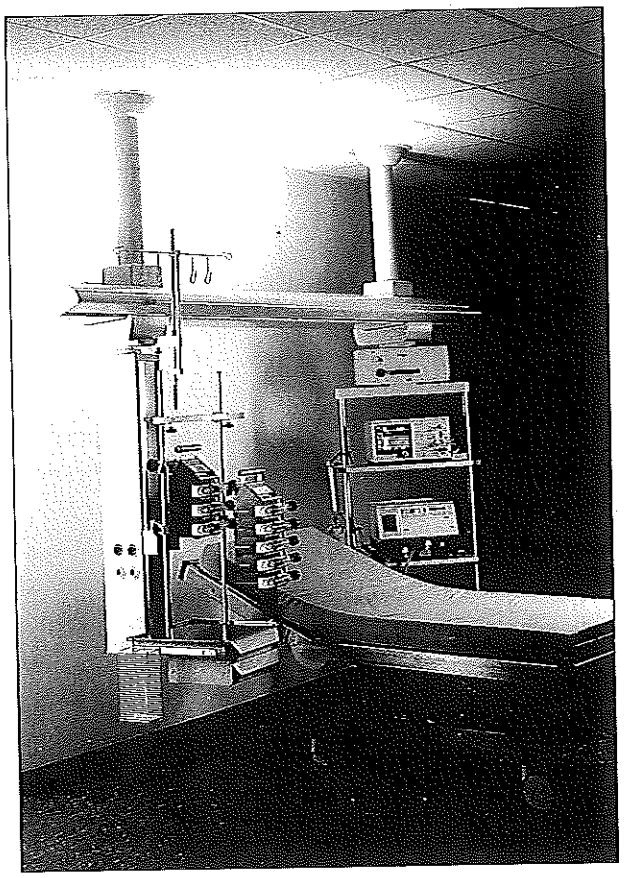
PAEDIATRIC INTENSIVE CARE SOCIETY

Standards for Paediatric Intensive Care

1996

INCLUDING STANDARDS OF PRACTICE FOR THE TRANSPORTATION OF THE CRITICALLY ILL CHILD



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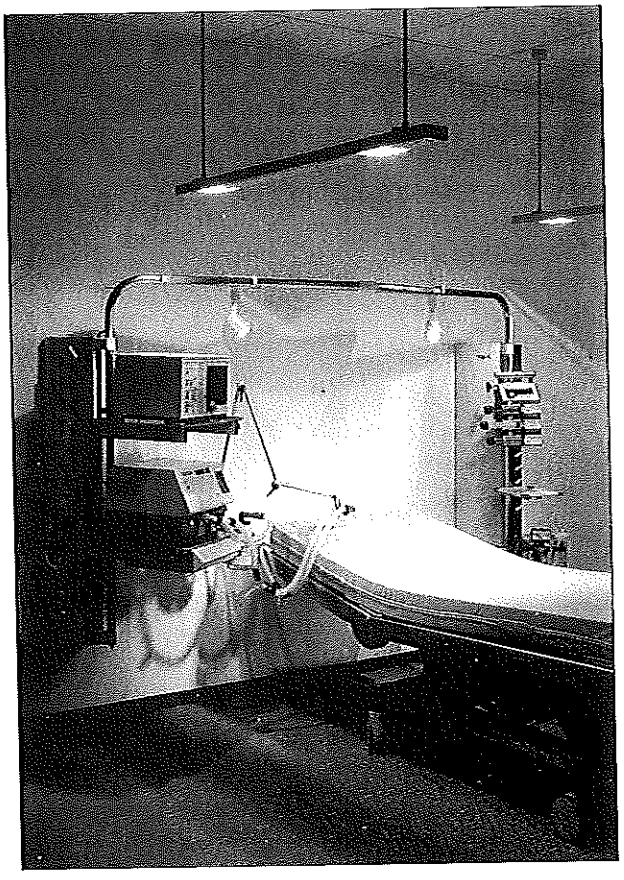

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PREFACE

The original version of the Standards was prepared by a working party consisting of Members of Council of the Paediatric Intensive Care Society. As part of the consultation process, comments were received from numerous individuals, Intensive Care Units and professional bodies, prior to completion of the final document.

The Standards working party consisted of the following:

Dr Neil R Bennett	Convenor of Working Party. Chairman, Paediatric Intensive Care Society. Consultant in Paediatric Anaesthesia and Intensive Care, The Children's Hospital, Sheffield.
Mrs Julie P Asquith	Senior Nurse, Paediatric Intensive Care Units, Guy's Hospital, London.
Dr David Heaf	Past Treasurer, Paediatric Intensive Care Society. Senior Lecturer in Paediatrics and Consultant Paediatrician, Royal Liverpool Children's Hospital, Alder Hey, Liverpool.
Mr E M Kiely	Consultant Paediatric Surgeon, The Hospital for Sick Children, Great Ormond Street, London.
Dr Duncan J Matthew	Past Chairman, Paediatric Intensive Care Society. Formerly Consultant Paediatrician and Director of Paediatric Intensive Care Unit, The Hospital for Sick Children, Great Ormond Street, London.
Dr Elena Vivori	Past Secretary, Paediatric Intensive Care Society. Formerly Consultant in Paediatric Anaesthesia and Intensive Care, Royal Liverpool Children's Hospital, Alder Hey, Liverpool.

