Recommended norms and standards for providing Essential Newborn Care in South Africa. Standards for clinical services, infrastructure, equipment, human resources, and infection control, clinical care, transfer and transport of newborns.
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INTRODUCTION TO RECOMMENDED STANDARDS

A standard is a statement about a desired and acceptable level of care. The standards for essential newborn care are derived from South African National and Provincial standards, global standards and the experience of senior clinicians working in neonatal care in South Africa for many decades.

We believe that they form a good baseline from which to work and would like to recommend that you use these standards as a starting point for the provision of essential newborn care. Your district or province may want to adjust the standards to your particular service.

1. ESSENTIAL NEWBORN CARE

Essential newborn care is the care required by all newborns in the first 28 days of life, if they are healthy, or if they are sick or small. It includes the care they require to prevent illness in the newborn period and later on in life. This care takes place at home, in clinics, and in hospitals. Some newborns require intensive or specialised care in a tertiary unit. We strive for equal access to essential and specialised newborn care.

1.1 ESSENTIAL MATERNAL CARE

A discussion on newborn care cannot leave out maternal care. If the mother is not well and has not accessed essential maternal services, the baby may be affected in the neonatal period and later in life. Essential maternal care includes

- Attendance at Antenatal Clinic from the first trimester of pregnancy and for at least 5 good quality antenatal visits
- Identification of high risk maternal and neonatal situations with access to appropriate care
- Recognition of HIV positive women, assessment and care of the mother including antiretroviral treatment or prophylaxis
- Recognition and treatment of syphilis
- Prenatal folate administration and adequate maternal nutrition
- Recognition and treatment of maternal illness, e.g. diabetes, pregnancy induced hypertension
- Prevention of prematurity and care of the mother in preterm labour to prevent Hyaline Membrane Disease in the baby
- Monitoring and care in labour to prevent foetal hypoxia and neonatal asphyxia
- Early referral of the mother to level II or III centres if a difficult maternal or neonatal course is anticipated
1.2 ESSENTIAL NEWBORN CARE SERVICES

1.2.1 NEONATAL RESUSCITATION AT BIRTH

Most babies will not need help to breathe, but 6 – 9% do and can be helped to breathe within 1 minute of birth.

Every clinic, casualty, emergency service and labour ward must be prepared for a baby at delivery, and ensure that the baby breathes within the first minute of life. All staff need training in Basic Neonatal resuscitation and need regular drills to ensure the skills are maintained. Basic essential equipment is required at every labour ward bed, and an advanced resuscitation trolley in the unit. Helping Babies Breathe, a training programme of the American Academy of Paediatrics is an example of training that should be rolled out to all staff. Advanced midwives and doctors require skill in advanced neonatal resuscitation.

1.2.2 ROUTINE CARE

Routine care at birth is all the care an apparently well newborn requires to be healthy. It excludes the care that is required for those identified as sick and small babies. Routine care happens in the maternal service at clinics, in labour ward, and postnatal ward, and is provided by these staff in concurrence with the mothers care.

In labour ward routine care is newborn resuscitation, triage of babies to identify those sick or small babies needing more care, initiation of breast feeding within 30 minutes of birth, administration of eye prophylaxis and administration of Vitamin K to prevent haemorrhagic disease of the newborn. The first dose of antiretroviral treatment to HIV exposed infants is given in labour ward. Documentation of care is in the maternal record.

In postnatal ward routine care includes a full assessment of the baby to detect and manage risk factors such as HIV, any predisposition for jaundice, and a thorough examination to look for illness and abnormalities. Babies’ room in with their mothers, there is no “well baby nursery". Additional screening may be done according to local protocols e.g. saturation measurement for cyanotic congenital heart disease and thyroid and hearing screening. Breastfeeding is supported for all babies, except in rare cases, where medically indicated, the mother will be assisted with formula feeding. Information is documented in the newborn section of the maternal record and the Road to Health Booklet. If well, the baby is referred to the Primary Health Care service for follow up on the third day.

A 3-day visit – either by the mother to the clinic, or clinic to the mother, is essential to support feeding, reinforce preventive care and further screen for jaundice and illness.

Routine care of the newborn is provided by the staff that provides the maternal care to the mother at primary health care facilities or hospitals. If risks or illness are identified, the baby is referred to the paediatric and neonatal service.
1.2.3 INPATIENT CARE OF SICK AND SMALL NEWBORNS

At birth babies are examined in labour ward and again in postnatal ward to assess the care they require. Babies who are less than 2kg as well as babies who are sick, e.g. have neonatal asphyxia, respiratory problems, infection or a major abnormality are admitted to the neonatal unit for further assessment and management.

Inpatient neonatal care is provided in the neonatal unit of a hospital. As most babies in South Africa are born in district hospitals, district hospitals need to have the services and a skilled team to manage sick and small babies. Certain babies require further care at regional and tertiary hospitals. Where possible, neonatal problems are anticipated in utero, so that the baby can be born at the appropriate level to receive the care they require.

About 10– 15 % of babies will require inpatient neonatal services. This is in the hospital Neonatal Unit. All hospitals must have a neonatal unit for sick and small babies, but not for well babies. This document refers to the Neonatal Unit that may be synonymous with, or inclusive of, the following terms, nursery, premature unit, NICU, KMC.

STANDARD INPATIENT NEONATAL CARE

Standard inpatient care is the care of a baby who has been identified as sick or small and referred to the neonatal unit for special care. It includes the care of babies who are less than 2 kilograms at birth, those that have asphyxia, infections or a congenital abnormality. Standard care includes Kangaroo Mother Care.

KANGAROO MOTHER CARE (KMC)

KMC is care to low birth weight and preterm babies, who have been stabilized in standard inpatient care, NICU or high care and are now ready to receive care in the Kangaroo position with their mothers. KMC is part of Standard Inpatient Care. The Kangaroo position provides, warmth, stability, nutrition and infection prevention to the low birth weight babies. All low birth weight babies once stabilized will receive KMC until the baby is well and big enough to be discharged home. The Kangaroo Mother Care Unit is part of the Neonatal Unit.

NEONATAL HIGH CARE

Neonatal High care is the care of sicker babies and includes those who require cardio respiratory monitoring, oxygen therapy of more than 40%, Nasal prong CPAP, those who have recurrent apnoea and convulsions, or who may need an exchange transfusion.

INTENSIVE AND HIGHLY SPECIALIZED CARE

Intensive care is required for babies who need mechanical ventilation, total parenteral nutrition, or who have a complex problem requiring further investigation and management or who have a neonatal surgical problem. Advanced care is a scarce resource, and much money can be spent on managing babies who are very small and immature, or whose long term outcome may be poor. Limiting care needs consideration and is discussed under referral. Essential care includes guidelines on which babies should access advanced care.
<table>
<thead>
<tr>
<th>Category of baby requiring care</th>
<th>ROUTINE CARE (RC)</th>
<th>STANDARD INPATIENT CARE (SIC)</th>
<th>HIGH CARE (HC)</th>
<th>INTENSIVE AND HIGHLY SPECIALISED CARE (NICU)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most Full term infants</td>
<td>Babies with</td>
<td>Babies with</td>
<td>Babies with</td>
<td>A need for assisted ventilation</td>
</tr>
<tr>
<td>Most low birth weight infants &gt; 2kg</td>
<td>• Low Apgars</td>
<td>• LBW &lt; 1500g</td>
<td>• Gestational age &lt; 32wks</td>
<td>Complex Surgical problems</td>
</tr>
<tr>
<td></td>
<td>• Congenital abnormalities</td>
<td>• Gestational age 32 – 36 wks</td>
<td>• Encephalopathy</td>
<td>Persistent hypoglycaemia</td>
</tr>
<tr>
<td></td>
<td>• LBW 1500 – 1999g</td>
<td>• Birth weight &gt;4000g</td>
<td>• Meconium aspiration</td>
<td>Cardiovascular problems</td>
</tr>
<tr>
<td></td>
<td>• Gestational age 32 – 36 wks</td>
<td>• Meconium staining</td>
<td>• Septicaemia / meningitis</td>
<td>Multisystem problems</td>
</tr>
<tr>
<td></td>
<td>• Birth weight &gt;4000g</td>
<td>• Wasting</td>
<td>• Recurrent apnoea</td>
<td>Problems requiring specialist intervention e.g. ambiguous genitalia</td>
</tr>
<tr>
<td></td>
<td>• Meconium staining</td>
<td>• Possible infection</td>
<td>• Moderate and severe respiratory distress</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Wasting</td>
<td>• Jaundice</td>
<td>• Convulsions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Possible infection</td>
<td>• Jaundice</td>
<td>• Severe jaundice</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Jaundice</td>
<td>• Simple neonatal surgical problems</td>
<td>• Simple jaundice</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Care provided</td>
<td>IN addition to routine care</td>
<td>In addition to routine and standard care</td>
<td>In addition to other neonatal care</td>
<td></td>
</tr>
<tr>
<td>Safe, clean delivery</td>
<td>• Maintenance of thermo-neutral environment.</td>
<td>• Cardio-respiratory monitoring</td>
<td>• IPPV, and advanced techniques for respiratory support</td>
<td></td>
</tr>
<tr>
<td>Apgar score</td>
<td>• Oxygen administration and monitoring</td>
<td>• Oxygen therapy &gt; 40% Head box</td>
<td>Total parenteral Nutrition</td>
<td></td>
</tr>
<tr>
<td>Basic newborn resuscitation</td>
<td>• Monitoring glucose and correcting abnormalities</td>
<td>• Nasal prong CPAP</td>
<td>Arterial catheterization</td>
<td></td>
</tr>
<tr>
<td>Initiation of Breast feeding at birth and further support</td>
<td>• IV Fluid administration</td>
<td>• Short term IPPV</td>
<td>Therapeutic cooling</td>
<td></td>
</tr>
<tr>
<td>Maintenance of warmth</td>
<td>• Tube feeding</td>
<td>• Blood transfusion</td>
<td>Advanced neurological monitoring</td>
<td></td>
</tr>
<tr>
<td>Emergency care before referral</td>
<td>• Bilirubin monitoring and Phototherapy</td>
<td>• Chest drains</td>
<td>Ultrasound and Echo-cardiography</td>
<td></td>
</tr>
<tr>
<td>Vitamin K, eye care, immunisation, cord care, measurement,</td>
<td>• Drug administration</td>
<td>• Exchange blood transfusion</td>
<td>Sophisticated diagnostic investigation</td>
<td></td>
</tr>
<tr>
<td>Examination of newborn</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Care to baby whose mother has HIV, TB or syphilis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skin to skin care and KMC</td>
<td></td>
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<td></td>
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</tbody>
</table>
2. HOSPITAL FACILITIES: NEONATAL UNIT AND MATERNITY

