to: Carol Maskrey – Regional PICU Audit Co-ordinator, PICU Consultants Office, Royal Hospital for Children, C/O No 2 St Michael's Hill, Bristol. BS2 8BJ.
Tel: DDI 0117 342 8843 Mobile: 0771 569 1120 Fax: 0117 342 8910 email: carol.maskrey@ubht.nhs.uk

Example of Data Entry for monitoring *ICU* critical care episodes within a Region incorporating the 'Paediatric Critical Care Minimum Dataset'

AUDIT FORM FOR INTENSIVE CARE BASED PAEDIATRIC PATIENTS

***PLEASE ENTER* 16 digit unique PATIENT IDENTIFIER**
Form cannot be processed unless this section is completed

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

1st 3 letters of first name, 1st 3 letters of surname, Date of Birth in 6 digit format, 1st part of post code eg: JOHSMID30995GL2- (Enter a dash (-) if box is blank)

DO NOT AFFIX PATIENT STICKERS

NAME OF HOSPITAL: _____ DATE/TIME OF UNIT ADMISSION: ____/____/____ :__HRS

SPECIALITY OF CONSULTANT _____

ADMITTED FROM: HOME ☐ GP ☐ OPD ☐ A&E ☐ Adult HDU ☐ Paediatric HDU ☐

THEATRE ☐ ITU/PICU ☐ WARD ☐ WARD NAME _____ OTHER HOSPITAL ☐

IF TRANSFERRED FROM ANOTHER HOSPITAL, ENTER NAME+WARD AREA OF OTHER HOSPITAL _____ WARD AREA _____

TRANSFERRING TEAM: DGH team ☐ SPECIALIST team ☐

PAEDIATRIC INDEX OF MORTALITY (PIM + PIM 2) DATA

Was the child a BOOKED admission after elective surgery, or admission for procedure e.g. insertion of a central line.	YES/NO
--	--------

If the child has one of these **UNDERLYING CONDITIONS** please **TICK** the appropriate box

<p>NONE</p> <p>Cardiac Arrest OUT of hospital.</p> <p>Cardiac Arrest IN hospital.</p> <p>Severe combined immune deficiency.</p> <p>Leukaemia/lymphoma after completion of 1st induction</p> <p>Spontaneous cerebral haemorrhage from aneurysm or AV malformation.</p> <p>Cardiomyopathy or myocarditis</p> <p>Hypoplastic left heart syndrome, <1 month requiring Norwood.</p> <p>HIV or AIDS infection</p> <p>Inborn error in metabolism</p> <p>Liver Failure</p> <p>Severe developmental delay</p> <p>A neurodegenerative disorder</p> <p>Ex-premature baby < 32/40</p>	<p>Please enter the FIRST value of each variable measured within ONE HOUR of contact with ICU doctor</p> <p>Pupil response >3mm both fixed = 1 Other/unknown = 0</p> <p>Base excess in arterial/capillary/venous blood (include + or - sign)</p> <p>PaO₂ (Arterial sample only) kPa or mmHg</p> <p>FiO₂ or O₂ flow in litres at time of PaO₂ sample above</p> <p>METHOD of O₂ delivery</p> <p>Nasopharyngeal airway <input type="checkbox"/></p> <p>Face mask with reservoir bag <input type="checkbox"/></p> <p>Nasal cannulae or face mask <input type="checkbox"/></p> <p>Head box <input type="checkbox"/></p> <p>Endotracheal tube <input type="checkbox"/></p> <p>Tracheostomy <input type="checkbox"/></p> <p>SYSTOLIC blood pressure in mmHg</p> <p>CPAP at any time? Nasal <input type="checkbox"/> Facial <input type="checkbox"/> Pronged <input type="checkbox"/></p> <p>Mechanical ventilation at any time in FIRST HOUR</p>
---	--

DIAGNOSTIC DETAILS

Primary diagnosis

Secondary diagnosis

Operative procedure

Co-morbidity

Example of Data Entry for monitoring *ICU* critical care episodes within a Region incorporating the 'Paediatric Critical Care Minimum Dataset' (P2)

PAEDIATRIC CRITICAL CARE MINIMUM DATASET CRITICAL CARE ACTIVITIES

Please indicate below if any of the following interventions were carried out

	Start date & time	Finish date & time
Continuous pulse-oximetry		
Intravenous bronchodilator or continuous nebuliser		
Apnoea requiring intervention in past 24 hrs [>3 stimulation or bag mask]		
Nebulised adrenaline		
Invasive mechanical ventilation		
Continuous CVP monitoring		
Continuous arterial line monitoring		
Vasoactive infusion [inotropes] [enter number]		
>80 ml/kg in 24 hours volume boluses		
CPR in the last 24 hours		
Inhaled Nitric Oxide		
Cardiac pacing		
Intravenous thrombolysis		
DKA requiring continuous infusion of insulin		
Haemofiltration* Haemodialysis* Plasmapheresis* Peritoneal Dialysis*		
Exchange transfusion		
ICP monitoring		
Burns [enter % BSA]		
Isolation in a side room		

* Please circle all that apply

DISCHARGE INFORMATION

Was there a delay in ITU discharge? YES ☐ NO ☐

If YES, why?

Date/Time of Discharge/...../..... hrs DIAGNOSIS ON DISCHARGE

Discharge DESTINATION

Was the patient discussed with BCH PICU at any time? YES ☐ NO ☐

TRANSFER DETAILS – please complete if child is transferred to another hospital

Transferred by your hospital team? YES ☐ NO ☐ Retrieval by BCH PICU? YES ☐ NO ☐

Retrieval by other team? YES ☐ NO ☐ Name of other PICU retrieval team

If YES, was this because:

BCH PICU full? ☐ BCH PICU team unavailable? ☐ BCH PICU team not requested? ☐

Other reason

OUTCOME: ALIVE ☐ DIED ☐ Enter date and time of death...../...../.....hrs

Mode of Death: Treatment Withdrawn ☐ Treatment Limited ☐ Failed CPR ☐

Was there a "Do not Resuscitate" order in place for this patient? YES ☐ NO ☐

Please indicate if any of the following were performed:

Brain Stem Death ☐ Tissue/Organ Donation? ☐ Post Mortem? ☐

***** To be signed by a Clinician to verify the patient required high dependency/intensive care (form will not be processed unless this section has been signed)**

Signed Date/...../.....

Please ensure that all sections of the form have been completed before return and complete a new form for each admission episode*

DO NOT SEND THIS FORM WITH PATIENT NOTES

THANK YOU FOR YOUR HELP AND CO-OPERATION

Please return all COMPLETED forms to: Carol Maskrey – Regional PICU Audit Co-ordinator, PICU Consultants
Office, Royal Hospital for Children, C/O No 2 St Michael's Hill, Bristol. BS2 8BJ.
Tel: DD1 0117 342 8843 Mobile: 0771 569 1120 Fax: 0117 342 8910 email: carol.maskrey@uhht.nhs.uk

DRUGS & EQUIPMENT FOR RESUSCITATION AND STABILISATION AREAS

Immediate Drug Availability

Adrenaline	1:10,000
Adenosine	3mg/ml
Adrenaline	1:1,000
Aminophylline	25mg/ml
Amiodarone	50mg/ml
Amiodarone	50mg/ml
Antibiotics according to local microbiology protocols	
Atracurium	10mg/ml
Atropine sulphate	Check Label – variations.
Calcium Gluconate 10%	100mg/ml
Chlorphenamine	10mg/ml
Dextrose 10%	
Diazepam inj.	5 mg/ml
Dinoprostone (prostaglandin E2)	1microg/ml
Dobutamine	250mg vials
Dopamine	40mg/ml
Flecainide	10mg/ml
Flumazenil	100mcg/ml
Frusemide	20mg/ml
Hydrocortisone inj	
Ketamine	10mg/ml OR 100mg/ml - NB!!
Lidocaine 1%	10mg/ml

Appendix 3(Continued)

Lorazepam inj.	4 mg/ml
Mannitol	10% and 20%
Midazolam	5mg/ml (Check Label - variations)
Morphine	10mg/ml
Naloxone	400mcg/ml
Nebulisable beta-agonist (salbutamol or terbutaline)	(Various preparations)
Nebulised Budesonide	250 or 500 microg/ml
Noradrenaline	2mg/ml
Paraldehyde	Neat or dissolved in olive oil. Check Label.
Phenytoin sodium	50mg/ml
Propofol (inj NOT Infusion)	10mg/ml
Propranolol	1mg/ml
Rectal diazepam	5mg and 10mg
Rocuronium	10mg/ml
Salbutamol inj.	500 mcg/ml (Check – variations)
Sodium Bicarbonate	4.2% and 8.4%
Sodium Chloride (HYPERTONIC)	3% or 5% (For raised ICP)
Suxamethonium	100mg/2ml
Thiopental	500mg vials powder (mix with 20ml water)
Vecuronium	10mg powder (mix with dextrose 5%)

Appendix 3 (continued)

Equipment List for ED, HDU & General ICU

General Items	In ED		In HDU/GICU	
	Essential	Desirable	Essential	Desirable
Dry White board and markers	●		●	
Advanced Paediatric Life Support algorithms	●		●	
Organized emergency trolley	●		●	
Printed drug doses / tape	●		●	
Weighing scale	●		●	
Heating source (for infant warming)	●		●	
Clock	●		●	

Monitoring Equipment	In ED		In HD/GICU	
	Essential	Desirable	Essential	Desirable
ECG monitor & defibrillator with paediatric paddles 0–400 joules and hard copy capabilities	●		●	
Pulse oximeter (adult / paediatric probes)	●		●	
Noninvasive blood pressure monitoring (infant, child, adult cuffs)	●		●	
Rectal thermometer probe (28–42°C)	●		●	
Otoscope, ophthalmoscope, stethoscope	●		●	
Cardiopulmonary monitor	●		●	
Invasive arterial and central venous pressure transducers & connections	●		●	
Portable capnograph	●		●	
Arterial / capillary blood glucose monitor	●		●	
Access to blood gas machine	●		●	
Access to 12 lead ECG	●		●	

Appendix 3 (continued)

Airway Control/Ventilation Equipment	In ED		In HDU/GICU	
	Essential	Desirable	Essential	Desirable
Bag-valve-mask device: paediatric (500 mL) & adult (1000 / 2000 mL) with oxygen reservoir bags	●		●	
Infant, child, and adult masks	●		●	
Oxygen delivery device with flow meter	●		●	
Clear oxygen masks, standard and non-rebreathing (neonatal, infant, child, adult)	●		●	
Nasal cannulae (infant, child, adult)	●		●	
Oral airways (sizes 0–5)	●		●	
Suction devices-catheters 6–14 FG Yankauer-tip	●		●	
Nasal airways (infant, child, adult)	●		●	
Nasogastric tubes (sizes 6-16 fr)	●		●	
Laryngoscope handle and blades: Macintosh curved 2,3; Robertshaw/Seward straight 1,2	●		●	
Endotracheal tubes + tape for securing: uncuffed (2.5-5.5), cuffed (3.0-9.0)	●		●	
Stylets for endotracheal tubes (paediatric, adult)	●		●	
Lubricant, water soluble	●		●	
Magill forceps (various sizes)	●		●	
Laryngeal masks (size 0–3)	●		●	
Tracheal guide		●		●
Tracheostomy tubes (Sizes 3-6mm ID)		●		●
Oxygen blender	●		●	
Ventilators (capable down to 5 Kg Infant)	●		●	
Chest drain set	●		●	
Cricoidotomy set	●		●	

Appendix 3 (continued)

Vascular Access	In ED		In HDU/GICU	
	Essential	Desirable	Essential	Desirable
Butterflies (19–25 gauge)	●		●	
Needles (18–27 gauge)	●		●	
Intraosseous needles	●		●	
Catheters for intravenous lines (16–24 gauge)	●		●	
IV administration sets and extension tubing with calibrated chambers	●		●	
Paediatric infusion pumps	●		●	
Syringe drivers	●		●	
I.V. fluids	●		●	
Lumbar puncture set		●	●	
Urinary catheters: Foley 6–14 Fr	●		●	
Fracture immobilisation	●			●
Cervical Collar (hard) Various Sizes	●		●	
Head blocks & Tape	●			●
Femur & Pelvic splint	●			●
Extremity splints		●		●

Return to [List of Appendices](#)

KNOWLEDGE & SKILLS REQUIREMENTS FOR NURSES CARING FOR CHILDREN IN PAEDIATRIC HIGH DEPENDENCY AND DGH INTENSIVE CARE ENVIRONMENTS

Aim: - The objectives and content of any educational programme should be adapted to meet the needs of the participants. Its content & emphasis will vary depending on whether the participants are Registered Children's Nurses or Registered General Nurses and the environment in which they work e.g. paediatric high dependency, paediatric ward or general ICU.

