

**Paediatric Section of the Union of European Medical  
Specialists**

**&**

**ESN**

**THE EUROPEAN SOCIETY  
FOR NEONATOLOGY**

**EUROPEAN CURRICULUM AND SYLLABUS FOR TRAINING IN  
NEONATOLOGY**

**(Second edition - Version 3; 2 January 2007)**

## Paediatric Section of the Union of European Medical Specialists

and

## EUROPEAN SOCIETY FOR NEONATOLOGY

### TRAINING IN NEONATOLOGY (Second edition)

This training curriculum has been developed to support national training programmes in Neonatal Medicine, one of the Paediatric Specialist training programs as defined by the European Union of Medical Specialists (UEMS). This new edition replaces the Syllabus prepared by the ESPR-Working Group for Neonatology, formally approved in 1998. The revisions have taken place to make the process of training in Neonatology following post core training in Paediatrics clearer and to facilitate the incorporation of high quality national training programmes that were not easily reconciled with the proposed modular system. The curriculum should be delivered over a minimum of two years spent in specialist clinical training and we would recommend that individual EU countries move to deliver this curriculum over three years of training in the interests of training competent practitioners in neonatal medicine and to provide consistency.

#### 1. INTRODUCTION

In order to achieve high standards of both patient care and scientific research in the field of medicine, high quality postgraduate training programmes are indispensable. One of the endeavours of the Union of European Medical Specialists (UEMS) and the Confederation of European Specialists in Paediatrics (CESP), now called the Paediatric Section of UEMS, is to promote training programmes of equivalent quality in the various member countries throughout the European Union (EU). Because of the rapid integration of these countries, doctors can now freely practice medicine throughout the EU. It is therefore of prime importance for the maintenance of standards of patient care that specialist doctors should receive equivalent training in each member countries.

Neonatology is a highly technical and rapidly evolving area of paediatric medicine, which is established as an independent specialty in most European countries. In different countries the form and duration of the training, as well as process for accrediting training centres and monitoring the quality of training, vary markedly.

We believe that this curriculum and assessment framework may be utilised to:

- Harmonise training in Neonatology between different European countries,
- Establish clearly-defined standards of knowledge and skills required to practice Neonatology at a tertiary care level.
- Foster the development of a European network of proficient tertiary care centres for Neonatology
- Through these measures, the curriculum and assessment framework will
  - improve the quality of care for severely ill newborn babies and
  - enhance European contribution to international scientific progress in the field of Neonatology

This document defines the aims of training, the contents and the duration of the training program, the basic requirements for entering such a program and a spectrum of required qualifications for training centres and tutors. Appendix 1 describes the background and the development of this curriculum.

## 2. AIMS OF TRAINING

### 2.1. CONTENT OF TRAINING (Syllabus)

The training provided should equip the doctor with the necessary knowledge, skills and attitudes required to practice high quality neonatal medicine.

#### **The trainee Neonatologist should acquire detailed knowledge of:**

*2.1.1 Epidemiology:* Mortality and morbidity rates in the perinatal period and factors which influence mortality and morbidity. Methods of data collection at national and local level, including birth and death notification systems and audits aimed at quality assessment.

*2.1.2 Pathophysiology of the fetus:* Fetal growth and development and the means of its assessment. Impact of the major diseases of pregnancy on the fetus, e.g. hypertensive disease, maternal medical conditions, ante partum haemorrhage, and preterm labour. Detection of fetal anomaly and collaborative prenatal counselling.

*2.1.3 Physiology of postnatal adaptation:* Respiratory, cardiovascular and other physiological changes at birth. Development of organ systems and physiological changes after birth. Physiology of breast feeding.

*2.1.4 Pathophysiology of prematurity:* Respiratory development and pathology including surfactant deficiency and its sequelae. Cardiovascular problems including patent ductus arteriosus and persisting pulmonary hypertension. Gastrointestinal development and feeding, renal maturation and fluid balance. Neurological problems, including pathogenesis of intraventricular haemorrhage and periventricular leucomalacia.

