REPUBLIC OF KENYA

MINISTRY OF HEALTH

GUIDELINES FOR ESTABLISHING NEWBORN HEALTH CARE SERVICES

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Foreword

Kenya has achieved a significant reduction in mortality among children aged below 5 years, but neonatal mortality remains largely unchanged. The Kenya Demographic Health Survey (KDHS 2022) shows that the under-five mortality rate decreased from 52 to 41 deaths per 1,000 live births and the infant mortality rate decreased from 39 to 32 deaths per 1,000 live births. However, the neonatal mortality rate has declined at a slower rate and currently stands at 21 deaths per 1000 live births from 22 deaths per 1,000 live births in 2014. This rate is nearly twice the target of the Sustainable Development Goals (SDGs), which is12 deaths per 1,000 live births by 2030. We must make joint efforts to address the basic needs of the newborns and manage the common newborn conditions to achieve the SDG neonatal mortality targets.

The care of small and/or sick newborns must be built on quality maternal care and essential newborn care for all newborns, ensuring prevention of complications and improvement of outcomes. These high-impact, evidence-based and cost-effective strategies, when integrated and used as a care package, can save lives. Kenya has committed to implementing global strategies aimed at accelerating the reduction in newborn mortality, such as Every Newborn Action Plan (ENAP) and Every Woman Every Newborn Everywhere (EWENE), which aims to end preventable newborn deaths, reduce disability and end preventable stillbirths by 2030. One of the ENAP targets is the establishment of functional Level 2 newborn care units that can provide comprehensive care for small and sick newborns (including phototherapy and use of CPAP) in 80% of the Counties.

The Ministry of Health is mandated to provide policy and strategy leadership for service delivery and capacity building of health providers while county governments ensure quality service delivery. As counties endeavour to equip the county hospitals to provide different levels of newborn care, the Ministry of Health has developed norms and standards for newborn care.

The norms and standards for newborn care, therefore, target to operationalize the MOH document standards for improving the quality of care for children, including small and sick newborns. These norms and standards will be used to establish the care and services that newborns need. On behalf of the Ministry of Health, I call upon all the relevant stakeholders at the National and County Levels to prioritize and support the implementation of these norms and standards. This will contribute significantly to the scale up of the latest evidence based high impact newborn interventions in Kenya and improve the quality of newborn care, leading to better outcomes.

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Abbreviations

ABCD	Airway, Breathing, Circulation, Disability
AC	Alternating Current
ART	Antiretroviral Therapy
bCPAP	bubble Continuous Positive Airway Pressure
BP	Blood Pressure
BVM	Bag-Valve Mask
C/S	Caesarean Section
CAH	Congenital Adrenal Hyperplasia
CCHD	Congenital Cyanotic Heart Disease
CCTV	Closed Circuit Television
CDH	Congenital diaphragmatic hernia
CFL	Compact Fluorescent Light
CHX	Chlorhexidine
CME	Continuing Medical Education
CPAP	Continuous Positive Air Pressure
CT	Computed Tomography
dB	Decibel
DC	Direct Current
DDH	Developmental Dysplasia of the Hips
DSD	Disorder of Sexual Development
EBM	Expressed Breast Milk
ECG	Electrocardiogram
EEG	Electroencephalogram
ENT	Ear, Nose and Throat
EONS	Early-Onset Neonatal Sepsis
EPA	Environmental Protection Agency
EPALS	European Paediatric Advanced Life Support
Et CO2 Monitor	End-tidal Carbon dioxide
FFP	Fresh Frozen Plasma
FR	Flame Resistance
GA	Gestational Age
HBV	Hepatitis B Virus
HCWs	Health Care Workers
HEPA	High-Efficiency Particulate Air
HFNC	High Flow Nasal Cannula
HHHFNC	Heated Humidified High Flow Nasal Cannula
HIV	Human Immunodeficiency Virus
HMIS	Health Management Information System
HR	Heart Rate
HVAC	Heating, Ventilation, and Air Conditioning
ICU	Intensive Care Unit
IM	Intramuscular

IMDRF	International Medical Device Regulators Forum
IMNCI	Integrated Management of Newborn and Childhood Illness
INO	Internuclear Ophthalmoplegia
iNO	Inhaled Nitric Oxide
IP/OP	In- Patient, Outpatient
IPC	Infection Prevention and Control
IV	Intravenous
IVF	Intravenous Fluid
KDHS	Kenya Demographic Health Survey
KEPH	Kenya Essential Package for Health
KMC	Kangaroo Mother Care
KMPDC	Kenya Medical Practitioners and Dentist Council
KVA-	Kilo Volt-Amperes
LED	Light-Emitting Diodes
LMA	Laryngeal Mask Airway
LP	Lumbar Puncture
LW	Labour Ward
MCH	Maternal & Child Health
MCS	Multiple Chemical Sensitivity
MO	Medical Officer
MOH	Ministry of Health
MRI	Magnetic Resonance Imaging
MRSA	Methicillin Resistant Staphylococcus Aureus
NAR	Newborn Admission Record
NBU	Newborn Unit
nCPAP	nasal Continuous Positive Air Pressure
NEC	Necrotizing Enterocolitis
NEWTT	Newborn Early Warning Trigger and Track
NG tube	Nasal Gastric Tube
NICE	National Institute for Health and Care Excellence
NICU	Newborn Intensive Care Unit
NSVD	Normal Spontaneous Vaginal Delivery
OEM	Original Equipment manufacturer
OG tube	Oral Gastric Tube
OPD	Outpatient Department
pCO2	Partial Pressure of Carbon Dioxide
PCR test	Polymerase Chain Reaction
PHC	Primary Healthcare Centers
PICC	Peripherally Inserted Central Catheter
PMTCT	Prevention of Mother-To-Child Transmission
pO_2	partial Pressure of Oxygen
POCUS	Point-of-Care Ultrasound
PPE	Personal Protective Equipment
RBC	Red blood cell
RDS	Respiratory Distress Syndrome
RH	Relative Humidity

ROP	Retinopathy of Prematurity
RR	Respiratory Rate
SCD	Sickle Cell Disease
SDGs	Sustainable Development Goals
SOPs	Standard Operating Procedures
SpO2	Saturation of Peripheral Oxygen
SSNBs	Small and Sick Newborns
TOBY	Total Body Hypothermia for Neonatal Encephalopathy Trial
TPN	Total Parenteral Nutrition
TST	Temperature Steam Time
UAC	Umbilical Artery Catheter
UPS	Uninterrupted Power Supply
US	Ultrasound Scan or Ultrasonography
US FDA	United States Food and Drug Administration
UVC	Umbilical Venous Catheter
Y/N	Yes/No

Introduction

Globally, neonatal deaths contribute to approximately 47% of under 5deaths (1). In Kenya, neonatal deaths account for 51% of under five deaths and 66% of infant deaths (2). Over the years, Kenya has achieved a significant reduction in mortality among children aged below 5 years. However, neonatal mortality has remained largely unchanged. The Kenya Demographic Health Survey (KDHS) 2022 shows that the neonatal mortality rate has decreased at a slower rate and currently stands at 21 deaths per 1000 live births from 22 deaths per 1,000 live births in 2014. This rate is nearly twice the target of the Sustainable Development Goals (SDGs), which is 12 deaths per 1,000 live births by 2030.

Kenya is among the countries required to accelerate the reduction of neonatal mortality by at least fivefold to achieve the SDG target by 2030(1). Serious concerted efforts must therefore be made to address the basic needs of the newborns and manage the leading causes of newborn mortality.

Simple, evidence-based, preventive and promotive high-impact interventions remain the cornerstone in tackling newborn morbidity and mortality. The care of small and sick newborns (SSNBs) must build on quality maternal care and essential newborn care, which will prevent complications and improve outcomes. The provision and delivery of essential newborn care services, as well as the care of small and sick newborns in the existing health facilities can be improved through standardization at each level of care.

Universally, newborn health care is classified into three levels, level I, II and III, with the services offered at each level highlighted in table 1 below. Kenya has adapted these levels of newborn care. Level I newborn care corresponds to essential newborn care (immediate and subsequent care), which is the basic newborn care that should be provided to all newborns including the SSNBs. However, Kenya has classified Level II newborn care into two categories, Level II A and level II B. Level II A corresponds to inpatient care for small and sick newborns, including the use of CPAP, while level II B will offer transitional advanced life support in addition to the care provided in level II A e.g. short-term ventilation for less than 7 days as a newborn awaits transfer to level III3. Level III newborn care refers to intensive newborn care services that include mechanical ventilation and advanced feeding support e.g. parenteral nutrition.

Health facilities that provide care for newborn infants should be classified based on functional capabilities and these facilities should be organised within a regionalized system of perinatal care. The three levels of newborn care should be embedded in the Kenyan health system which is organised into six levels of care (level 1 to 6). Level 1 corresponds to community health units; level 2 corresponds to dispensaries and level 3 corresponds to health centres. Levels 4, 5, and 6 correspond to the primary, secondary, and tertiary referral facilities respectively (MOH 2018- 2023 Strategic Plan). For the Kenyan Standards of Newborn Care, Level 1 newborn care (essential newborn care) will be provided in all facilities where births take place (level 2-6). Level 2 newborn care will be offered in the primary, secondary and tertiary referral facilities (Level 4 to 6 hospitals). Level 3 newborn care will be provided at the secondary and tertiary referral facilities (level 5 and 6 hospitals).

The level of newborn care that should be offered at the various Kenya Essential Package for Health (KEPH) levels is summarized in table 1 below.