When preparing the present revised version, comments and suggestions were received from many individuals including:

Dr David Hallworth	Consultant in Paediatric Anaesthesia & Intensive Care, Royal Glasgow Children's Hospital.
Dr Ian James	Clinical Director, Paediatric Intensive Care Unit, The Hospital for Sick Children, Great Ormond Street, London.
Dr Steven J Mather	Consultant in Paediatric Anaesthesia & Intensive Care, Royal Bristol Children's Hospital.
Dr Andrew J Mathews	Consultant Paediatric Anaesthetist, Queens Medical Centre, Nottingham.
Dr Jane Ratcliffe	Consultant Paediatric Intensivist, Royal Liverpool Children's Hospital, Alder Hey, Liverpool.
Miss Anne-Marie Rogers	Clinical Nurse Tutor, Paediatric Intensive Care, Sheffield Children's Hospital NHS Trust.
Miss Heather Steele	Sister, Intensive Care Unit, Birmingham Children's Hospital NHS Trust.
Miss Jenny Walker	Consultant Paediatric Surgeon, Sheffield Children's Hospital NHS Trust.
Miss Carol Williams	Senior Sister, Paediatric Intensive Care Units, Guy's Hospital, London.

This version also contains a significant addition: A section which sets out standards of practice for the transportation of the critically ill child. The section was prepared by a sub-committee chaired by Dr David Hallworth.

The Paediatric Intensive Care Society is a multidisciplinary group which was established in 1987. There are more than 300 members who are actively involved in the provision of Paediatric Intensive Care. It is an independent body and has no formal affiliation with any other group or society.

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 publication of this revised version of Standards for Paediatric Intensive Care has been made possible through the generous support of Draeger Limited. Thanks are also due to Mr Malcolm Allan and his staff at Saldatore Limited for invaluable help and advice; and for preparing, typing, typesetting, and arranging for printing of the document. Finally, I would like to thank all colleagues in the Paediatric Intensive Care Society whose comments, help and advice have proved invaluable in preparing this document; in particular Dr David Hallworth and his sub-committee who have been responsible for preparing the Standards of Practice for the Transportation of a Critically Ill Child.

Neil R Bennett, Sheffield, July 1996

SECTION 1:

STANDARDS FOR PAEDIATRIC Intensive Care UNITS

CONTENTS

1 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 (PICUs), each serving a specific geographical area and population.

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 (PICU) which conforms to agreed guidelines and standards.

Paediatric Intensive Care is a growing specialty, and the purpose of this document is to set out national standards and guidelines for use by hospitals and professional bodies who wish to develop new units or modify existing services, and Health Authorities and purchasing groups who are involved in commissioning 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."[1]

Intensive Care is usually reserved for patients with threatened or established organ failure which may have arisen as a result of an acute illness, trauma or as a predictable phase in a planned treatment programme.

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.[2]

Intensive Care for adults is usually provided in units within Teaching Hospitals and 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.[3]

Neonatal Intensive Care

Intensive Care for newborn infants is usually provided within a network of regional and sub-regional Neonatal Intensive Care Units, supplemented by Special Care Baby Units (SCBUs) which provide High Dependency Care for neonates at local level.

Paediatric Intensive Care

Apart from the newborn who usually undergo treatment in a Neonatal Intensive Care Unit, children who become critically ill at any time between early infancy and adolescence require the facilities of a PICU.

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3 THE PROVISION OF PAEDIATRIC INTENSIVE CARE: General Considerations

Because of the distribution and, at times, unpredictable availability of Paediatric Intensive Care beds in the United Kingdom, significant numbers of critically ill children have been

managed in general Intensive Care Units which cater predominantly for adults; in these units children may be nursed in an 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. These arrangements have a number of disadvantages: there may be insufficient nursing staff with 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; in those hospitals where critically ill children are managed on a ward, the childrens' 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. These problems can be overcome by admitting critically ill children to PICUs.

A PICU offers a facility exclusively for the treatment and management of critically ill children from infancy to early adolescence, regardless of specialty category. Whilst most sick neonates are managed in Neonatal Intensive Care Units and SCBUs, some with special requirements – such as those who have had major surgery – may be cared for in PICUs. Similarly, infants recently discharged home may subsequently develop airway problems or conditions such as pneumonia or severe bronchiolitis, necessitating admission to a PICU although they may still be less than four weeks of age.

Paediatric Intensive Care Bed Requirements

Recommended requirements for Paediatric Intensive Care beds vary from 1 bed per 30,000 to 1 per 100,000 children.[4,5] In the United Kingdom it has been estimated that 2% of all children admitted to hospital require Intensive Care, and that the requirements for Paediatric Intensive Care beds is 1 per 48,000 of the child population.[6]

Minimum Size and Number of Admissions

An Intensive Care Unit is an expensive facility because of the necessity for sophisticated equipment, trained specialised staff and other resources. It can only be employed effectively if all staff can retain their skills and are exposed continuously to the full range of clinical and technical problems which may arise. It is therefore essential to concentrate Paediatric Intensive Care beds in regional units and ensure that they are used in the most efficient and cost effective way. There is a critical mass and it is recommended that a PICU should comprise at least six beds and admit a minimum of 250 patients a year. A significant body of expert opinion considers that Paediatric Intensive Care is best provided in units with 10 beds or more.

Facilities Required for Providing Paediatric Intensive Care

A PICU must be able to provide facilities for artificial ventilation, invasive cardiovascular monitoring, renal support, intracranial pressure monitoring, intravenous nutrition, and complex drug scheduling. There should therefore be a comprehensive selection of monitoring and other equipment suitable for use over the entire paediatric age range (see Subsection 6 and Appendix B), 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 access to expert microbiological, biochemical and haematological advice together with ready 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 requirements of the critically ill child demand a high level of medical and surgical expertise from a multidisciplinary team; the unit staff should therefore 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 Subsection 4). Particular attention must 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, psychologists and clergy. Where these services and facilities are not available, a fully comprehensive Paediatric Intensive Care service cannot be provided.[7]

Transfer Services

Each PICU should provide a fully-equipped Emergency Transport Team to permit safe retrieval of critically ill infants and children from other units and hospitals. Particular attention must be given to the provision of equipment for monitoring, ventilation, and environmental control of the patient during transfer. This should be a consultant-led service; and the team should include a doctor and senior nurse, both from the Intensive Care Unit; there must be close liaison with the local ambulance service. The transfer service should be available on a 24-hour basis, and suitable allowances will need to be made within the staffing establishment of the unit to provide adequate cover. When drawing up plans it is essential to procure additional funds to support a retrieval service, which effectively becomes an additional albeit peripatetic Intensive Care Unit bed. When planning for the future, hospital managers need to be aware of the necessity to identify landing facilities for helicopters; where possible these should be included in any future plans for the hospital. Detailed guidance on transport of critically ill children is contained in Section 2.