2.1 POSITION OF THE NEONATAL UNIT

The neonatal unit is ideally located as a stand-alone unit between the labour ward and postnatal ward. When making alterations to existing buildings, plan to incorporate as many of the elements of the service in one geographical area, but this may not always be possible. In most district hospitals the neonatal unit is located in the postnatal ward. This is acceptable if there is adequate space for all component of the unit. If there is inadequate air and oxygen supply or space, neonatal high care beds may be placed in the hospital high care or ICU.

2.2 SIZE OF THE NEONATAL UNIT

The number of deliveries in the catchment area that the hospital serves determines the projected size of the neonatal unit. A hospital requires 3 - 4 beds per 1000 annual deliveries to provide level I inpatient newborn care services. The delivery numbers include all the deliveries in the catchment or sub-district i.e. in the hospital, feeder clinics and home deliveries. An additional 2 – 3 beds per 1000 deliveries are required for high care and 0.5 beds per 1000 deliveries for intensive or highly specialized care. High care and intensive care are usually provided at regional (Level II) and tertiary hospitals (Level III).

The current shortage of regional hospital newborn facilities and staff, and difficulty in transporting babies mean that district hospitals in rural provinces, need to plan for some high care services.

Before planning the number of beds and configuration of the beds ask yourself a number of questions

✓ How many deliveries in the hospital, clinics and at home?
✓ Is the number of deliveries expected to increase or decrease over the years?
✓ Is there a regional hospital service in the district to refer high care patients or should we be planning for some high care beds?

Example:
If a district hospital delivers 3000 babies in a year the hospital will require (12 inpatient neonatal beds.

- 4 / 1000 x 3000 deliveries = 12 beds
We have used 4 not 3 per thousand deliveries, as home and clinic deliveries are probably about 20% of deliveries in South Africa. If the hospital also provides limited high care to the catchment population, the hospital may require an additional 1 per 1000 high care beds i.e. 3 additional high care beds.

- 1 / 1000 x 3000 deliveries = 3 beds
The hospital will require 15 inpatient neonatal beds.

Efficiency dictates that district hospitals should not have less than 9 beds or more than 24 beds. The following model is given as a guide to hospitals, based on the number of deliveries.

<table>
<thead>
<tr>
<th>Deliveries</th>
<th>Beds</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 2000</td>
<td>9</td>
</tr>
<tr>
<td>2000 – &lt; 3000</td>
<td>12</td>
</tr>
<tr>
<td>3000 – &lt; 4000</td>
<td>18</td>
</tr>
<tr>
<td>4000 – &lt; 5000</td>
<td>24</td>
</tr>
<tr>
<td>&gt; 5000</td>
<td>36</td>
</tr>
</tbody>
</table>

A hospital this size would usually be a Level II hospital
A regional hospital will require 4 inpatient beds for each 1000 deliveries in the sub-district and 2 inpatient beds for every 1000 deliveries in the whole district. If the hospital delivers 4000 babies they need 16 beds level 1 beds, and if the district delivers 20,000 babies, they need and additional 40 level II beds for the district. They thus need 56 beds. If the district hospitals are providing high care, they may require fewer beds.

Regional services are best planned as 36, 48 and 60 bed units. A 48 and 60 bed unit would also provide some intensive care service, but not neonatal surgery and highly specialized care, as the specialists required for this service are usually only at the tertiary hospital.

The beds in the neonatal unit are divided into Standard Inpatient Care (SIC), Kangaroo Mother Care (KMC), High Care (HC) and Intensive care (NICU). Lodger mother beds are needed for mothers not in KMC and not themselves admitted in postnatal ward.

In a district hospital approximately a third of beds will be HC, a third SIC and a third KMC.

EXAMPLES OF DISTRIBUTION OF BEDS

DISTRICT HOSPITALS

9 bed Neonatal Unit = 3 SIC beds + 2 HC beds + 4 KMC beds + (3 lodger mother beds)
12 Bed Neonatal Unit = 3 SIC beds + 3 HC beds + 6 KMC beds + (4 lodger mother beds)
18 Bed Neonatal Unit = 6 SIC beds + 4 HC beds + 8 KMC beds + (6 lodger mother beds)
24 Bed Neonatal Unit = 8 SIC beds + 6 HC beds + 10 KMC beds + (10 lodger mother beds)

REGIONAL HOSPITALS

36 bed Neonatal Unit = 4 NICU beds + 8 HC beds + 12 SIC beds + 12 KMC beds + (16 lodger beds)
48 bed Neonatal Unit = 6 ICU beds + 12 HC beds + 12 SC beds + 18 KMC beds + (24 lodger beds)
60 bed Neonatal Unit = 12 ICU beds + 12 HC beds + 24 SC beds + 12 KMC beds + (36 lodger beds)

2.3 CONFIGURATION OF THE NEONATAL UNIT

The design of the neonatal unit may depend on the space available to build or make alterations and the preferences of individuals. Whatever the opportunities or constraints the following should be considered. Work flow patterns should allow for efficient patient and staff movements.

- The need for constant surveillance of each bed from the nurses’ station.
- All sections of the neonatal unit in one physical area, including the KMC area where possible
- Area should be restricted to general traffic
- A dual corridor rather than a central corridor is ideal
- All mothers should lodge near the neonatal unit
- Babies partitioned into functional units of 4 – 8 babies per area.
- Access for mothers on wheelchairs
- Access for portable Xray and ultrasound machines
The neonatal unit includes a number of areas

**STANDARD INPATIENT (SIC) AREA**

The standard inpatient care area of the neonatal unit requires a minimum space of 5m² per bed. The service panel requires oxygen and suction and 6 plugs. Infants are usually nursed in a closed incubator or a bassinette. No more than 6 babies should be in one standard inpatient care area.

**KANGAROO MOTHER CARE (KMC) AREA**

In the KMC area babies are nursed skin-to-skin with their mothers in the KMC position. Each mother requires a bed, with 7.2 – 10m² of space. Each cubicle can accommodate 2-6 beds. A lounge and dining area with television, fridge, microwave and kettle help make the unit homely. Ablutions are required as well as a washing area with washing machine and tumble dryer.

Each KMC bed requires a service panel with lights, oxygen, and suction and 4 plugs. The KMC area is ideally adjacent to the neonatal unit with an inter-leading door. If the KMC unit is a distance away from the neonatal unit, it will require additional administrative and utility areas as well as an emergency resuscitation area.

**HIGH CARE (HC) AREA**

The high care area is for unstable babies e.g those requiring cardio-respiratory monitoring, on more than 40% head box oxygen and babies on CPAP. In a small neonatal unit there will be designated high care beds in the neonatal unit. In a larger neonatal unit, there can be a high care cubicle. High care beds require a space of 7.2 – 10 sqm and the service panel requires 6-12 electric plugs as well as medical air, oxygen, a blender and suction.