Table 1: WHO classification of newborn care and the adapted levels of Newborn Care in relation to KEPH levels

Level of care		Intervention per level	Level in relation to KEPH
Level I	**Level I** (Essential newborn care immediate and subsequent care)	• Immediate newborn care (delayed cord clamping, drying, skin to skin etc.) • Neonatal resuscitation • Breastfeeding -early initiation and support • Ongoing essential newborn care • Identification and referral of complications • Targeted care as needed e. g PMTCT of HIV	Level 1 (some components may apply) Level 2 (mandatory) Level 3 (mandatory) Level 4 (mandatory) Level 5 (mandatory) Level 6 (mandatory)
Level II	**Level IIA** (Special Newborn Care Unit)	In addition to the services provided in Level I, Level IIA should provide: • Thermal care including KMC for all stable neonates <2000gm • Assisted feeding and IV fluids • Safe administration of oxygen • Detection and management of neonatal sepsis with injection antibiotic • Detection and management of neonatal jaundice with phototherapy • Detection and management of neonatal encephalopathy • Detection and referral/management of congenital anomalies. • Initiate both prophylactic and rescue CPAP for all eligible newborns • Stabilize and transfer small and sick newborns who require Level IIB or III care	Level 3 may possible, Level 4 (mandatory) Level 5 (mandatory) Level 6 (mandatory)
	Level II B (Transitional advanced life support in addition to the care provided in level II A)	In addition to the services provided in Level IIA, Level IIB should provide: • Provision of parenteral nutrition for less than 7 days • Short term ventilation for less than 7 days. • Screening and treatment for retinopathy of prematurity • Exchange transfusion • Provide an appropriate transport system.	Level 5 (mandatory) Level 6 (mandatory)
Level III	**Level III** (Neonatal Intensive Care)	In addition to the services provided in Level IIB, Level III should provide: • Mechanical /assisted ventilation • Advanced feeding support (e.g. parental nutrition) • Paediatric survey for congenital anomalies • Screening and treatment for retinopathy of prematurity	• Level 5 (highly recommended) • Level 6 (mandatory)

The purpose of these norms and standards for newborn care is to support efforts of the Kenyan government (National and County levels), health care entrepreneurs and other stakeholders involved in planning and managing Facility Based Care for Newborns at the various KEPH levels.

The document outlines the services provided at the various levels of newborn care and provides the standards required (in terms of design/layout, infrastructure, equipment, supplies, human resource, guidelines, data entry tools, job aids and referral processes) to provide newborn care at these levels. It will serve as a ready-reference, a one-stop guide for the establishment of newborn care units and contribute to the standardization and expansion of newborn care in Kenya, hence improving the quality of newborn care in the country.

LEVEL I

ESSENTIAL NEWBORN CARE

Definition and Services

Level I newborn care corresponds to essential newborn care (immediate and subsequent care).

Essential newborn care is the care required by all newborns, including the small and sick newborns. It involves care given immediately at birth and the routine subsequent care given in the first 28 days of life. It is the care required to prevent illness in the newborn period and later on in life. This care should be provided in all health facilities where births take place.

Services For Level I Newborn Care (Essential Newborn Care)

1. Immediate care at birth (thorough drying, skin-to-skin contact of the newborn with the mother, delayed cord clamping, hygienic cord care, early initiation of exclusive breastfeeding).
2. Neonatal resuscitation.
3. Support for exclusive breastfeeding (including supporting use of expressed breastmilk for those who are unable to breastfeed).
4. Thermal care (Warm room, delayed bathing for at least 24 hours, rooming in, appropriate warm clothing, breastfeeding and warm transportation).
5. Routine care (Vitamin K, eye care, cord care, vaccinations and weighing.)
6. Newborn examination - in the first hour after delivery, within the first 24 hours of life, whenever the mother/ caregiver or healthcare provider has a concern and at discharge).
7. Prevention of mother to child transmission of HIV, syphilis and Hepatitis B.
8. Kangaroo Mother Care (based on the Kenya KMC guideline).
9. Assessment, management and referral of:
    a. Bacterial infections including treatment of Possible Severe Bacterial Infection (PSBI) where referral not possible*
    b. Jaundice
    c. Feeding issues
    d. Hypoglycemia
    e. Hypoxemia and Hypothermia
    f. Premature newborns less than 37 weeks gestation
    g. Congenital anomalies
    h. Low birth weight babies (<2500g)
10. Pre-discharge advice on mother and baby care.
11. Follow up post-natal care (within 48 hours, at 2 weeks, 6 weeks).

Infrastructure & Design Specifications for Level I

Rooms/ Areas Required for Level I newborn care include:

Table 2: Rooms/ Areas Required for Level I newborn care

Room	Design specifications	Equipment that should be in the room
A warm delivery room and/or theatre (25-28ºC)	• All delivery areas (labour room and theatres) should have a dedicated warm newborn area) • Floor area at least 20-30 sq ft for every delivery bed or operating table. • Central heating system or fixed heaters e.g. wall mounted heaters • Wall thermometer within the area to confirm the temperature • Away from draught of air • Have appropriate power connection with at least 4 power outlets for plugging in the resuscitation equipment. • Hand washing facilities with running water and liquid soap	• A trolley or storage cabinet for neonatal equipment and supplies. • Resuscitation tray with an updated checklist of the Relevant Airway, breathing, circulation and disability and emergency drugs (ABCD equipment and supplies listed in table 4 below)
Postnatal ward	• Size- 7.2-10m² per bed • Should be available in facilities that offer maternity services and will be found in level 3 to 6 KEPH levels. • All postnatal wards should have a dedicated newborn resuscitation and stabilization area/room. • Have provision for central heating system or fixed heaters • Ablution block that is easily accessible to mother. • Sluice room with running water and proper drainage • Hand washing facilities with running water and liquid soap	• A radiant warmer/ resuscitaire with a temperature probe • Resuscitation tray with an updated checklist of the relevant ABCD equipment and supplies (listed in table 2 below)
	• Should have a room dedicated to the care of stable sick newborns who do not require specialised newborn care, e.g. newborns completing antibiotics, to allow rooming in with their mothers.	• Cabinets for mothers. • Television (for health education).

KMC room	**Size** • Should be designated rooms within postnatal wards and should be in facilities offering maternity services (level 3 to 6 KEPH facilities). • Beds each occupying a floor space of at least 7.2 m² and/or recliner seats • Provision for central heating system or fixed heaters • Cabinets for mothers • Ablution block that is easily accessible to mother • Hand washing facilities with running water and liquid soap	• At least two beds • Television (for education)

Milk expression room	• Size - 6m²
	• Milk expression rooms should be available in all facilities offering inpatient newborn care.
	• They should have:
	  • Hand washing facilities with running water and liquid soap
	  • Storage cabinets for clean cups, bowls etc.
		• Milk expression/ feeding equipment decontamination area with sink and running water.
		• Comfortable Chairs with back rest
		• Tables

Counseling room	• Room size of 40m² with moveable seating • Privacy: A sound proof, quiet, private space, with adjustable, covered windows, near waiting room/ bathroom facilities. Entrances and exits must also be as private as possible to make clients feel protected. • Aesthetics: Calm blue/green based colour schemes with personalised comfortable spaces. Indoor plants and non- abstract artworks of nature/animals/ people. • Soft to bright adjustable lighting sources, ease of access to resources for therapist and clients. • Should have a separate office with adequate desk space. • Comfort: Suitable adjustable room temperature, fresh air, comfortable flexible seating options and natural light.	
Newborn prereferral care room	• See details below	

Newborn prereferral care room

All neonates <35 weeks or <1500 gram and sick neonates should be referred to a higher level (level *(Refer to section on referral)* newborn care facility within 30 minutes of stabilisation.

In the event that immediate transfer is not possible, subsequent care of the neonates (e.g. IVF, NG tube feeds, antibiotics, oxygen therapy, thermoregulation etc.) should be initiated immediately as the newborn awaits transfer.

There should be a newborn prereferral care room for stabilising newborn infants who are ill and those born at <35 weeks gestation until transfer to a higher level of care is feasible. The following are some minimum specifications for the room.

Table 3: Minimum specifications for prereferral care room and KMC room

REQUIREMENTS	SPECIFICATIONS
Dimensions	**Size 6-15 m2**
A. Electrical needs	• The room should have a 24-hour uninterrupted power supply, as well as a backup power supply. • To ensure this, an automatic switch generator with 25-50 KVA capacity and a servo stabilizer (3 phase) of the same rating is needed. • In order to handle equipment each bed needs 1-2 central voltage stabilized outlets per bed: 1 outlet should provide 5 amperes and the other should provide 15 amperes. • There shall be a minimum of 4 simultaneously accessible electrical outlets with UPS connection for individual beds. • Each area should have 1 additional plug for cleaning equipment. • The central supply should be able to power the air conditioning ducted system and be switched on permanently.