The educational programme is designed to equip nurses (and other members of the team) who might care for critically ill children with the knowledge and skills to do this safely and competently. "Critical Care" covers both High Dependency and the initiation of Intensive Care.

Method: - Students would be expected to build up a portfolio during such a programme with evidence of achievement of KSF dimensions. Clinical competency will be assessed by individuals' workplace mentors following assessment during and after the programme.

Programme Objectives that relate to Knowledge Skills Framework (KSF):

Dimension	Programme indicative content
Communication	<ul style="list-style-type: none"> Accurate verbal reporting of a child's condition to other members of the Multidisciplinary Team (MDT) Communicating potentially distressing news to relatives
Personal and people development	<ul style="list-style-type: none"> Identification of own development needs Development of knowledge and skills relating to critical care
Health, safety and security	<ul style="list-style-type: none"> Enhanced knowledge of actions during paediatric emergency situations
Service Improvement	<ul style="list-style-type: none"> Through development of knowledge, improve services for critically ill children in own work area Reflection on knowledge and skills gained during the programme
Quality	<ul style="list-style-type: none"> The importance of team working when caring for critically ill children Increased quality in own work due to new knowledge and skills
Equality and diversity	<ul style="list-style-type: none"> Respond to the needs of children with varying chronic or acute health issues

Example of how a programme content might link to the specific KSF dimensions:

HWB2 Assessment and care planning to meet peoples health and well being needs	<ul style="list-style-type: none"> Accurate assessment of the child with Critical Care features Ability to plan care around the individual child's needs
HWB5 Provision of care to meet health and well-being needs	<ul style="list-style-type: none"> Provision of individualised care to meet the child's Critical Care needs Development of interpersonal and communication skills to support and care for children and their relatives.
IK1: Information processing	<ul style="list-style-type: none"> Accurate charting of observations and fluid status for children in Critical Care Retrieval of patient results such as blood gas analysis

Suggested Programme Learning Outcomes

At the end of the Programme the student should be able to:

1. Recognise the acutely ill child and relate the child's condition to anatomical and physiological changes associated with illness.
2. Demonstrate a comprehensive knowledge of the monitoring required by acutely ill children, and relate observations and investigations to anatomical and physiological disturbance.
3. Recognise life threatening situations and respond appropriately, acting as a team member during resuscitation.
4. Assess, plan, implement and evaluate care for children with high dependency needs, taking into consideration family centred care 'and the psychological and emotional needs of the child and family'.
5. Have the ability to communicate to members of the multi-disciplinary team issues relating to the care of high dependency children (this includes verbal and written communication).
6. Demonstrate the knowledge and skills to safely participate in the care of a child requiring intensive care for a period of time.
7. Contribute to the development of high dependency care by utilising evidence based practice.

SYLLABUS OUTLINE:

Assessment, implementation and evaluation of the care of the acutely ill child

1. Respiratory management to include assessment, pathophysiology of common paediatric respiratory illnesses, management of the child in respiratory distress and the principles of the management of the child requiring intubation and mechanical ventilation
2. Cardiovascular assessment and management. Including an overview of congenital heart disease, the pathophysiology of cardiac dysfunction and the use of vasoactive drugs in acutely ill children.
3. Neurological management to include neurological assessment of the child, pathophysiology of neurological dysfunction in children with appropriate therapeutic interventions
4. Metabolic and renal care to include the assessment and management of the child with acute renal failure and Diabetic Ketoacidosis
5. Pain assessment and management in children.
6. Assessing, planning and implementing family centred care.
7. Recognition and implementation of strategies to assist in managing the emotional and psychological needs of the child and family.
8. Relevant death, child protection, legal, ethical and policy issues.
9. Basic and advanced paediatric life support.

Decision Making and Change Management

1. Critical evaluation of current practice in light of contemporaneous research with identification of changes which should be made to practice.
2. Identification of ways in which change may be facilitated in clinical areas and the practitioner's role in the change process.

Return to [List of Appendices](#)

PAEDIATRIC RESUSCITATION TRAINING AND UPDATING

PICS does not endorse any particular Course in preference, whether European Paediatric Life Support ('EPLS'- UK Resuscitation Council), or the Advanced Life Support Courses ('APLS' – Advanced Life Support Group), though the undoubted value of such courses is recognised. Paediatric Resuscitation training should be tailored for individuals' functions and working environment, taking into account existing background knowledge & skills:

STAFF GROUP	Appropriate Minimum Training
MEDICAL STAFF	
Consultant who may be on call for acute paediatrics, ED, ICU/Anaesthesia or PICU	Advanced Life Support
ST3-8 in acute paediatrics, ED, ICU/Anaesthesia or PICU	Advanced Life Support
ST1-2 in acute paediatrics, ED or ICU/Anaesthesia	One day Paediatric Life Support
Medical staff (all grades) caring for children in settings other than acute paediatrics and ED	One day Paediatric Life Support
NURSING STAFF	
Retrieval team	Advanced Life Support
Nominated Lead Nurse for an area such as HDU/ICU	Advanced Life Support
Senior Nurses on PICU/Theatres & Recovery	Advanced Life Support
Nurses in Paediatrics, ED, ICU or PICU/Theatres & Recovery	One-day Paediatric Life Support
Health care assistants	Basic Life Support

NOTES:

1. Updates: Basic Life Support should be updated yearly. Advanced Resuscitation skills should be refreshed every three/four years. Please also refer to the recommendations of any providing agencies.
2. The expected level of Advanced Life Support training can be met by courses such as APLS or EPLS. However, more may be expected from already highly qualified practitioners, so training should be tailored to the individual and identified by formal yearly Appraisal. For example, Simulation Training & Clinical Attachments may be required
3. Paediatric Life Support training (Basic or One-day, according to the individual's role) should be undertaken within the first 20 days of working with acutely ill children. This training should be transferable between posts (and Hospitals). Advanced Life Support should be of at least 8 hours duration in total and include both lectures in recognition of ill children and practical skills training in defibrillation, basic airway management and intraosseous access. Assessment of competence should be undertaken and evidence of competence should be documented.

Return to [List of Appendices](#)

GUIDELINES ON REFERRAL TO A PICU

The following “procedures” are “critical care dependent” and should be performed in a paediatric critical care environment.

- Endotracheal intubation,
- Endotracheal Continuous Positive Airway Pressure (endotracheal CPAP) (acute and medium term)
- Artificial/mechanical ventilation (acute and medium term)
- Continuous invasive cardiovascular monitoring (e.g. central venous or arterial line),
- Use of antiarrhythmic, inotropic or vasoactive drug infusions,
- Acute renal support (haemodialysis, haemofiltration, plasmafiltration and peritoneal dialysis),
- Cardioversion or DC countershock,
- Acute or external cardiac pacing,
- Mechanical circulatory support,
- Intracranial pressure monitoring,
- Complex intravenous nutrition and drug scheduling,
- Complex/intravenous anticonvulsant therapy
- Frequent or pressurised infusions of blood products,
- Active or forced diuresis,
- Induced hypothermia,
- Balloon tamponade of oesophageal varices,
- Emergency thoraco- or pericardiocentesis.

Paediatric intensive care admission is mandatory for patients likely to require advanced respiratory support (i.e. acute or medium term mechanical ventilation) but children should also be referred to a PICU:

- If it is highly likely that they will need an intensive care dependent procedure.
- Who have symptoms or evidence of shock, respiratory distress or respiratory depression.
- Who have the potential to develop airway compromise.
- Who have an unexplained deteriorating level of consciousness.
- Who have required resuscitation or who are requiring some form of continuing resuscitation.
- Who have received a significant injury.
- After prolonged surgery or any surgical procedure that is medium or high risk or of a specialist nature, even if this surgery is elective.
- Who have potential or actual severe metabolic derangement, fluid or electrolyte imbalance
- Who have an acute organ (or organ-system) failure.
- Who have established chronic disease (or organ-system failure) and who experience a severe acute clinical deterioration or secondary failure in another organ-system.
- Who require one to one nursing because of the severity of an acute or acute on chronic illness.

Return to [List of Appendices](#)

EXAMPLE OF ESSENTIAL REFERRAL INFORMATION

Patient	
Name	
D.O.B.	
Age	
Weight	

Hospital	
Consultant	
Contact tel	
Contact bleep	
Patient location	

Brief History
Diagnosis
Reason for referral
Family Situation/Child Protection concerns

Airway	Intubated	Y	N	ETT size	ETT length	
Breathing	Spontaneous			Assisted	Rate	
	FiO2			SaO2	PIP	PEEP
Circulation	HR			BP	Cap refill	
	Access			Volume given	Inotropes	
Neurology	GCS			Pupils	Scan	

	Time						
Blood gases		pH	pCO2	pO2	HCO3	BE	Lact
Haematol.		Hb	WBC	Plat	INR		
Biochem.		Gluc	Na	K	Urea	Creat	
		Ca	Mg	Lactate	NH ₃		
Imaging		CXR			Other		

RETRIEVAL & TRANSFER SAFETY PROTOCOL

Breakdown

- In the event of an ambulance breakdown team members should remain in the ambulance unless unsafe to do so.
- Ensure ambulance staff have contacted base to inform them of the breakdown and any ensuing problems likely to arise from it.
- Ambulance staff should be asked to contact the police to divert or stop the traffic.
- High visibility jackets should be worn if the team member is required to leave the ambulance for any reason.

Equipment safety

- All retrieval and ambulance equipment should be stowed and securely restrained during the transport.
- All retrieval equipment should be serviced yearly by medical physics and battery integrity confirmed.

Speed

- Lights and sirens should be used with discretion and mainly to expedite the way through busy traffic.
- The speed limit and traffic lights should be observed unless requested by the team and agreed by all members travelling in the ambulance.
- It may occasionally be appropriate to use lights and sirens on both outbound and return journeys.
- In exceptional circumstances it may be felt appropriate to exceed the speed limit but the reason must be stated and agreed upon by all team members.

Patient Safety

- The vacuum mattress must be securely strapped to the trolley.
- The patient must be securely strapped onto the 'vacumattress' or harness if the mattress is not being used.
- CO₂ monitoring and waveform must be displayed on all intubated patients.
- It must be ascertained prior to departure that the oxygen supply is sufficient for the needs of the journey.

Parent Safety

- Parents accompanying their child in the ambulance must wear seatbelts at all times.
- Retrieval & Ambulance Services must make certain that the carriage of parents is appropriately insured in case of accident & personal injury.
- Parents must be told not to follow the ambulance on the return journey.
- A contact number for parents must be taken prior to departure from the referring hospital.
- Parents must be provided with the PICU telephone number. The PICU will then be able to contact the retrieval team on their behalf.