*2.1.5 Pathophysiology of conditions encountered in premature and mature infants:* Congenital abnormalities and their management. Perinatal hypoxia and consequences of hypoxia and ischemia. Metabolic adaptation to postnatal life. Inborn errors of metabolism including screening programs for their detection. Neonatal immunity and pathogenesis of perinatal / neonatal infection.

*2.1.6 Pharmacology in the perinatal/neonatal period:* Pharmacokinetics in the term and preterm newborn, drug toxicity and interactions; Influence of maternal medication on neonatal condition, effects of maternal drug abuse on the fetus and newborn infant, and transmission of drugs via breast milk.

*2.1.7 Principles of neonatal care:* Theory and organisation of resuscitation. Respiratory care and mechanical ventilation, endotracheal intubation and delivery of respiratory support. Management of complications and long term sequelae of prolonged neonatal ventilation. Cardiovascular support, assessment of cardiovascular system and of patent arterial duct. Postnatal growth, breast feeding, composition and use of neonatal formulae and supplements. Parenteral nutrition, prescription, administration and indications. Assessment, diagnosis and management of severe enteral diseases. Neonatal skin and thermal care. Assessment of fluid balance and nutritional requirements. Assessment of bone mineralisation. Assessment of structural and functional integrity of the brain using clinical examination and special investigations. Prognosis of major neuropathology, screening preterm and 'at risk' babies for retinopathy and hearing loss. Diagnosis and assessment of congenital abnormality and dysmorphology. Investigation of suspected inborn errors of metabolism. Use of genetic investigations and diagnostic aids. Routine care of the newborn in relation to jaundice, breast feeding, infections. Screening for neonatal disease by examination and investigation. Early, medium term and late sequelae of neonatal and perinatal events and ethical issues in neonatal care.

*2.1.8. Follow-up of high risk infants:* Outcomes associated with perinatal high risk groups (e.g. prematurity, fetal growth restriction and intrapartum hypoxia), diagnosis and counselling associated with cerebral palsy, visual and hearing defects, chronic respiratory problems and an understanding of the importance of other neurocognitive outcomes.

2.1.9 *Ethical issues and legal problems*: including National and European practice

**Trainees will be expected to have acquired extensive skills in the following domains:**

2.1.10 *Practical procedures*: Resuscitation of the newborn, tracheal intubation and techniques of artificial ventilation. Insertion of arterial catheters (umbilical and peripheral), establishment of intravenous infusion and long intravenous lines. Blood transfusion and exchange transfusion. Arterial puncture, pleural drainage of pneumothorax, suprapubic aspiration of urine, lumbar and ventricular puncture.

2.1.11 *Diagnosis*: Interpretation of neonatal chest and abdominal radiological investigations. Role of specialised investigations, e.g. MRI, CT. Experience in interpreting results of ultrasound examination of the nervous system, the abdominal organs, and of congenital hip dysplasia. Ordering and interpretation of common laboratory and micro-biological investigations. Use and interpretation of the results of EEG, cortical evoked responses and neuromuscular electro-physiological tests.

2.1.12 *Clinical practice*: Clinical examination of sick and healthy newborn baby, recognition of specific neonatal problems including deformation and malformation, assessment of gestational age. Developmental and neurological assessment of the older infant and child and the assessment of disability.

2.1.13 *Communication*: Counselling and communication skills including appropriate approach to distressed and bereaved parents, disclosure of “bad news”, handling of autopsy reports. Staff support and team dynamics. Co-operation and consultation with other medical specialists.

2.1.14 *Technology*: The neonatologist will be expected to understand basic mechanical and electrical function of radiant heaters, incubators, ventilators, and monitoring equipment.

2.1.15 *Teaching*: The neonatologist should be trained and involved in teaching activities including teaching programs for doctors and nurses.

#### **2.1.16 Personal development:**

The neonatal specialist role includes leadership within the clinical team and many neonatologists undertake important management roles within the team and within their host organisation (usually their Hospital or University). In particular the training programme must equip the trainee with the personal skills necessary to fulfil these roles, for example:

- *Counsellor*
- *Manager*
- *Leader*
- *Teacher*
- *Clinical governance and audit*
- *Statistical and interpretative skills*

## 2.2 PURPOSE OF TRAINING

The use of this curriculum through the assessment framework should result in the European Neonatologist being competent at providing clinical care within the framework of a specialised tertiary care unit, division, department or hospital. This clinical care should include routine application of various specialised diagnostic and therapeutic methods.