Paediatric Intensive Care : Organisation and Contracting

We consider that Paediatric Intensive Care should be provided on a regional basis.[6,7,8] There needs to be a strategy for the provision of Paediatric Intensive Care facilities with one or more PICUs 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 PICU. Because general PICUs may exist separately from some paediatric single Specialty Units (e.g Cardiothoracic Surgery), there should be close links between all units which accept children within each region so that they may work in close collaboration.

Before the most recent Health Service reorganisation a number of specialty services received regional recognition and funding. Under the new arrangements, Paediatric Intensive Care has to be negotiated between provider units and purchasing groups. Units which offer to provide Paediatric Intensive Care must comply with national standards, which need to be clearly specified during the contracting process. Purchasers should stipulate the standards and recommendations set out in this document and incorporate them in the contracts. It will also be necessary to establish mechanisms whereby units providing Paediatric Intensive Care are closely monitored. We consider it mandatory that purchasing groups contract for Paediatric Intensive Care separately from other children's services.

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.[8] A similar survey identified 12,822 children who received some form of Intensive Care during 1991: 3,671 (28.6%) were cared for in children's wards, 2,627 (20.4%) in adult Intensive Care Units, and 6,524 (51%) in children's Intensive Care Units.[9]

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 will therefore need to be admitted to a part of the unit which is enclosed and physically separate from the adult area, and there will need to be sufficient Paediatric Intensive Care beds and adequate numbers of nurses trained in Paediatric Intensive Care: also designated Paediatricians and Anaesthetists with specific training and experience in the management of critically ill children of all ages. It is most unlikely that many adult units will meet these requirements, and it is recommended that children requiring Intensive Care should, when stable, be transferred to a PICU. An unstable critically ill child should normally continue to receive intensive treatment at the referring hospital until the arrival of a paediatric retrieval team from the referral unit.

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. This person should be a paediatric intensivist with wide experience of Paediatric Intensive Care, who has undergone a period of recognised training under the aegis of the Royal Colleges and the Intercollegiate Committee for Training in Paediatric Intensive Care Medicine. 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. From this pool, there should be a consultant designated to provide cover for the Intensive Care Unit at all times. We recommend that there should be a minimum consultant sessional allocation to the unit of ten notional half days per week for weekdays, plus five for emergency and weekend work. In the United Kingdom many PICUs adopt a multi-disciplinary approach to patient management: the unit medical staff will supervise and oversee many aspects of treatment while the patients remain under the overall charge of the hospital consultants under whom they were admitted. The consultants in Paediatric Intensive Care must therefore be responsible for establishing lines of communication with all staff who have involvement in the care of patients on the unit.

The Intensive Care Director should be a paediatric intensivist and the Job Plan must include adequate numbers of Notional Half Days designated for 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
Total	10

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; supervision of patient data collection; the follow-up of discharged patients; coordination 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 is required 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 Medical Officer with no other commitments 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 appropriate middle-grade cover. 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.

Following the establishment of the Intercollegiate Committee for Training in Paediatric Intensive Care Medicine in 1995, a number of recognised training posts are being established specifically for those individuals who intend to pursue a consultant career in Paediatric Intensive Care.

Other Staff (excluding nursing personnel)

Any institution providing Paediatric Intensive Care should provide 24 hour access to a broad range of multidisciplinary 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
Paediatricians with Special Interests in:
- Infectious Diseases
- Endocrine and Metabolic Disorders
- Liver Diseases
- Renal Disorders
- Respiratory Illness

Radiologists
Chemical Pathologists
Haemotologists
Microbiologists

The expertise and services of the following will also be required by the PICU:

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

Patients' 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 well-being of the child and family, but who do not necessarily have formal involvement in the management of the patient, and they may include:

Psychiatrists
Clinical Psychologist
Clergy
Bereavement Counsellor
Family Care Coordinator

Secretary/Ward Clerk/Data Collector

Secretarial support and ward clerks must be provided for the Intensive Care Unit. Duties will include collating laboratory results, filing notes and records, typing discharge summaries etc. A person is also required to collect and process information in order to facilitate record keeping, audit and research, and to liaise with the Information Technology Department.

5 NURSING STAFF

It is essential that there is a Clinical Nurse Manager in charge of the unit who will be a senior nurse (H or I Grade) with several years experience in Paediatric Intensive Care. This individual will have a significant management role and will be responsible for providing and coordinating the PICU nursing service. There will need to be close liaison with the Consultant-in-Administrative Charge, and a specific amount of time will need to be allocated separately during the week in order to undertake management duties. A team of sisters and senior staff nurses will be required to support the senior nurse. There will need to be a minimum of one G or F Grade nurse per shift. Every senior member of staff should be an experienced Paediatric Intensive Care nurse, and have undertaken a recognised course: for example ENB Course 415, "Intensive Care Nursing of Children" or equivalent. A PICU should give careful consideration to developing these courses.

Nurse Staffing Levels

Each patient undergoing Intensive Care requires a minimum of one trained nurse throughout the entire 24 hour period. Nevertheless flexible use of of resources and staff is required in order to provide optimum care of the patients according to their needs.

Dependency Categories

It is essential to provide the appropriate nurse to patient ratio, and this can be calculated by using clinical classification scores or "dependency categories".

Four categories of patient dependency may be encountered within Intensive Care: Level 1 is required by patients undergoing High Dependency Care; Levels 2, 3 and 4 are required by children requiring Paediatric Intensive Care of increasing complexity.