Personal Safety

- Full three point seat belts must be worn at all times.
- If any patient interventions are required the ambulance should be requested to stop.
- Appropriate footwear should be worn on retrieval
- High visibility jackets should be carried and worn at night and if for any reason the team member has to leave the ambulance.
- A spare 150cm line with a three-way tap should be flushed through and left accessible throughout the ambulance journey. This will enable team members to bolus drugs/fluids without removing their seatbelts.
- If staff have been out for a long period of time they must consider whether they are in a fit condition to drive home. A taxi may be provided for team members if it is felt to be appropriate.

FACILITIES & SUPPORT FOR FAMILIES OF CRITICALLY ILL CHILDREN

This list of recommendations represents the gold standard which should be met in Tertiary Centres containing PICUs. 'Action for Sick Children' hopes that all DGHs with a children's ward and a High Dependency Unit will strive to meet these quality standards as far as possible.

Facilities

Overnight facilities should be provided for the parent or carer of each child, to include all of the following:

- Somewhere for them to sit away from the ward.
- A quiet room for use by relatives whose child is critically ill.
- A kitchen, toilet and washing area together with changing facilities for other young children in the family.
- Provision for breastfeeding mothers.

Parents should not be charged for overnight accommodation. The following choices should be offered:

- A foldaway bed or pullout chair bed next to the child.
- A bed at "dressing gown" distance (so that the parent can be called quickly but has some privacy and is more likely to have a good night's sleep)
- Accommodation away from the ward. This is particularly useful for specialist units where the children have longer stays. Sometimes it is possible for both parents to stay or for whole families to come for the weekend when this kind of facility is available.
- Hostels in specialist centres for parents to stay with their children as a preparation for going home, where complex home care is needed.

Support

A family care nurse should be appointed who would lead a family support service. He or she would act as a link with the family from admission through to discharge from PICU. Liaison with the Health Visitor and Community Carers when the child leaves hospital would be an important part of this role.

A welcome pack with written information about the unit would be helpful. This should include details about ward routine and the location of facilities within the hospital which the parents might want to use such as the chapel/prayer room and cafeteria. Some parents will be from a long way away and may have particular difficulties.

Children & families from Minority Communities

The need for link workers, advocates and interpreters to facilitate communication, religious and cultural understanding between English speaking health care workers and non-English speaking users has long been recognised. It is not satisfactory to use untrained interpreters, whether relatives, neighbours or friends since interpreting requires a knowledge of two languages i.e. that of the health professional and that of the patient. Untrained interpreters may unwittingly cause distress when they try to save the parents the pain and shock of serious information by not telling them the whole truth. Parents should be told about the availability of interpreters on admission.

It would be helpful if the hospital could forge links with the local minority ethnic community, religious and cultural leaders as well as outreach workers. Staff should be able to provide contact with local leaders if parents need this.

Costs

The following points should also be borne in mind:

- **Car Parking:** Special arrangements should be in place for the parents of children who are critically ill.
- **Travel Costs:** Transport could be a considerable problem for families when their child is admitted to a specialist unit outside their home area.

It is very important that parents are able to stay with their child in hospital and to visit as often as possible. Travel costs to visit children in hospital can be a major problem for some families and limit how often they can visit.

The NHS Travel Costs Scheme will refund fares of the patient and an escort for a child attending hospital where the parents are on Income Support or Family Credit but there are no arrangements to cover the cost of visiting. Visiting parents on Income Support can apply to the Social Fund but many are refused and offered a loan instead.

Action for Sick Children research has found that many families suffer financial distress as a result of visiting. Some funding can be provided by the Health Service within ambulance service contracts. Commissioners need to include the cost of visiting in their contracts for services with specialist units and arrangements for reimbursement for those in need at the hospital.

Catering

Kitchen facilities should enable parents to prepare simple meals to help reduce the expense of buying hospital food. This is also more convenient for those with siblings present. Minimum provision should include a kettle, microwave, toaster and refrigerator/freezer.

Return to [List of Appendices](#)

PROVISION OF PLAY SERVICES IN HOSPITAL

Children coping with health care and illness express their feelings and needs differently from adults, their behaviour may be out of character as they perhaps become withdrawn, lethargic, clinging or resistant to treatment. Many sick children, certainly those who are critically ill or injured, are not able to play without skilled adult help.

All paediatric staff can use play in their care of the sick child but the trained play specialist is able to ensure that appropriate play activities and specialist programmes of care are available to help the child's care and recovery.

Children and young people frequently have fears about what might happen to them in hospital. Play can help reduce anxiety, prepare the child for treatment and procedures, or provide distraction play during treatment. Children may need post-procedural and rehabilitation support when critical illness or injury is sudden. Trained play specialists can offer specialist programmes that address the individual needs of these children offering support and empowering families to play with children who are critically ill often on intensive care.

The National Service Framework for Children and Young People provides clear guidance on the provision of play services throughout the NHS. Many previous publications have endorsed the provision of hospital play services. The 2005/06 Health Care Commission Self Assessment Framework for Children's Services includes criteria for auditing hospital play specialists. The United Nations Convention on the Rights of the Child Article 31 states that signatories shall "Recognise the right of the child to rest and leisure, to engage in play and recreational activities appropriate to the age of the child and to participate freely in cultural life and the arts."

The development and implementation of a professional play service when health budgets are overstretched is often difficult, but should be viewed as vital in meeting the psychological needs of the sick child. How play services are managed within a hospital will vary with the size of the paediatric department and the budget available. The recommended level of service would be a professionally trained play specialist working on every ward and in the emergency department with their work coordinated by a play services manager who would hold the play specialist diploma and have additional training in staff management. Often this service is managed centrally and ward teams and health care professionals will refer children and young people with specific needs for support. Play provision on the ward and in the ward playroom should be provided by play assistants, trainee play specialists or nursery nurses. In this case, it is important that the ward play staff should be given regular training, particularly on the value of normalising play, developmental play and assessment and the specific needs of babies, adolescents and children with learning disabilities. Play should be available on the ward and clinical areas on a daily basis. If nursery nurses are employed on the ward, they should have protected time for play and should not be expected to juggle their play role with clinical commitments.

Children who are critically ill or injured have specific play and psychological needs that should be addressed by specialist programmes of care that are vital in meeting their overall holistic needs and their fundamental right to play.

References

1. Play for Health. Delivering and Auditing Quality in Hospital Play Services.
Judy Walker. The National Association of Hospital Play Staff, 2006.
2. The Facilitating Role of the Play Specialist. Alison Webber.
Paediatric Nursing **12**(7) Sept 2000
3. Convention for the Rights of the Child.
United Nations Article 31 (1989).
(Ratified by the UK government in 1991)

Useful addresses

1. National Association of Hospital Play Staff
NAHPS information Officer
C/o Coram Family. Coram Community Campus
49 Mecklenburgh Square. London WC1N 2QA
www.naphs.org.uk
2. Play Therapy Association
PO Box 98
Amersham
Buckinghamshire
HP6 5BL
3. Hospital Play Staff Education Trust
PO Box30
Bramhall
Stockport
SK7 1FR

Return to [List of Appendices](#)

DESIGN OF PAEDIATRIC INTENSIVE CARE UNITS

General guidance for the design of PICUs can be found in published recommendations by:

The Royal College of Anaesthetists, Guidelines for the Provision of Anaesthetic Services (Critical Care Services), 2009
The Society of Critical Care Medicine, 1988, 1996;
Committee on Hospital Care and Pediatric Section of the Society of Critical Care Medicine, 1993;
Intensive Care Society 1997 (Standards for Intensive Care Units);
Health Building Note 57 (HBN 57).

A more general overview of how to make areas child friendly can be found in:

Friendly healthcare environments for children and young people (NHS Estates 2003)
HBN23 "Hospital accommodation for Children and Young People"

The design should aim to create a critical care environment that allows health care professionals to practise efficiently and effectively to achieve the best patient outcome. There are always constraints on money and physical space available and compromises may have to be made in order to achieve the best use of resources. However all units must comply with all the relevant building, medical engineering and health and safety regulations which now also addresses the need for adequate natural light, appropriate areas for the patients family, staff facilities and adequate storage space.

1. Location

For clinical reasons, there are a number of critical adjacencies for the PICU It must be easily accessible to elevators and to the departments from which patients are usually admitted these include:

- High dependency units.
- Operating theatres and recovery suites
- Accident and emergency department
- Imaging department and laboratories
- Cardiac catheterisation laboratory
- Ambulance or helicopter access.

Additionally office accommodation (where staff can deal with administrative tasks and acquire and collate information about patient care) should be located within or directly adjacent to the PICU.

2. Size

The size of each individual PICU will depend on the population it serves and the number of regional and sub-regional services on site. Factors to be considered include:

- Previously calculated occupancies of ICUs, HDUs and other high care areas.

Appendix 11 (Continued)

- Surgical specialties serviced, throughput and case mix (e.g. cardiac, neuro-, maxillo-facial, transplant, emergency, elective, urgent).
- Medical specialties (cardiology, oncology, haematology).
- Regional and subregional services (e. g. ECMO, renal transplant, cardiac surgery, burns).
- Facilities for long-term ventilator-dependent patients.
- Number of PICU transfers into the unit per year
- Number of PICU admissions refused per year.
- Geographical location – motorways, airports, holiday resort, proximity of other PICUs
- Future developments (redesign or centralisation of services).

There are advantages to adopting a design system that offers the maximum flexibility and allows step-up and step-down facilities as the patient mix changes. Clinical admission and discharge criteria can have a significant impact on the number of beds needed.

3. Accommodation

Essential accommodation consists of the patient care areas and management base, reception area, equipment and consumables storage areas, utility rooms, laboratory, workshop, cleaner's room, doctor's bedroom(s), staff sitting room and kitchen, toilets, showers. Other accommodation required includes: a seminar room, Audit/Database/Computer room and offices for medical, nursing and secretarial staff. Facilities should incorporate space for parents & other carers, siblings, their immediate families. Patient areas and staff rooms should have access to natural lighting and an outside view.

All units should be capable of providing security for their staff and patients. High levels of staffing tend to ensure security in the patient area. Other parts of the unit may be more vulnerable. Security measures include a single entrance, with a variety of locking devices (keys, codes, cards) and video surveillance. Separate entrances for hospital staff and the public may be useful. Local advice should be sought, balancing perceived threat against inconvenience and possible hazard to patients.

4. Patient care area

The patient area will contain a combination of open-plan areas and isolation cubicles. A general recommendation is one isolation room for every 2 beds but this will vary considerably with each institution's patient mix. It is estimated by the Centre for Disease Control and Prevention that there will be an increasing demand for isolation facilities in the future. The ratio of single rooms to open plan beds should be increased but it is acknowledged that staffing constraints limit the number of single cubicles. New units should currently be planned using a minimum ratio of one isolation cubicle for every 2-3 beds.

The manner in which the beds are grouped is based on the total number of beds and specialty sub-groups. Duplicate pods of beds may be grouped around a service core. They may function as one unit or each pod may be designed as a specialty unit. Various physical arrangements are possible. Rooms arranged along long hallways are the least efficient configuration and should be avoided. Modified square, triangular or radial plans are often more effective. HBN 57 recommends 26m² per bed in an open plan and 26m² per bed for cubicles (+ 6m² if a gowning lobby.). In the multi-bed areas, beds should be positioned to maximise patient privacy. Hand washing facilities should be available for *each* bed in the open plan areas. In view of the increasing number of surgical interventions that take place at the bed space a surgical scrub sink should be installed for every 8 beds.(HBN 57, 7.27).