### 3. TRAINING PROGRAM

#### 3.1. STRUCTURE OF THE PROGRAM:

The precise training programme will vary from centre to centre. We recommend that the programme be designed to ensure that the trainee acquires competencies in several key areas (see below). Each trainee should be allocated to a mentor at the commencement of training and the mentor is responsible for the assessment and recording of competence. In some countries final certification in neonatology is undertaken but this is not mandatory and should not replace the process of mentoring and professional assessment.

3.1.1. Each area of competency set out below comprises a specific area of practice specific to neonatology and more general areas of competency, for example clinical governance and audit, should be catered for within the general training programmes of the institutions undertaking training. These areas as appropriate to the neonatologist can be identified from the curriculum. In addition to the training necessary to support the development of the competencies below, it is recommended that trainees develop expertise in specific areas relevant to the practice of Neonatology, for example:

- Peri-operative care in neonatal surgery
- Fetal medicine
- Clinical genetics
- Neurodevelopmental assessment to support practice in follow-up clinics

#### 3.2. KEY COMPETENCIES IN NEONATOLOGY:

3.2.1. *Resuscitation:* The trainee will be able to institute and lead neonatal resuscitation both of the term and preterm baby. The trainee must have demonstrated a full understanding of the physiology and treatments involved.

3.2.2 *Neurology:* The trainee will demonstrate proficiency at clinical assessment. Investigation (including cerebral ultrasound scanning) and management of a range of neurological disorders, including preterm and term brain injury, congenital malformations, intracranial trauma and seizures

3.2.3 *Communication skills and counselling:* The trainee will demonstrate increasing skills in communication with parents and staff, both individually and as part of a team, during their training. This includes experience at breaking bad news, handling perinatal death and discussing prognosis with parents

3.2.4 *Congenital anomalies and genetic disease:* The trainee will be able to recognise common congenital anomalies, to investigate babies with such lesions and to use literature and database searches to identify rare conditions and communicate such information to parents

3.2.5 *Cardiorespiratory intensive care:* The trainee will be able to institute and maintain full cardiorespiratory intensive care for preterm and sick term newborn babies. This will include a full working knowledge of the principles and application of a range of ventilatory modalities, of circulatory support and the trainee must be able to manage complications. In addition the trainee must be able to plan care for the baby with chronic respiratory disease and be aware of the potential long-term complications.

3.2.6 *Fluid balance, thermoregulation and renal failure:* The trainee will be able to initiate and manage the thermal environment of preterm and term babies, and manage fluid balance in such babies, demonstrating a full understanding and knowledge of the underlying physiology - with special reference to the rapid postnatal changes in body water distribution and transepidermal water loss. The trainee will be able to diagnose and initiate treatment of renal failure.

*3.2.7 Haematology and transfusion:* The trainee will be able to diagnose and manage the range of haematological disorders found in newborn babies. The trainee will be conversant with the full range of blood products available for transfusion and the appropriate use of each.

*3.2.8 Metabolism and endocrine disorders:* The trainee will demonstrate proficiency in the recognition, assessment, investigation and management of the more common and important metabolic and endocrine disorders.

*3.2.9 Nutrition, feeding, gastro-intestinal and hepatic disease:* The trainee will understand the importance and principles of neonatal nutrition and be able to provide comprehensive nutritional support to well and sick newborn babies, including the recognition and treatment of common complications; the trainee will be able to recognise both common congenital gastro-intestinal and hepatic anomalies and acquired neonatal disease.

*3.2.10 Immunity and infection:* Understand the development of immunity and the vulnerability of the newborn to infection

*3.2.11 Family care and care of the well newborn baby:* The trainee should have a wide knowledge of normal development, common minor problems and morphological variation and the importance of communication with other health care professionals and the parents.