**INTENSIVE AND HIGHLY SPECIALISED CARE (NICU)**

Intensive care will be in regional and tertiary hospital only. Intensive care is for infants requiring IPPV, arterial catheterization, those that have complex medical problems and neonatal surgical problems. Each bed requires a minimum of 10-15 m² of space, and the service panel requires 12 - 24 plugs, 2 oxygen points, 2 air points and a suction point.

**ADMINISTRATIVE WORK AREAS**

**RECEPTION AREA**

Larger neonatal units require a reception area, which is the organisational centre for welcoming patients, and doing administrative work. The reception needs a work area for 2 to 4 people, telephones, computer and data points as well as storage space for stationary.
THE NURSING STATION AND UNIT OFFICE

The nursing station is situated so that patients can be seen and traffic controlled. Space is required for work stations appropriately equipped with computers and internet connections. Storage is required for records and stationary.

Larger units require a unit office and a doctor’s office with work a relevant number of workstations.

COUNSELLING ROOM

A counselling room where you can talk to parents and family about the child’s condition is needed. It should be comfortably and tastefully decorated. Smaller units may share a space with maternity.

STORAGE, UTILITY AND PREPARATION AREAS

Multiple storage and utility space is needed, large units need a separate room for each function whereas small units may combine space or utilise a cupboard. The following areas are required.

- A **lockable drug trolley or cupboard** to store medication.
- A **Clean utility area** to store consumables and supplies
- A **linen cupboard for clean linen and nappies**
- An **equipment store** to clean and keep equipment ready for use
- A **dirty utility area** for dirty linen, so that dirty linen can be removed without going through the neonatal unit.
- A **cleaners room** to place and keep cleaning materials
- A **milk preparation** or storage area. Smaller hospitals will have a 24 hour central milk kitchen, that can deliver the occasional formula that may be required, large units may have their own unit. If flash heat treatment is done, a milk kitchen is required. Larger hospitals may have breast milk banks.

NURSES AND DOCTORS REST AREAS

A rest room with comfortable chairs, lockers and a dining area with fridge, microwave and kettle are required for staff.

Regional hospitals and large units require a doctor’s overnight room for 24-hour medical officer cover. The overnight room should include a bed, table and chair, internet connection, television and en-suite bathroom.

FAMILY FACILITIES

Mothers who are no longer admitted to the postnatal ward or not providing KMC need rooms and facilities where they can lodge until their babies are ready to go home. The facility needs ablutions, a day room and laundry area.

A visitor’s lounge is required for family and visitors to support the mother. Comfortable chairs, hot and cold water are required.
ADDITIONAL FACILITIES

Mobile Xray facilities require storage and in bigger units a place to process the XRay.

An outpatient area for babies to be seen at follow up is required in bigger units.

A laboratory side room is required in larger units for blood gas analyser, microscopy and bilirubin measurement.

2.4. ENVIRONMENTAL DESIGN

2.4.1 HAND WASH FACILITIES

A hand washbasin is placed at the entrance to the neonatal unit and each baby should be within 6 metres of a hand washbasin, and there should be at least 1 basin for every 4 – 6 babies. The hand washbasin must have elbow operated taps and be large enough to contain splashing, but not be too deep. There should be no surrounding counter surface but space for soap, towel dispensers and trash receptacles.

2.4.2 ELECTRICAL NEEDS

The unit should have a 24 hour uninterrupted power supply, as well as a back up power supply.

In order to handle equipment each bed needs a number of central voltage stabilized outlets.

- Intermediate care beds: 4 – 6 per bed
- High care beds: 6 – 8 per bed
- ICU: 12 per bed
- KMC: 4 per bed

Each area should have 2 additional plugs for cleaning equipment and mobile X ray units.

The ward air conditioning ducted system on central supply and switched on permanently.

2.4.3 LIGHTING

Lighting should be carefully planned. Plan for the ability to have adequate procedure light as well as to achieve darkness. Each light must be individually switch controlled. The unit should have adequate daylight, and artificial light should be indirect, lights should be direct up to illuminate the ceiling. The newborn’s direct line of sight to the fixture should be protected to prevent retinal damage. Each bed requires a procedure light with adjustable direction, intensity and field size. Lighting should provide adequate skin tone recognition, usually a white light, and be free of glare. Light fixtures should be easy to clean.

2.4.4 FLOORING AND WALLS
Floor surfaces should be easily cleanable without use of chemicals, and be highly durable, impervious and jointless. Walls also need to be durable with washable paint or tiles. Walls should be white or light for skin tone recognition. Acoustic properties need to be considered for floors and walls to diminish noise.

2.4.5 WINDOWS

At least one source of daylight should be visible from the baby area. External windows should ideally be glazed to avoid heat gain or loss, and should be situated at least 0.6m from an infants bed to minimize radiant heat loss or gain.

2.4.6 VENTILATION AND TEMPERATURE

Temperature and humidity control in the neonatal unit is extremely important. The air conditioning system needs to be of the highest quality and must be one that has air-mixers so that the air coming into the room is at the right temperature, and hot or cold air is not blown across the babies. The air conditioning must be able to keep the temperature of the unit at between 22 and 26 degrees at all times. The air conditioner should supply 6 air changes per hour minimum, the humidity should be between 30 and 60%, there should be minimal draft and filtration should be 90% efficient.

2.4.7 SOUND CONTROL

Noise generating activities, phones, staff areas – should be away from the babies to reduce noise. The unit needs to be quiet and staff should be able to hear each other without raising their voice. Alarms should be appropriately set for new-borns and attended to immediately. Soft music may be played.

Walls, floors, sinks and ceilings can all be designed to absorb sound.

2.4.8 SECURITY

Careful consideration should be given to security, with access control to protect the security of the infants family and staff. Closed circuit television access can be considered.
EXAMPLE OF A NEONATAL UNIT DESIGN

12 Bed Neonatal Unit = 3 SIC beds + 3 HC beds + 6 KMC beds + (4 lodger mother beds)

24 Bed Neonatal Unit = 8 SIC beds + 6 HC beds + 10 KMC beds + (10 lodger mother beds)

(still to be inserted)
2.5 MATERNITY FACILITIES

2.5.1 CLINIC, COMMUNITY HEALTH CENTRE OR MIDWIFE OBSTETRIC UNIT.

Clinics, Community Health Centers’ or Midwife Obstetric Units’ require 1 labour ward bed for every 500 deliveries a year and 1 postnatal bed for every 300 deliveries per year. Most clinics deliver less than 500 babies a year, but they are usually designed to have 2 maternity beds for labour and postnatal care. A space of at least 10 – 12m² (3m x 3.5 – 4m) is required for each bed. Each service unit / bed requires oxygen and suction points, 2 electric plugs and 1 light. The room needs to have air conditioning.

A space for resuscitation of the newborn of 7.2m² per is required. There should be one resuscitation area for each labour ward bed, usually one per clinic. The resuscitare requires oxygen and suction points and 2 electric plugs.

A transport, or standard closed incubator is also required, should the infant be small and sick and need monitoring before transfer.

2.5.2 HOSPITAL MATERNITY FACILITIES

LABOUR WARD

Hospitals require 1 labour ward bed for every 500 deliveries a month. Each control panel requires Oxygen with a double flow controller and suction, 4 electric plugs and an extra electric plug for cleaning equipment. Air conditioning is needed. The space required per bed is 10 – 12m² (3m x 3.5 – 4m)

Each labour ward bed requires a resuscitare with basic resuscitation equipment and an advanced neonatal resuscitation trolley for every 6 beds. Theatres require a resuscitare with advanced neonatal resuscitation equipment. The theatre should be able to accommodate an additional mobile resuscitare in the case of twin deliveries. Regional and tertiary hospitals require medical air and oxygen in the labour ward high care area

For each resuscitation area there should be a transport incubator for the care of the small or sick baby whole waiting to be moved to the neonatal unit.

POSTNATAL WARD

Hospitals require 6 postnatal beds per 1000 deliveries per year. Standard care beds require 4 electric plugs per bed and a light. Space required is 7.2 – 10 m² per bed. The baby rooms in with the mother and can “lie in” with the mother or be in a bassinette next to the mother. Bathing facilities are not required for babies, neither is a transitional or well baby nursery area, as the baby should either be with the mother, or in the neonatal unit. If phototherapy is required this can be given next to the mothers bed.
3. EQUIPMENT AND RENEWABLE RESOURCES FOR NEONATAL CARE

Equipment is needed in the neonatal unit to assist in the care of newborns e.g.

