

# PAEDIATRIC INTENSIVE CARE SOCIETY

*Standards for  
Paediatric Intensive  
Care*

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## PREFACE

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This document has been prepared by a working party consisting of Members of Council of the Paediatric Intensive Care Society. As part of the consultation process, a draft version was circulated to numerous individuals, intensive care units, and professional bodies for comment prior to completion of the final document.

The Paediatric Intensive Care Society is a multi-disciplinary group which was established in 1987. There are more than 200 members who are actively involved in the provision of Paediatric Intensive Care.

The aims of the Society include the provision of a forum for discussion; the provision of specialist advice; the promotion of training, education and research; the establishment of Standards for Paediatric Intensive Care.

The Paediatric Intensive Care Society is an independent body and has no formal affiliation with any other group or society.

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# STANDARDS FOR PAEDIATRIC INTENSIVE CARE UNITS

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## I INTRODUCTION

The need for adequate paediatric intensive care facilities is widely recognised, and in countries such as Australia Canada and the United States of America, there are networks of Paediatric Intensive Care Units which serve specific geographical areas.

It is clear that the critically ill child has special medical and emotional needs and therefore requires care from medical and nursing staff trained in both Paediatrics and Intensive Care; this is best provided in a Paediatric Intensive Care Unit which conforms to agreed guidelines and standards.

Paediatric Intensive Care is a growing specialty and the intention of this document is to establish such a set of standards and guidelines to serve as a reference for Health Authorities hospitals and professional bodies who wish to develop new units or modify existing services. The purpose of these standards is to recommend the minimum requirements necessary for an Intensive Care Unit dedicated to the care of the critically ill child.

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## 2 INTENSIVE CARE SERVICES

### **Intensive Care**

Intensive Care is defined as "a service for patients with potentially recoverable diseases who can benefit from more detailed observation and treatment than is generally available in the standard wards and departments".<sup>1</sup>

### **Intensive Care Unit**

An Intensive Care Unit is an area to which patients are admitted for treatment of actual or impending organ failure, and who may require technological support, including mechanical ventilation and/or invasive monitoring.<sup>2</sup>

Intensive Care for adults is usually provided in units within the teaching hospitals and the larger District General Hospitals. There are already established standards for adult intensive care with particular reference to unit design, services, staffing, training, administration and equipment.<sup>3</sup>

### **Neonatal Intensive Care**

Intensive Care for newborn infants is usually provided within a network of regional and sub-regional Neonatal Intensive Care Units.

### **Paediatric Intensive Care**

Apart from infants who undergo treatment in a Neonatal Intensive Care Unit, children who become critically ill at any time between birth and adolescence require the facilities of a Paediatric Intensive Care Unit (PICU).

There are only a small number of Paediatric Intensive Care Units in the United Kingdom, and many critically ill children undergo treatment in general Intensive Care Units which cater predominantly for adults; in these units, children may be nursed in an open plan area alongside adults undergoing intensive care. An alternative adopted by some hospitals is to manage critically ill children in part of a general paediatric ward.<sup>3</sup> Both these arrangements have a number of disadvantages; there may not be enough nursing staff with the appropriate experience and training to look after children and small infants requiring intensive care; the equipment for monitoring and treating critically ill children may be inadequate. Children's wards may be located at some distance from other departments in the hospital and in the event of an acute emergency, immediate availability of anaesthetic and other appropriate help cannot always be guaranteed.

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## 3 THE PROVISION OF PAEDIATRIC INTENSIVE CARE: General Considerations

A Paediatric Intensive Care Unit offers a facility for the treatment and management of children from 4 weeks of age to adolescence who are referred regardless of specialty category. Although most sick neonates are managed in Neonatal Intensive Care Units and Special Care Baby Units (SCBUs) some with special requirements - such as those who have had major surgery - may be cared for in Paediatric Intensive Care Units. Similarly, infants recently discharged from a Neonatal Intensive Care Unit may subsequently develop airway problems or conditions such as pneumonia severe bronchiolitis etc necessitating admission to a Paediatric Intensive Care Unit during the first four weeks of life.