*3.2.12 Ward Organisation / Management Skills / Clinical Governance:* The trainee will have demonstrated skills at leading clinical rounds, be able to carry out the administrative duties required to run a neonatal unit and will have organised and attended perinatal meetings, unit meetings and clinical governance meetings.

*3.2.13 Transport of the newborn baby:* The trainee will be competent at retrieval and transport of the sick newborn baby and will be able to teach others to carry out transfers.

### 3.3 EXPERIENCE IN OTHER AREAS:

In addition, it is expected that the trainee will develop expertise in more detail in one of the areas covered by competency (for example transport, metabolic disease, nutrition), the mandated areas listed above (3.1.1: Neonatal Surgery, Fetal Medicine, Follow up and Clinical Genetics) or develop expertise in areas not covered, for example paediatric cardiology or an area of relevant research. Such "special interests" are expected and may be developed as part of a three year training programme (where they may comprise up to 12 months of training), or following the completion of a two year programme.

### 3.4 RECORDING OF PROGRESS:

We recommend that each trainee develops a portfolio which will include an assessment framework to record the evolution of competency. This will be completed by the trainee and mentor who will both sign the trainee off at the requisite level annually. In addition the portfolio should comprise:

- Evidence of completion of other key areas of the curriculum, in particular experience of neurological and developmental assessment, of neonatal surgical conditions and of fetal medicine.
- Reflective notes covering each of the defined key competency areas, suitably referenced, based on a single case for each area. These should not be longer than 2 sides of A4 (10 point Arial type, 2cm margins; exclusive of references) and be read by, discussed with and appraised by their supervisor.
- Evidence of attendance at a minimum of three regional/national/international academic meetings each year, with a description of the learning points attained.
- A record of continuing professional educational activities undertaken, other than the above, including locally organised educational opportunities.

- Copies of abstracts submitted and publications achievement during the trainee's career.
- Reports of three audits performed by the trainee (alone or as part of a team) during Training.
- Evidence of certification for courses claimed in the assessment framework.

An example of a suitable assessment framework is included in Appendix 5

### 3.4. DURATION OF THE TRAINING:

3.4.1 The recommended minimum training period as a neonatal specialist is 2 years (following common trunk paediatric training of 3 years) and it is strongly recommended that at least one year of training should be in a tertiary academic centre.

3.4.2 Training may include periods of attachment at other units for the acquisition of specific skills not available at the primary training institution.

### 3.5. MONITORING OF TRAINING

3.5.1 The neonatal programme director will designate a neonatologist teacher as mentor or supervisor to each trainee at the beginning of the training programme. The mentor, with or without the programme director, provides advice to the trainee on important training issues and reviews the trainee's progress at least at yearly intervals.

3.5.2 The trainee maintains a personal portfolio (including the assessment framework) as described above, where she/he documents relevant training experiences. This portfolio and the trainee's progress through various levels of competency are regularly reviewed by mentor and trainee (we suggest 3 monthly intervals). Successful achievement of competency is certified by the neonatologist teacher. Accompanying the assessment framework, the certification should be detailed and state

- The duration of training,
- The centres in which the trainee received education,
- Describe acquired knowledge and skills, and accurately quantify extent of theoretical and practical experience accumulated by the trainee over and above that recorded in the assessment framework.

3.5.3 We recommend that each national body maintains a register of trainees and provides or is provided with suitable certification of satisfactory training. Furthermore we recommend that national bodies develop systems for the regular review of neonatal training centres using suitable measures such as the minimum scheme recommended in Appendix 4.

## 4. OBLIGATORY PREREQUISITES FOR THE TRAINEE

The trainee must have completed core training in paediatrics: i.e. common trunk of a minimum of 3 years before commencing specialist training in neonatology.

## 5. TRAINING PROGRAMMES

### 5.1 Training Programmes

We recommend that institutions that wish to provide neonatal specialist training develop a prospectus detailing the proposed plan of for their training programme. This should include details of how experience in key or mandatory areas is to be obtained and in which units. Training programmes may comprise experience of more than one neonatal centre, indeed this is encouraged so that the trainee is exposed to different styles of neonatal care. For example the prospectus may indicate where the candidate will receive experience in fetal medicine or neonatal surgery if these are not available in the host institution.