Cubicles should be rectangular (not L-shaped) to maximise space available for therapeutic interventions. Each cubicle requires hand washing and scrub facilities and should be plumbed for dialysis. The ability to remove the partitions between adjacent cubicles allows more efficient use of nursing staff by grouping patients with similar problems into 2 or 3 bed cubicles if necessary.

A fully equipped resuscitation trolley should be available for every 4-6 beds and a separate one for a cubicle area. At least one defibrillator with pacing facility will be required for every 10 beds. Special procedure trolleys should be readily available for most common interventions.

5. Central station

The management base/nurses' station must be sited in such a way that it commands a clear, unobstructed view of the whole of the main patient area. An L or U shape works well. Alternately the unit is divided into smaller pods (4-5 beds), each served by a separate work station. This base serves as the central communications area for all the clinical management of the patients. Adequate space will be required for staff and equipment. Visual display units and other equipment should allow an overview of bedside monitor activity, access to the hospital information system and local area networks. The base will require at least 4 telephone extensions capable of receiving direct-dial incoming calls. For national calls, no block requiring switchboard intervention should exist. At least two lines must be able to receive e-mail or fax transmissions. Telephones fitted with lights rather than bells may significantly reduce noise as may a glazed partition which allows beds to be visible while decreasing the noise of persistent formal and informal discussions.

6. Bedside Layouts

A pivotal decision in bedside design is the way equipment, power outlets and gas or vacuum sources are positioned around the patient. The two main approaches are head wall and free standing systems. Each can be fixed or moveable, and can be on one or both sides of the

patient. An important factor in selecting bedside set-ups for doctors is rapid unobstructed access to the head of the bed during emergencies. For nursing staff, access to the whole patient for various aspects of patient care without weaving through tangled monitoring equipment leads is as important. HBN 57 considers a number of bedhead designs in terms of ergonomics. Each bedspace should be provided with sufficient electrical outlets, piped oxygen, air and vacuum outlets. The following list includes the current recommendations per bed (HBN 57 7.19):

- 28 single electrical outlets with connection to UPS
- 4 outlets for oxygen
- 2 low pressure and 2 high pressure vacuum outlets
- 2 4Bar and 1 7bar compressed air outlets
- Nitrous Oxide outlet
- Scavenging system
- an examination lamp
- Data sockets for multiparameter monitoring, and PC for Clinical Information System
- TV aerials and radio and telephone sockets
- Emergency bell, Nurse Call

All sockets and service outlets should be distributed on both sides of the bed. It is desirable that each bedspace be self-contained for basic equipment to allow the nurse to spend the maximum amount of time with the patient. The charts or Clinical Information System upon which the patient's observations are recorded must be located at the bedside. Paperless recording via visual display units and automated data acquisition require hard copy back up.

7. Storage

Lack of adequate storage facilities is a common design fault in many intensive care units. Good design should allow optimal use of available space. The best choice for any particular unit will be determined by local needs and will depend on unit size and patient mix. Future requirements are difficult to predict, therefore flexibility of design is advantageous.

It is important to first determine which supplies should be stored at the bedside, near the bedside, elsewhere in the unit or outside the unit. Storage trolleys, shelves, cupboards, and rooms can be tailored to specific needs. Those supplies used repeatedly and in emergencies should be readily available and easy to find.

For an 8 bedded unit

Storage should consist of:

- Bulk supplies (21 m²)
- Clinical Equipment (30 m²)
- X-ray/ imaging equipment area (5m²)
- Linen Store (4 m²)
- FurnitureStore (15 m²)
- Gas cylinders (4 m²)
- Dirty utility room (18m²)
- Clean utility room (17m²)

- Laboratory (8.5m²)
- Medical equipment workshop (12 m²)
- Procedures/treatment room (20m²)
- Clinical waste disposal area (10m²)
- Cleaners' room (7m²)
- Emergency trolley bay (1m²)

The area calculated in HBN 57 for a standard 8 bedded adult intensive care unit with patient areas, storage and staff and relatives facilities is estimated to be 972m². A PICU with the need for an increased range of equipment to cater for different ages and sizes of children, and an increased need for parents' facilities will require a larger area.

8. Staff Accommodation

The area devoted to meeting the needs of staff is often inadequate as space is usually at a premium and it is tempting to limit the support area in favour of larger patient rooms. Clever and creative planning of multi-purpose rooms can make it possible for a large space to be either used for large groups or broken into smaller units. Multipurpose seating, stackable or folding chairs can increase flexibility. The following are the recommendations of HBN 57 for staff accommodation in an 8 bedded unit:

STAFF FACILITIES

Office: Clinical director	1	10.5m ²
Office: Manager	1	10.5m ²
Office: 4 place; clinical staff/IT resource room	1	24.0m ²
Office: 2 place; outreach	1	13.0 m ²
Office: 2 place; teaching and research staff	1	13.0 m ²
Meeting/interview room (6 person)	1	14.0 m ²
Staff restroom/dining: 15 place	1	20.0 m ²
Staff pantry/beverage area	1	6.0 m ²
Staff changing: 20 place	1	11.5 m ²
Staff changing: 30 place	1	16.0 m ²
Staff shower	4	10.0 m ²
Staff WC	4	8.0 m ²
Seminar/training room: 20 place	1	37.5 m ²
On-call room: Office/bedroom	1	13.0 m ²
On-call room: En-suite shower/WC/wash	1	4.0 m ²

These areas should be segregated from the relative's rooms and through routes to the main ward area. Security precautions are necessary. The changing room requirements may be modified if the hospital has centralised changing facilities for staff.

9. Facilities for relatives (see also [Appendix ...](#))

There should be a comfortable environment within the PICU but away from the bedside. The area should consist of a large communal room (with beverage provision, snacks, TV, telephone and easy chairs), bedrooms, shower, WC and interview rooms. These facilities should be adjacent to the reception area and will require an area of approximately 50m². The relatives' facilities should be outside the area of medical and nursing accommodation and should be sited to prevent relatives from overhearing staff conversations. Items of value (TV, video) should be securely fixed in place. More extensive parental accommodation should be available elsewhere in the hospital where parents can stay for more prolonged periods of time if necessary.

10. Communication Systems

Unit efficiency and patient safety depend on effective communication. Communication equipment includes computerised information systems, telephones, fax machines, intercoms, beepers, visual locating systems and pneumatic tubes. New units should be designed to accommodate future developments in technology. Paperless systems can increase unit efficiency and quality of care as well as collecting and correlating information for later assessment. Their use must be associated with patient confidentiality guarantees.

The number of telephones required are:

- The central station should have 4 telephones with direct dial facility for local and national calls. At least two lines must be able to receive e-mail and fax transmissions
- 1 telephone at each bedside
- 1 telephone with direct dial facility in each office
- 1 telephone with direct dial facility in doctor's bedroom/study
- 1 telephone with direct dial facility in bereavement/counselling room
- 2 extensions with direct dial facility in computer room
- 1 telephone and fax facility in workshop
- 1 payphone in relatives' sitting room and bedroom

The use of mobile phones should be prohibited within the vicinity of the PICU because stray electronic signals may interfere with medical equipment. Radiopagers and mobile phones should be provided for parents and staff. The consultants on-call for PICU and transport should both be provided with an in-house pager, a long-distance radiopager and a cellphone. At present, because of communication blackspots and interference with electronic equipment, the cellphone cannot entirely replace the radiopager. The on-call resident doctor must be provided with a personnel locator with 2-way communication. This system will also function as a 'crash bleep' and avoid the need to carry multiple pagers. Other doctors will require an in-house pager. Pagers can also be attached to drug cupboard keys to allow rapid location of the

keys in an emergency. All telephones should be equipped with controls that allow the ringers to be turned down or off when appropriate.

Intercoms may be necessary, depending on the size and design of the unit. High quality equipment that minimises static and voice distortion should be selected. Each unit should have a volume and on-off control facility. It is important to consider their location carefully as they can add significantly to the noise level in a unit.

Pneumatic tubes are getting renewed attention due to improvements in technology. They are capable of transporting sealed specimens, small supplies, drugs and paperwork quickly and efficiently. They must be strategically placed and have a good method for announcing the arrival of incoming tubes. A light system to alert staff of the tube's arrival is probably superior to an audible signal which adds to unit noise level. The system should be located away from patient areas or on-call rooms.

11. Patient Monitoring

Patient monitoring systems will vary according to staff preference and the patient case mix of each unit. Minimal monitoring standards for ICUs can be found in *Guidelines for the Provision of Anaesthetic Services/Critical Care Services* (Royal College of Anaesthetists, 2009 - <http://www.rcoa.ac.uk/docs/GPAS-Critical.pdf>), namely:

- Continuous ECG display with heart rate & respiratory rate monitoring
- Continuous monitoring of oxygenation using pulse oximetry or equivalent
- Continuous invasive & non-invasive arterial blood pressure monitoring
- Continuous Central Venous and Pulmonary Artery pressure monitoring. [For PICUs it suffices that at least three forms of intravascular pressure should be available]
- Continuous monitoring of ventilatory volumes
- Continuous monitoring of inspired oxygen concentration.
- Capnography.
- Continuous monitoring of central temperature. [PICUs generally measure core and skin.]
- Cardiac output measurement. [PICUs should aim to have some form of cardiac output measurement available, though it is recognised that this remains technically more difficult in smaller children.]

Provision should be made in the design of new units for the installation of any likely future system. All electrical monitoring systems must comply with the electrical safety regulations.

Physiological information derived from monitoring systems should be displayed at each bedside. Wall or gantry mounted display units are preferable to free-standing units. The VDU should be readily visible to staff and out of the patient's line of vision. Slave VDU's should be sited at the central station and on-call room. Central hard copy recording, and downloading of summarised information is advantageous. It is useful to have compatible monitoring equipment for inter- and intra-hospital transport of patients, theatres and PICU.

12. Environment

Improving the patient experience; Friendly healthcare environments for children and young people (NHS Estates 2003) gives guidance on making the environment friendly, welcoming and focused on the healthcare needs of children. The unit design should create a pleasant, safe environment that reduces stress for patients, families and staff. Finishes, furnishings, lighting, heating, ventilation and views to the outside all contribute to creating a healing environment. Negative influences such as noise, overcrowding, odours, and inadequate heating and ventilation should be minimised.

Sophisticated computerised systems for variable setting and control of temperature, humidity, ventilation and lighting are currently available and may be required for care areas likely to be used for immunosuppressed patients or those with burns.

The concentration of technology, alarms and personnel all contribute to high noise levels in ICUs. Sleep deprivation is a common finding in ICU patients and may have detrimental effects on the recovery process. Reducing noise levels may reduce anxiety and stress levels in patients and staff and reduce sleep deprivation. Much of what is accepted as necessary background noise is not and can be eliminated. Every effort must be made to minimise noise.

Consideration should be given to minimising noise by the choice of sound absorbing materials, position of beds, doors, rest rooms, design of alarms and the use of lights on telephones. Each device at the bedside and in the work areas should be evaluated for its contribution to the unit's noise level. The International Noise Council recommends that the noise level in an ICU should be less than 45dBA in the daytime, 40dBA in the evening, and 20dBA at night (dBA is a scale that filters out low frequency sounds and is more akin to the human hearing range than plain dB). Research is in progress on the use of white sound to control environment noise.

13. General Services

All units must comply with relevant building, medical engineering and health and safety regulations. Detailed structural and ergonomic design information for intensive care units is included in HBN 57 and Hospital Technical Memoranda (HTM). Fire safety regulations should comply with the Intensive Care Society's publication *Fire safety in the Intensive Care Unit (1991)* and *Standards for Intensive Care Units (199)*. Other sources of information include HTM 81, 82, 83, 85 and 87. Guidelines on other services: electricity, ventilation, water supply and plumbing, heating, lighting, vacuum, oxygen, compressed air, anaesthetic gases, nitric oxide, anaesthetic and toxic gas scavenging systems can also be found in the above publications.