- To administer oxygen, monitor oxygenation and provide ventilator assistance
- To administer feeds and fluids
- To monitor vital signs
- To provide warmth through an incubator or other source
- To monitor and manage jaundice

When purchasing equipment for the neonatal unit consider:

- The quantity required based on the current and projected bed space
- The electrical or mechanical requirements to operate the equipment
- Any pre-purchase installation requirements
- After sales support including installation, training, and immediate back up and repair
- Maintenance contracts for the equipment
- Consumables that the device will require in order to function, look at cost and availability and compare with alternative options
- Specifications required, and specifications of the item
- Durability of the item. An item may cost less than another item, but the durability of some items makes them more cost effective.
- The advice of paediatricians and neonatal nurses

Table 2 lists the equipment and consumable requirements. Calculate what you need for your facility.

Additional specifications for equipment, lists of manufacturers and prices are included in Appendix 2.
## TABLE 2: EQUIPMENT FOR NEWBORN CARE

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Labour unit and postnatal ward</th>
<th>Level I Neonatal Unit</th>
<th>Level II Neonatal Unit</th>
<th>Level III Neonatal Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Incubators, bassinets, and general neonatal equipment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closed incubator</td>
<td>1 per SIC bed</td>
<td>1 per SIC bed</td>
<td>1 per SIC bed</td>
<td></td>
</tr>
<tr>
<td>Bassinette (Washable)</td>
<td>4 per 1000 deliveries / month</td>
<td>1 per SIC bed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport incubator</td>
<td>1 per 3 LW beds</td>
<td>1 per SIC bed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overhead servo incubator</td>
<td>0</td>
<td>1 per HC bed</td>
<td>1 per HC/ICU bed</td>
<td>1 per HC/ICU bed</td>
</tr>
<tr>
<td>Heat Shield</td>
<td>0</td>
<td>1 per HC bed</td>
<td>1 per HC/ICU bed</td>
<td>1 per HC/ICU bed</td>
</tr>
<tr>
<td>Wall suction unit</td>
<td>1 per suction point</td>
<td>1 per suction point</td>
<td>1 per suction point</td>
<td>1 per suction point</td>
</tr>
<tr>
<td>Phototherapy units</td>
<td>1 / Health centre</td>
<td>1 per 2NNU beds</td>
<td>1 per 2 NNU beds</td>
<td>1 per 2 ICU and HC beds</td>
</tr>
<tr>
<td>Transcutaneous bilirubinometer</td>
<td>1 / Health centre</td>
<td>1 per NNU</td>
<td>1 per KMC and SC</td>
<td>1 per KMC and ICU</td>
</tr>
<tr>
<td>Electronic scale</td>
<td>1 per 6 LW beds</td>
<td>1 per NNU cubicle</td>
<td>1 per NNU cubicle</td>
<td>1 per NNU cubicle</td>
</tr>
<tr>
<td><strong>Equipment for respiratory support and oxygen therapy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ventilators (Complete)</td>
<td>0</td>
<td>1 – 2 for short term ventilation</td>
<td>1 per ICU bed</td>
<td></td>
</tr>
<tr>
<td>Nasal CPAP (Complete)</td>
<td>1 per HC bed</td>
<td>1 per HC bed</td>
<td>1 per HC bed</td>
<td></td>
</tr>
<tr>
<td>Head boxes</td>
<td>1 per HC and HC bed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulse oximeters*</td>
<td>1 per Health Centre</td>
<td>1 per HC beds</td>
<td>1 per HC beds</td>
<td>1 per HC / ICU beds</td>
</tr>
<tr>
<td>Oxygen flow meter</td>
<td>1 double per oxygen point</td>
<td>1 double per NNU bed</td>
<td>1 double per NNU bed</td>
<td>1 double per NNU bed</td>
</tr>
<tr>
<td>Oxygen blender</td>
<td>1 per HC bed</td>
<td>1 per 2 HC bed</td>
<td>1 per 2 HC bed</td>
<td>1 per 2 HC bed</td>
</tr>
<tr>
<td>Oxygen analyser</td>
<td>1 per 2 HC bed</td>
<td>1 per 2 HC bed</td>
<td>1 per 2 HC bed</td>
<td>1 per 2 HC bed</td>
</tr>
<tr>
<td>Apnoea monitors</td>
<td>1 per 2 HC bed</td>
<td>1 per 2 HC bed</td>
<td>1 per 2 HC bed</td>
<td>1 per 2 HC bed</td>
</tr>
<tr>
<td>Trans-illumination light</td>
<td>1 per NNU</td>
<td>1 per HC unit</td>
<td>1 per ICU unit</td>
<td>1 per ICU unit</td>
</tr>
<tr>
<td>Chest drain kit</td>
<td>1 per NNU</td>
<td>1 per NNU</td>
<td>2 per NNU</td>
<td></td>
</tr>
<tr>
<td>Fluid controllers and cardiac monitors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intravenous infusion controllers</td>
<td>1 per NNU bed</td>
<td>1 per NNU bed</td>
<td>1 per NNU bed</td>
<td></td>
</tr>
<tr>
<td>Multi-parameter monitors</td>
<td>1 per HC bed</td>
<td>1 per HC / ICU bed</td>
<td>1 per HC / ICU bed</td>
<td></td>
</tr>
<tr>
<td>BP monitor - portable</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Syringe pumps</td>
<td>1 per ICU bed</td>
<td>1 per ICU bed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equipment</td>
<td>Labour unit and postnatal ward</td>
<td>Level I Neonatal Unit</td>
<td>Level II Neonatal Unit</td>
<td>Level III Neonatal Unit</td>
</tr>
<tr>
<td>---------------------------------------------------------------</td>
<td>--------------------------------</td>
<td>-----------------------</td>
<td>------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td><strong>Other equipment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portable suction apparatus</td>
<td>1 per clinic 1 per labour ward</td>
<td>1 per Neonatal unit</td>
<td>1 per 6 beds</td>
<td>1 per 6 beds</td>
</tr>
<tr>
<td>Mobile X Ray</td>
<td>1 in the hospital</td>
<td>1 in the unit</td>
<td>1 in the unit</td>
<td>1 in the unit</td>
</tr>
<tr>
<td>Ultrasound machine</td>
<td>1 mobile with neonatal and echo probes available in hospital</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood gas analyser</td>
<td>1 in large hospitals</td>
<td>1 in the hospital</td>
<td>1 in the unit</td>
<td></td>
</tr>
<tr>
<td><strong>Resuscitation equipment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resuscitaire</td>
<td>1 per labour ward bed 2 per theatre 1 per postnatal ward</td>
<td>1 per unit</td>
<td>1 per unit</td>
<td>1 per unit</td>
</tr>
<tr>
<td>Self-inflating neonatal bag and mask and masks 00,0/1,2</td>
<td>2 per resuscitaire 2 per advanced resuscitation trolley</td>
<td>2 per advanced resuscitation trolley</td>
<td>2 per advanced resuscitation trolley</td>
<td>2 per advanced resuscitation trolley</td>
</tr>
<tr>
<td>Advanced Resuscitation trolley</td>
<td>1 per health centre 1 per 6 labour ward beds</td>
<td>1 per unit</td>
<td>1 per 6 HC / IC beds</td>
<td>1 per 6 HC / IC beds</td>
</tr>
<tr>
<td>Neopuff</td>
<td>1 per health centre 1 per 6 labour ward beds</td>
<td>1 per unit</td>
<td>1 per unit</td>
<td>1 per unit</td>
</tr>
<tr>
<td>Laryngoscope, straight miller blade size 00, 0, spare batteries and bulb</td>
<td>1 per advanced resuscitation trolley</td>
<td>1 per advanced resuscitation trolley</td>
<td>1 per advanced resuscitation trolley</td>
<td>1 per advanced resuscitation trolley</td>
</tr>
<tr>
<td>Endotracheal tubes</td>
<td>3 size 2.5, 3.0, 3.5 and 4.0 per resuscitation trolley</td>
<td>3 size 2.5, 3.0, 3.5 and 4.0 per resuscitation trolley</td>
<td>3 size 2.5, 3.0, 3.5 and 4.0 per resuscitation trolley</td>
<td>3 size 2.5, 3.0, 3.5 and 4.0 per resuscitation trolley</td>
</tr>
<tr>
<td>Introducer</td>
<td>1 per advanced resuscitation trolley</td>
<td>1 per advanced resuscitation trolley</td>
<td>1 per advanced resuscitation trolley</td>
<td>1 per advanced resuscitation trolley</td>
</tr>
<tr>
<td>McGills forceps</td>
<td>1 per advanced resuscitation trolley</td>
<td>1 per advanced resuscitation trolley</td>
<td>1 per advanced resuscitation trolley</td>
<td>1 per advanced resuscitation trolley</td>
</tr>
<tr>
<td>Suction catheters</td>
<td>Size 10 3 at each resuscitaire</td>
<td>Size 10 3 at each resuscitaire</td>
<td>Size 10 3 at each resuscitaire</td>
<td>Size 10 3 at each resuscitaire</td>
</tr>
<tr>
<td>Equipment</td>
<td>Labour unit and postnatal ward</td>
<td>Level I Neonatal Unit</td>
<td>Level II Neonatal Unit</td>
<td>Level III Neonatal Unit</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>--------------------------------</td>
<td>-----------------------</td>
<td>------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>Consumables</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oxygen tubing*</td>
<td>2 per oxygen point</td>
<td>2 per oxygen point</td>
<td>2 per oxygen point</td>
<td>2 per oxygen point</td>
</tr>
<tr>
<td>Nasal prongs*</td>
<td>2 neonatal / preterm per oxygen point</td>
<td>2 neonatal / preterm per oxygen point</td>
<td>2 neonatal / preterm per oxygen point</td>
<td>2 neonatal / preterm per oxygen point</td>
</tr>
<tr>
<td>Venturi’s*</td>
<td>1 full set per oxygen point in SC /HC</td>
<td>1 full set per oxygen point in SC /HC</td>
<td>1 full set per oxygen point in SC /HC</td>
<td>1 full set per oxygen point in SC /HC</td>
</tr>
<tr>
<td>CPAP circuit</td>
<td>4 circuits / machine available for reuse</td>
<td>4 circuits / machine available for reuse</td>
<td>4 circuits / machine available for reuse</td>
<td>4 circuits / machine available for reuse</td>
</tr>
<tr>
<td>Ventilator circuits</td>
<td>4 circuits / machine available for reuse</td>
<td>4 circuits / machine available for reuse</td>
<td>4 circuits / machine available for reuse</td>
<td>4 circuits / machine available for reuse</td>
</tr>
<tr>
<td>Neonatal saturation probes</td>
<td>2 per machine available for reuse</td>
<td>2 per machine available for reuse</td>
<td>2 per machine available for reuse</td>
<td>2 per machine available for reuse</td>
</tr>
<tr>
<td>Neonatal incubator probes</td>
<td>6 per incubator</td>
<td>6 per incubator</td>
<td>6 per incubator</td>
<td>6 per incubator</td>
</tr>
<tr>
<td>Infusion sets*</td>
<td>5 x 60 dpm set</td>
<td>5 x 60 dpm or Correct set for infusion controller</td>
<td>5 x 60 dpm or Correct set for infusion controller</td>
<td>5 x 60 dpm or Correct set for infusion controller</td>
</tr>
<tr>
<td>IV cannulas</td>
<td>5 x 24 and 22 G</td>
<td>Many 24 and 22 G</td>
<td>Many 24 and 22 G</td>
<td>Many 24 and 22 G</td>
</tr>
<tr>
<td>Dial – a – flow</td>
<td>5 per clinic</td>
<td>Infusion controllers are preferable</td>
<td>Infusion controllers are preferable</td>
<td>Infusion controllers are preferable</td>
</tr>
<tr>
<td></td>
<td>5 in labour ward, and postnatal ward</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumables for bilicheck</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iv fluids</td>
<td>10% Neonatolyte, N Saline, 10% dextrose 5% dextrose</td>
<td>10% Neonatolyte, N Saline, 10% dextrose 5% dextrose</td>
<td>10% Neonatolyte, N Saline, 10% dextrose 5% dextrose</td>
<td>10% Neonatolyte, N Saline, 10% dextrose 5% dextrose</td>
</tr>
<tr>
<td>Feeding equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breast pumps</td>
<td>Not recommended in clinics and hospitals as they are difficult to clean and sterilise. Express milk by hand into a cup</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equipment for flash heat treating milk</td>
<td>Nil</td>
<td>1 per 12 beds</td>
<td>1 per 12 beds</td>
<td>1 per 12 beds</td>
</tr>
<tr>
<td>2 plate stove, aluminium pots</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>200ml and 50ml feeding cup</td>
<td>4 per 10 deliveries</td>
<td>8 per bed</td>
<td>8 per bed</td>
<td>8 per bed</td>
</tr>
</tbody>
</table>