### **Paediatric Intensive Care Bed Requirements**

Although it has been suggested that there should be a minimum of one general paediatric intensive care bed per 40,000 of the child population, this may be an underestimate.<sup>4</sup> Because Intensive Care is expensive in terms of manpower and resources, it is essential to centralise paediatric intensive care facilities so that they may be used in the most efficient and cost-effective way.

### **Minimum Size and Number of Admissions**

The facilities on an Intensive Care Unit will only be employed effectively if all staff can retain their skills and are exposed continuously to the clinical and technical problems which may arise. It is therefore recommended that a Paediatric Intensive Care Unit should have at least four beds and admit a minimum of 150 patients a year.

### **Facilities Required for Providing Paediatric Intensive Care**

A Paediatric Intensive Care Unit (PICU) must be able to provide facilities for artificial ventilation, invasive cardiovascular monitoring, renal support, intracranial pressure monitoring, and complex intravenous nutrition and drug scheduling. There should therefore be a comprehensive selection of monitoring and other equipment suitable for use over the entire paediatric age range, and a blood gas machine within or adjacent to the Unit. Facilities must be available within the hospital to perform all routine haematological and biochemical tests on very small samples of blood. There should also be ready access to expert microbiological, biochemical and haematological advice together with availability of all necessary blood products.

There will need to be immediate access within the hospital to all routine radiological and imaging facilities including ultrasound and CT scanning. Both the Department of Radiology and the Laboratories will need to provide an emergency out-of-hours service.

The special needs of the critically ill child demand a high level of medical and surgical expertise from a multidisciplinary team; the unit staff should include Paediatricians, Paediatric Anaesthetists and Registered Sick Children's Nurses, all trained in Paediatric Intensive Care. In addition, there should be close involvement of other medical and surgical staff; also appropriate non-medical ancillary and support staff (see Section 4).

Particular attention must also be given to the psychological and emotional needs of the child and the family, and there will need to be a support team which should include Social Workers.

Where these services and facilities are not available, a fully comprehensive paediatric intensive care service cannot be provided.

### **Transfer Services**

Each Paediatric Intensive Care Unit should provide a fully-equipped transport team for the safe retrieval and transfer of critically ill infants and children from other units and hospitals. There should be particular attention given to the provision of equipment for monitoring, ventilation, and environmental control of the patient during transfer.

This should be a consultant-led service; the transfer team should include a doctor and senior nurse, both from the Intensive Care Unit, and there must be close liaison with the local ambulance service. The transfer facility should be a 24-hour service, and suitable allowances will need to be made within the staffing establishment to provide adequate cover. When planning for the future, hospital managers need to be made aware of the necessity to identify landing facilities for helicopters; where possible these should be included in any future plans for the hospital.

### **Regional Organisation**

We consider that Paediatric Intensive Care should be provided on a regional basis. There needs to be a clear strategy for the provision of paediatric intensive care facilities with one or more Paediatric Intensive Care Units per region; these units will be based at a children's hospital or major paediatric centre. Children requiring Intensive Care who present at other hospitals should undergo initial assessment and stabilisation; they should then be transferred to a hospital with a designated Paediatric Intensive Care Unit.

The recently introduced Health Service reforms have changed the system whereby certain speciality services received both regional recognition and funding. In order to ensure adequate funding under the new arrangements, Paediatric Intensive Care Units will therefore need to establish contracts with purchasing groups. Nevertheless, it is essential that units which contract to provide Paediatric Intensive Care should adhere to accepted norms and standards in their provision of facilities and care, and these will need to be clearly stated during the contracting process. We therefore recommend that purchasers stipulate the standards and recommendations set out in this document, and these should be specified in the contracts. It will also be necessary to establish mechanisms whereby units providing Paediatric Intensive Care are closely monitored.

General Paediatric Intensive Care Units will usually be additional to the Supra-Regional Paediatric Sub-Specialty Units which may exist for specialties such as Cardiothoracic Surgery. Nevertheless, there should be close links between all units which accept children within each region so that they may work in close collaboration.