Level 1 Nurse to Patient Ratio 0.5 to 1

This level is usually provided for those children who require high dependency nursing; they therefore need close monitoring and observation but do not require assistance from life-support machines. Examples would include the recently extubated child awaiting transfer to a general ward; the child undergoing close post-operative supervision with ECG and saturation monitoring, receiving supplementary oxygen and intravenous fluids or parenteral nutrition. Children requiring long-term chronic ventilation (with tracheostomy) are also included within this category.

Level 2 Nurse to Patient Ratio 1 to 1

The child requiring continuous nursing supervision who is intubated and is undergoing IPPV or CPAP. Also the unstable non-intubated child, for example: some cases with acute upper airway obstruction who may be receiving nebulised adrenaline; the recently extubated child.

Level 3 Nurse to Patient Ratio of Between 1.5 to 1 and 2 to 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. In addition, the dependency category of a Level 2 case will be increased to Level 3 if the child is being managed in a cubicle.

Level 4 Nurse to Patient Ratio of 2 to 1 or more

These are children requiring the most intensive interventions such as unstable or Level 3 children managed in a cubicle; those on ECMO; and children undergoing renal replacement therapy.

Occupancy & Nursing Establishment

Occupancy gives an indication of the number of beds occupied over a period of time; it can be expressed as a percentage of the total beds 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 beds which are available.

When determining the number of nurses required for Paediatric Intensive Care, it is important to know the occupancy according to each dependency category. A form can 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:

BED NO:														
DAY	1	2	3	4	5	6	7	8	9	10	11	12	13	14
DEPENDENCY LEVEL*														

*

Enter: C = Closed bed

0 = Empty bed

0.5)
1.0)
1.5)
2.0) = Nurse: patient ratio
2.5)
3.0)
3.5)
4.0)

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 should be calculated in order to compare the numbers of nurses required and those actually available.

Additional Factors Influencing Nursing Establishment

When calculating nursing establishment, it is also necessary to make allowances for staff handover time, and the absence of staff due to sickness, annual, maternity 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 figure of 6.4 WTE per bed 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. Where there is a paediatric emergency transport service, additional provision must be made when calculating the total nursing establishment for the unit.

Most PICUs will have a major commitment to training and education. These units will need to appoint a Clinical Nurse Specialist to coordinate and undertake education and training of staff within the PICU. Allowances will therefore be required to ensure that sufficient trained nurses are available to continue patient management when teaching and training take place on the unit. The nursing establishment must therefore be sufficient to cover in-service training needs, in addition to absences on study leave and approved courses.

In summary, provision will be needed to ensure that the number of trained nurses is sufficient to cover: the absence of colleagues on annual study and maternity leave; patient retrievals and inter-hospital transfers; patients on the unit of Level 3 or 4 dependency; and in-service training.

Additional Nursing Staff

In addition to the nurses allocated for bedside care, there 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, one 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 must not be included in the establishment figures of Intensive Care nurses.

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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 must be kept within the Intensive Care Unit. There will need to be a minimum number of essential items, available separately, for each bed; for example a 6-bedded unit will require a minimum of 6 patient monitors, 6 ventilators etc. A number of other items of equipment also need to be available but will not necessarily be required by every patient. 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 Appendix B. Because of the large number of complex items 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 (HEI98).[10] There should be access to a full-time Medical Physics Officer and a Ventilator/General Equipment technician with 24 hour back-up.

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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 PICUs since they should conform to the recommendations made in Hospital Building Note 27,[11] Hospital Technical Memoranda 7,[12] and 22,[13] and the Standards Document of the Intensive Care Society.[3] However these recommendations should be regarded as minimum requirements. Certain aspects of unit design may require modification or be of particular importance to the provision of Paediatric Intensive Care, and these are described in the following paragraphs.

Size and Location

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 often require more infusion controllers and syringe pumps; other items such as ventilators and patient monitors are the same size as those used for adults. The unit should be designed so that there is adequate provision of natural light; 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.

The PICU should be situated close to essential services and departments such as the Accident and Emergency Department, the X-ray Department, the Operating Theatres and the Laboratories.

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 environment control and it must be possible to raise the temperature to at least 25°C. Depending on local circumstances, each cubicle may have a separate entry lobby with wash hand 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 fibre-optic 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 subsequent procedures which need to be performed during the course of the child's stay in the unit can usually be performed at the bedside.

Central Station

Although there may be a central 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. They should be observing the patient and the monitor 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 can 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, wash bowls etc.

The blood gas machine and other analytical equipment should be housed in a small laboratory within the Intensive Care complex.

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 a screen and projectors; this may also act as the unit library. A staff rest-room should be provided with tea and coffee making facilities; there should also be facilities for staff changing together with 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 and be provided with natural daylight.

Facilities for Parents

Satisfactory facilities must be provided for parents; these should include nearby toilets 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 be provided for the specific use of relatives of Intensive Care Unit 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 PICU should draw up clear management policies covering all aspects of activity. There should be written protocols for the treatment of all major conditions which are encountered in the Intensive Care Unit.

For instance, there should be protocols concerning indications for specific types of drug therapy, drug dosages, respiratory therapy, sedation regimes, and organ donation. There should be clear 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 and siblings as 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. This should include details of all admissions, collection of patient data, and analysis of morbidity and mortality. In addition data should be collected with particular attention to age, previous health status, duration of stay, diagnosis and diagnostic category, severity scoring, nurse dependency scores, therapeutic procedures, outcome and complications.[14,15] 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. PICUs will need to employ or identify an individual who will collect, collate and enter all appropriate data into the IT system.