### 5.2 Training Centres

Individual Training centres are defined by their ability to provide well supervised training content and the availability of teachers. Each training centre should seek accreditation as such from its national body. If this is not available the European Society of Neonatology, in collaboration with the Paediatrics Section of UEMS, will provide a scheme whereby such institutions may register their ability to train individuals centrally. Several institutions, located in close proximity, may contribute to a training programme. In such a case, one qualified individual must be designated as training programme director with overall responsibility for the offered program. The key features of a suitable training centre are set out in Appendix 3.

### 5.3 Trainers

5.3.1. Each neonatal training programme must identify a Programme Director. This individual will usually be a senior neonatologist in an academic centre and a committed teacher. The Director should have teaching experience, documented in form of a teaching assignment to a local university. The Programme Director is responsible for developing the prospectus for a training programme, for identifying, supervising and allocating mentors to trainees (the Director may undertake this role him/herself). He/she should also meet regularly with trainees and coordinate feedback for the training programme.

5.3.2. Mentors - These individuals should hold a staff neonatologist post at an accredited training Neonatal Intensive Care Unit. Such individuals should undertake continuing professional development to equip them with the necessary skills to undertake the role. They have a duty to the trainees under their supervision to meet regularly with the trainee, to make assessment of their competence and to act as an advocate for the trainee to ensure that the individual obtains the optimal training opportunity from the programme.

### 5.4. ACCREDITATION

For each country of the EU, a list of training programme, training centres and programme directors should be compiled and updated on an annual basis. This may be facilitated by ESN and, where such a national body is not in being, may provide a central registry for such a list. Each centre is defined by the available modules and teachers. Accreditation is given by the European Board of Paediatrics, based on recommendations of the national guidelines of the country. EAP ensures that the national guidelines of a European country meet or exceed the minimal requirements of the training programs and training centres as defined in section; 3 and 5.

## 6. EXAMINATIONS

At present there are no plans for a centrally administered examination to licence practice as a Neonatologist. Several European member countries currently have such certification and the training described in this document merely underpins this process and we anticipate these processes will be recognised. Certification of medical practitioners occurs on a national basis, which is not affected by this process. Individuals holding their national Certificate of Completion of Specialist Training (or equivalent) are eligible to work in other EU states. The process described in this document is intended to provide a framework whereby there may be confidence in the training of neonatologists in each member country.

## Appendix 1: BACKGROUND

The European Society for Paediatric Research (ESPR), founded in 1967, has member neonatologists in most European countries within and without the EU. According to its constitution, the purpose of the ESPR is "to advance paediatric research in Europe and to promote the interchange of ideas and information between investigators on subjects of importance for paediatrics". In view of developments in the EU, the Working Group of Neonatology (WGN), founded in 1988 in Oslo, has recognised the need to specify the minimum training requirements for the accreditation of neonatologists. It was also considered important to make recommendations about aspects of the institutions in which training should take place. The aim of this document is to set out recommendations for minimum postgraduate training in Neonatology and for an adequate infrastructure in the training hospitals. Until these recommendations are incorporated into national guidelines it is envisaged that there will be a transition period for each country during which the national programs will be adapted to the guidelines of the EU. As decided in the WGN-ESPR business meeting at Lyon on September 3, 1996, the first edition of this document was drafted by Dr. Michael Obladen, Berlin based on guidelines that were proposed by Prof. Marlow from Nottingham UK. This draft was presented for consideration by the Council of the WGN-ESPR, and was adopted by the European Board of Paediatrics (EBP) in the meeting on December 14 1996 in Brussels. Thereafter the manuscript was distributed over the European countries and comments and additions were incorporated. Based on the recommendations expressed during the meeting of representatives of paediatric subspecialties of the CESP/EBP in Helsinki 6 June 1998, the draft first edition was adapted to the uniform format of training curricula of all subspecialties. In 1997 the WGN-ESPR was recognised by the EBP as the representative organisation of all European neonatologists. In June 1998 Neonatology was given sub-section status by CESP.