For consumable equipment, this is the number that must be available every day, ensure adequate stocks for this to happen.
4. HUMAN RESOURCES FOR NEWBORN CARE

Guidelines are given for nursing and doctor norms, as well as competencies and suggested training and learning.

4.1 NEONATAL UNIT NURSING NUMBERS

A neonatal intensive care should have 1 professional nurse per patient. It is acceptable to have one nurse for 2 patients.

A high care unit requires 1 Professional Nurse (PN) per 2 patients but one per 3 patients is acceptable. If you have one PN and one Enrolled Nurse (EN) for 4 babies this is also acceptable, as long as the EN is experienced in newborn care.

A standard inpatient care unit and KMC unit should have one PN for each 6 babies as well as one EN for each 6 babies. Having one PN to cover 12 standard and KMC babies during the day is acceptable, if there are 2 Enrolled nurses.

A neonatal unit requires a unit manager. In a smaller unit, the unit manager may be part of the staff complement, but in larger units an additional post is necessary.

To provide 24-hour cover every day for each nursing shift, 6 posts are required for each position.

4.2 NURSE SKILLS, TRAINING AND DEVELOPMENT

A diploma in neonatal ICU or paediatrics is recommended for the professional nurses in the intensive care unit and the unit manager.

As a minimum requirement PN’s should undergo in-service training in newborn care such as the one week LINC training and be engaged in self-study or an ongoing in-service training programme at the facility. e.g. Perinatal Education Programme.

Non-rotation of professional nurses in the neonatal unit is essential. Working in a neonatal unit requires specific skills, and nurses with a passion and interest in newborns are needed. Once you have found good nurses, develop their skills further, and do not rotate them.

4.3 DOCTORS

There must be a doctor responsible for the neonatal unit in the hospital. The doctor must do a daily ward round, and a problem round in the afternoon and evening. The larger the unit, the more of the doctors time will be spent in the neonatal unit. Large neonatal units with 18 or more beds require a medical officer to be present at all times during the day.

A regional hospital neonatal unit, requires a permanent medical officer to be allocated to every 18 babies, and a paediatrician to provide advice, support and training. A 24 hour paediatric medical officer cover for the neonatal unit is needed.
Doctors should have an interest in newborns, should have undergone as a minimum a neonatal resuscitation course and the 2-day LINC training, and should participate in on-going learning. Doctors at regional hospitals are encouraged to work towards a Diploma in Child Health.

### 4.4 SKILLS DEVELOPMENT

There are a number of competencies required to work with newborns and a number of ways to assist your health workers in acquiring these competencies. These are listed in the resource chapter and summarised here.

**ADVOCACY.**

Before embarking on any skills development ensure that staff are interested in newborn care, committed to learning, and want to further their skills. You can do this by introducing them to newborn care through advocacy materials, preparing topics and bringing in an outside expert to talk about newborn care.

**NEONATAL RESUSCITATION TRAINING**

Helping Babies Breathe (HBB) training is a basic resuscitation training required by all nurses and doctors who work in the maternity and neonatal unit. Doctors, advanced midwives and neonatal nurses should have skill in advanced neonatal resuscitation that can be achieved by sending them on a NRP course, or training your province provides. HBB training can be done on-site in each facility. Ongoing on-site drills and skills revision on neonatal resuscitation is required at facilities.

**BASIC NEWBORN CARE COURSES**

LINC has developed basic newborn care learning and training materials and suggestions for courses or in-service training.

A Module on Routine care can be taught as a one or two day course or as part of in-service training in the facility. The Routine Care assumes that participants have already done an HBB course. It is best that this learning is facility based.

Charts and modules that can be adapted to teach nurses, doctors and enrolled nurses cover the management of sick and small babies. A 5-day course schedule for nurses is provided that includes interactive adult learning and practical. This course can be run as a 5 day course, as self learning or as a facility based in-service training programme.

**DISTANCE BASED LEARNING**

There are a variety of distance based learning materials for nurses and doctors. The Perinatal Education Programme is such a course and can be used as self learning or group learning in a facility.
**FURTHER DIPLOMA TRAINING**

Various universities offer diploma training in Neonatal Intensive care or Paediatrics. Regional hospitals should arrange study leave for nurses to undergo this training. Doctors are encouraged to study for the diploma in Child Health.