B. Lighting	Lighting should be carefully planned and every effort should be made to prevent direct intense light from reaching the infant's eyes since this is harmful to the developing retina. Light fixtures should be easy to clean.
	a. Daylight: At least one source of natural daylight shall be visible from all infant care areas. Where a window or skylight is provided, the following requirements shall be met:
	• Exterior windows in newborn rooms shall be:
	  • Glazed with a maximum U value of 0.50.
	  • Situated at least 2 feet (0.6 meter) from the infant bed.
	  • Carefully placed to avoid direct sunlight from striking the infant, IV fluids, or monitor screens
	  • Allow easy cleaning.

	b. Ambient lighting
	• Accurate colour rendering is important since perception of skin tones is critical; light sources should provide accurate skin-tone recognition.
	• Panel of lights with cool white fluorescent tubes, preferably Compact Fluorescent Light (CFL) or LED (light-emitting diodes) is recommended.
	• Lights should be:
	  • Adjustable in order to direct them upwards to illuminate the ceiling.
	  • As free as possible of glare or veiling reflections.
	  • Located so as to prevent direct light from reaching the neonate's eyes (including procedure lighting)

	c. Procedure lighting in baby care areas • Have adequate light for procedure lighting as well as adjustable to achieve darkness. • Each light should be individually switch controlled and adjustable • Procedure lights with adjustable intensity, field size and direction can help protect an infant's eyes from direct exposure and provide the best visual support to staff. • Procedure light that comes inbuilt with radiant warmers is often sufficient for procedures and no separate lights are required. Otherwise, can have portable procedural lighting (lamps)
	d. Illumination of support areas • Illumination of support areas within the newborn unit including the charting areas, medication preparation area, reception desk, and hand washing areas should be adequate. • Care must be taken to ensure that bright light from these locations does not reach an infant's eyes • In locations where infant care areas functions overlap (such as close proximity of the staff charting area to infant beds) with support area functions, separate light sources with independent controls so that the different needs of sleeping infants and working staff can be accommodated.
C. Sound	The acoustic conditions of the unit should favour clear and private communication for staff and families while promoting physiological stability, uninterrupted sleep and freedom from acoustic distraction for the newborn. • Sound levels in infant rooms shall not exceed an Leq of 50 dB and an L10 of 65 dB • Staff work areas, family areas, and staff lounge areas shall be designed to mitigate the combination of continuous background sound and operational sound of at least an Leq of 50 dB and an L10 of 75 dB. • If a refrigerator or freezer is located in the infant room or a hallway in open communication with it, the condenser and fan noise shall not exceed 40 dB. • Noise generating activities, phones, staff areas – should be away from the babies to reduce noise or have adjustable announcing signals.

	• Alarms should be appropriately set for newborns and attended to immediately. • Soft music may be played. • Walls, floors, sinks and ceilings can all be designed to absorb sound.

D. Floors and walls	Floor surfaces should be easy to clean and maintain, without the use of chemicals. It should be highly durable, impervious and jointless to minimise the ability to harbor bacterial pathogens.
	• Flooring material should be:
	  • Porcelain with a porcelain skirting of 10 cm in height. (alternative materials in the absence of porcelain are epoxy flooring, plastic or ceramic tiles)
	  • Resistant to degradation by ultraviolet light, bleach, hydrogen peroxide, and other exposure elements (including foot traffic)
	  • Have a light reflectance value not exceeding 30 percent.
	  • Able to minimise sound
	• Walls need to be:
	  • Covered with porcelain, alubond or ceramic tiles, or painted with a durable washable or anti-bacterial paint.
	  • White or light.
	  • Able to diminish noise.
	• Ceilings must be painted with a washable paint.

E. Furnishings	• Built-in and freestanding furnishings such as cabinets and carts, especially those in the infant care areas, should be easily cleanable with the fewest possible seams in the integral construction. • Edges exposed to impact should be rounded • Exposed surface seams should be sealed. • Furnishings should be of durable construction to withstand impact by movable equipment without significant damage • Metal surfaces should be free of rust and/or stains • Curtains are not allowed in the newborn care area.
F. Ventilation and Temperature	• Temperature and humidity control in the neonatal unit is extremely important. • The unit should be designed to provide an air temperature of 25-28° C. • The HVAC 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 conditioner should supply 6 air changes per hour minimum. • The humidity should be between 30 and 60% Rh. • There should be minimal draft and the filtration should be 90% efficient. • Ventilation in the unit should inhibit particulate matter from moving freely in the space and to minimise drafts on or near the newborn beds.

	• General ventilation can be provided in two ways: exhaust-only and supply-and-exhaust. • Exhaust fans pull stale air out of the unit while drawing fresh air in through cracks, windows or fresh air intakes. • Exhaust-only ventilation is a good choice for units that do not have existing ductwork to distribute heated or cooled air. • Supply-and-exhaust ventilation is a good choice for units with heating or cooling ducts, as it is an inexpensive way of providing fresh air.
G. Security	The newborn care area shall be designed as part of an overall security program to protect the physical safety of infants, families, and staff. The room shall be designed to minimise the risk of infant abduction. • Limit the number of exits and entrances to the unit. • All rooms shall have self-closing devices on all room exit doors
H. Water Supply	Water Supply – The unit should have 24-hour uninterrupted running clean water supply. To ensure continuous water supply, it is useful to have a separate reserve tank with a capacity of ≥2000 L, which should always be full.
I. Signage and Art	Signage and art at the entrance and throughout the unit shall reflect the diversity of the community served and shall convey to families that they are welcomed and supported as essential to the care of their infants. This information shall be provided to families immediately after entering the newborn care area in languages and/or symbols understandable to the diverse communities served.

Equipment and Supplies

Equipment and supplies required for essential newborn care include warm chain equipment, resuscitation equipment and general equipment as per the table below:

Table 4: Equipment and supplies for level I newborn care

Warmth	• Functional resuscitaire/radiant warmer with a temperature probe • Central heating system or fixed heaters e.g. wall mounted heaters • Wall thermometer within the area to confirm the temperature (25-28ºC) • At least 2 dry towels/linen per delivery pack for every baby • Plastic wraps for preterm births (<32 weeks) • Thermal blanket
A (Airway)	• Suction device (penguin sucker and functional suction machine) • Appropriate suction catheters (Fr size 6-8)
B (Breathing)	• Self-inflating Bag size 200-300 ml with mask size 0,00,1,2 • Pulse oximeter with a neonatal probe • Clear face masks (for attaching to the self-inflating bag) sizes 00,0,1 • Neonatal nasal prongs and neonatal non-rebreather masks • Oxygen source (Piped oxygen, cylinder or concentrator) with backup oxygen manifold • Oxygen accessories: oxygen delivery tubes, humidifier, paediatric flow meter and regulator

C (Circulation)	• Neonatal /Paediatric stethoscope • Peripheral IV cannulas (26, 24) • IV paediatric/neonatal solusets
D (Disability & Emergency Drugs)	• Functional glucometer with strips (for point of care use) • IV 10% Dextrose • 50% dextrose/ 40% oral glucose gel dextrose for buccal application • IM Phenobarbital • IV Adrenaline (1:1000)
General equipment and Supplies	• Wall clock • Weighing scale • Length board (infantometer) • Head circumference measurement inelastic tape • Clinical, digital thermometer (32-43ºC) • Cord clamps • Nasal/Oral gastric (NG/OG) tubes (size Fr 4-8) • Feeding cups • Bowls for expressed milk • Syringes (2cc, 5cc, 10cc) • Patient identification tags. • Disposable diapers • Dried Blood spot kit for HIV PCR test • Crash cart (Emergency trolley)
IPC equipment, commodities and supplies	Each clinical area should have the following: 1. Gloves (sterile and clean gloves) 2. Hand sanitizer (alcohol based minimum 70%) at the entrance, nursing station, entrance to all the rooms and within the rooms 3. Clean running water 4. Liquid soap dispensers (at hand washing areas) with liquid soap at all times 5. Disposable hand towels (at hand washing areas) 6. Decontamination buckets (Plastic 20L each, minimum 4) 7. Appropriate disinfectants 8. Pedal-operated colour-coded bins (plastic) with appropriate bin liners 9. Sharps container (Puncture resistant and leak proof) 10. Alcohol swabs.

Pharmaceuticles and drugs

Commodities	Medicines for level one newborn 1. 10% Dextrose 2. 50% dextrose (strictly for buccal glucose administration – not for IV use in neonates) /40% buccal glucose gel. 3. Water for injection 4. First-line antibiotics (crystalline penicillin / gentamicin) 5. Vitamin K (neonatal formulation of 2mg) 6. Chlorhexidine digluconate 7.1% gel 7. Tetracycline Eye Ointment (1%) 8. Immunisation commodities

Human Resource

- At least one qualified healthcare provider (nurse, midwife, medical doctor, clinical officer) competent in newborn resuscitation should be dedicated for the newborn at every delivery.
- All healthcare providers working in childbirth areas, postnatal, MCH, and OPD should be trained on the 5-day essential newborn care training package.
- All health care providers working in areas providing essential newborn care should receive mentorship on essential newborn care.
- All health care providers working in areas providing essential newborn care should receive refresher sessions at least once in 12 months.

For KMC rooms,

- At least 1 Nurse/midwife for every 6-8 KMC occupied beds per shift.
- There should also be at least 1 Doctor/Clinical Officer and 1 Nutritionist assigned per shift.
- In all settings, and on every shift, there should be at least one support staff to clean the newborn care areas/ rooms.