Return to [List of Appendices](#)

PICU MEDICAL WORKFORCE PLANNING

CONSULTANTS:

Paediatric intensive care in the UK is extremely labour-intensive at Consultant level and consultants invariably spend significant amounts of time during the night or weekends performing clinical duties on the PICU alongside their trainees. The need to provide appropriate continuity of care often leads to many consultants working extended shift durations.

1. Integral to the “New” Consultant contract (2003) is the explicit description of the consultants work split into programmed activities (PAs), nominally of 4hrs of Direct Clinical Care (DCC) or supporting professional activities (SPAs). After 19:00 hrs each PA comprises 3 hours.
2. DCC is work directly relating to the prevention, diagnosis or treatment of illness and includes emergency work, ward rounds, multidisciplinary meetings, follow up of patients and their families and administration directly related to patient care.
3. SPAs are central to the role of a consultant; they include time for patient and service related correspondence, Service Development, Audit, Guideline writing, Research, Continued Professional Development, Trainee Education & Appraisal, Medical Student Teaching and Examinations and work with other Trust specialities and departments, such as teaching of other professions or professional liaison, and work with External Agencies such as District General Hospital Staff, Community Services, the Courts and the Police. This time is additional to time allocated for DCC. The 2003 contract suggests a typical number of SPAs would be 2.5 per week. This is supported by the Academy of Royal Colleges. Variance from 2.5 SPAs should be supported by robust reasons and not simply through ‘short-termism’.
4. There must be a named Director of Intensive Care. For PICUs with more than 8 ‘Level 3’ beds, a Director post should be considered whose job plan is committed to patient care but DCC PA time set aside for this management aspect of the PICU.
 - a. The director must have sufficient time identified in his contract for administration. A minimum of 1 PA per week is recommended additional to other contracted SPAs.
 - b. There must be appropriate information technology and secretarial support, office space and equipment. A ratio of *at least* 1 Secretary to 5 Consultants is recommended.
 - c. The lead consultant must have a nominated deputy who has approved training in intensive care.

Appendix 12 (Continued)

5. All consultants appointed after 1999 with programmed activities in paediatric intensive care must have training that has been approved by the ICTPICM or, if trained wholly outside the UK, retrospective approval gained through Postgraduate Medical Education & Training Board (PMETB) who will also refer to Royal Colleges.
 - a. All newly appointed consultants with programmed activities (PAs) in PICM should have acquired ICTPICM competences or equivalent.
 - b. All consultants with PICM responsibilities must provide evidence of Continuing Medical Education in PICM.
6. For the purposes of the new consultant contract, the number of PAs can be calculated following a diary exercise documenting the amount of DCC and SPA activity associated with running the PICU. As a minimum however:
 - a. There must be 24-hour cover from a named consultant with approved training in paediatric intensive care.
 - b. The maximum number of beds managed by one consultant must be carefully considered. This would not normally exceed 8 to 10 beds.
 - c. All units must have a minimum of 3 PAs per day of consultant time totally committed to PICM each week per 8 to 10 Level 3 beds.
 - d. During the normal working week an increase in the total PAs dedicated to PICUs with more than 8 to 10 Level 3 beds is strongly recommended.
 - e. Consultants should not be rostered for any other clinical commitment when covering the PICU during daytime hours. During daytime hours the consultant in charge of the PICU should spend the majority of his or her time on the PICU and must always be immediately available on the PICU.
 - f. Daytime PAs in PICM at the weekends and on public holidays should be routine for all PICUs.
 - g. All consultants providing an 'on-call' service to the PICU must have PAs dedicated to this commitment that equate to the actual workload.
 - h. Consultants with a daytime commitment to PICM must have a minimum of two Clinical PAs devoted to PICM; four is desirable.
7. There must be continuity of care in the consultant cover of the PICU; a consultant managing the unit for a period of several days at a time achieves this best. Where a group of consultants have significant overlapping commitment to PICU, then a single day working pattern is acceptable, but adequate time must be provided for a full clinical handover of patient care.
 - a. A handover must occur between the consultants in charge of the PICU whenever there is transfer of responsibility for the unit. Sufficient time must be allowed in the job plans for an effective handover between consultants. This will depend on the size of the PICU.
 - b. All admissions, refused admissions and transfer requests must be discussed with the duty PICU consultant and a management plan agreed.

- c. A consultant in PICM must see all patients admitted to the PICU within eight hours of admission.

The PICU must be covered by consultants at least 10 hours a day. Unlike most other hospital services, evenings and weekends require similar input, though there is less “elective” activity. The consultant weekend and out of hours work needs to be calculated from work diaries and will vary depending on size, activity and complexity of patients. It will also depend on the presence and abilities of non-career grade medical staff. However, it is usual for the consultant to be in the Unit for most of the day on Saturday and Sunday. The ‘out of hours’ work at the weekend is of course similar to the weekday commitment.

Units with a transport commitment, more PICU or HDU beds, or less experienced supporting medical staff would require more PAs based on a diary exercise of actual work. With MMC, EWTD & now Working Time Regulations (‘WTR’) affecting the background experience of trainees, it can be expected that busy units may have to have 2 consultants available on a 24 hour basis to ensure adequate cover of these complex and demanding patients.

Weekday work, particularly during ‘normal hours’, needs more medical input due to the visiting of various specialist teams and ancillary services, but other activities, additional to direct care of PICU patients, occur on all days and include: production of discharge letters, accurate PICANet coding, transfers for CT / MRI and other investigations, attending family counselling meetings, induction for new trainees, attending the Emergency Department, liaising with DGH colleagues and responding to increasingly frequent requests to review ward patients, possibly due to the effects of Paediatric Early Warning Systems.

In 1998 the Central Consultants and Specialists Committee of the BMA (CCSC) and the NHS Executive negotiated derogations to the EC directive on working time (EWTD) for senior hospital doctors to ensure that the need to provide appropriate continuity of care was compensated with the provision of compensatory rest when the entitlements under the EWTD were not taken as prescribed. These derogations apply to consultants, associate specialists, staff grade doctors, hospital practitioners and clinical assistants but not trainee doctors.

Compensatory rest is allowable under EWTD when the individual has less than 11 hrs undisturbed rest in a 24 hr period. For the purposes of job planning, it should be assumed that sleep is always disturbed during the weekend on call period and frequently during the weekday. Three working 8 hour rest days per 6 week cycle is probably less than full entitlement based on EWTD. The rest should be taken within a reasonable period and before returning to work.

Two major rulings by the European Court of Justice (ECJ) (known as SiMAP and Jaeger) have had a significant impact on the application of the Directive. SiMAP defined all time when the worker was required to be present on site as work and Jaeger confirmed that this was the case even if the worker was allowed to sleep when their services were not required.

PROPOSED MODEL

The following is based upon the diary exercises of Consultants of several PICUs in the UK for Units who also run their own Retrieval Service.

Category	Working (Diary Information)	PA / week
PICU Week (0800- 1900)	11 hrs = 3PA	15
Weekday 1 st o/c (1700 – 0800, Mon-Thur)	2 PA (x4/wk)	8
Weekend 1 st o/c (1700 Fri – 1000 Mon)	13	13
Weekday Retrieval/Backup Consultant (0830-1700)	2 PA (x5/wk)	10
Weekday Night Retrieval/Backup (1700- 0800)	0.5 PA (x4/wk)	2
Weekend Retrieval/Backup (Fri1700 – Mon 0800)	5 PA	5
Clinical PICU practice meetings, Morbidity Reviews		1.4
Clinical & Legal reports, LTV planning/training, Multidisciplinary clinical planning, Bereavement counseling and follow-up		8
PLS training, Simulation		1
TOTAL for UNIT		63.4

NON-CONSULTANT MEDICAL STAFF

1. The numbers of Consultant and junior medical staff dedicated to the unit should conform to the standards in this document.
2. A medical practitioner of appropriate experience and training must normally be present on the unit at all times
3. There should be a minimum of two, and preferably three, PICU rounds every day at which a consultant is present; the only exception is when the round has been specifically delegated to a senior trainee for training purposes.

Appendix 12 (Continued)

4. The previous PICS Standards 2001 stated that "at least two dedicated resident (on-site) doctors in training who are approved as being appropriately trained to work on the unit. One of these to be trained and available for retrieval". At the time of writing these Standards, a number of external factors are impacting on medical manpower and this standard may be untenable;
 - 4.1. The European Working Time Directive (EWTD) was fully implemented in August 2009 and is now best characterised as Working Time Regulations (WTR). This limits the hours worked by employees to an average of 48 hours per week with a limit of 8 hours worked in every 24 hours for night work⁷.
 - 4.2. Modernising Medical Careers (MMC 2004) and the fallout following the failure of the Medical Training Application Service (MTAS 2007) with the subsequent Took report (Jan 2008). This has led currently to uncertainty about the exact format of post-graduate training. What seems clear however is that there will be a decrease in the number of Post Graduate Medical Education and Training (PGMET) posts as the UK moves to become self sufficient in doctors and aims to match Certificates of Completion of Training (CCTs) to numbers of specialist posts expected to be required in each specialty.
 - 4.3. Changes to immigration rules from April 2006 and implemented from Feb 2008 make it harder for doctors outside of the EEC to train in the UK. It may also become harder to appoint non-EEC applicants to other non-training posts without first having ascertained that no suitable EEC candidates are appointable. This legislation is currently being challenged and a House of Lords ruling is awaited.
 - 4.4. The slow turn around time for Criminal Records Bureau (CRB) enhanced disclosure checks (target 90% within 4 weeks) which can significantly impact on the start times of non-permanent medical staff who were classically appointed on six monthly or yearly contracts
 - 4.5. These factors have combined to decrease the availability of career grade medical staff and have led to a further increase in consultant workload. Staff working in PICU will need to work in new and innovative ways to continue the work which was classically carried out by career grade medical staff. Examples include developing the roles of:
 - 4.5.1. Assistant and Advanced Nurse Practitioners
 - 4.5.2. Pharmacists and Pharmacist assistants
 - 4.5.3. Operating Department assistants
 - 4.5.4. Respiratory Therapists
 - 4.5.5. Dieticians and Nutrition team
5. Consequent to the factors above, it is suggested that at least two dedicated resident (on-site) doctors in training *or equivalent other staff members* who are approved as being appropriately trained to work on the unit. One of these to be trained and available for retrieval (where the Unit undertakes this rather than a stand-alone Retrieval Service).

REFERENCES

1. Modernising Medical Careers The next steps. The future shape of Foundation, Specialist and General Practice Training Posts. Department of Health 2004.
2. Aspiring to Excellence, Findings and recommendations of the Independent Inquiry into Modernising Medical Careers led by Professor Sir John Tooke. January 2008. Aldridge Press, London.
3. Comprehensive Critical Care. A review of Adult critical Care Services Department of Health, 2000.
4. Quality Critical Care beyond “Comprehensive Critical Care” Critical Care Stakeholder Forum 2005
5. Standards for Consultant Staffing of Intensive Care Units. Intercollegiate Board of Training in Intensive Care Medicine, 2006
6. Job planning in intensive care. Implications of the new consultant contract. Intensive Care Society <http://www.ics.ac.uk/icmprof/pubs/other.asp?menuid=8> (Accessed 28 May 2009)
7. http://www.healthcareworkforce.nhs.uk/working_time_directive/general/working_time_directive_faqs.html

Return to [List of Appendices](#)

PICU NURSE WORKFORCE PLANNING

Factors affecting Workforce Planning

Agenda for Change

A number of complex algorithms can be adopted to calculate the number of qualified nursing staff required to staff one occupied critical care bed over the calendar year. Previous standards have endorsed the benchmark of 6.4 whole time equivalents (WTE) per bed.