**ATTENDANCE AT CONFERENCES AND UPDATES**

A variety of conferences are held every year, that will encourage learning. These include

1. Perinatal priorities conference
2. Biannual paediatric conference
3. Paediatric refresher course
4. Various updates

Guidelines, training materials and resources are attached. xxx

**MENTORING AND SUPPORTIVE SUPERVISION**

Clinical mentoring is an important way of learning, and traditionally this is how nurses, interns and junior doctors do most of their learning, from experienced colleagues. Many institutions have experienced a loss of skilled health workers, and health workers have not always kept up to date. In these instances, outside mentors can assist with skills development. More information can be found in Chapter 3.

**4.5 NURSING NORMS FOR MATERNAL CARE**

Newborn care starts during pregnancy! Pregnancy is about having a baby, and it is the responsibility of everyone involved – parents and health workers to do everything possible to ensure that, at the end of the pregnancy, there is a healthy baby. This also means that there must be a healthy mother.

The key to a good outcome of pregnancy is the care that the mother gets during pregnancy and labour. There must be sufficient staff available for this care to be provided.

All staff providing maternity care, from booking to discharge after delivery, must not be “rotated”. They must be permanently allocated, unless the staff member him or her self requests to be moved.

**MATERNITY STAFFING**

This staffing refers to hospital staffing of antenatal clinic, labour ward and postnatal ward. It does not include staffing for the neonatal unit. The maternity staff are responsible for the care of the mother in the high risk antenatal clinic, in the labour ward and in postnatal ward, as well as the routine care of the baby in utero, in labour ward and postnatal ward.

The neonatal unit requires a separate staffing, unless the hospital is very small and there are fewer than 1000 deliveries a year.
MIDWIVES

The staff establishment requires 16 midwives for every 100 deliveries per month. A unit manager, who is clinically involved, is needed in addition to this number. In order to have 1 nurse on duty 24 hours in the day, there must be 5 nurses on the staff establishment.

There should be an advanced midwife on duty 24 hours per day as part of this number – therefore at least 5 advanced midwives on the staff establishment.

ENROLLED NURSES AND ENROLLED NURSING ASSISTANTS

10 – 12 enrolled nurses per 100 deliveries per month are required on the staff establishment. This allows for 1 to be working in the labour ward and 1 to be working in the postnatal ward to provide 24-hour cover.

DOCTORS

There must be a designated doctor responsible for patient care in the maternity ward as his / her first responsibility. Doctors doing their community service year do not need to be “rotated”. They are medical officers as any other.

STAFFING FOR PHC CLINICS

Norms cannot be specifically provided for maternity care at PHC clinics as this is integrated into the work done a PHC facility. Many PHC clinics conduct fewer than 5 deliveries a month. Where clinics are bigger or there are health centres that do deliveries the same norm will apply for professional nurses, i.e. 16 midwives for every 100 deliveries a month.
Newborns are at high risk of acquiring infection, this is due to their immature immune system. They are usually protected from infection through exclusive breastfeeding, and limited contact with other individuals.

The neonatal unit or any facility predisposes the baby to infection. In this environment the baby is handled by many people, exposed to different surfaces and probes, and the integrity of their skin or mucous membrane may be broken by procedures. Most organisms are transmitted by hands onto the baby or equipment in the environment.

This guide applies to all levels but is intended mainly for level I and II facilities with units from 6 – 36 beds. Larger level II and Level III facilities may require additional infection control measures to be put in place.

**HAND WASHING IS THE SINGLE MOST IMPORTANT WAY TO PREVENT INFECTION.**

- Strict hand washing, before touching a baby
- Adequate soap, water and paper towels
- Prevent overcrowding
- Feed babies breast milk only
- Be obsessive with housekeeping and asepsis

**5.1 FACILITIES: SPACE, STAFFING, POLICIES**

**5.1.1 SPACE**

Infection is reduced if there is adequate space for nursing, and only a few people with clean hands touch the baby. Adherence to the norms and standards for staff and facilities that are outlined will prevent infection. The key factors that prevent infection are:

- Adequate space for each incubator or bassinette so that there is space for the mother, the medical staff and the required equipment
- Having 4 - 8 babies per functional area, even without dividers, so that there is one hand wash basin for each 4 – 8 babies, and that the nursing staff work only with 4 – 8 babies each
- The unit is air-conditioned and that this is kept between 24 and 25 degrees Celsius
- Adequate ventilation in the unit
• Limit the number of people coming into the unit
• Swing doors, or no doors between sections to prevent having to handle doors

5.1.2 PERSONNEL

Personnel with airborne infections and skin infections should not work directly with patients until they are better.

Personnel should be allocated to patients not tasks, and should ideally not care for more than 6 babies.

Personnel should be immune to measles, rubella, and varicella.

Personnel should receive annual influenza vaccinations.

5.1.3 HAND WASHING FACILITIES

Hand washing facilities need to include

• A hand wash basin with elbow operated taps at the entrance to the neonatal unit
• Each cubicle of 4 – 8 babies to have a hand wash basin with elbow operated taps, and each baby should be less than 6 metres from a hand wash basin
• A hand washing poster with clear instructions posted above or next to each basin
• Antiseptic soap and clean disposable towels at each basin
• Alcohol hand spray
• A peddle operated refuse bin at each basin

5.1.4 ISOLATION

• Most infections in newborns do not require special isolation precautions
• General newborn care measures will prevent transmission of most infections between newborns
• Examples of babies who may need special precautions are a baby with infective diarrhoea, RSV or staphylococcal skin sepsis. They can be nursed in a closed incubator, and a distance of 1 metre should separate them from other patients in the nursery.
• Babies who are deemed to have a serious infectious risk, e.g. varicella or measles require isolation outside the neonatal unit.
• No special restrictions should be applied to babies born outside the hospital. They should be treated the same as babies born in the hospital.
• If there is an outbreak of an infection, then the staff and babies involved in the outbreak are kept as a cohort in a single cubicle until discharge.
5.1.5 ADMISSION CRITERIA

Babies are usually born without infections and are gradually colonised by organisms from their mothers and the environment. Babies who have been home may be colonised by community-acquired organism that may be less problematic to treat than those with hospital acquired infections. There is no justification to excluding babies who come from home or other environments or nursing them in a separate area.

- All neonates irrespective of where they are born, or have been, are admitted to the neonatal unit
- Other “infected babies” can be nursed in a closed incubator with attention to infection control. These include babies with staphylococcal skin sepsis and possible RSV infection

Wash your hands before and after touching a baby

5.1.6 VISITING CRITERIA

Parents are free to visit at any time. They need to adhere to hand washing guidelines. Other visitors including grandparents, important care givers and siblings can visit for short periods, as long as they have no respiratory infection, wash their hands and the unit is not overcrowded.

5.1.7 Clothing

The routine use of gowns is of no proven value. Studies have shown that routine use of gowns does not reduce colonisation or infection in newborns

Personnel should wear comfortable short-sleeved clean clothes daily, and may choose to wear a uniform scrub dress or suit.

Doctors must remove white coats as they enter, as these may be contaminated from other areas in the hospital

Gowns are only used for sterile procedures, e.g exchange transfusion.

Lodger mothers should wear clean clothes every day.

5.2 CLINICAL PROCEDURES FOR INFECTION CONTROL

5.2.1 HAND WASHING

Wash hands for one minute on entering the neonatal unit

Wash hands for 30 seconds or do an alcohol rinse between touching each baby.
HAND WASHING PROCEDURE

- Roll sleeves to elbow
- Remove watch, bangle
- Use water and soap and wash hands in the following sequence
  - Palms and fingers in web spaces
  - Backs of hands
  - Fingers and knuckles
  - Thumbs
  - Finger tips
  - Wrists and forearms to elbows
  - Keep elbow lower than hands
- Close the tap with elbow, or with paper once hands are dry
- Dry hands with single use clean paper
- Discard in the peddle bin

When using alcohol hand spray, follow the same procedure

5.2.2 SEPARATE BASIC EQUIPMENT FOR EACH BABY

The following equipment and supplies should be assigned to a single patient and kept below the incubator or bassinette

- Stethoscope
- Tape measure
- Cotton wool swabs
- Swabs
- Thermometer
- Alcohol

Clean with alcohol between patients.

Keep records, files and X-rays on the nurses’ station, not on the incubator

5.2.4 SKIN AND UMBILICAL CORD CARE

Clean umbilical cord and umbilicus with 70% alcohol 4 times a day

5.2.5 MANAGING IVI INFUSIONS, OXYGEN, MEDICATIONS

- Change IV lines after 72 hours
- Change all vacolitres after 24 hours
- Label the bag with date and time of opening
- Change buretrols after 24 hours
- Change suction bottles after 24 hours
- Do not use humidification bottles unless the patient is getting nasopharyngeal oxygen.
• Change oxygen humidification bottles and water every day and replace with clean bottles, and sterile water daily.
• Change ventilator and CPAP circuits once a week
• Change nasal prongs and cannulas every 3 days
• Changed porthole cuffs every day or do not use
• Discard antibiotic vials after 24 hours
• Use syrups for one week after opening and then discard

5.3 CLEANING EQUIPMENT

5.3.1 SMALL EQUIPMENT

Wipe down swab container, injection and medicine tray each day with soap and water

Clean the following daily with spirits if used for the same patient

• Stethoscope
• Measuring tape
• Thermometer
• BP cuffs
• Radiant warmer probes
• Pulse oximeter

If used for different patients, wipe with spirits between patients.