### Children in General Intensive Care Units

A survey on paediatric intensive care facilities in the United Kingdom, which was carried out in 1986 by the British Paediatric Association revealed that about 33% of children requiring Intensive Care were nursed in general adult Intensive Care Units; in some parts of the country, the number was more than 50%, the majority of children being less than 5 years of age. However, around half of these General Intensive Care Units admitted 12 or fewer children per year<sup>1</sup>.

We recommend that children should not be admitted to General Intensive Care Units treating adults unless these units fulfil the standards and guidelines set out in this document.

Children should therefore be admitted to a part of the unit which is enclosed and physically separate from the adult area, and there need to be adequate numbers of nurses trained in Paediatric Intensive Care: also designated Paediatricians and Anaesthetists with experience in dealing with critically ill children of all ages. It is unlikely that many adult units would be able to meet these requirements, and it is recommended that children requiring Intensive Care should when stable, be transferred to a Paediatric Intensive Care Unit.

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## 4 STAFFING

### Consultant Medical Staff

The unit medical staff will usually be Paediatric Anaesthetists, Paediatricians or both. One consultant should be designated to take full administrative responsibility for the unit. Such a person should possess wide experience of Paediatric Intensive Care and have undergone suitable specialty training. In addition there should be a nominated deputy and a nucleus of consultant staff with appropriate training and experience who have designated sessions in Paediatric Intensive Care and are able to provide 24 hour consultant cover.

Most British Paediatric Intensive Care Units adopt a multi-disciplinary approach to patient management: although the unit medical staff will supervise and oversee many aspects of treatment, the patients will normally remain under the overall charge of the hospital consultant under whom they were admitted. The consultant-in-administrative charge of Intensive Care should therefore be responsible for establishing lines of communication with all staff who have involvement in the care of patients on the unit.

The Job Plan of the Intensive Care Director must include adequate numbers of Notional Half Days designated to intensive care work; also Notional Half Days to take account of administration, audit, teaching, research and emergency work. A suggested programme of work might comprise the following:

	NHD
Paediatric Intensive Care	4
Other specialty interest e.g. Paediatrics/Anaesthesia	2
Administration	1
Audit	1
Teaching & Research	1
Emergency work	1
<u>Total</u>	<u>10</u>

Each day the Consultant-in-Administrative Charge or Consultant-on-Call should carry out formal ward rounds. Other tasks will include the organisation of regular meetings for the purpose of clinical audit and evaluation of morbidity, mortality and critical incident reports; also, the supervision of patient data collection, including the follow-up of discharged patients; co-ordination of research activity; involvement in the planning and organisation of educational activities for the unit staff, and quality assurance programmes.

### Non-Consultant Medical Staff

A nucleus of Intensive Care Medical Officers should be provided in order to ensure sufficient numbers for an on-call rota whilst allowing continuity of care. Throughout any 24 hour period a resident Intensive Care Officer of Senior House Officer or Registrar status should be continually available. In addition to the Consultant-On-Call, the Intensive Care Medical Officer should be supported throughout the 24 hour period by middle-grade cover at Registrar/Senior Registrar level.

The work programmes and on-call rotas of trainee medical staff will need to comply with national guidelines concerning hours of work.

For the purposes of training and continuity of care, the resident medical staff should be involved in all discussions concerning the clinical management of the patients, and should spend 3-6 months attached to the Intensive Care Unit.

**Other Staff (excluding nursing personnel)**

Any institution providing Paediatric Intensive Care should provide 24-hour access to a broad range of multi-disciplinary expertise and sub-specialty services which are necessary for the optimal care of patients.