Guidelines and Relevant Tools

Level I newborn care Guidelines and Relevant Tools

Guidelines

- National guidelines for quality obstetric and perinatal care
- Essential newborn care guidelines
- KMC clinical implementation guidelines
- Guidelines for the use Chlorhexidine for Cord care
- PMTCT guidelines
- ART guidelines
- Baby Friendly Hospital Initiative guidelines
- IMNCI guidelines
- National IPC guidelines
- Basic Paediatric Protocol Comprehensive newborn care protocols - to be availed everywhere

Job Aids

- Newborn resuscitation
- Cord care
- KMC
- Hand washing
- Breastfeeding positioning and attachment
- Breast milk expression
- Danger signs
- PMTCT
- Apgar Score
- Ballards Score
- Antibiotics and emergency drugs dosing charts
- Waste Segregation
- Equipment decontamination
- Management of hypoglycemia (including 50% buccal dextrose)
- Preparing 10% from 50% dextrose

Tools

- In-patient maternity file
- MOH 216 handbook (MCH)
- Birth defects Assessment chart
- Birth notification (B1)
- Death notification (D1)
- Neonatal death review form (MOH 527)
- MOH 333 Maternity register
- KMC (MOH 374) register
- MPDSR
- MOH 710 summary (immuni- zation)
- MOH 711 summary (Interven- tions)
- Referral form
- Transfer form

Others

- SOPs (National)
- Manufacturer's instructions

LEVEL II A

(SPECIAL NEWBORN CARE UNIT)

Definition, Services and Criteria for Admission

This is a unit that provides care for sick term and preterm infants ≥ 32 weeks and/or and a birth weight ≥1500g as well as continuous care for recovering neonates transferred back from Level IIB and Level III centres.
In addition, the unit should be able to:

- Manage small and sick newborns who do not require Level IIB or III care
- Initiate both prophylactic and rescue CPAP for all eligible newborns
- Stabilize and transfer small and sick newborns who require Level IIB or III care

Services For Level IIA Newborn Care (Special Newborn Care Unit)

In addition to all the services provided at level I, the following should be offered:

1. Screening for ROP
2. Hearing screening
3. Management of referrals from level I
4. Management of recovering neonates from level IIB and III
5. Jaundice requiring phototherapy.
6. Standard risk assessment for all newborns.
7. Managing sick newborns that can be managed at level IIA care
8. Assisted feeding and intravenous fluids
9. Detection and management of the following congenital anomalies:
   - Minor congenital anomalies based on WHO definition
   - Major congenital anomalies with no available treatment e.g. anencephaly
   - Other major congenital anomalies that can be managed at level IIA care
10. Pre-referral stabilisation and referral services
11. Prophylactic or rescue CPAP for all eligible newborns.

Criteria for admission of neonates at Level IIA

- Preterm infants ≥ 32 weeks
- Infants of diabetic mothers
- Affected infant born from a high-risk pregnancy or complicated delivery
- Respiratory distress not needing assisted ventilation.
- Low birth weight (LBW) ≥1.5 kg
- Hyperbilirubinemia needing phototherapy
- Neonatal sepsis
- Provide care to newborns recovering from IIB and III

Infrastructure & Design Specifications

Layout:

Location

- Should be proximal to the delivery room and maternity theatre.
- Units receiving infants from other facilities should have ready access to the hospital's transport receiving area and a designated space for transport equipment.
- Away from human traffic.

Size

- Must not be less than 12m² per room and at least 4m² for each baby.

Bed capacity

The size of the unit is primarily influenced by the total number of births occurring in the health facility each year. As a general guideline, 3 to 4 beds should be allocated for every 1,000 deliveries annually, with an additional 30% of that number to accommodate babies referred from outside the hospital. This approach aligns with international recommendations (1,2), although adjustments may be made based on local needs and available resources.

Example Calculation:
For a hospital with 3,000 deliveries per year:
• Beds for inborn (intramural) babies:
3/1000×3000=9 beds
• Beds for out born (extramural) babies:
30%×9=3 beds
• Total required beds:
9+3=12 beds

In addition to these, beds for Kangaroo Mother Care (KMC) should be included as per the National KMC Guidelines (3). A proportion of the KMC beds should be equipped for immediate KMC (iKMC), including essential infrastructure such as oxygen outlets, space for CPAP machines, and monitoring equipment, as specified in the national standards.

As per the KMC clinical implementation guidelines 2023 a level 5 facility (Level IIB newborn care facility) should have 10 iKMC beds and 20 KMC beds.

Administrative Areas

Table 5: Level IIA Special Newborn Care Unit Administrative Areas

Area	Specification	Equipment
Entrance to the newborn unit	• The neonatal unit should be clearly labeled	N/A
Reception area	• This is the organizational center for receiving patients and doing administrative work. • It should have a work area for 2 to 4 people, telephones and computers. • Families should have immediate and direct contact with staff when they arrive at the reception area. • The design should favour family-centred care (the area should contribute to positive first impressions for families and foster the concept that families are important members of their infant's health care team, not visitors). • Should have a handwashing area with signage to remind everyone on handwashing. • Should control traffic to the unit	Computers Telephone Printers Relevant furniture
Area for data clerk/ records personnel	Dimensions:15m² Storage is required for records and stationery	Desk, chairs, computer, cabinet
Doctor's Office	Dimensions: 36m². • It should be appropriately equipped with internet connection. • Storage is required for records and stationery	Desk, chair, computer, cabinet
Nurse in charge's Office	Dimensions: 36m². • It should be appropriately equipped with internet connection. • Storage is required for records and stationery	Desk, chair, computer, cabinet
CME Room	Dimensions: xx • Should be sound proofed if near NBU	Projection equipment, telemedicine facilities and public address system.
Simulation Room	Dimensions: 72m² • A room that can accommodate 10 staff and equipped with lockable storage areas among others.	Neonatal mannequins Resuscitation equipment Breastmilk expression simulators, Oxygen delivery devices, AIR device, Registers, Tables and chairs, Job aids, Tele-mentoring Equipment

Staff Lounge	Dimensions: 20m² • Should have toilets, rest room lockers, a dining area	Comfortable chairs, TV, lockers, fridge, microwave and kettle are required for staff.
Doctors On Call Room	Dimensions: 15m² • It is an overnight room within the newborn unit for 24-hour medical officer cover. • Should have lockable cupboard, Internet connection and en-suite bathroom	A bed, table and chair, TV.
Storage and Utility Areas	The following areas are required. • A drug preparation area with 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 • A dirty utility area for dirty linen, so that dirty linen can be removed without going through the neonatal unit. • An equipment store to keep clean equipment ready for use. • A cleaner's area to place and keep cleaning materials • A milk preparation and storage area with a dedicated fridge for expressed breast milk.	Drug trolley, Cupboards, Fridge for expressed breast milk

Patient Areas

Table 6: Level IIA Special Newborn Care Unit patient areas

AREA	SPECIFICATIONS	EQUIPMENT
The Nursing Station	Dimensions: 20m² • Prioritize central access to patients' rooms. • Space is required for work stations appropriately equipped with computers and internet connection. • Storage is required for records and stationery	Tables, chairs computers, cabinets
Hand Washing areas	• A hand wash basin is placed at the entrance to the neonatal unit and each baby should be within 6m of a hand washbasin, and there should be at least 1 basin for every 3 – 6 babies. • Handwashing stations shall be no closer than 0.9m from an infant bed. • Space shall also be provided for soap and towel dispensers and for appropriate waste receptacles. • Towel dispensers shall operate so that only the towel itself need be touched in the process of dispensing and constructed in such a fashion as to control noise. • The hand washing facilities should be large enough to contain splashing and not retain water, but not be too deep. • They should be wheelchair accessible points.	Have hand washing job aids displayed above all sinks. Soap and towel dispensers a Appropriate trash receptacles.

	• The hand washing sink should:
	  • Be 24" wide x 16" front to back x 10" deep (There should be no surrounding counter surface but space for soap, disposable towel dispensers and waste receptacles.
	  • Faucets must be operated by knee, elbow or pedal controls.
	  • Have adjacent walls that are constructed with non-porous /non-absorbent material to prevent growth of mold.
	  • Have no open floor drains.
	  • Have clean, adequate and consistent supply of hot and cold water supply.	

Milk Expression room	• Milk expression rooms should be available in all facilities offering inpatient newborn care • They should have hand washing facilities with running water and liquid soap	Chairs with backrest, Storage cabinets for clean cups, bowls etc. Milk expression/ feeding equipment, decontamination area with sink and running water. (should be separate from the hand washing facilities)
Counselling Room	• This is intended for counselling family members. Dimension: Size: • Ideal size: At least 23-28m² **Requirements of a counselling room** • **Privacy:** A sound proof, quiet, private space, with adjustable, covered windows, near waiting room/bathroom facilities. Entrances and exits must also be as private as possible to make clients feel protected. • **Aesthetics:** Calm blue/green based colour schemes with personalised comfortable spaces. Indoor plants and non-abstract artworks of nature/animals/people. • **Room Design:** Suitable room with moveable seating, soft to bright adjustable lighting sources, with ease of access to resources for therapist and clients. Separate office, desk space. • **Comfort:** Suitable adjustable room temperature, fresh air, comfortable flexible seating options, natural light.	• Moveable seating, soft to bright adjustable lighting sources, Separate office, desk • Stationery

Kangaroo Mother Area	• **Dimension:** 150m² KMC rooms are designated in close proximity with the delivery room/theatre areas and should be in close proximity with the newborn unit so as to support immediate KMC. • KMC rooms should have: • At least 10 beds • Beds each occupying a floor space of at least 7.2m² and/or recliner seats • Provision for central heating system or fixed heaters • Cabinets for mothers • Ablution block easily accessible to mother • Hand washing facilities with running water and liquid soap • Television (for both health education and entertainment) • Milk expression area with storage for the utensils, separate sink and fridge for storage	• Beds or recliner seats • Central heating system or fixed heaters • Cabinets for mothers • Audio vision for info-tainment • Storage
iKMC Room	In addition to the above specifications iKMC should have: • Each KMC bed in the iKMC room requires a service panel with lights, oxygen, and suction and 4 plugs	
Decontamination Area	**Dimension:** 12m² • There should be clear separations between soiled and clean areas • Decontamination work areas should be physically separated from clean and other work areas by walls or partitions to control traffic flow and to contain contaminants generated during the stages of decontamination • Walls or partitions should be constructed of materials capable of withstanding frequent cleaning with the cleaning and disinfecting products used in the health care setting. • Self-closing doors are recommended to restrict access and optimise ventilation control. • Doors should be pass- through, to ensure one-way movement by staff from contaminated areas to clean areas. • There should be adequate space provided for decontamination equipment and materials used for cleaning and reprocessing • Work surfaces and surrounding areas should be designed to minimise crowding of work space; • Work surfaces shall be flat, cut-resistant, seamless and composed of a non-porous material so they can be cleaned, disinfected and dried; stainless steel surfaces are recommended. • Counter tops should be waterproof and have a backsplash • There should be at least two adjacent decontamination sinks	• Deluge showers • Protective Equipment (PPE)

	• Decontamination sinks should:
	  • Be at a height that allows staff to use them without bending or straining;
	  • Be large enough to accommodate trays or baskets of instruments; Not have an overflow; and be equipped with water ports for the flushing of instruments with lumens, if appropriate.
	• There should be an area for donning or removing Personal Protective Equipment (PPE):
	• There must be easy access to hand hygiene facilities
	• There must be easy access to emergency supplies.
	• Eye-wash stations, deluge showers and spill equipment should be provided as necessary.
	• There should be an area for storage of dedicated housekeeping equipment and supplies.	