Oxygen hood: wipe with soap and water each day, and clean with 0.5% chlorhexidene between patients and after 7 days

5.3.2 INCUBATORS AND BASINETTES

Clean incubators every day with a damp cloth soaked in mild detergent, don’t use chemicals or spirits

Clean incubators thoroughly with 0.5% chlorhexidene after use by a patient and after 7 days. Allow to dry before using.

Replace waterproof mattresses when waterproofing is broken

Disinfect basinettes daily using detergent solution or disinfectant solutions

5.3.3 OXYGEN TUBING AND RESPIRATORY CIRCUITS

If baby has had a gram negative infection discard oxygen tubing and respiratory circuits

OTHERWISE

• Clean oxygen tubing and respiratory circuits with soap and water
• Rinse with clean water
• Dry thoroughly by hanging to dry for 24 hours or blow dry with air or oxygen
• Pack and gas sterilise

OR

• Soak in hibiscrub (4% chlorhexidine gluconate) for 30 minutes
• Soak in Cydex (10% isopropyl alcohol) mixed with a bucket of water for 30 minutes
• Rinse in water, hang on a stand and allow to dry

5.3.4 CPAP GENERATORS AND NASAL PRONGS FOR CPAP

• Wash with soap and water to remove secretions, blood and dirt
• Rinse and dry thoroughly
• Pack
• Gas sterilise

5.3.5 HUMIDIFIER CHAMBERS

• Fill with sterile water daily
• After each baby or after one week, wash with soapy water, rinse, dry thoroughly
• Gas sterilise

5.3.6 INFANT FEEDING CUPS

• Wash and sterilise cups used for feeding
• Discard disposable syringes after use if used for feeding

5.4 HOUSEKEEPING

5.4.1 CLEANING

• Keep the nursery clean and dust free.
• Cleaning methods that minimise dust dispersal should be used.
• Have a housekeeping schedule
• Clean floors and horizontal surfaces once or twice daily with an EPA approved disinfectant. Phenolic solutions should not be used.
• Clean and dust windows and blinds weekly
• Clean from top to the bottom
• Ensure that a fresh bucket containing disinfectant solution is available at all times;
• Immediately clean up spills of blood or body fluid with disinfectant solution (0.5% chlorhexidine
• Dustbins should be washed daily with soap and water, and the bags changed daily or when full.
5.4.2 LINEN

- Wash linen at 60 degrees celsius and infected linen at 93 degrees celsius
- Clean linen must be available at all times
- Linen to be transported in covered laundry bags
- New linen to be laundered prior to use
- Contaminated linen to be placed in a yellow plastic bag and taken to the laundry twice a day

5.4.3 WASTE HANDLING

- Soiled nappies and medical waste to be collected 3 hourly after every feeding round
- Separate contaminated waste from non-contaminated waste
- Use a puncture proof container for contaminated sharps, and empty when 2/3 full

5.5 NOSOCOMIAL INFECTIONS AND OUTBREAKS

A presumptive epidemic is two or more babies with in a neonatal unit with the same condition at the same time. Strict control measures need to be put in place and monitored to resolve the problem.

- Isolate the baby and mother in a private room or place in a closed incubator
- Or place all babies with the same infection in the same room
- Or do not admit new babies to that room

When entering the room

- Wear clean gloves and change gloves after contact with infectious materials (secretions, gauze)
- Wear a clean gown when in contact with the baby
- Remove the gown and gloves after contact with the baby
- Wash hands when leaving the room
- Avoid touching potentially contaminated surfaces

- Reserve non critical equipment for use only with the infected baby

Review Compliance with infection control procedures.
Newborn care is to be provided according to set standards. These standards can be made into guidelines, protocols and policies for care. They require implementation strategies, training, support and monitoring.

Standard clinical guidelines have been developed in order to facilitate standard care. Hospitals need to adopt the national standard clinical guidelines. Adjustments to the guidelines may be made into protocols to facilitate local implementation of the guidelines.

Examples of standard clinical guidelines include

1. Standard clinical guidelines and EDL for Paediatric Care
2. LINC guidelines for district hospitals (Limpopo)
3. LINC Charts on routine care and the care of the sick and small newborn.

These guidelines are attached to the toolkit, in hardcopy and on the CDROM.

Tertiary units develop their own standard clinical guidelines. While these are not for use in district hospitals, we have included electronic versions of some of these guidelines for reference.

Support for the implementation of standard care is important. Ways to do this include

- Clinical support visits by a paediatrician
- Clinical audit
- Clinic supervision
- Record reviews
- Mortality audits
7. NEONATAL TRANSFERS

Referral of patient occurs in 2 directions:

A critically ill neonate referred from a district to a tertiary service eg: Neonate born at a district hospital requiring surgery for a congenital abnormality at a tertiary hospital.

A high risk neonate born at a tertiary hospital referred from a tertiary service once stable to a district hospital to receive Kangaroo mother care.

The decision to refer a patient should be telephonically discussed between the doctor from the referring hospital to the doctor at the receiving hospital.

For certain critically ill newborns transfer and referral may not be the best form of management. These newborns might be served better by providing comfort or palliative care at the birthing unit. Babies born at the extreme end of viability or with congenital abnormalities incompatible with survival are some examples.

In a situation where no bed may be available at the time of referral, on-going management of the neonate must be continued at the place of delivery in liaison with the specialist at the receiving hospital. It is the duty of the referring doctor to update the doctor at the receiving hospital of the patient’s condition. Transfer should happen once a bed becomes available.

The following guidelines are suggestions to facilitate the referral and transfer of the correct patient to the correct level of care. They may not be applicable to every district and province, and local guidelines for referral are necessary. There is inequitable access to standard care for newborns in South Africa and equity across provinces needs to be discussed.

7.1 FROM A CLINIC TO A LEVEL 1 DISTRICT HOSPITAL

Indications for referral to a district hospital are the same as for any baby referred to the neonatal unit from maternity and include the following

- Babies with Apgar scores less than 8
- Babies with birth weight < 2kg
- Baby with a priority sign or congenital abnormality
- Baby with a risk factor that cannot be adequate managed at clinic level

7.2 FROM A LEVEL I TO A LEVEL II HOSPITAL

Some of the indications for referral from Level I to Level II care.

- Babies with a birth weight of 1000g - 1500g who are unwell at DISTRICT hospitals
- Babies with Respiratory distress with saturations < 80% on Head Box oxygen at > 60% oxygen in head box, and CPAP is not available
- Baby with severe respiratory distress, grunting, severe in drawing and RR> 70
- The baby is receiving CPAP, and the inhaled oxygen is > 60% to maintain oxygen saturation at 88 – 92% or a baby on CPAP is having recurrent apnoea requiring mask ventilation.
• Baby with uncontrolled seizures
• Hypoglycaemia not responding to treatment in 1 hour
• Jaundice with bilirubin levels indicating imminent exchange transfusion
• Persistent vomiting
• Asphyxiated patients are not usually considered but some infants with a Thompson HIE score of 10 – 15, or Sarnat grade 1 – 2 may benefit from therapeutic cooling started within 4 hours of birth, if this service is available.
• Dysmorphic babies need to be seen by a paediatrician but this is not a reason for urgent transfer to a level II or level III hospital

7.3 FROM LEVEL I OR II TO LEVEL III HOSPITAL

Level 3 space is a limited, a costly resource, and not available in all provinces. The decision to refer a patient to a tertiary hospital must be discussed with the specialist in the NICU. Some patients e.g. patients with surgical problems such as gastroschis, will benefit from going directly to a tertiary unit. Some patients who may qualify include

• Failed CPAP if no ventilation is available at level II
• All VLBW requiring ventilation beyond 72 hours
• Congenital abnormalities requiring surgery
• Long term feeding problems requiring Total Parenteral Nutrition (TPN)
• Severe Persistent Pulmonary Hypertension (PPHN) requiring ventilation and inotropic support

When the bed capacity at the referral hospital has been reached, the receiving doctor will need to be involved to identify an alternative bed at the appropriate level of care. If no bed is available the patient may have to stay at the referring hospital until such time that a bed becomes available.

7.3 LIMITATION OF CARE GUIDELINES

“Limitation of care” is a decision to not offer active resuscitation or continued ventilation. It may include the limitation of escalation of care or withholding of antibiotics, oxygen and monitoring.