The RCN recommends a minimum of 25% uplift to nursing establishments to cover annual leave, study leave and sick leave (*Defining staffing levels for Children's and Young People's Services, Royal College of Nursing, September 2003*).

Within Intensive Care environments there are additional specific pressures which also need to be considered when calculating overall nursing establishments, including;

- Following the introduction of Agenda for Change there were changes to the annual leave allowances for nursing staff. The nature of critical care nursing attracts more experienced practitioners who qualify for the higher levels of annual leave and this must be taken into account when agreeing the number of WTE required per bed.
- The number of beds.
- Geographical layout of the unit.
- Number of single rooms.
- Acuity of patient mix.

The following algorithm sets out one example and is summarised Table 1.

Effect of Annual Leave and Bank Holidays

1Wte = 37.5hrs/week x 52 weeks = 1950 working hours a year

Annual leave = 30 days x 7.5 hrs = 225 hrs (30 days taken as an average allowance)

Bank Holidays (8 days) = 8 x 7.5 = 60 hrs

Total available to work = 1950 hrs less (225 + 60) hrs. = 1665 hrs per year

Therefore, **Annual Leave & Bank Holidays accounts for 15% 'deficit'**.

Shifts available = 1665hrs divided by 11.5 hours (most PICU's nursing staff work long days) = 144.7 Shifts per year

Therefore, the **number of qualified nurses required to staff 1 critical care bed** over the 24hr period over 365 days is:

Appendix 13 (Continued)

2 shifts/24 hrs x 365 days of the year = 730 shifts per bed per year

Divide this by shifts available per WTE = $730/145 = 5.04$ WTE per critical care bed

This calculation **only allows for annual leave**, it does not allow for; study leave, mandatory and statutory training, maternity, special leave or for a nurse in-charge and/or runners.

Supervising Nurses

The effect of including a nurse in-charge can be expressed as 0.5 WTE. Additionally many larger units (8 beds plus) or those PICUs with a higher than average acuity of patient mix require a runner, this has also been calculated as 0.5WTE per bed.

Therefore, 5.04Wte plus 1Wte = **6.04 WTE**

Statutory and Mandatory Training

It is necessary to include various forms of ongoing educational activity, Trust Governance Training & CPD. Study leave, based on the average minimum amount of Mandatory and Statutory training – 2.5 days each year and Professional leave – 2.5 days each year, equates to approximately **5% per WTE**.

Sickness & Maternity Leave

Research has shown average sickness per WTE over the year appears to be in the region of a further **5% per WTE**. Special Leave i.e. paternity/carers/compassionate equates to a **further 1%** of the workforce over the year.

Adding this **11%** to the 6.04WTE total comes to: $6.04 + 11\% = 6.7$ **nurses per critical care bed. Recent working from NHS London also adds in a factor of 5% for maternity leave taking the minimum WTE per bed to 7.01.**

This calculation does not include an allowance for special study leave, to undertake intensive care course and other specialist training e.g. retrieval, ECMO course etc. Neither does it compensate for new staff who require varying periods of orientation and supervision by a more experienced practitioner.

In summary the minimum number of qualified nurses required to staff 1 critical care bed is, therefore, at least 7.01Wte.

Additional Supernumerary Workforce

Any agreed algorithm used to calculate the number of whole time equivalent should not include; the Senior Nurse/Matron, Research and Audit nurses, Nurse Consultant or any nursing staff employed in clinical education as their main responsibility.

Appendix 13 (Continued)

Neither should the figure include ancillary staff e.g. Housekeeper, data clerks etc. and Health Care Assistants/Nurse Assistants equally should not be used in any calculation.

New emerging roles such as the Associate Practitioner, which may make a valuable contribution to the totality of the nursing workforce, need to be carefully evaluated. The responsibility for direct patient care always lies with the Registered Nurse.

Effect of Casemix & Skill Mix

It is difficult to make any recommendations regarding skill mix that meets the needs of all PICUs. There are numerous factors that influence skill mix; size of unit, geographical location within the UK, difficulty in recruitment and retention to this exacting speciality and acuity of patient mix, to name but a few. However, there is agreement that all PICUs should have a senior and experienced practitioner to co-ordinate and supervise less experienced nurses to ensure high quality care over the 24 hour period with a Registered Children's Nurse at Band 7 or above and that all units should be managed overall by a Senior Nurse/Matron, Band 8a or above. [This recognises that that the senior nurse has a complex role managing both managerial and clinical leadership responsibilities.](#)

See Overleaf for Summarised Example

Summary - as worked example (Table 1):

A PICU with 15 beds with nurses working a 2 shift/day roster (each nurse working 3 - 4 days per week). The mean dependency on the unit is 1.0 nurses per patient per shift and the average occupancy is 80%. The unit uses nurse runners, that is nurses with no allocated patient who check drugs and infusions, help set up equipment, assist with more dependent patients and cover meal breaks.

Row No.	Category	Formula	Column B
1	Mean dependency (nurse/patient ratio 1:1)		1.0
2	Number of nursing shifts per day		2
3	Number of days worked per nurse per week		3.12
4	Allowance for annual leave 15%, sickness 5%, study leave 5%, maternity leave 5%, special leave 1% (total 31%)	26% + 5% (Factor = 1.31)	1.31
5	Number of beds in unit		15
6	Number of beds per runner		8
7	Number of WTE <i>bedside</i> nurses/bed	$B1 \times B2 \times (7/B3) \times B4$	5.87
8	Total number of nurses (includes 1 in charge per shift and runners)	$(B7 \times B5) + (B7) + [(B5/B6) \times B7]$	105
9	Total number of bedside nurses	$B7 \times B5$	88
10	WTE of bedside nurses per bed at capacity	$B9/B5$	5.87
11	Overall number WTE per bed at capacity (includes 1 in charge per shift and runners)	$B8 \times B5$	7.06

Conclusion

It is recommended that a ratio of 7.06 nurses per bed is used to calculate the Nursing Establishment for PICUs.

References

1. RCN Health Care Service Standards in Caring for Neonates, Children and Young People, London: Royal College of Nursing, 2010.
2. Defining staffing levels for Children's and Young People's Services, Royal College of Nursing, September 2003
3. The Recruitment and Retention of Staff in Critical Care, Department of Health June 2004
4. NHS London, Paediatric intensive Nurse Care Workforce Planning, 2007

Return to [List of Appendices](#)

RECOMMENDATIONS FOR A NATIONALLY CONSISTENT PAEDIATRIC INTENSIVE CARE EDUCATION PROGRAMME FOR NURSES

PICS-E

The Paediatric Intensive Care Society – Educators group (PICS-E) was informally established as a subgroup of PICS in early 2000. It became a formal subgroup of PICS in Sept 2004. Key objectives of the group are to:

- Promote the highest standards of education in paediatric intensive care units,
- Develop nationally agreed standards for PIC education,
- Share and develop innovation in education and evaluate the outcomes.

Work so far:

- Development of National Standards for Orientation / Development Programmes for Nurses in PICU (PICS-E 2002).

BACKGROUND

The paediatric critical care workforce has changed considerably over the last 5 years, with staff shortages necessitating the employment of newly qualified nurses directly into paediatric intensive care (PIC). The challenge for PIC educators has been, and is, to enable a more junior workforce to safely and effectively care for level 2, 3 and 4 PIC patients. This involves increasing the depth of nurses understanding of anatomy and physiology, as well as developing core intensive care knowledge and skills.

The changing political and consumer expectations of healthcare has placed greater demands on the healthcare system and this has lead, in some areas, to service delivery taking precedence over nurse education and training. Addressing educational needs whilst maintaining service delivery is essential in order to minimise risk and avoid adverse events.

Additionally, the changing medical education system and European Working Time Directive has lead to a reduction in the experience of medical doctors working within PIC, hence the roles and responsibilities of the PIC nursing team are changing.

Currently, there are a range of paediatric critical care education programmes provided by higher education institutions in the UK . The programmes range from 20 credits [200 learning hours] to 60 credits [600 learning hours], at Diploma, Degree and Masters level. This corresponds to 10-40 study days over a 6-9 month period. Note that learning hours do not equate to taught hours.

In summary, the main challenges PIC educators face are:

- The number of 'taught' hours in these PIC programs are being continually reduced by higher education institutions
- Increasing difficulty allowing supernumerary time for these nurses to learn
- Poor depth of basic knowledge in clinical sciences and anatomy and physiology for both the nursing diplomates and graduates.
- Increasing restrictions placed on PIC educators by working within academic institutions e.g. assessment times, course leader ability/authority to change assessment processes.
- Difficulty in marrying the academic and service demands of these programs

PICS-E recommends that a mechanism is designed to promote consistency among PIC Nursing Education Programmes in the UK.

PICS-E RECOMMENDATIONS FOR THE PIC EDUCATION PROGRAMME

The main aims of the programme:

At the end of the course the student should be a competent PIC nurse able to manage without support a level 2 intensive care patient and level 3 or 4 ICU patients with senior supervision & support.

The graduates from these programs will also be able to:

- Deliver evidence based care to the child and their family
- Communicate effectively with the patient, family and health care team
- Understand the organisational and political context of paediatric critical care

This will translate to improvements in the Knowledge and Skills Framework (KSF) in the core dimensions of communication, quality, personal & service development. The specific dimensions of the KSF they will develop to a higher level are:

- Assessing and addressing health needs
- Communication of information & knowledge
- Biomedical investigation & reporting
- Measuring, monitoring and treating physiological conditions through the application of specific technologies
- Partnership
- Leadership
- Research & development

Specific PIC related skills that should be developed include:

- Advanced resuscitation skills
- Advanced assessment skills (specifically in respiratory assessment),
- Interpersonal and communication skills including specifically how to deliver bad news
- Improved clinical decision -making processes.

Entry requirements:

- Registered nurses intending to develop a career in Paediatric Intensive Care.
- If newly qualified - 18 months PIC experience
- Previous nursing experience – a minimum of 9-months full-time PIC experience [pro-rata if part time].
- Successful completion of hospital PICU orientation / development programme [PICS-E Standards for PICU Nursing Orientation Programmes 2002].

Education Programme structure:

- Minimum of academic level 3 (level 6 - QAA - or 'First Degree level'). Minimum 40-60 credits.
- View to extend the availability of Masters level modules for graduate nurses.
- Time period - a minimum of 6 months
- Option to complete as stand - alone modules.

THEORETICAL CONTENT OF EDUCATION PROGRAMMES:

Assessment aspects:

Advanced clinical assessment of the critically ill child including chest auscultation.

Respiratory aspects:

Respiratory anatomy & physiology, respiratory failure and distress, principles and management strategies for mechanical ventilation + weaning, arterial blood gas (ABG) analysis, respiratory pathology commonly seen in the PICU, advanced respiratory therapies, e.g. High Frequency Oscillatory Ventilation (HFOV), Extracorporeal membrane oxygenation (ECMO), nitric oxide, CXR interpretation, issues in long term ventilation, physiotherapy in the ICU, Non-invasive ventilation (NIV) and tracheostomy care

Cardiovascular monitoring and therapies:

Cardiovascular anatomy & physiology, haemodynamic monitoring, paediatric ECG interpretation, arrhythmias and pacing, congenital heart disease, & shock. If working in a cardiac surgical centre all should be covered in more detail including post-operative surgical management.

Pharmacology:

PICU related pharmacology - inotropes, vasodilators, analgesics, sedatives and muscle relaxants as well as the impact of age and critical illness on pharmacodynamics and pharmacokinetics.

Infection & Sepsis

Sepsis, infection, septic shock and Systemic inflammatory Response Syndrome (SIRS) – pathology, therapies, nursing care and infection control issues.