In addition to Paediatricians and Paediatric Anaesthetists, there will need to be close involvement of other groups of medical staff who should include:

Paediatric Surgeons  
ENT Surgeons  
Orthopaedic Surgeons  
Neurosurgeons  
Paediatric Cardiologists  
Paediatric Neurologists  
Radiologists  
Chemical Pathologists  
Haematologists  
Microbiologists

The expertise and services of the following departments and ancillary staff will also be required by the Paediatric Intensive Care Unit:

Radiographers  
Physiotherapists  
Pharmacists  
Dietitians  
Parenteral Nutrition Team  
ECG and EEG Technicians  
Transplant Co-ordinator  
Social Workers  
Medical Physics Officer  
Ventilator/General Equipment Technician  
Data and Audit Co-ordinator

Patient's relatives and unit staff may all be subjected to considerable stress. It is therefore essential that personnel are available who are able to provide for the emotional and psychological needs of the child and family, but who do not necessarily have formal involvement in the management of the patient. These should include:

Psychiatrists  
Clinical Psychologist  
Clergy  
Bereavement Counsellor  
Family Care Co-ordinator

**Secretary/Ward Clerk**

A secretary/ward clerk must be provided for the Intensive Care Unit. Duties will include collating laboratory results, filing notes and records, typing discharge summaries and collecting information for the purpose of audit.

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## 5 NURSING STAFF

It is essential that there is a senior nurse with several years experience in Paediatric Intensive Care in charge of the unit. This individual will be responsible for liaison with the Consultant-in-Administrative Charge, in-service education and unit management issues.

Supporting the senior nurse will be a team of sisters and senior staff nurses. There should be a minimum of one senior nurse per shift throughout the 24 hour period. Every senior member of staff should be an experienced Paediatric Intensive Care nurse, and have undertaken a recognised course; at present the most appropriate is ENB Course 415, "Intensive Care Nursing of Children".

**Nurse Staffing Levels**

A minimum of one trained nurse to one patient is usually required throughout the entire 24 hour period. Flexibility of resources and staff is required in order to provide optimum care of the patients according to their needs. To establish the appropriate nurse patient ratio, clinical classification scores "dependency categories" can be used.



## Dependency Categories

Three categories of patient dependency may be encountered within Intensive Care.

### Level 1

Those cases needing close monitoring and observation, but not requiring assistance from life-support machines. For example, the recently extubated child awaiting transfer to a general ward; the sick child receiving intravenous feeding; the child undergoing close post-operative supervision on an ECG or respiratory monitor and receiving supplementary oxygen, and intravenous fluids or parenteral nutrition. A typical nurse to patient ratio would be 0.5 to 1. This level is usually provided for those patients who require high-dependency nursing.

### Level 2

The child requiring continuous nursing supervision who is intubated and is undergoing IPPV or CPAP. In these cases the nurse to patient ratio should be 1 to 1.

Some unstable but unintubated patients will also fall into this category such as cases with acute upper airway obstruction who may be receiving nebulised adrenaline.

### Level 3

The child who needs intensive supervision at all times, requiring additional complex and regular nursing and therapeutic procedures.

This would include ventilated patients undergoing peritoneal dialysis, or receiving intravenous infusions of vasoactive drugs or inotropes, and patients with multiple organ failure. These cases would require the highest nurse to patient ratio of 1.5 to 1 and 2 to 1.

The nurse to patient ratio needs to be further increased if children are undergoing Intensive Care in isolation cubicles.

## Occupancy

Occupancy gives an indication of the number of beds occupied over a period and can be expressed as a percentage of the total available. In order to use this information to calculate intensive care nursing requirements, dependency-weighted occupancy must be calculated. This takes account of the severity of illness and therefore the level of nursing intervention that is required.

Dependency weighted occupancy is calculated by dividing the dependency score by the total number of open beds.

When determining the nursing establishment for a Paediatric Intensive Care Unit, it is important to know the occupancy according to each dependency category. A form should therefore be devised for this purpose and filled out at the change-over of each shift. The dependency level appropriate to each bed can be scored as follows:

C	=	Closed bed
0	=	Empty bed
0.5	)	Nurse: patient ratio of each occupied bed
1	)	
1.5	)	
2	)	

If a bed is occupied by two successive children, the highest category should be entered. If a child is moved from one bed to another, this should be scored only once. The figures scored should be equal to the number of nurses required at the bedside.