Risk adjustment methods should be used for all patients requiring Paediatric Intensive Care. The purpose of these is to permit objective assessment of severity of illness and information on mortality risk, and provide a reference against which the efficacy of treatment may be assessed. The PRISM score has been devised specifically for use with the critically ill child.[16] At present, it is the most widely used system for use in Paediatric Intensive Care, and is being used increasingly by PICUs throughout the world. Nevertheless it has not been validated against a British reference population, and takes little account of other case mix factors such as co-morbidity.

The Paediatric Intensive Care Society is developing a common data set in conjunction with the Intensive Care National Audit and Research Centre (ICNARC) which is intended to be used by all units providing Paediatric Intensive Care in the United Kingdom. It is hoped that the introduction of a common data set will help stimulate units to implement the recommendations contained in this document. Examples of Paediatric Intensive Care data sets suggesting information which should, at present, be collected are included in Appendix A. In addition, units should record full details and follow-up any patient who is refused admission because there is no Intensive Care bed available.

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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.

All children who require Level 2, 3 or 4 care should be managed in a designated Paediatric Intensive Care Unit.

The improved outcome for critically ill children demonstrates the benefits of Paediatric Intensive Care,[17] and it is important that this area of work now receives national recognition. This document establishes standards and guidelines for those providing Intensive Care for infants and children in the United Kingdom. It is hoped 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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13 APPENDIX A

SUGGESTED DATA SET FOR USE IN PAEDIATRIC INTENSIVE CARE UNITS

PICU Admission Data

Patient Name: _____

Hospital No: _____

Sex: M/F _____

Date of Birth: _____

Admission Date: _____

Postcode: _____

Type of Admission: _____
(Planned/Emergency)

Mode of Admission: _____
(Direct/Transfer/Retrieval)

Source of Admission: _____

Speciality: _____

1 = Home
2 = A&E
3 = Ward
4 = Theatre/Recovery
5 = Adult ICU
6 = Other hospital
7 = Other PICU

1. Paediatric Medical
2. Paediatric Surgical
3. Cardiothoracic Surgery
4. Cardiology
5. ENT
6. Neurology
7. Neurosurgery
8. Orthopaedics/Trauma
9. Plastics/Burns
10. Other (specify)

Duration of Illness before Admission:

_____

_____

Diagnosis: _____

_____

Reason for Admission: (specify eg, monitoring, airway obstruction, respiratory support, cardiac arrests, fits etc): _____

_____

Pre-existing/chronic conditions: (specify eg asthma, BPD, Cystic Fibrosis, haematological, immuno-compromised, malignancy, neurological, neuromuscular): _____

_____

_____

ILLNESS SEVERITY SCORING – (e.g PRISM/PIM/APACHE/CRIB)

ADMISSION DETAILS _____

NURSE DEPENDENCY LEVELS

GIVE AVERAGE DEPENDENCY LEVELS FOR EACH 24 HR PERIOD

DAY	1	2	3	4	5	6	7	8	9	10	11	12	13	14
DEPENDENCY LEVEL														

PICU Treatment Data

(Tick as appropriate)

		Duration
Intubated		
Oral ETT		
Nasal ETT		
Tracheostomy		
Surfactant		
IPPV		
HFO		
Nitric Oxide		
ECMO		

Drugs:

- Antibiotics _____
- Opioids _____
- Sedatives _____
- Relaxants _____
- Vasodilators _____
- Steroids _____
- Antacids _____
- H_2 Antagonists _____
- Sucralfate _____
- Anticonvulsants _____
- Nebulised Drugs _____
- (Specify) _____
- _____
- Other Drugs _____
- (Specify) _____
- _____

- Colloid _____
- Inotropes _____
- Cardiac Massage _____
- Defibrillation _____
- Diuretics _____
- Peritoneal Dialysis _____
- Haemofiltration _____
- Haemodialysis _____

Monitors:

- Aerial Line _____
- CVP Line _____
- PA/Swan-Ganz Line _____
- ICP Monitor _____
- CFAM/
- Continuous EEG _____

Nutrition:

- Enteral _____
- Parenteral _____

Outcome Data

Duration of Intensive Therapy _____

Disposal of Survivors _____

1 = Home
2 = Ward
3 = Other Hospital ICU
4 = Other Hospital

Neurological status on discharge _____

_____

1 = Normal
2 = Moderately impaired
3 = Severely impaired

Outcome of Intensive Care, eg death, convalescence, terminal care: _____

_____

_____

_____

If death occurred during intensive care, was a diagnosis of brain stem death made before circulatory arrest? Yes/No _____

_____

_____

_____

_____

13 APPENDIX B

MINIMUM RECOMMENDED EQUIPMENT FOR PAEDIATRIC INTENSIVE CARE

The following equipment should be provided at each bed position:

- ECG monitor with memory, recorder and alarm systems. Each monitor must be able to display respiratory wave form, measure respiratory rate, and monitor direct arterial pressure (xl) venous pressure (xl) and body temperature (x2)
- Non-invasive blood pressure monitor
- Pulse oximeter
- End-tidal CO_2
- Inspired O_2
- General Purpose Ventilator with facilities for IMV & CPAP which can be used in patients throughout the entire paediatric age range
- Humidifier
- Infusion controller (3)
- Volumetric pump (2)
- Syringe driver (4)
- Self-inflating resuscitation bag with oxygen reservoir
- T-piece circuit and facemask

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

- Extra infusion controllers, pumps and syringe drivers
- Infusion warmers
- Additional temperature monitor or modules
- Additional pressure monitors or modules
- ICP monitoring facilities
- Transcutaneous O_2+CO_2 monitors
- Facilities for cardiac pacing
- Cardiac output computer
- 12 lead ECG
- Continuous EEG Recorder/EEG Processor/Analyser
- Infant ventilators
- High frequency ventilator and oscillator
- Equipment for nitric oxide administration and analysis
- CPAP circuits
- Blower humidifiers
- Oxygen analysers
- Head boxes
- Blood gas machine and co-oximeter
- Resuscitation trolley with intra-osseous needles, defibrillator and drug packs
- Anaesthetic machine
- Fibre-optic laryngoscope and bronchoscope
- Full range of rigid paediatric bronchoscopes
- Peripheral nerve stimulator
- Mobile overhead heater
- Heating/cooling blankets and blowers
- Incubators & Babytherms
- Transport trolley/incubator and retrieval equipment
- Peritoneal dialysis equipment
- Haemofiltration equipment
- Equipment for administration and monitoring of nitric oxide

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SECTION 2:

STANDARDS OF PRACTICE FOR THE TRANSPORTATION OF THE CRITICALLY ILL CHILD

CONTENTS

1 PHILOSOPHY

To provide a safe and supportive environment for critically ill children who require to be moved to a centre which is able to cater most appropriately for their needs.