Gastrointestinal aspects:

Gut problems, hepatic failure, nutrition and feeding strategies (enteral & parenteral)

Trauma and retrieval aspects:

Trauma in children, burns, poisoning, near drowning and non-accidental injuries.

Retrieval and transport of the critically ill child

Neurological aspects:

Neurological anatomy & physiology, neurological assessment and coma scoring, common pathology (trauma, hydrocephalus etc), care of child with raised ICP, paediatric brain stem death & testing & organ donor management, status epilepticus + (more detail if working in a neurosurgical centre including post-operative management & ICP monitoring) and care of external ventricular drains

Advanced Life Support Skills:

Advanced Life support workshop (not necessarily a formal course) – rhythm recognition, airway management, use of ‘Bag-valve-mask’ (BVM), Basic Life Support (BLS), defibrillation, vascular access & algorithms.

Renal aspects:

Renal failure – fluid physiology – fluid compartments, osmolality etc, fluid management, fluid shifts in critical illness, choice of solutions for volume replacement, renal pathology, therapies, nursing care and renal replacement therapies: PD, CVVH, CVVHD

Pain & sedation management:

Pain & sedation assessment in different aged children, scoring tools, treatment modalities, evidence base for treatments, withdrawal problems

Evidence based practice in paediatric critical care:

Reviewing and analysing the evidence base for PICU nursing care and multi-disciplinary therapies.

Professional, ethical & psychosocial issues:

Knowledge management and diagnostic reasoning skills. Communication within the ICU team. A parent’s perspective of having a child in PICU. Legal & clinical governance issues related to ICU. Professional issues – advanced practice roles and extended roles. The political context of PICU. Organisation (centralisation & funding), leadership and managerial issues linked to PICU. Child protection issues.

Ethics – how to analyse ethical issues, case discussions from practice, withdrawal of treatment, basic counselling skills for PICU nurses – how to best support parents when child dies, how people cope with grief, how to break bad news and assessing stress in families.

Other key issues to be addressed:

Metabolic emergencies – especially DKA, neonatal intensive care issues, and oncology emergencies in PICU.

Care of the child receiving long-term ventilation.

This recommended content for paediatric critical care nursing education programmes is consistent with key organisations internationally (Australian College of Critical care Nurses, 1999 & World Federation of Intensive & Critical Care Nurses, 2004)

TEACHING & LEARNING STRATEGIES

These programmes should utilise a broad range of teaching & learning strategies, incorporating newer technologies where available (e.g. high fidelity clinical simulators). Problem based teaching & learning techniques could be utilised to develop the student's skills in seeking out information, rather than being passive learners. Teaching & Learning strategies must reflect current clinical practice and be realistic and emphasise reflection upon and learning from the practice environment.

Assessment strategies

Assessment strategies should reflect both theoretical and practice learning in relation to paediatric intensive care. A range of assessment strategies should be used including: Written assignments, student presentations (based on patient cases), objective structured clinical examinations (OSCEs), poster presentations, critical incident analyses and practice development projects.

In addition a practice competency document **MUST** be completed (see the separate standards on the practice assessment document).

Evaluation of the Programmes

Regular evaluation is needed to ensure the Programme remains responsive to the changing context of PIC, thus ensuring its relevance. Evaluation strategies in addition to the academic evaluation should include student/mentor/clinical management perceptions of the programme, observational studies on practice, patient/user involvement in evaluation and impact on evidence based care delivery.

Time frame

The group accepts that it may take individuals and institutions some time to achieve all of the above recommendations given academic regulations at higher education institutions.

Appendix 14 (Continued)

REFERENCES:

1. Standards for nursing orientation Programmes within Paediatric Intensive Care. A Report from the Paediatric Intensive Care Society Educators Group (2002).
2. Position Statement on Postgraduate Critical Care Nursing Education. Australian College of Critical Care Nurses (1999)
3. The NHS Knowledge and Skills Framework. Dept of Health (2001)
4. Declaration of Madrid: position statement on the preparation of critical care nurses (version 2). Williams, G. *The World of Critical Care Nursing* 3(4). (2004)

Return to [List of Appendices](#)

RECOMMENDATIONS FOR PRACTICE ASSESSMENT IN NATIONAL PIC NURSE EDUCATIONAL PROGRAMMES

There is currently a marked variation amongst the practice assessment methods and documentation used within PIC Educational Programmes. These require standardising to ensure a fair, reliable and valid method of assessment of nursing practice within this environment. All assessment must be reproducible and universal for the UK.

The following is a suggested competency base assessment framework encompassing key standards

1. CORE PRACTICE COMPETENCES FOR PICU NURSING EDUCATIONAL PROGRAMMES/MODULES:

The student must be able to demonstrate safe and effective:

- Assessment of the critically ill/injured child
- Hand ventilation (bagging)
- Airway management, endotracheal/tracheostomy care including suctioning
- A detailed knowledge of mechanical ventilation, both invasive and non-invasive and advanced strategies, e.g. High Frequency Oscillatory Ventilation
- Arterial blood gas sampling and analysis
- Cardiac rhythm interpretation
- Haemodynamic & invasive pressure monitoring, (including ICP monitoring) interpretation and associated haemodynamic management and the justification of actions
- Chest drain management
- Pain and sedation assessment and management in critically ill children
- Management of renal support within the PICU – Peritoneal Dialysis and CVVH
- Basic and advanced life support skills
- Promotion of family-centred care in the PICU
- Supporting distressed families and dealing with bereavement within the PICU context
- Communicate effectively with the multi-professional health care team, as well as with families and children
- Transfer a critically ill child within the hospital environment (e.g. to CT scan) and also to ward areas.
- Planning nursing care within the framework of PICU
- Knowledge of the evidence base for essential nursing cares: eye care, mouth care, pressure area care and positioning etc
- Time management when caring for a Level 3/4 intensive care patient
- Reflection upon their practice and recognition of their limitations

2. ENSURING CLARITY IN THE WORDING OF COMPETENCES

The level of competency and skills expected needs to be clearly worded to minimise variations in interpretation by practice mentors.

3. PROVISION OF SUPERNUMERARY TIME WITH THE STUDENT'S PRACTICE MENTOR

In order to facilitate reflection and completion of competencies, there should be a minimum of 3 supernumerary periods (8 hour shifts or equivalent) provided in the clinical environment.

It is also strongly recommended that the nurse is allowed some time (preferably a week or more) outside their own practice unit to broaden their PICU experience (especially if they have only worked on the one ICU – their practice base).

4. IMPLEMENTING MORE LECTURER PRACTITIONER POSTS IN PICU

The use of Lecturer Practitioner posts (or similar) in PICU nursing should be encouraged as practice developments are rapid and clinical credibility needs to be maintained. These posts are a 50:50 split between the university and the NHS Trust, and can help reduce the gap between theory and practice (Leigh et al 2005). If these cannot be implemented then, the full time lecturer (in PICU) should aim to spend some of their time (ideally 4 -8 hours a week) in clinical practice.

REFERENCES:

Leigh, Howarth & Devitt. 'The role of the Lecturer Practitioner: An exploration of stakeholders and practitioners perspectives.' *Nurse Education In Practice* 5(5); 255-316, 2005.

Return to [List of Appendices](#)

PHARMACY STANDARDS

(Drawn up by the Paediatric Hospitals Chief Pharmacists Group & reproduced here by kind permission)

INTRODUCTION

A report to the Chief Executive of the NHS entitled 'Paediatric Intensive Care: A Framework for the Future' (July 1997) suggests standards which should apply in all hospitals providing paediatric intensive care and describes an organisational framework for a unified service. The report does not contain standards for the quantity or quality of the services provided or for the training, skills and competence of paediatric intensive care pharmacist practitioners.

This report has been prepared by the Paediatric Hospitals Chief Pharmacists Group in consultation with the Neonatal and Paediatric Pharmacists Group and documents the standards of pharmaceutical care required and relates them to the requirements set out in the framework document. Like the framework document it does not address standards in designated neonatal intensive care or special care baby units.

PHARMACEUTICAL SERVICES

1. PICU CENTRE

(providing level 2 and 3 care, expert retrieval service for critically ill patients and supporting all intensive care across a geographical area)

- a) A lead advanced clinical paediatric pharmacist with approved training and experience in paediatric intensive care with sufficient clinical paediatric pharmacists, trained in paediatric intensive care, to provide daily input equivalent to 0.07 to 0.1 WTE for each single level 2 or 3 intensive care bed to allow .
 - i. Clinical input to each patient and attendance at appropriate ward rounds
 - ii. Pharmaceutical collaboration with the Pathology Laboratory to provide timely drug level monitoring, interpretation and advice
 - iii. Pharmaceutical lead or input to drug-related policies, protocols and guidelines
 - iv. Sufficient resources available for the continuing education of pharmacy practitioners providing the service
 - v. Sufficient pharmacist time for education of medical, nursing and pharmacy staff at the
 - vi. lead centre and associated units

vii. Sufficient pharmacist time for conduct of and input to pharmacy practice and drug-related research and audit

viii. Review of medication error and adverse drug reaction reporting

ix. Provision of advice to specialist pharmacists in major acute general hospitals and specialist units within the geographical area who are providing intensive care and to district general hospitals providing high dependency or initiating intensive care.

b. In addition the PICU pharmacist should provide or enable access to

- i. Expertise in neonatal and paediatric parenteral nutrition
- ii. Aseptic preparation service for all parenteral nutrition and the majority of intravenous injections and infusions
- iii. Medicines information services with experience in the problems of paediatric intensive care
- iv. An on-call service for the supply of urgent medication, information and advice (? Should this be a paediatric pharmacist!!)
- v. An efficient drug supply service which includes drugs for resuscitation and an agreed, comprehensive range of drugs in suitable packaging to support the retrieval service.

Appropriate ward cover should be provided when lead practitioner on leave by a specialist paediatric pharmacist.

2. SPECIALIST UNITS

(Providing intensive care for children in support of individual specialties (eg. burns, cardiac, neurosurgery))

- a.** A specialist paediatric pharmacist with approved training and experience in paediatric intensive care
- b.** Review of pharmaceutical care at appropriate intervals by pharmacists with training in intensive care and paediatric pharmacy
- c.** Access to advice from an advanced clinical paediatric pharmacist at a lead centre and to a medicines information service with experience in the problems of paediatric intensive care
- d.** Access to a pharmacist experienced in paediatric parenteral nutrition

- e. Provision of an aseptic preparation service for all parenteral nutrition and the majority of intravenous injections and infusions
- f. Provision of an efficient drug supply service which includes drugs for resuscitation
- g. Pharmaceutical input to drug-related policies, protocols and guidelines
- h. Medication error and adverse drug reaction reporting and review systems

3. DISTRICT GENERAL HOSPITALS

(Providing high dependency care and general intensive care to which children are admitted for stabilisation prior to Retrieval)

- a. Review of pharmaceutical care at appropriate intervals by specialist pharmacists with training and experience in intensive care and paediatric pharmacy
- b. Pharmaceutical input to drug-related policies, protocols and guidelines from a pharmacist with training in paediatric pharmacy, developed in conjunction with the lead centre
- c. Access to advice from an advanced clinical paediatric intensive care pharmacist at a lead centre

TRAINING OF PAEDIATRIC INTENSIVE CARE PHARMACISTS

Paediatric Intensive Care pharmacists will have received core training in clinical pharmacy and paediatric pharmacy practice. In addition they require at least the following knowledge, skills and competence.