The WGN was renamed as the European Society for Neonatology (ESN) in 2001 and following changes in the constitution of the ESPR in 2004 developed a new constitution in 2005 to accommodate the roles described above. The council of the ESN have led the rewriting of the curriculum in line with current practice and as a prelude to establishing a formal accreditation process for neonatal training programmes.

## Appendix 2: EUROPEAN COUNTRIES REPRESENTED IN ESPR

### EU Member Countries

Austria  
Belgium  
Cyprus  
Czech Republic  
Denmark  
Estonia  
Finland  
Hungary  
France  
Ireland  
Germany  
Greece  
Latvia  
Lithuania  
Ireland  
Italy  
Luxembourg  
Malta  
The Netherlands  
Poland  
Portugal  
Spain  
Slovakia  
United Kingdom  
Slovenia  
Sweden

### Non EU Member Countries

Croatia  
Macedonia  
Norway  
Russia  
Switzerland  
Yugoslavia  
Iceland  
Israel

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Dr. P. Stevens, Berlin

## Appendix 3: REQUIREMENTS FOR INSTITUTIONS OFFERING NEONATOLOGY TRAINING

This section describes features that are desirable for an optimal setting for a training centre for specialist Neonatology. It is realised that there are differences in care between the European countries so that this description comprises recommendations not obligations.

### The perinatal unit providing training

**Size of the unit:** At a Neonatology training institution the number of patients and their care must be of such a standard as to be able to meet the training requirements within the time set. The institution should provide care for a majority of the range of neonatal diseases and must admit at least 50 very low birth weight infants (less than 1500 g) per year. Specifically the trainee will be expected to demonstrate experience of primary care and/or resuscitation for at least 25 very low birth weight infants (less than 1500 g) including at least 10 extremely low birth weight infants (less than 1000 g). These details should be included in the assessment framework alongside the formal details signed off by the trainer in Appendix 5.

**Obstetrics:** A hospital offering training for neonatologists must be part of a perinatal centre: The institution, or one closely linked to it, must be equipped for prenatal diagnosis of fetal disorders, management, admission and delivery of pregnant women with maternal or fetal high risk disorders, facilities for receiving maternal and infant transfers, delivery and caesarean section room with facilities for resuscitation of the newborn infant.

**Other Specialities:** Each unit providing training in Neonatology should have defined lines of communication and access within the institution to specialist advice from the following: Neonatal surgery and anaesthesia, paediatric cardiology, paediatric respiratory medicine, radiology (including ultrasound), ophthalmology, laboratory services for clinical chemistry, microbiology, and haematology & transfusion, child development centre (clinical genetics, paediatric neurology and neurophysiology), paediatric nephrology, audiology and other surgical specialists (ENT, orthopaedics, neurosurgery). There should be access to necropsy by a trained perinatal/ paediatric pathologist.

**Staff in other departments:** Within each training hospital the following staff supporting neonatal intensive care must have training and expertise in the care of sick newborn infants and their parents: Radiographers, pharmacists, physiotherapists, neurophysiology staff, and social workers.

**Supporting staff:** Each unit providing training in Neonatology should have trained supporting staff to minimise inappropriate work which otherwise would be undertaken by nursing and medical staff. Examples are administrative, secretarial and clerical staff, medical technicians, audit assistants, and housekeeping staff.

### Neonatal Nursing Staff

All units providing training in Neonatology must have a senior nurse with neonatal experience and managerial responsibility, together with a designated nurse responsible for further education and in-service nurse training.

A nurse should not have responsibility for more than two infants receiving neonatal intensive care normally.

There are occasions when one nurse should be responsible for only one baby; for example, during admission, exchange transfusion, peritoneal dialysis or transport; and when a baby is particularly unstable (for example with severe pulmonary hypertension) or when dying. The need for one-to-one nursing cannot be predicted so there should always be at least one nurse available on each shift to fulfil this role.

A nurse should not have responsibility for more than four babies who are receiving special care.

The nursing establishment for each training hospital should be sufficient to allow for leave, maternity leave, sickness, study leave, staff training, attendance at multi-disciplinary meetings and professional development, without compromising the principles above.