---

2 BACKGROUND

The need for a specialised team for the transfer of critically ill children has been identified by the multidisciplinary working party convened by the British Paediatric Association (BPA).[1] This service has been provided for many years in North America and Australia, and on a smaller scale by some Paediatric Intensive Care Units (PICUs) in the UK. It is logical and efficient to provide Paediatric Intensive Care in the UK in a limited number of units large enough to have a sufficient through-put of patients to maintain clinical skills. These units should be strategically situated around the country.[1,2] An integral part of this strategy is the transfer of critically ill children from other hospitals into regional PICUs.

Experience in the USA, Canada and Australia has demonstrated that this practice is both safe and effective in providing good quality Intensive Care over a wide geographical area.[3,4,5] At present in the UK some critically ill children are transferred to tertiary referral centres by specialised transfer teams, but others are moved by non-specialist staff under conditions which are often suboptimal. Surveys conducted in this country have shown that patients transferred by experienced personnel arrive at the receiving hospital in better clinical condition and suffer considerably fewer "critical incidents" than those moved by staff with little expertise in this area of critical care.[6,7] This document has been produced to improve the care of critically ill children by the definition and adoption of a minimum standard of care during patient transfer.

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3 REQUIREMENTS

Transfer of the critically ill child has been described as "an Intensive Care bed on the move."[8] It is apparent from this definition that all facilities provided in the Paediatric Intensive Care Unit (PICU) must also be provided in a compact, mobile and reliable form in transit. With care and attention to detail, there should be no interruption to the patient's therapy, monitoring or medical and nursing care during a well planned and executed transport episode.

Provision of Service

A Paediatric Emergency Transport Team:

- Is a fundamental part of PICU provision
- Should be staffed from the PICU
- Requires experienced staff
- Is an "Intensive Care bed on the move"

The transfer team and equipment should be based on the PICU at the receiving hospital where the necessary expertise will be available. There must be provision made in the staffing levels of PICUs for this service. Transport services cannot be considered in isolation from the overall provision of Paediatric Intensive Care.

Contracting

The provision of this service should be addressed in conjunction with the contracting for Paediatric Intensive Care as specified in the document produced by the multidisciplinary working party.[2]

Liaison

All efforts to develop and run a paediatric transfer service require the assistance and co-operation of the ambulance and other emergency services where appropriate. Discussions must be held with these services when plans are made for establishing a paediatric transport service and when transfer is planned.

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4 STAFFING

Requirements:

- Experienced specialist in Paediatric Intensive Care
- Experienced Paediatric Intensive Care nurse
- Trainee

Medical Staff

The service should be run under the direct supervision of specialists in Paediatric Intensive Care. Some transfers may be managed by staff undergoing specific Paediatric Intensive Care training following suitable education and experience in both Intensive Care and inter-hospital transport.[9,10]

This has implications for the staffing levels in PICUs, and must be considered when plans are made to establish a transport service. Experienced medical staff must be available on a 24 hour basis to provide this cover.

Nursing Staff

The participation of nursing staff as active members of the transfer team is essential. They will provide skilled assistance for the accompanying medical staff, and assess the nursing needs of the child.

Transport services should be provided only by experienced Paediatric Intensive Care nurses, who should have a higher qualification in Paediatric Intensive Care – ENB415 or equivalent. All nursing staff participating in patient transfer must receive in-house training.[10,11] It is essential that provision is made in the nursing establishment of the PICU to ensure the availability of nurses to fulfil the role of both providers and trainers for this service.

Other

Local circumstances may favour the presence of additional skilled assistance from other specialist groups such as Operating Department Assistants (ODAs).

Paramedics

The transfer of critically ill children requires a coordinated team who have ongoing experience in the management of this group of patients. The current role of the paramedic is in the pre-hospital care and transportation of patients. With the involvement of medical and nursing staff specifically trained in transport medicine, it is not envisaged that paramedics will have a specific input into this service.

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5 REFERRAL OF PATIENTS

Requirements:

- Reserved telephone extension
- Contact at consultant level
- Initial resuscitation at referring hospital

A dedicated telephone extension should be available within the PICU. If the duty consultant is not immediately available details of the patient should be taken and the call returned by the consultant within ten minutes.

Discussion should take place at consultant level both in the PICU and the referring hospital.[4,12] Advice on patient management may be given on this or any subsequent contact between senior medical staff, all of which must be clearly documented at the time. Ultimate responsibility for the patient remains with the referring hospital staff until the transport team arrives.

The transfer of critically ill patients by dedicated transfer teams is both costly and labour intensive; the benefits in terms of reduction of morbidity and mortality during transfer are well documented.[13] It is of paramount importance that children receive the best available resuscitation and care before the arrival of the transfer team.

This role is, and must remain, the responsibility of the referring unit, and should be provided at a senior level by clinicians most skilled in this field,[14] in conjunction with advice given by the receiving hospital staff.

Discussion should take place with the parents or guardians of the patient before the child is moved. The reasons for transfer should be explained emphasising the specialist nature of Paediatric Intensive Care. Information should be provided which must include:

- Location of hospital
- Location of PICU within hospital
- Access to hospital – including car parking and public transport
- Telephone number of hospital and PICU

Patients Suitable for Transfer

This service should be available for any child who could benefit from Intensive Care.