A mean score for the week is usually calculated, and the number of nurses required and those available compared.

## Additional Factors Influencing Nursing Establishment

When calculating nursing establishment, it is also necessary to make allowances for staff handover time, holidays, sickness and study leave. This adds an extra 22% to the total number of nurses required. The most accurate calculation may be obtained by multiplying the mean dependency score plus two standard deviations of the mean by 5.5. This, plus 22%, gives a bedside establishment of 6.4 WTE:1 to cover any 24 hour period.

However units with a higher proportion of Level 3 patients will have higher mean dependency scores and may therefore require more nursing staff than the norm of 6.4 WTE per bed.

If a patient collection or transport service is offered, provision must be made for this within the establishment, depending on the number of collections and whether an 'on-call' system is in operation.

Where education and teaching occurs on the unit, further allowances will be needed to ensure that sufficient nurses are available to continue patient management. Provision will also need to be made within the ward budget for replacement of staff during maternity leave.

## Additional Nursing Staff

In addition to the nurses allocated for bedside care, there will need to be additional staff whose tasks may include cover for meal breaks, helping with lifting, setting up infusions, checking drugs etc.

The number of additional personnel required will depend on unit design, teaching commitments and other extra duties undertaken by staff. Generally, 1 additional nurse to 3 children will be adequate.

#### **Support Workers/Health Care Assistants**

Additional staff should be available to provide support in carrying out non-nursing tasks: they will not be included in the nursing establishment.

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## **6 EQUIPMENT**

Great care must be taken in selecting equipment which is suitable for the management of critically ill children of all ages; this equipment must be kept within the Intensive Care Unit.

There will need to be a minimum number of essential items of equipment available separately for each bed; for example a 4-bedded unit will require a minimum of 4 patient monitors, 4 ventilators etc. Many other items of equipment also need to be available but will not necessarily be required by every patient; they can therefore be used flexibly.

In order to minimise the number of separate items of equipment, patient monitors should be selected which will measure several different parameters: these may be designed to a fixed configuration, or they can be modular, allowing greater flexibility in use. Detailed recommendations concerning equipment are given in the Appendix.

Because of the concentration and complex nature of equipment in the Intensive Care Unit, it is essential that adequate provision is made for servicing, maintenance, repair and replacement in accordance with the guidelines set out in Health Equipment Information Number 98 (HEI 98).

There should be access to a full-time Medical Physics Officer and a Ventilator/General Equipment technician and a 24 hour back-up service.

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## **7 STRUCTURE, DESIGN AND SERVICES**

It is not intended to give a detailed description of the structure, design and services relating to Paediatric Intensive Care Units since they should conform to the recommendations made in Hospital Building Note 27,<sup>10</sup> Hospital Technical Memoranda 7<sup>11</sup> and 27<sup>12</sup>, and the Standards Document of the Intensive Care Society.<sup>13</sup> These recommendations should, however, be regarded as minimum requirements. Certain aspects of unit design which may require modification or are of particular importance to the provision of Paediatric Intensive Care are described in the following paragraphs.

#### **Size and Location**

Intensive Care Units of less than 4 beds are inefficient. It is essential that the minimum floor area for each bed should be at least 25 sq metres: compared with adults, paediatric intensive care patients usually require at least as many infusion controllers and syringe pumps; other items such as ventilators and patient monitors are the same size as those used for adults.

The Paediatric Intensive Care Unit should be situated close to other essential services and departments: the Accident and Emergency Department, the X-ray Department, the Operating Theatres and the Laboratories.

The unit should be designed so that there is adequate provision of natural light during the daytime; great care should be taken to include decorative features, paintings and colour schemes so that the unit provides an environment suitable for the management of children.

#### **Isolation Facilities**

Isolation facilities should comprise at least 25% of the total bed complement of the unit. Each isolation cubicle should have appropriate ventilation and control of the environment and it must be possible to raise the temperature to at least 25°C. Depending on local circumstances, cubicles may have a separate entry lobby with washhand basin, and provision for gowns and overshoes. Each cubicle must be provided with an alarm system so that the nurse may summon immediate help from outside.