The decision to limit care is based on a combination of limited resources and expected long term outcome. These guidelines are subject to change depending on availability if resources and further information regarding the prognosis of the clinical condition. It is difficult to give absolute guidelines but it is important to recognize when the offered therapy is failing and the situation is now futile. It is critical to treat the patients and their families with the utmost respect and empathy and to accommodate baptism or other religious or cultural ceremonies where possible.

Preferably two named doctors should agree on a DECISION to limit care and it should be considered in the following scenarios

• Chronic IPPV > 14days and not steadily improving in the absence of a known treatable condition with expected good long term outcome
• Infants with Necrotising Enterocolitis (NEC) who fail conventional ventilation
• Multisystem disease and deteriorating after a week of treatment
• Congenital / Metabolic abnormalities with a known or expected poor outcome
• Chronic neuromuscular disorders with expected duration of ventilatory support > 30 days.
• Expected poor neurological outcome, eg: Bilateral grade 3 or unilateral grade 4 intraventricular haemorrhage (IVH) or unilateral periventricular leucomalacia (PVL) in the parietal / occipital regions
• Asphyxiated infants who do not establish sustained spontaneous respiration by 20 minutes of life or who have continuous, persistent profound bradycardia < 60bpm beyond 10 mins of life despite the usual, appropriate resuscitative measures (In the absence of reversible maternal medication influence)
• Severe Hypoxic Ischaemic Encephalopathy (HIE) ie: Sarnat grade 3 or Thompson HIE score 15 or more.
• Prolonged profound hypoxia / acidosis / seizures not responding to treatment within 6 hours (and metabolic disease unlikely).
In South Africa critically ill neonates are born at all levels of care. Where there is effective screening and referral of high-risk mothers antenatally to Level II or Level III services, these infants have a better chance of survival as they are delivered where there is a specialized neonatal unit staffed by specialist paediatrician or neonatologist.

Critically ill neonates who are born at a district facility have to be transferred to a secondary or tertiary centre and are dependant upon emergency transfers to a referral hospital. The neonatal outcome is directly related to efficient and rapid transport time, and the care that they receive before and during transport.

Vehicles for ground transport of neonatal patients have historically been general-purpose ambulances, with or without a transport incubator.

We need to work towards dedicated neonatal ambulance services, with vehicles fitted with specialized neonatal equipment and skilled neonatal trained emergency medical personnel to staff them.

There are two main components involved in the transport of a patient. These are:

### 8.1 THE REFERRAL SERVICE
The referral system consists of the personnel, vehicles, and protocols for transfer

#### 8.1.1 PERSONNEL
There are
- the personnel manning the office at the “ambulance” call centre,
- the clinical staff at the hospital
- the personnel manning the ambulance.

The call centre staff receive the call to fetch a patient and pass this on to the staff manning the vehicles. These calls are prioritised according to a list. Neonatal transfer should be high on the priority list. Clear protocols for transporting newborn infants, which include urgency must be in place and be available to the “ambulance” staff.

The ambulance personnel usually consists of the driver of the vehicle and a colleague who may, or sometimes may not, have had only basic first aid training. For transporting newborn babies, there is a need to have a person who has had training in the care of a newborn baby during transport.

The doctor at the receiving hospital is in the best position to advise the ambulance personnel on the urgency of transport and any special management which the baby could need during transport.

It is essential that all three categories of staff meet on a regular basis to discuss problems, develop protocols, and form plans to improve the service.

#### 8.1.2 MODE OF TRANSPORT
Ground ambulances are used for relatively short-distance transport when surface transportation is more efficient and often more rapid than air transport. It must also be used when climactic conditions preclude air transport.

Helicopter or fixed-wing airplane transport may be used for medium-distance transfers. They result in rapid transfer but are costly, and weather does not always permit their use.

8.2 CARE OF THE NEWBORN DURING TRANSPORT

COMMUNICATION

The doctor who has been looking after the baby should make a request for transfer of a sick baby to the receiving doctor. This should be as early as possible before the baby deteriorates. The most senior doctor should make the decision about referral.

The receiving doctor will

- Give advice on pre-transport stabilization prior to the arrival of the transport team.
- Decide whether transfer is appropriate.
- If indicated, authorizes or recommends a mode of transport.
- Advise the transport team on the care needed during transport.
- Inform the nurse in charge of the neonatal unit that the baby is being transferred in.

PRE-DEPARTURE STABILIZATION

The condition of the baby must be stabilised before transportation. The following aspects of care are essential for the baby:

- The baby must be kept warm.
- Ensure that the baby is getting sufficient oxygen. The oxygen saturation should be kept between 88 and 93% (preterm infant) or 94 – 96% (term infant).
- The blood glucose level must be maintained in the normal range.
- The baby must have a secured airway. This may mean endotracheal intubation.
- All the documentation (copies of all the patient notes, observation charts, and the results of special investigations) must be ready for the transport team when they arrive.

CARE OF THE NEONATE IN THE TRANSPORT ENVIRONMENT

PERSONNEL NEEDED

The most reasonable option is to have a suitably qualified paramedic as part of the transport team. This, in South Africa, is most often not possible.

The alternative is to send a qualified nurse with the baby. This usually results in the staffing of the referring hospital being depleted. The nurse also needs to be returned to her hospital. This is a far from ideal situation.
EQUIPMENT

The ambulance needs to have basic equipment for transporting newborns. This consists of:

- A transport incubator which can plug into the vehicle’s electrical system
- A source of oxygen, usually a cylinder, with a means of controlling the flow and the percentage being administered. The former is usually present on the cylinder gauge head, but the percentage administered will need venturis, if a head box is being used.
- A pulse oximeter (oxygen saturation monitor)
- A drip stand
- An IV infusion rate controller, or suitable alternative
- A place for the baby’s mother, and the accompanying health professional to sit.
- Adequate resuscitation equipment – a minimum of a bag and mask.
- Transport ventilators are available, and will definitely be needed if a baby needs to be ventilated on the way.

THERMAL CONTROL

Thermoregulation is vital to both morbidity and mortality in the critically ill neonate. Ways of keeping a baby warm during transport

- Transport incubator: The temperature of the baby must be checked ½ hourly and the incubator temperature adjusted according to the baby’s temperature.
- Using a polythene bag or “sheet”. This can be used even if the baby is in an incubator, as it reduces the heat loss from the baby.
- Keeping the baby in the KMC position. Unless there is a special reason for not being able to do this, it is a safe method of keeping the baby warm during transport. It will be essential to do this if a transport incubator is not available.
- The temperature of babies with HIE should be kept between 34 – 35°C for the duration of the transport.

VENTILATION AND AIRWAY MANAGEMENT

The first level of intervention is bag-valve-mask ventilation. This is acceptable for short transfers if transferred by unskilled transport staff. However, it is an unacceptable practice for prolonged airway management during transport.

If ventilation is needed or anticipated, the baby will need to be intubated with an endotracheal tube, before the journey, and a transport ventilator is required with personnel who can support ventilation.

MONITORING DURING TRANSPORT
Monitoring the vital signs of a neonate in an ambulance has its challenges. The following observations need to be done: Temperature, Respiratory rate, Heart rate, Oxygen saturation, IV line running correctly (Check drip site) These observations must be recorded and the record put with the babies documents.

ARRIVAL AT THE REFERRAL HOSPITAL

On arrival at the referral hospital, the baby should be taken directly to the Neonatal Unit, and NOT via the out-patient department or casualty. All the necessary observations must be commenced immediately on arrival. As soon as the baby has been settled into an incubator, the responsible doctor must be called to assess the baby. There should be a report back to the referring doctor by the receiving doctor within 24 hours of the baby arriving at the referral hospital. This should initially be by telephone, and a brief written note also sent.

8.3 QUALITY ASSURANCE

Regular meetings need to be held between the neonatal service and the transport service, and guidelines for monitoring quality assurance put in place.

8.4 THE CASE FOR A NEONATAL RETRIEVAL TEAM (NRT)

Paramedics, nurses and doctors, have the role of rapidly stabilizing critically ill newborn patients for immediate transfer. The services of a specialized neonatal transport team has been shown to be associated with reductions in hypothermia and acidosis, as well as reduced mortality in low birth weight infants.

A number of transport team configurations are used for neonatal transport. Critical care transport teams are not common in the public sector. However, in the private sector, the most common crew configuration is an experienced professional nurse working with a paramedic, and an emergency specialist or a doctor if required. However, in developed countries, many neonatal transport programs include a respiratory therapist as the second crew member because of airway management expertise. Adding a specialist to the team is very costly and South Africa has taken the route of providing advanced training for paramedics in neonatal conditions as a cost effective alternative.
9. REFERENCES


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