---

6 TRANSPORT

Requirements:

- Fully equipped ambulance
- Personnel must be familiar with vehicle or aircraft
- Specific problems with air transport

The mode of travel to and from the referring unit will vary according to local circumstances.

Stabilisation before Transport

The senior member of the transport team has responsibility for the child in transit. No patient will leave the referring hospital unit until this individual is satisfied with their stability and suitability for transfer.[16]

Special Considerations

Where long distances or inaccessible locations are involved, or where traffic conditions make rapid transport difficult or impossible, air transport may be preferable. Both rotary and fixed wing aircraft have been used successfully for this purpose in the UK. It must be remembered that the space requirements for equipment and personnel preclude the use of many of the small 'rescue' helicopters currently in use by the emergency services. It is essential that personnel involved with air transport are appropriately trained and familiar with the facilities on board the aircraft. Air transport has specific difficulties e.g noise, altitude and vibration, and full consideration must be given to these problems in relation to the patient's condition and requirement for rapid transport.

---

7 EQUIPMENT

The definition of transport as an "Intensive Care bed on the move" dictates that the facilities provided in transit should be as close as possible to those available in the PICU. Continuous monitoring of physiological parameters is possible with the use of modern portable devices and is essential for the continuity of patient care during a transport episode. Monitors should be kept in a constant state of readiness and checked at frequent intervals. The battery charge must be capable of supporting full monitoring facilities for a period of a least twice the maximum anticipated length of transfer. Although it may be possible to use an electrical supply from the ambulance, this is not usually permissible in aircraft. The availability of an extraneous supply should be discussed with the local ambulance service.

The ability to monitor and record the following parameters during transfer is essential in all circumstances:

- ECG
- Oxygen saturation
- Non-invasive blood pressure

Further facilities which must be available when required include:

- Temperature (core and peripheral)
- Invasive pressure (x2)
- End tidal CO_2

Equipment must also be carried to enable the transfer team to perform any resuscitative measures that may be required during a transfer. For example tracheal intubation, chest drain insertion, or venous access. With experienced staff and adequate stabilisation before transport the need for such interventions during the journey is likely to be minimal.

The following equipment must also be available:

- Ventilator
- Incubator
- Jackson-Rees modified Ayres T-piece
- Self inflating bag – adult and paediatric sizes
- Portable suction
- Minimum of six infusion devices
- Paediatric sized defibrillator paddles – to suit ambulance defibrillator
- Spare batteries and bulbs for all laryngoscopes

Individual PICUs will decide their own preference for the specific equipment they carry; however, a typical list is appended for information (see Appendix C).

A list of all equipment carried should be kept in the bags or boxes used and the contents should be checked and replaced after each transport. The containers should be sealed to prevent items being removed. Some items carried have a limited shelf life, and must be replaced before expiry.

It is strongly recommended that advice is sought from the local ambulance service before any equipment is purchased. Many items are now designed to fit directly into ambulance vehicles.

A mobile telephone is necessary to enable the team to maintain contact with both the referring hospital and base. The restrictions on the use of cellphones in aircraft must be observed, as must the potential interference with monitoring equipment and infusion devices.

Drugs

Drugs carried by the transfer team will largely be a matter of local preference. A typical drug list is appended for reference (see Appendix C). Most of the drugs required will be available at the referring hospital. Doses of sedatives or muscle relaxants may need to be repeated in transit and a supply of resuscitative agents must always be available.

Controlled drugs e.g morphine, are available at the referring hospital and should be obtained from this source.

A paediatric formulary such as Alder Hey 'ABCD' or the Melbourne book 'Drug Doses' should be included.

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8 AUDIT

Local and national audit of the paediatric transport system must be undertaken. This should include details for children transferred without using a specialised paediatric transport service. All physiological data obtained during transfer should be recorded. A monitor capable of storing and downloading information is a great advantage. Full details of the patient, referral source, complications and outcome should also be noted.

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9 INSURANCE

All individuals undertaking this work must have appropriate additional life insurance in the event of an accident during transport. Allowance must be made for this cost when contracts are made with NHS Trusts or Health Authorities and written confirmation of this cover must be available before any such work is undertaken. Individuals should also confirm the terms and conditions of their personal life insurance policies to ensure that they are covered, especially if air transport is contemplated.

Indemnity

Medical insurance must be provided by the transfer team's employing trust or Health Authority written confirmation must be available before any transport is undertaken.

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10 SUMMARY

- A Paediatric Emergency Transport Team is a necessary part of Paediatric Intensive Care provision and cannot be considered in isolation.
- In the UK and abroad it has been shown to be a safe and effective means for the transport of critically ill children, if appropriately staffed and equipped
- It must be staffed at a senior level with medical and nursing input from suitably trained personnel.
- Training must be provided for the future provision of this service.
- Requests for transfer should be made at senior level, i.e consultant to consultant contact.
- Advice may be sought or given on patient management issues without transfer actually taking place.
- Initial resuscitation must remain the responsibility of the referring hospital.
- Lines of communication must be available direct to the Paediatric Intensive Care Unit.
- Information must be given to parents or guardians of patients transferred – preferably in the form of a standard sheet giving details of hospital location, Paediatric Intensive Care Unit location, telephone numbers etc.

- This service must be available for any child who will benefit from Intensive Care.
- In some areas and under special circumstances air transport may be essential. Provision for this facility must be made in the training of staff involved.
- The establishment of a transport service requires capital investment to provide dedicated equipment necessary to ensure the safety of patients being moved. The final decision on patient transfer rests with the senior medical member of the transfer team on site.
- Allowances must be made for the cost of this service when contracts are made for the provision of Paediatric Intensive Care.
- Paediatric transport services must be the subject of audit at local and national level.
- Life insurance for those involved with the provision of this service must be adequate, and further appropriate cover should be provided by their employer.
- Medical indemnity must be accepted by the employing authority.
- Other relevant emergency services must be involved with the set up and running of any service provided.