#### **Admissions Room/Procedures Room**

Some units find it useful to have a separate room set aside for admission procedures: on admission critically ill children can be taken there to be stabilised and undergo procedures such as nasotracheal intubation, bronchoscopy, insertion of intravenous and arterial lines etc.

This room should contain a full set of monitoring equipment, an anaesthetic machine and airway equipment including paediatric rigid bronchoscopes and a fiberoptic laryngoscope; intravenous and central lines should be readily available for immediate use and there should be a patient warming device and sufficient space for an operating table or full-size patient trolley. Most of the procedures which need to be performed during the course of the child's stay in the unit would continue to be performed at the bedside.

#### **Central Station**

Although there should be a management base for storage of notes X-rays and stationery, telephones, and X-ray viewing, nursing staff should remain at the patient's bedside for the majority of the time. The patient monitor should therefore be located by the bedside and any central monitoring facility should form part of a data management system allowing printing of wave forms, tables and graphs relating to any of the patients on the unit. The data management system may be located at the central station or in the unit office. All monitors should be linked to one another and to the central system controller by means of a network, the cables for which are contained in ducts or conduits.

#### **Engineering Services**

The guidelines contained in the Standards Document of The Intensive Care Society which relate to engineering services, environmental control and number of outlets should be regarded as minimum requirements. For example, at each bed head there should be a minimum of 16 electrical sockets and 2 outlets each for oxygen, vacuum and compressed air (4 barr). There should also be an X-ray power socket between each pair of beds.

#### **Alarm Systems**

There should be an alarm at each bed so that the nurse may summon immediate help; when activated, alarms should sound and display in the rest-room, offices, storage areas and all other rooms within the unit with the exception of the parents' room.

#### **Equipment Storage**

The equipment storage areas will need to be larger than those provided in adult units because of the greater range of equipment such as babytherms and incubators, and the requirement for cots and different sizes of bed. Storage space will also be required close to each bed for personal belongings, nappies, toys, etc.

#### **Office Accommodation and Staff Facilities**

The unit should be provided with office accommodation to include rooms for the Intensive Care Director and medical staff, the nurse manager and nursing staff, and a separate computer room. There should also be a tutorial room equipped with screen and projectors; this may also act as the unit library. A staff rest-room should be provided equipped with tea and coffee making facilities; in addition, there should be facilities for staff changing to include showers and toilets.

#### **Accommodation for Resident Medical Officer**

Adjacent to the unit, a bedroom should be provided for the on-call Resident Medical Officer. This should be provided with a desk, television and intercom and there should be an en-suite toilet and shower. The on-call room should be located in a quiet area, away from main corridors.

#### **Facilities for Parents**

Satisfactory facilities must be provided for parents; these should include nearby toilet facilities, and a pleasantly decorated room situated adjacent to the unit, equipped with easy chairs, a carpet, television, books and tea making facilities. There should be accommodation available within the hospital so that at least one relative per intensive care bed may be resident; there should also be facilities available for the provision of meals for relatives within the hospital. A telephone should also be provided for the specific use of relatives of ICU patients.

In addition to the waiting room, a separate, "quiet room" should be available for private interviews with unit medical and nursing staff, psychiatrists, clergy, social workers etc.

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## **8 MANAGEMENT POLICIES**

Each Paediatric Intensive Care Unit should draw up clear management policies covering all aspects of activity. There should be written protocols for the treatment of all the major conditions which would be encountered in the Intensive Care Unit. There should, for instance, be protocols concerning indications for specific types of drug therapy, drug dosages, respiratory therapy, sedation regimes, and organ donation.

There should be clear and unequivocal procedures for the admission and discharge of patients

and guidelines regarding the daily investigations to be performed. In addition, there need to be policies concerning infection control, and Health and Safety at Work.

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## 9 PARENTS

Parents should be encouraged to be with their child and, where appropriate, to participate in their care.