Changing room	**Dimension** • Have lockable cabinets, toilets and showers, bench	Benches, Lockers

Other Infrastructural and Design Specifications

Table 7: Level IIA Special Newborn Care Unit other infrastructural and design specifications

REQUIREMENTS	SPECIFICATIONS
Electrical Needs	• The unit should have a 24hour uninterrupted power supply, as well as a backup power supply. • The unit should be connected to an automatic switch/changeover generator with 25-50 KVA capacity and a servo stabilized 3 phase connectivity. • In order to handle equipment each bed needs 4-6 central voltage stabilised outlets per bed: 2-3 of them should be of 5 amperes and another 2-3 of 15 amperes. • Each area should have 2 additional plugs for cleaning equipment. • The central supply should be able to power the ward air conditioning ducted system and be switched on permanently. • Each room should be connected to a stable UPS room.
Internet Access	• There should be stable internet connectivity within the unit. Each patient bed should have a port for internet access.

Lighting	• Lighting should be carefully planned and every effort should be made to prevent direct intense light from reaching the infant's eyes since this is harmful to the developing retina. Light fixtures should be easy to clean.
	
	A. Daylight
	• At least one source of natural daylight shall be visible from all infant care areas, either from the infant care station itself, or from an adjacent area.
	• Where a window or skylight is provided, the following requirements shall be met:
	• Exterior windows in infant areas or infant rooms should be:
	  • Glazed with a maximum U-value of 0.50nm.
	  • Situated at least 2 feet (0.6m) from the infant bed.
	  • Carefully placed to avoid direct sunlight from striking the infant, IV fluids, or monitor screens and to avoid glare and heat loss
	  • Allow easy cleaning.

	B. Ambient lighting • Light sources should provide accurate skin-tone recognition. • The unit should be well illuminated with adequate daylight. Panel of lights with cool white fluorescent tubes, preferably Compact Fluorescent Light (CFL) or LED (light-emitting diodes) is recommended. • Lights should be adjustable in order to direct them upwards to illuminate the ceiling. • Light sources should be as free as possible of glare or veiling reflections. • No direct view of the electric light source or sun shall be permitted in the newborn space; this does not exclude direct procedure lighting, as described below. • Any lighting used outside the baby area shall be located so as to prevent any newborn's direct line of sight to the fixture.
	C. Procedure lighting in baby care areas • Plan for the ability to have adequate procedure light as well as to achieve darkness. • Each light must be individually switch controlled and adjustable • Temporary increases in illumination necessary to evaluate a baby or to perform a procedure should be possible without increasing lighting levels for other babies in the room. • Procedure lights with adjustable intensity, field size and direction can help protect an infant's eyes from direct exposure and provide the best visual support to staff. • The luminaire shall be capable of providing no less than 1000 lux at the plane of the infant bed, and must be framed so that no more than 2% of the light output of the luminaire extends beyond its illumination field. • Procedure light that comes inbuilt with radiant warmers is often sufficient for procedures and no separate lights are required. Otherwise, can have portable procedural lighting (lamps). **D. Illumination of support areas** • Illumination of support areas within the newborn unit including the charting areas, medication preparation area, reception desk, and hand washing areas should be adequate. • Care must be taken to ensure that bright light from these locations does not reach an infant's eyes • In locations where infant care areas functions overlap (such as close proximity of the staff charting area to infant beds) with support area functions, separate light sources with independent controls so that the different needs of sleeping infants and working staff can be accommodated.
Temperature And Humidity	• Temperature and humidity control in the neonatal unit is extremely important. • The unit should be designed to provide an air temperature of 25-28° C. • 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 conditioner should supply 6 air changes per hour minimum. • The humidity should be between 30% and 60% RH. • There should be minimal draught and filtration should be 90% efficient.

Sound	• The acoustic conditions of the unit should favour clear and private communication for staff and families while promoting physiological stability, uninterrupted sleep and freedom from acoustic distraction for the newborn. (Normal conversation is approximately 60 db and whispers is 30db). • Sound levels in infant rooms shall not exceed a Leq of 50 dB and an L10 of 65 dB • Staff work areas, family areas, and staff lounge areas shall be designed to mitigate the combination of continuous background sound and operational sound of at least an Leq of 50dB and an L10 of 75dB. • If a refrigerator or freezer is located in the infant room or a hallway in open communication with it, the condenser and fan noise shall not exceed 40 dB. • Noise generating activities, phones, staff areas – should be away from the babies to reduce noise or have adjustable announcing signals • Alarms should be appropriately set for newborns and attended to immediately. • Soft music may be played. • Walls, floors, sinks and ceilings can all be designed to absorb sound

Floors and Walls	• Floor surfaces should be easy to clean and maintain, without the use of chemicals. It should be highly durable, impervious and jointless to minimize the ability to harbor bacterial pathogens.
	• Flooring material should be:
	  • Porcelain with a porcelain skirting of 10 cm in height. (alternative materials in the absence of porcelain are plastic or ceramic tiles)
	  • Resistant to degradation by ultraviolet light, bleach, hydrogen peroxide, and other exposure elements (including foot traffic).
	  • Have a light reflectance value not exceeding 30 percent.
	  • Able to minimize sound
	• Walls need to be:
	  • Covered with porcelain or ceramic tiles, or painted with a durable washable or anti-bacterial paint.
	  • White or light.
	  • Able to diminish noise.
	• Ceilings must be painted with a washable paint.

Ventilation	• Ventilation in the unit should inhibit particulate matter from moving freely in the space and to minimise drafts on or near the newborn beds.
	• General ventilation can be provided in two ways: exhaust- only and supply-and-exhaust.
	  • Exhaust fans pull stale air out of the unit while drawing fresh air in through cracks, windows or fresh air intakes.
	  • Exhaust-only ventilation is a good choice for units that do not have existing ductwork to distribute heated or cooled air.
	• Supply-and-exhaust ventilation is recommended for units with heating or cooling ducts, as it is an inexpensive way of providing fresh air

Doors	• A minimum of 1200mm clear opening is recommended for doors requiring cot/ trolley access. • In addition to the security guard, entrance doors need to be secured to prevent unauthorized access.

	• Staff reception complete with door release button for staff access control. • Security surveillance of the unit should include CCTV cameras and monitors. • Special baby monitoring security tags system must be employed throughout the unit and all doors connecting to it; including fire doors, smoke doors, public and staff entrance doors. • Swing doors -hinged doors that can swing open in both directions (inward and outward) with a push, hands free with reduced touch points minimizing cross infection, quick movement and easy passage for bulky equipment.
Furnishings	• Built-in and freestanding furnishings such as cabinets and carts, especially those in the infant care areas, shall be easily cleanable with the fewest possible seams in the integral construction. • Edges exposed to impact should be rounded • Exposed surface seams shall be sealed. • Furnishings shall be of durable construction to withstand impact by movable equipment without significant damage • Metal surfaces should be free of rust and/or stains • Curtains are not allowed in the newborn care area.
Security	• The newborn care area shall be designed as part of an overall security program to protect the physical safety of infants, families, and staff in the newborn care area. The newborn care area shall be designed to minimize the risk of infant abduction. • Limit the number of exits and entrances to the unit. • All rooms shall have self-closing devices on all room exit doors • Closed circuit television access can be considered. • Panic buttons should be installed within staff areas and counselling rooms
Water Supply	• Water Supply – The unit should have 24-hour uninterrupted running safe water supply. • To ensure water supply, it is useful to have a separate reserve tank with a capacity of ≥ 5000 L which should always be full. • • Quality of water as per the Kenya management and coordination Water Quality regulations
Signage and Art	• Signage and art at the entrance and throughout the newborn unit shall reflect the diversity of the community served and shall convey to families that they are welcomed and supported as essential to the care of their infants. • This information shall be provided to families immediately after entering the newborn care area in languages and/or symbols understandable to the diversity of communities served.
Access to nature and other positive distractions	• Views of nature shall be provided in the unit in at least one space that is accessible to all families and one space that is accessible to all staff. • These nature environments may consist of outdoor spaces such as gardens or walking paths or indoor spaces such as greenhouses and atria. • Amenities in the nature environment might include water features, plant and animal life and solitary and group seating. • When possible, windows should have views of nature environments (consist of trees, plants, human and animal activity, gardens, and landscapes.) • In urban settings, appropriate nature elements might include planters or water features.

	• When such views are not possible, artwork with nature images or other nature simulations (e.g., video and artificial representations) should be provided throughout the unit. • Other positive distractions might include fitness centers and access to music
Oxygen Supply	• The unit should have piped oxygen and medical air supply with standalone backup cylinders to ensure consistent supply of oxygen. • Appropriate neonatal accessories and humidifiers should be available for oxygen use.
Internet Access	• There should be stable internet connectivity within the unit and access to telemedicine. Each patient bed should have a port for internet access.