These standards have been produced as a guide to both purchasers and providers of Paediatric Intensive Care.

The staffing levels and monitoring capabilities are not intended to represent a maximum level of service, but rather a standard that must be achieved before transfer of critically ill children can be accomplished in relative safety.

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11 APPENDIX C

SUGGESTED EQUIPMENT AND DRUGS FOR TRANSFER

Portable battery powered multi-function monitor
Syringe drivers (6)
Pressure transducers (3)
Pressure monitoring cables (3)
Transducer domes (3)
Pressure monitoring set (3)
Pressure infusion bag
Heparinised saline 500ml
ECG leads
ECG electrodes (3 packs)
SpO_2 lead
SpO_2 probes – selection
Non invasive BP tubing
Non invasive BP cuffs – Neonatal to adult sizes
Temperature probes (2)

Items for Intravenous Access

Intravenous cannulae sizes	16-24G	(4 each size)
	14G	(2)
Hypodermic needles sizes	19-27G	(5 each size)

Intraosseous needles (2)
Single lumen Seldinger type central venous catheter set 19&20G (2 each size)
Triple lumen central venous catheter set 5F 5 7 8 cm (1 each size)

Syringes	1,2,5ml	(5 each size)
	10,20ml	(2 each size)
	50ml	(6)

Pressure monitoring extension lines	10cm	(2)
	50cm	(2)
	200cm	(3)

3-way taps (4)
3-way taps with extension (4)
IV injection caps
Spirit wipes
Splints

Cannula and ET Tube Fixation

Sutures – Silk on hand size needle (W675)(2)
Zinc oxide tape 0.5"
Transpore tape 1"
Elastoplast tape 1"
Crinx bandage
Tegaderm dressings
Sterile scissors (2)
Artery forceps – large & small
Disposable scalpels 10, 11 & 15
Swabs

Airway Management

- Oxygen tubing
- Oxygen therapy mask (paediatric)
- Nasal cannulae – infant & paediatric
- Nebuliser and mask
- J-R modified Ayres T-piece (disposable)
- 1 L reservoir bag
- Condenser humidifiers
- Self inflating bags – adult & paediatric
- Swivel ET connector
- Catheter mount (2)
- Anaesthetic face masks 1,2,3,4,5 (1 each size)
- Guedel airways 000,00,0,1,2,3,4 (1 each size)
- Endotracheal tubes 2.0-5.5 (2 each size) 6.0-7.5 (1 each, plain and cuffed)
- Intubation stylets – small and medium
- Minitrach set
- Epidural kit
- Laryngoscope handles – penlight (2)
- Laryngoscope blades – straight and curved, neonatal to adult sizes
- Magill forceps – small & medium
- Penlight torch
- Lubricating jelly

Chest Drain Set

- Heimlich valves (2)
- 1/4 x 1/4 straight connectors (2)
- Chest drains 8-16F (2 each size)

Miscellaneous

- Gloves – L,M,S
- Nasogastric tubes 6-14F (1 each size)
- Suction catheters Yankauer high, regular, fine (2 each size)
- Flexible 6-12F (3 each size)
- Sputum trap
- Space blanket – adult size
- Silver swaddler
- Stiff neck collars – assorted sizes
- Stethoscope/oesophageal stethoscope
- Paediatric ICU formulary
- ICU charts
- Spare batteries for laryngoscopes
- Spare bulbs for laryngoscopes
- Glucostix
- Drug additive labels
- Syringe labels
- Roll of "Gamgee" (cotton wadding)

Drugs

- Mannitol 10% 500ml
- Atropine 500mcg Minijet
- Adrenaline 1: I 0,000 Minijet
- Calcium chloride 10% Minijet
- Sodium bicarbonate 8.4% Minijet

Atropine 400mcg (4)
Midazolam 10mg (4)
Diazemuls 10mg (4)
Phenobarbitone 50mg (5)
Adrenaline 1: 1000 (5)
Atracurium 25mg (3) – in refrigerator
Pancuronium 4mg (2) – ditto
Suxamethonium 100mg (2) – ditto
Vecuronium 10mg (2)
Phenytoin 250mg (2)
Paraldehyde 5ml (4)
Thiopentone 0.5g (2)
Propofol 20ml – not for infusion
Ketamine 10mg/ml (1)
Ketamine 100mg/ml (1)
Etomidate I0mg (2)
Trimeprazine/chloral hydrate/triclofos – to taste
Frusemide 500mg (2)
Frusemide 20mg (2)
Naloxone 400mcg (2)
Flumazenil 500mcg (1)
Hydrocortisone 100mg (2)
Dexamethasone 8mg (2)
Aminophylline 250mg (2)
Dopamine 200mg (2)
Dobutamine 250mg
Isoprenaline 2mg (2)
Noradrenaline 4mg
Labetalol 100mg (1)
Lignocaine 1 & 2%
Salbutamol iv 5mg & resp. solution 0.5%
Paracetamol suppos. 125mg
Acyclovir 250mg (2)
Cefotaxime 1g (1)
Ceftazidime 1g (1)
Metronidazole 500mg (1)
Benzyl penicillin 600mg (5)
Chloramphenicol 1g (2)
Sodium chloride 30% (2)
Potassium chloride 20mmol in 10ml (2)
Heparinised saline 5ml (5)
Water for injection 20ml (5)
Human albumen solution – 5% 500ml
Plasma expander (Haemaccel or Gelofusin) 500ml
Narcotics as required from referring hospital

Other Items

Ventilator with disconnect alarm – ideally with provision for PEEP
Defibrillator paddles
Incubator as required
Telephone
Audit and Observation charts
Information for parents or guardians

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