Each unit should allow open visiting of parents; also other relatives where appropriate. Great care should be taken in providing parents with regular, clear and accurate information concerning the condition of their child.

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## 10 DATA COLLECTION AND AUDIT

In order to assess the performance of an intensive care unit, it is necessary to collect information and undertake audit.<sup>13</sup> This should include details of the unit workload, collection of patient data, and analysis of morbidity and mortality. In addition data should be collected with particular attention to age, duration of stay, diagnosis and diagnostic category, severity scoring, nurse dependency scores, therapeutic procedures, and complications. There should be regular audit meetings so that all staff can be made aware of any adverse occurrence, or alteration in the standard and quality of care. Audit and data collection will be facilitated by the development of Information Technology Systems.

All Paediatric Intensive Care Units should use an appropriate illness severity score which is completed for each patient on admission. The purpose of the score is to assess objectively the severity of illness; it may also provide prognostic information and serve as a reference point against which the efficacy of treatment may be assessed. The recently introduced PRISM score<sup>14</sup> has been devised specifically for use with the critically ill child. At present, it is the most satisfactory system for use in Paediatric Intensive Care, and is being adopted increasingly by paediatric intensive care units throughout the world.

The Paediatric Intensive Care Society is also developing a common data set which is intended for use by all units providing paediatric intensive care in the United Kingdom. It is hoped that the introduction of the common data set will help stimulate units to implement the recommendations contained in this document.

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## 11 CONCLUSION

Advances in the practice and provision of Paediatric Intensive Care have led to significant improvements in the prognosis of critically ill children. Conditions which were once fatal can now be treated; many children who would previously have sustained permanent disability may now make a complete recovery.

The improved outcome for critically ill children demonstrates the benefits of Paediatric Intensive Care<sup>15</sup>, and it is important that this area of work now receives national recognition.

It is therefore intended that this document should establish standards and guidelines for those providing intensive care for infants and children in the United Kingdom: that it will act as a stimulus for the national recognition of Paediatric Intensive Care as a specialty; and that this will lead to the creation of a nation-wide Paediatric Intensive Care Service with a network of designated units.

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## 12 APPENDIX

### RECOMMENDED EQUIPMENT FOR PAEDIATRIC INTENSIVE CARE

The following equipment should be provided at each bed position:

- ECG monitor with memory, recorder and alarm systems. This monitor should also include facilities for displaying respiratory wave forms, measuring respiratory rate, and monitoring direct arterial pressure (x1) venous pressure (x1) and body temperature (x2)
- Non-invasive blood pressure monitor
- Pulse oximeter
- End-tidal CO<sub>2</sub>
- Inspired O<sub>2</sub>
- General Purpose Ventilator with facilities for IMV & CPAP which can be used in patients throughout the entire paediatric age range.
- Humidifier
- Infusion controller (2)
- Volumetric pump (2)
- Syringe driver (2)
- Self-inflating resuscitation bag
- T-piece circuit and facemask

The following additional equipment should also be available on the unit:

- Extra infusion controllers, pumps and drivers
  - Infusion warmers
  - Additional temperature monitor or modules
  - Additional pressure monitors or modules
  - ICP monitoring facilities
  - Transcutaneous O<sub>2</sub>+CO<sub>2</sub> monitors
  - Facilities for cardiac pacing
  - Cardiac output computer
  - 12 lead ECG
  - Continuous EEG Recorder/EEG Processor/Analyser
  - Infant ventilators
  - High frequency ventilator
  - CPAP circuits
  - Blower humidifiers
  - Oxygen analysers
  - Head boxes
  - Blood gas machine
  - Resuscitation trolley and defibrillator
  - Anaesthetic machine
  - Fibreoptic laryngoscope and bronchoscope
  - Full range of rigid paediatric bronchoscopes
  - Peripheral nerve stimulator
  - Mobile overhead heater
  - Heating/cooling blankets
  - Incubators & Babytherms
  - Transport trolley/incubator
  - Peritoneal dialysis machine
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Dräger's worldwide reputation is built on our giving to you as our customer the best:

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