Health Products and Technologies for Level IIA (Equipment and Supplies)

In addition to the equipment in level I, a level IIA unit should have equipment available to provide: respiratory support with CPAP. The table below shows the requirements in detail.

At level IIA, 40% of the total capacity should cater for preterm admissions.

Table 8: Level IIA Special Newborn Care Unit preterm admissions

Equipment	Labour ward (LW) and Postnatal ward	Level IIA Neonatal Unit	Installation	Training	Consum-ables
THERMOREGULATION					
Double walled incubators	Not applicable	15% of total bed capacity	Y	Y	
Resuscitaire/radiant warmer, fixed height with trolley and drawer	1 per bed	1 per room	Y	Y	
Transport incubator with oxygen cylinder	1 per LW	1 per NBU	Y	Y	
Wall thermometer	1 per room	1 per room	Y	N	
Overhead servo Incubator	Not applicable	1per 6 beds	Y	Y	
Thermometer, clinical, digital, (32 -43 degrees centigrade)	1 per 3 LW bed	1 per bed	Y	Y	
Heat Shield	Not applicable	1 per bed	Y	Y	
Thermal mattress	1 per LW radiant warmer	1 per radiant warmer	N	Y	
NB: Overhead servo incubator and the double walled incubators can be used interchangeably					
GENERAL NEONATAL EQUIPMENT					
Bassinet (Washable)	2 per unit	1 per bed	N	N	
Phototherapy unit, LED with a high intensity mode	Not applicable	1 per 3 beds	Y	Y	
Irradiance meter for phototherapy unit	Not applicable	1 per 3 bed phototherapy unit	N	Y	
Transcutaneous bilirubin meter	1 /Postnatal ward	1 for KMC and NBU	N	Y	

Equipment	Labour ward (LW) and Postnatal ward	Level IIA Neonatal Unit	Installation	Training	Consum-ables
Point of care bilirubin meter	1 /Postnatal ward	1 for KMC and NBU	N	Y	
ANTHROPOMETRY EQUIPMENT					
Digital weighing scale	1 per 6 LW beds	1 per NBU cubicle and 1 for KMC	N	Y	
Tape measure, vinyl-coated 1.5M	1 per 6 LW beds 1 per 6 PN beds	1 per bed	N	Y	
Infantometer /stadiometer 105cm	1 per 6 beds	1 per 6 beds	N	Y	
DRESSING / PROCEDURES / LAUNDRY					
Syringe Hub cutter/Sharp box	1 per bed	1 per 6 beds	N	Y	
Surgical instrument /suture set	2 per 24hours	1 per 3 beds	N	Y	
Stainless steel basin/ kidney dish, 825mls	2 per bed	2 per bed	N	Y	
Dressing tray, 300x200x30mm	1 per 24 hours	1 per 3 beds	N	Y	
Tray with on castors	1 per room	1 per 12 beds	N	Y	
Indicator, TST control spot/PAC-300	1 per 12 beds	1 per 12 beds	Y	Y	
Autoclave, steam, bench top 20L, electric	1 per 12 beds	1 per 12 beds	Y	Y	
Laundry washer, dryer, combo 15kg	1 per 12 bed	1 per 12 beds	Y	Y	
Linen trolley	1 per labour ward	1 for NBU	N	Y	
Wall clock	1 per labour ward	1 per room	Y	N	
EQUIPMENT FOR RESPIRATORY SUPPORT AND OXYGEN THERAPY					
Wall suction unit,	1 per suction point per 6 /PN beds	1 per suction point per room bed	Y	Y	
Portable neonatal suction	1 per 12 beds	1 per 12 beds	N	Y	
Nasal CPAP	1 per 6 beds	1 per 3 beds	Y	Y	
T-piece resuscitator	1 per bed	1 per bed	N	Y	
Pulse oximeters*	1 per bed LW 1 for postnatal ward	1 per bed	N	Y	
Oxygen flow meter	Double flow meter per oxygen point	1 per bed	Y	Y	
Oxygen blender	1 per LW bed	1 per bed	Y	Y	
Oxygen analyser	1 per unit	1 per 2 beds	Y	Y	
Back up oxygen manifold	1 per unit	1 per unit	Y	Y	
Trans-illumination Light	1 per LW	1 per unit	Y	Y	
BVM hand operated, neonate 200-300mls	1 per bed	1 per bed	N	Y	

Equipment	Labour ward (LW) and Postnatal ward	Level IIA Neonatal Unit	Installation	Training	Consum-ables
Nebulizer kit (electric)	Not applicable	2 per unit	Y	Y	
FLUID CONTROLLERS AND CARDIAC MONITORS					
BP monitor - Portable	1 per room	1 per bed	N	Y	
Syringe/infusion pumps 10,20,50mls, (single phase)	1 per bed	1 per bed	N	Y	
Blood warmer	Not applicable	1 per unit	N	Y	
Stethoscope, neonatal	1 per bed	1 per bed	N	Y	
Drip stand	1 per bed	1 per bed	N	Y	
ECG unit, 3 channel, portable /SET	1 per LW	1 per unit	Y	Y	
Cardiac monitor	1 per LW	5 per unit	Y	Y	
COLD CHAIN MANAGEMENT FOR DRUGS					
Fridge for drugs	Not applicable	1 per unit	Y	Y	Ice packs, digital thermom-eter
Cool box	1 per unit	5 per unit	N	Y	Ice packs
ADMINISTRATIVE EQUIPMENT					
Computers	Not applicable	1 per room	Y	Y	Cables
Printers	Not applicable	1 per room	Y	Y	Cartridges Printing papers

Minimum Specifications for equipment

1. Syringe Pump for infusion of drugs and fluids

Regulation	At least one of: CE marking, approved by US FDA or another stringent regulatory body of a founding member of IMDRF (e.g., Japan or Australia or Canada)
Size	Small footprint; portable
Decontamination	Easy to clean with common disinfecting agents
Alarm characteristics	Visual and auditory
Syringe requirements	Syringe 5-60 mL, works with multiple syringe type
Flow rate requirements	0.1 -60 mL/hr.
Benchtop measurement accuracy (for flow rate)	±3.0%
Occlusion Detection	Adjustable based on pre-set (5, 10, 25 psi)
Weight	< 5 kg (without batteries)
Voltage	Model must match the voltage and frequency of the power grid 220-240 VC at 50 Hz)

2. Bilirubinometer measuring bilirubin levels

Regulation	At least one of: CE marking, approved by: **US FDA or another stringent regulatory body of a founding member of IMDRF (e.g., Japan or Australia or Canada)**

Result format	Quantitative across whole linear range
Result units	Must display mg/dL or µmol/L
Sample	Whole blood heel=stick sample <50 µL; does not require user to separate serum using a centrifuge
Linear range	5-30 mg/dL (85.5 - 513 µmol/L)
Accuracy	± 20% from 5-30 mg/dL (85.5 - 513 µmol/L) 2

3. Phototherapy treatment of jaundice

Regulation	At least one of: CE marking, approved by US FDA or another stringent regulatory body of a founding member of IMDRF (e.g., Japan or Australia or Canada)
Irradiance	Standard Phototherapy: 8-10 uW/cm2/nm AND Intensive Phototherapy: >30 uW/cm2/nm
Light source	LED
Peak Wavelength	430-490 nm
Effective Treatment Area	>1300 cm2
Bulb Lifetime	>44,000 hours
Irradiance Meter	Available
Voltage	Model must match the voltage and frequency of the power grid 220-240 VAC at 50 Hz

4. Glucometer blood glucose monitoring

Regulation	At least one of: CE marking, approved by US FDA or another stringent regulatory body of a founding member of IMDRF (e.g., Japan, Australia, or Canada)
Result format	Quantitative across whole linear range (Should be able to switch between mg and mmol
Result units	mg/dL OR mmol/L
Precision	±2% or 2.5 mg/dL, whichever is greater
Linear range	0-20 mmol/L (0-360 mg/dL)
Accuracy	± 8% 2 ± 0.2 mmol/L at 3 mmol/L (± 3.6 mg/dL at 54 mg/dL)
Sample	Whole blood heel-stick sample <50 µL

4. Hemoglobinometer measuring Hb levels

Regulation	At least one of: CE marking, approved by US FDA or another stringent regulatory body of a founding member of IMDRF (e.g., Japan or Australia or Canada)
Result units	g/dL OR g/L
Sample	Whole blood heel-stick sample <25 µL; doesn't require user to separate serum using a centrifuge
Linear range	4.5-25 g/dL
Accuracy	± 1.75 g/dL
Result format	Quantitative; semi quantitative below 5 or above 25 g/dL
Power source	Mains with rechargeable battery

6. Oxygen Splitter delivery of oxygen

Regulation	At least one of: CE marking, approved by US FDA or another stringent regulatory body of a founding member of IMDRF (e.g., Japan or Australia or Canada)
Air Flow per Patient	0-2 L/min

Flow control	Each patient has individually controlled flow rate
Number of Output	At least 2

7. Pulse Oximeter measuring oxygen saturation levels

Regulation	At least one of: CE marking, approved by US FDA or another stringent regulatory body of a founding member of IMDRF (e.g. Japan or Australia or Canada)
Pulse rate	30-240 bpm
$Sp0_2$ Accuracy	+-3%
Alarms	Auditory
Alarm Limits - PR	80-180 bpm OR 100-180 bpm 2
Alarm Limits - Sp02	Adjustable
Continuous Measurement	Yes
Patient Interface	Neonate specific, biocompatible, and reusable
Weight	<500 grams, portable
Power Source	Mains with rechargeable battery