### Neonatal Medical Staff

**Career grade doctors (Consultants):** There should be at least three trained and nationally accredited (if available) neonatologists on the staff of the hospital. Each unit should have one neonatologist who is designated as responsible for the direction and management of the unit. These responsibilities encompass the monitoring of clinical policies, practice and standards. This person would usually be an authoritative source of advice for managers on the care of newborn babies. There should be 24 hour cover by neonatologists whose principal duties are to the neonatal intensive care unit.

**Resident Doctors:** We recommend two tiers of staff are resident in a hospital providing neonatal intensive care continuously over a 24 hour period. In any unit providing training in Neonatology there must be 24 hour resident cover by neonatal trainees or doctors who have completed at least 1 year general professional training in paediatrics, which includes 6 months experience of neonatal intensive care. This doctor should be available for the intensive care unit at all times, and not be required to cover more than one hospital. In addition there will be a tier of qualified doctors in training (or nurses with advanced specialist qualifications) who provide continuous bedside supervision.

### Parents:

Parents should be actively encouraged to take part in the care of their baby.

Breast feeding should be actively facilitated. There should be comfortable, discreet areas dedicated for expressing milk and for breast feeding. Electric breast milk pumps should be widely available for all mothers, and there should be a system for home-loan of equipment.

In addition, there should be other facilities for parents such as bedrooms, a quiet room, a bathroom, facilities for making drinks, and a telephone.

Further support for parents should include the availability of social worker, religious adviser, bereavement counsellor, breast-feeding support staff, psychological / psychiatric advice, and community support after discharge from hospital

### Transport Services:

**Maternal transport:** The training hospital should make every possible effort to encourage maternal transfer of high risk pregnant women to the perinatal centre and to avoid the postnatal transfer of preterm or sick infants. Information documents for referring hospitals and pregnant women should be available, as well as prenatal transfer facilities for pregnant women.

**Neonatal transport:** Each training unit accepting neonatal referrals should have, or have access to, an appropriately staffed and equipped transport service. When a doctor or a nurse is absent from the unit whilst transporting a baby there must be satisfactory arrangements to cover their duties.

### Equipment:

Each unit providing training in Neonatology should have a policy prepared in consultation with the technical service centre and agreed with the hospital management. There should be a budget for the purchasing, maintenance, replacement and upgrading of equipment for neonatal care, which complies with national standards. Such a policy should also extend to appropriate record keeping for usage of equipment and quality assurance in keeping with good laboratory and clinical practice.

Each neonatal intensive care cot in a training unit should have available the following: Incubator or unit with radiant heating, mask and bag, ventilator with humidifier, syringe/infusion pumps, monitors for respiration, heart rate, blood pressure, transcutaneous or intra-arterial oxygen tension, oxygen saturation, and ambient oxygen. There must be access to equipment for resuscitation, blood gas analysis (on the neonatal unit, by unit staff), phototherapy, transillumination by cold light, portable x-rays, ultrasound scanning, expression of breast milk, transport (including mechanical ventilation), and instant photographs.

There must be access to a 24 hour laboratory service with micro-technique orientated to neonatal service needs.

### Quality assurance:

**Clinical protocols:** Each training site for Neonatology should have agreed written protocols for medical and nursing staff, which also contain details of practical procedures as resuscitation and management of extremely preterm infants. These protocols must be regularly reviewed through discussion and audit.

**Monitoring clinical practice:** There should be monitoring systems for short and longer term morbidity among survivors with plans for regular review; including protocols for cerebral ultrasound examination, screening and treatment for retinopathy of prematurity, and screening of high risk survivors for hearing loss. A minimum data set to form the basis of an annual report should comprise the following items, stratified by birth weight and gestational age: the number and duration of admissions should be classified according to international guidelines; the numbers of mothers and infants transferred to and from that maternity unit for care; mortality before 28 days and before discharge from hospital classified by cause; number of infants receiving ventilatory support and duration, post-mortem examination rate .

## Appendix 4: REFERENCES

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Appendix 5: DRAFT ASSESSMENT FRAMEWORK

Included separately