1. Knowledge base

	Specialist Pharmacist (Specialist centre with areas relevant to specialty e.g. burns)	Advanced clinical pharmacist (in PICU centre)
Drug handling in paediatrics and critical care	✓	✓
Haemodynamic and physiological monitoring	✓	✓
Intravenous therapy (Venous access and influence on drug therapy; methods of drug administration, central v peripheral; compatibility problems; equipment)	✓	✓
Resuscitation therapy	✓	✓
Sedation and analgesia (Selection, optimal use, weaning, side effects, monitoring)	✓	✓
Cardiovascular support (Inotropes, vasodilators, diuretics)	✓	✓
Organ failure Effect on drug disposition management Renal replacement therapy and effects on drug handling ECMO – basic knowledge, advanced in specialist centres		✓ ✓ ✓
Fluid and electrolytes (Fluid types and selection, acid-base balance, monitoring)	✓	✓
Haematology		✓
Parenteral nutrition		✓
General 'therapy areas' Convulsions Severe asthma Severe infection Respiratory failure Shock CPR Trauma and head injury	✓	✓
Specific therapy areas Bronchiolitis Inborn errors Cardiac surgery Transplantation Burns Cardiology Diabetes insipidus and SIADH Nitric oxide administration and management Neurosurgery		✓

2. Skills and competences

Advanced clinical paediatric pharmacists should be assessed as competent at Master or Expert level for clinical pharmacy practice in paediatric critical care.

Specialist paediatric pharmacists should be assessed as competent at Foundation level for clinical pharmacy practice in paediatric critical care.

These will include competencies concerning:

- Prescription monitoring
- Optimisation of drug therapy in the critically ill
 - Individual patient care
 - Guidelines
- Therapeutic drug level monitoring
- Nutrition
- Pharmaceutical optimisation of intravenous therapy
- Adverse drug reaction prevention, treatment, monitoring and reporting
- Medication error potential analysis
- Drug interaction prevention
- Provision of drug information
- Communication with health care professionals
- Pharmaceutical care prioritisation and planning
- Teaching skills
- Report writing and publication

Approval

These standards have been reviewed and approved by the SIG and executive committee of NPPG and by PHCPG.

Abbreviations:-

NPPG	Neonatal and Paediatric Pharmacists Group (of UK and Eire)
PHCPG	Paediatric Hospitals Chief Pharmacists Group (Belfast, Birmingham, Bristol, Edinburgh, Glasgow, Liverpool, London (GOS), Manchester, Sheffield)
SIG	Special Interest Group in Paediatric Intensive Care of the NPPG

December 2000

Return to [List of Appendices](#)

REQUIRED PICU BED NUMBERS

In the absence of a geographic imperative, a paediatric intensive care service should ideally be planned around one Lead Centre per million children in the resident population. Admissions can be expected in the range of 1.2 per annum per 1000 children in the population and the average length of stay in British PICUs is about 4 days. This would make an average Lead Centre activity of 1200 admissions per year. To function at 1 bed per 48,000 children means PICUs of 20 beds in size with about 60 admissions per bed per year. Few PICUs in the UK function at this level of efficiency and to do so requires:

- Open access to all the intensive care beds for all patients (from whatever specialty) on the basis of need and order of presentation.
- strict limits on level I activity within the PICU
- the ability to provide level I care outside the PICU (as is common in children's hospitals)
- no bed congestion in the step-down wards

The number of PICU beds required for a given population has been modelled in more detail by Milne et al (1994) by approximation to a Poisson distribution. Thus the number of beds necessary to satisfy demand 95% of the time = $X + 1.64\sqrt{X}$

Where X =

$$\frac{(N^0 \text{ of children in the population}) \times (\text{rate of demand p.a.}) \times (\text{mean length of stay})}{365 \times \% \text{occupancy}}$$

To use this model if more than one unit is envisaged, the population should be regarded as being divided in a ratio matched by the relative size of each unit. In the worked examples below, the provision for a population of 1 million children can be seen to be provided 95% of the time by four average performing, eight bedded PICUs or one peak performing, 14 bedded PICU situated in a large children's hospital.

Planning to provide cover for 95% of demand is however insufficient since it means that 1 in 20 referrals cannot be accommodated and statistically such instances are likely to cluster during times of peak demand. Significant case mix fluctuations occur throughout the year. Trauma is more common during school holidays and particularly the summer months. Medical admissions and respiratory complications are more common in the winter months leading to a seasonal increase in the average length of stay. A service designed to provide sufficient capacity 95% of the time will particularly fail in the winter months. One way to alleviate the problem is to plan to run the PICUs at a lower average occupancy than the 80% level used in the calculations below. This leads to higher calculated bed requirement and an increased ability to accommodate peaks in demand.

When services are divided into more than one PICU the overall number of beds required are increased, the infrastructure is duplicated, the costs rise dramatically and the service is likely to become both less efficient and less effective.

Worked example:

If one uses the model to determine the required numbers of beds for centralised and decentralised systems assuming that both use beds as efficiently as each other then:

A population of 1 million children served by **4 PICUs** with an average length of stay of 4 days (assuming 80% occupancy) requires each PICU to have:

$$(250 \times 1.2 \times 4) / (365 \times 0.8) = 4.1 \text{ beds to satisfy demand 50\% of the time}$$

and

$$4.1 + (1.64 \times \sqrt{4.1}) = 7.4 \text{ ie 8 beds}$$

∴ To satisfy demand 95% of the time = a total of 32 beds

A **single ICU** to serve the same population would require:

$$(1000 \times 1.2 \times 4) / (365 \times 0.8) = 16.44 \text{ beds to satisfy demand 50\% of the time}$$

and

$$16.44 + 1.64 \times \sqrt{16.44} = 23.01 \text{ i.e. } \mathbf{24 \text{ beds to satisfy demand 95\% of the time}}$$

However the increased efficiency of a centralised system with a PICU in a specialist centre involves a shorter length of stay. If we repeat the model and calculate the requirement taking this into account (lengths of stay taken from Lancet 1997 349: 1213 – 1217):

A population of 1 million children served by one PICU with an average length of stay of 2.1 days rather than 4 requires the PICU (assuming 80% occupancy) to have:

$$(1000 \times 1.2 \times 2.1) \div (365 \times 0.8) = 8.63 \text{ beds to satisfy demand 50\% of the time}$$

and

$$8.63 + 1.64 \times \sqrt{8.63} = 13.4 \text{ i.e. } \mathbf{14 \text{ beds to satisfy demand 95\% of the time}}$$

Return to [List of Appendices](#)

BIBLIOGRAPHY & GENERAL GUIDANCE ON CHILDREN'S SERVICES

1. Children Act 1989, HMSO
2. The Children Act 1989 – an Introductory Guide, Department of Health.
3. The NHS and Community Care Act 1990, HMSO
4. United Nations Organisation, “The UN Convention on the Right of the Child” 1992. (CM1976) HMSO.
5. “The Allitt Inquiry” (The Clothier Report).HMSO 1994 and subsequent guidance DGM(94)26
6. Emergency Health Services for Children and Young People. Action for Sick Children 1997
7. Paediatric Intensive Care - “A Bridge to the Future”. NHSE 1997
8. Paediatric Intensive Care - “Framework for the Future”. NHSE 1997
9. Working Together to Safeguard Children. Department of Health 1999
10. AL(MD) 6/98: Working Time Directive agreement for career grade doctors. Advance Letter (Medical & Dental). Department of Health Nov. 1998.
http://www.dh.gov.uk/en/PublicationsAndStatistics/LettersAndCirculars/AdvancedLetters/DH_4003839
11. Framework for the Assessment of Children in Need and their Families. DoH, Dept of Education & Employment and Home Office, 2000
12. Paediatric Intensive Care Society Standards Document. Paediatric Intensive Care Society, 2001
13. Report of the Consent Working Party. BMA, March 2001.
14. Learning from Bristol: The Department of Health’s Response to the Report of the Public Inquiry into children’s heart surgery at the Bristol Royal Infirmary 1984 – 1995. Department of Health. 2002.
15. Standards for Bereavement Care. Paediatric Intensive Care Society, 2002.
16. Getting the right start: National Service Framework for Children. Standard for Hospital Services. Department of Health. 2003.
18. National Service Framework for Children. Emerging Findings. Department of Health. 2003.

Appendix 18 (Continued)

19. National Service Framework for Children, Young People and Maternity Services, Department of Health. Department for Education and Skills, 2004
20. Children's National Service Framework for Wales. Acute and Chronic Illness or Injury. Welsh Assembly, 2005.
21. Emergency Care Framework for Children & Young People in Scotland. Scottish Executive, 2006.
22. The acutely or critically sick or injured child in the district general hospital. A team response. London: Department of Health, 2006. (*Tanner Report*).
23. 0 - 18 Years: Guidance for all Doctors, General Medical Council, 2007
24. Direction of Travel for Urgent Care: Response from the Royal College of Paediatrics and Child Health, Royal College of Paediatrics and Child Health, 2007
25. Improving Services for Children in Hospital, Commission for Healthcare Audit and Inspection, 2007
26. Modelling the Future: A consultation paper on the future of children's health services, Royal College of Paediatrics and Child Health, 2007
27. Services for Children in Emergency Departments: Report of the Intercollegiate Committee for Services for Children in Emergency Departments. Royal College of Paediatrics and Child Health, April 2007
28. Statement on the Future Provision of General Paediatric Surgery in the District General Hospital, Children's Surgical Forum, the Royal College of Surgeons of England, Association of Paediatric Anaesthetists, the Association of Surgeons of Great Britain and Ireland, the British Association of Paediatric Surgeons, Specialist Advisory Committee in General Surgery, Specialist Advisory Committee in Paediatric Surgery, Royal College of Anaesthetists, British Association of Urological Surgeons, 2007
29. Surgery for Children - Delivering a First Class Service: Report of the Children's Surgical Forum July 2007; <http://www.rcseng.ac.uk/publications/docs/CSF.html>
30. Services for Children in Emergency Departments: Report of the Intercollegiate Committee for Services for Children in Emergency Departments, Royal College of Paediatrics and Child Health, 2007
31. Supporting Paediatric Reconfiguration: A Framework for Standards, Royal College of Paediatrics and Child Health, 2008

Appendix 18 (Continued)

32. Commissioning Safe & Sustainable Specialised Paediatric Services - a Framework of Critical Interdependencies, Department of Health, London, Aug 2008
33. The Role of the Consultant Paediatrician with Subspecialty Training in Paediatric Emergency Medicine, Royal College of Paediatrics and Child Health, 2008
34. Why Children Die: A Pilot Study 2006, CEMACH, 2008
35. Guidelines for the Provision of Anaesthetic Services (Paediatric Anaesthesia & Critical Care Services Sections), The Royal College of Anaesthetists, 2009
<http://www.rcoa.ac.uk/index.asp?PageID=477>
36. Healthy lives, brighter future: The strategy for children and young people's health, Department for Health, Department for Children, Schools and Families, 2009
37. Improving services for children in hospital: Report of the follow-up to the 2005/06 review, Healthcare Commission, 2009
38. RCPCH guidance on the role of the consultant paediatrician in providing acute care in hospital, Royal College of Paediatrics and Child Health, 2009
39. Short Stay Paediatric Assessment Units: Advice for Commissioners and Providers, Royal College of Paediatrics and Child Health, 2009
40. A Review of Safeguards and Standards of Care" Hospital Advisory Service. WHC (99) 2 [The Secretary of State's letter contains action for all hospitals admitting children.]
41. The Intercollegiate Committee for Training in Paediatric Intensive Care Medicine ICTPICM).
<http://www.rcoa.ac.uk/index.asp?PageID=37>
42. The Southwest Audit of Critically Ill Children (SWACIC).
<http://www.swretrieval.nhs.uk/> or <http://www.picanet.org.uk/>
43. Working Time Directive. (Includes information on 'Derogation' and 26 week reference periods.)
<http://www.healthcareworkforce.nhs.uk/workingtimedirective.html>

Return to [List of Appendices](#)