8. Suction Machine Pump

Regulation	At least one of: CE marking, approved by US FDA or another stringent regulatory body of a founding member of IMDRF (e.g., Japan, Australia, or Canada)
Size	Small footprint; portable, capacity 1 litre
Decontamination	Easy to clean with common disinfecting agents, collection bottle easy to clean and reusable
Pressure Alarm characteristics	60-120mmHg with continuous adjustment visual and auditory
Syringe requirements	Syringe 5-60 mL, works with multiple syringe type
Noise level Flow rate requirements	As low as possible 0.1 -60 mL/hr.
Benchtop measurement accuracy (for flow rate)	±3.0%
Occlusion Detection	Adjustable based on pre-set (5, 10, 25 psi)
Weight	< 5 kg (without batteries)
Voltage	Model must match the voltage and frequency of the power grid 220-240 VC at 50 Hz

9. Radiant Warmer/ Resuscitaire

Regulation	At least one of: CE marking, approved by US FDA or another stringent regulatory body of a founding member of IMDRF (e.g., Japan or Australia or Canada)
Skin temperature sensor	
Benchtop Measurement Accuracy	±0.1°C
Clinical Measurement Accuracy	±0.3°C
Stability	< 0.5°C
Includes Timer	Yes
Mobility	Has wheels; can be moved by one person

Uniformity	< 1°C
Alarm Characteristics	Visual and Auditory
Patient Accessibility and Visibility	Patient is visible and accessible to healthcare worker
Temperature Control	Based on infant's temperature and includes fail-safe mode
Power Source	Mains Power
Voltage	Model must match the voltage and frequency of the power grid 220-240 AC at 50 Hz

10. CPAP Machine

Regulation	At least one of: CE marking, approved by US FDA or another stringent regulatory body of a founding member of IMDRF (e.g., Japan or Australia or Canada)
Flow Driver	Integrated (on-board air compressor)
Oxygen Flow Capacity	0-10 L/min
Pressure	5-8 cm H20
Total (blended) Flow	0-10 L/min
Alarms	Audio Power
Accessories	Proprietary
Voltage	Model must match the voltage and frequency of the power grid 220-240 VAC at 50 Hz

11. Incubator

Air Temperature Control range	25°C ~ 38°C
Skin Temperature control range	32°C ~ 38.5°C
Humidity display range	0% ~ 100% RH
Humidity Control range	20% ~ 90% RH
Skin Temperature sensor accuracy	±0.5°C
Temperature fluctuation	±0.5°C
Environment Temperature	20°C ~ 30°C
Internal noise level	<55dB (A)
Infant bed tilt angle	±10°
Mattress Size	65cm (L) x 37cm (W)
X-ray cassette tray	Available
LED phototherapy	Available
Baby weighing system	Upto 7 kg
Power Supply	220-240V 60/50Hz
Power Input	420 VA
Safety class	Class I, type B

12. Transport Incubator: In addition to the specs of an infant incubator, a transport incubator should have;

- Microprocessor controlled Air mode and Baby skin mode Use AC Power and DC Power alternatively,
- Power on the ambulance to be DC12V or DC 24V LED
- Display of Set temperature, Air temperature, Skin temperature and internal battery power
- Double wall hood with side door.
- The infant bed can be pulled out easily
- Natural air flow humidity
- Adjustable Height Oxygen cylinder and Oxygen supply system
- LED Display, Brightness adjustable

Pharmaceuticals and Specific Drugs Commonly Used in a Level IIA

Table 9 Level IIA Special Newborn Care Unit Pharmaceuticals and specific drugs

Category	Pharmaceuticals
Analgesics/Local Anesthetics	Paracetamol oral/ IV, 25% oral Sucrose, 2% Lidocaine for local anaesthesia
Anticonvulsants	I.M Phenobarbital (30mg/ml), Oral phenobarbital 30mg tab, levetiracetam (100mg/ml), Oral levetiracetam 100mg/ml, Phenytoin (50mg/ml.).
Emergency Drugs	Adrenaline 1mg/ml, Alprostadil 500mcg/ml, Calcium Gluconate 10%, IV Chlorpheniramine 10mg, Hydrocortisone 100mg, Ipratropium 500mcg/2ml , Potassium Chloride 10%, Propranolol 1mg, IV Salbutamol 1mg/ml (for hyperkalemia), Salbutamol Nebulizing Solution 5mg/ml.
Lubricant	Water based Lubricating Gel
Drugs relating to coagulation	Vitamin K (1 mg/ml), Tranexamic 100mg/ml.
Diuretics	Furosemide, Spironolactone, Hydrochlorothiazide
IV Fluids	Normal Saline 0.9% 500ml, Ringers Lactate Solution 500ml, Dextrose 10% 500ml, Dextrose 50% (50ml), Dextrose 5%, Dextrose/Normal Saline 500ml, 30% Sodium Chloride, *IV fluids should have an autoseal
Antimicrobials	**First line antibiotics** – Benzylpenicillin (250000 iu vial), Gentamicin(20mg/ml), Flucloxacillin 125ml/5ml, Flucloxacillin 500ml vail PFI. **Second line antibiotics** -Ceftazidime 250mg, Cefotaxime 500mg, Cefepime 1gm Vancomycin(500mg/vial), Flucloxacillin 125ml/5ml, Flucloxacillin 500ml vail PFI, Amikacin (500mg PFI) **Topical antibiotics** - TEO 1% **Anti-fungal** - Fluconazole Oral liquid 500mg/5ml, injection 2mg/2ml **Anti-viral** - Acyclovir 250mg vail.
Nutrition Commodities	Human milk fortifiers, other breast milk substitutes (BMS) -preterm and term
Detergents	Liquid soap, Enzymatic detergents.
Antiseptics	Chlorhexidine digluconate 7.1%, Povidone10%, Chlorhexidine Solution 5%, Sanitizer/ Alcohol based Hand rub ≥70%
Disinfectants	Chlorhexidine Solution 5%, Surgical Spirit >70%, Presept Tablets, , Sodium Hypochlorite Solution 4 - 6%, Iodine Solution, glutaraldehyde 4%.
Others	Caffeine citrate 10mg/ml, Vitamin B6, pyridoxine 25mg/ml, Phosphorus, Calcium Soluble Insulin

Consumables and Supplies

Table 23: Consumables and Supplies used in the level III Neonatal Intensive Care Unit

Airway management
Suction catheters (sizes 4,6,8)
Yankauer tubes
Breathing
Neonatal BVM sizes 200mls and 300mls
T-piece resuscitator
Nasal prongs (neonatal)
Neonatal non rebreather Oxygen mask with reservoir bag
Endotracheal tubes size 2.0 2.5 3.0, 3.5 mm (uncuffed)
Circulation
Three Way stop cocks
Perfuser lines
IV Cannulas (gauge 24 and 26)
IV butterfly cannulas (gauge 23)
Assorted syringes (1ml,2ml, 5ml, 10ml, 20ml, 50ml, 60 ml)
Insulin syringes
Needles G21, G22 G23 and G25
Burette infusion set- Solusets
Blood giving sets
Clear adhesive tape/transparent dressing/strapping
Umbilical catheters double and single lumen, 3Fr; 3.5Fr; 4Fr; 5F
Peritoneal dialysis catheters
General patient supplies
Eye shields for phototherapy
Urine bags, graduated, with inlet and outlet.
Patient identification bands
Urinary Catheters
Nutrition
NG tube
Calibrated feeding cups
Milk expression bowls
IPC
Liquid soap
Disposable hand paper towels
Color coded waste segregation bins- red, yellow, black
Bin liners- Red, yellow, black
Safety boxes
Disposable face masks
Disposable plastic aprons

Disposable gowns
Clean gloves
Sterile gloves (sizes 6.5, 7.0, 7.5, 8.0)
Other Supplies
Branded NBU linen
Staff scrubs branded NBU
Mothers' gowns branded NBU
Diapers
Cotton wool
Gauzes
Slippers
Top tailing
Stationery
Neonatal inpatient file (MOH 378)
Admission book
Neonatal inpatient register
KMC register
Mortality Book
Paper punch and staplers
Clip boards

Human Resource

Quality service provision by a Level IIA newborn unit depends not only on the equipped unit but on the availability of round-the-clock clinical expertise.

The paediatrician /medical officers in Level IIA should support level I care in the facility by being present at every high-risk delivery to ensure essential newborn care is provided and to offer any additional initial care required. The health care providers working at this level should be trained on a 5-day comprehensive newborn care training and they should receive regular refresher courses at least once every 12 months. They should also be trained on effective communication with the caregivers and also amongst themselves.

There should be the following cadres within the unit:

Table 10: Level IIA Special Newborn Care Unit human resource

Cadre	Minimum number	Description
Paediatricians	2	• The head of the unit shall be a paediatrician • A consultant pediatrician should be available for ward rounds and available on-call for emergency • Member of relevant hospital ethical committees • Must undergo annual licensure and credential reviews • A paediatrician shall Co-chair the Facility MPDSR committee • Lead mentor for child health activities
Medical officers	1 per every 10 patients Per shift	• Minimum in-house physician coverage for 24 hours • Must undergo annual licensure and credential reviews
Clinical Officer paediatrics	4 (At least 1 per shift)	• Minimum in-house physician coverage for 24 hours • Must undergo annual licensure and credential reviews

Nurses	As per the nurse to baby ratio	**Head nurse**
		• A level IIA unit shall have a head nurse with neonatal training and management responsibility.
		• Responsible for coordinating inpatient activities and multidisciplinary care
		Clinical nurse educator
		• There shall be at least 1 designated nurse for continuing education and training
		Other nurses in the unit
		• A sufficient number of nurses with the following nurse and patient ratio;
		  • KMC staffing ratio shall be 1 professional nurse to every 6 -8 infants per 8-hour shift
		  • Category C nursery staffing ratio is: 1 professional nurse to every 6 infants
		  • Category B nursery staffing ratio is: 1 professional nurse to every 3 infants
		• In addition, there shall be 1 extra nurse available per shift.
		• Nurses in training shall work under the supervision of an experienced nurse.

Cadre	Minimum number	Description
		• 1 qualified nurse shall supervise only 2 nurses in training. • There must be 1 nurse dedicated to IPC/equipment cleaning and sterilization • Must undergo annual education and credential reviews
Nutritionists	At least 2	• Shall support exclusive breastfeeding (Positioning and attachment and expressing breast milk) • Shall offer nutrition counseling for the mother • Shall work with the clinical team to optimise nutritional interventions • Growth monitoring in collaboration with clinical team
Pharmacist	At least 2	• One should be a clinical pharmacist paediatrics • Champion Anti-microbial stewardship activities • Shall perform prescription audit to check for drug-drug interaction and medication errors • Liaison with the hospital pharmacy • Shall take lead in extemporaneous preparation of neonatal drug dosaging • Shall participate in ward rounds and guide in treatment plans • Shall delegate roles to the pharmaceutical team
Pharmaceutical technologists	At least 2	• Dispensing of the drugs • Shall check treatment sheets • Execute roles as assigned by the pharmacist
Laboratory personnel	At least 1	• Performing point of care lab test • Liaison with the hospital main lab • Communication of critical values • Routine quality checks and audits on neonatal laboratory processes
Biomedical Technologist	1	• Providing technical specifications of equipment • Installation of equipment • Planned preventive maintenance
Biomedical Technician	1	• Repair of equipment • Performing planned preventive maintenance
Clinical Psychological Counselor	1 per Unit	• Must have clinical background • Offer psychological support • Coordinate family conferences • Bereavement counseling
Social Worker	1	• Extracting psychosocial information from the patient and observation of causal factors that may be useful to the treatment plan and follow up post discharge • Placement of abandoned babies • Counselling of patients
Health Records Information Officer	1 per 8-hour shift	• Custodian of patient files • Registration of patients • Support the discharge process of patients • Overseeing data management • Ensures availability of relevant stationery • Death notification

Cadre	Minimum number	Description
Occupational Therapist	1	• Promoting neurodevelopmental care • Oral stimulation for newborns with no sucking reflex • Promoting self-regulation of the newborns • Counselling caregivers
Cleaner	At least 2 per shift	• Daily Cleaning of the unit • Scrubbing of the unit as part of IPC
Porters	At least 2 per shift	• Transporting specimens, investigations e.g. Xray films, lab reports etc.
Transport staff	1 per shift	• Transport of patients for investigations
Spiritual Advisor	1	• Spiritual support

Guidelines and Relevant Tools

Level IIA Special Newborn Care Unit guidelines and relevant tools

Guidelines

- National guidelines for quality obstetric and perinatal care
- Essential newborn care guidelines
- KMC clinical implementation guidelines
- Guidelines for the use Chlorhexidine for Cord care
- HIV, STI and Viral Hepatitis guidelines
- ART guidelines
- Baby friendly hospital initiative guidelines
- IMNCI guidelines
- National IPC guidelines
- National MPDSR guidelines
- Neonatal, Child and Adolescent Death Audit guidelines
- Basic Paediatric Protocol Comprehensive newborn care protocols - to be availed everywhere

Job Aids

- Newborn resuscitation
- Cord care
- KMC
- Hand washing
- Breastfeeding positioning and attachment
- Breast milk expression
- Danger signs
- PMTCT
- Apgar Score
- Ballards Score
- Antibiotics and emergency drugs dosing charts
- Waste Segregation
- Equipment decontamination
- 50% dextrose for managing hypoglycemia (buccal/oral)
- Preparing 10% from 50% dextrose

Tools

- In-patient maternity file
- MOH 216 Mother Child handbook (MCH)
- Standardized Neonatal Inpatient file (MOH 378)
- Birth notification (B1)
- Death notification (D1)
- Neonatal death review form (MOH 527)
- MOH 333 Maternity register
- KMC register (MOH 374)
- MPDSR
- MOH 710 summary (immuni- zation)
- MOH 711 summary (Interven- tions)
- MOH 408 HEI Register
- Paediatric Inpatient Register MOH- 377
- Neonatal Inpatient File MOH- 378
- Paediatric Inpatient File MOH -379
- Neonatal Death Review Form (NDRF) MOH - 527
- Neonatal Death Notification Form MOH - 661
- Child and Adolescent Death Notification Form MOH- 670
- Child and Adolescent Death Review Form MOH-671
- Community Neonatal Verbal Autopsy Form MOH-109
- Community Child and Adolescent Verbal Autopsy Form MOH-110

Others

- SOPs (national)
- Manufacturer's instructions

LEVEL IIB

(ADVANCED SPECIAL CARE UNIT)

Definition, Services and Criteria for Admission

It's a unit that cares for ill term and preterm infants <32 weeks and a birth weight <1500g as well as continuous care for convalescent infants ≥ 30 weeks.

Services For Level IIB Newborn Care

In addition to the services provided in Level I and Level IIA, the following additional services shall be: provided:

- Provision of care for infants born at <32 who weeks' gestation and a birth weight <1500 g are likely to require short term ventilation for less than 7 days.
- Provision of parenteral nutrition for less than 7 days
- Provision of nCPAP.
- Provision of care for infants who are convalescent and stable after intensive care with a postmenstrual age (i.e. gestational age at birth + postnatal age) ≥ 30 weeks.
- Exchange transfusion
- Provide an appropriate transport system
- Laboratory services.
- Conduct neonatal research (Ethics committee that protects research ethical rights of neonates)

Infrastructure & Design Specifications

Size of the Unit

The size of the unit is primarily influenced by the total number of births occurring in the health facility each year. As a general guideline, 3 to 4 beds should be allocated for every 1,000 deliveries annually, with an additional 30% of that number to accommodate babies referred from outside the hospital. This approach aligns with international recommendations (1,2), although adjustments may be made based on local needs and available resources.

Example Calculation:
For a hospital with 5,000 deliveries per year:

• Beds for inborn (intramural) babies:
3/1000×5000=15 beds

• Beds for out born (extramural) babies:
30%×9=5 beds

• Total required beds:
15+5=20 beds

In addition to these, beds for Kangaroo Mother Care (KMC) should be included as per the National KMC Guidelines (3). A proportion of the KMC beds should be equipped for immediate KMC (iKMC), including essential infrastructure such as oxygen outlets, space for CPAP machines, and monitoring equipment, as specified in the national standards.

As per the KMC clinical implementation guidelines 2023 a level 5 facility (Level IIB newborn care facility) should have 10 iKMC beds and 20 KMC beds

Administrative Areas

Table 11: Level IIA Special Newborn Care Unit Administrative Areas

Area	Specification	Equipment
Entrance to the newborn unit	• The neonatal unit should be clearly labeled	N/A
Reception area	**Dimensions: Size** • This is the organizational center for receiving patients and doing administrative work. • It should have a work area for 2 to 4 people, telephones and computers. • Families should have immediate and direct contact with staff when they arrive at the reception area. • The design should favour family-centred care (the area should contribute to positive first impressions for families and foster the concept that families are important members of their infant's health care team, not visitors). • Should have a handwashing area with signage to remind everyone on handwashing. • Should control traffic to the unit	Computers Telephone Printers Relevant furniture

Area for data clerk/records personnel	**Dimensions:**15m² Storage is required for records and stationery	Desk, chairs, computer, cabinet
Doctor's Office	**Dimensions:** 36m². • It should be appropriately equipped with internet connection. • Storage is required for records and stationery	Desk, chair, computer, cabinet
Nurse in charge's Office	**Dimensions:** 36m². • It should be appropriately equipped with internet connection. • Storage is required for records and stationery	Desk, chair, computer, cabinet
CME Room	**Dimensions: 14 -27m²** • Should be sound proofed if near NBU	Projection equipment, telemedicine facilities and public address system.
Simulation Room	**Dimensions:** 25- 32 m² • A room that can accommodate 10 staff and equipped with lockable storage areas among others.	Neonatal mannequins Resuscitation equipment Breastmilk expression simulators, Oxygen delivery devices, AIR device, Registers, Tables and chairs, Job aids, Tele mentoring Equipment
Staff Lounge	**Dimensions:** 20m² • Should have toilets, rest room lockers, a dining area	Comfortable chairs, TV, lockers, fridge, microwave and kettle are required for staff.
Doctors On Call Room	**Dimensions:** 15m² • It is an overnight room within the newborn unit for 24-hour medical officer cover. • Should have lockable cupboard, internet connection and en-suite bathroom	A bed, table and chair, TV.
Storage and Utility Areas	The following areas are required. • A drug preparation area with 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 • A dirty utility area for dirty linen, so that dirty linen can be removed without going through the neonatal unit. • An equipment store to keep clean equipment ready for use. • A cleaner's area to place and keep cleaning materials • A milk preparation and storage area with a dedicated fridge for expressed breast milk.	Drug trolley, Cupboards, Fridge for expressed breast milk

Patient Areas

Table 12: Level IIA Special Newborn Care Unit patient areas

AREA	SPECIFICATIONS	EQUIPMENT
The Nursing Station	**Dimensions:** 20m² • Prioritize central access to patients' rooms. • Space is required for work stations appropriately equipped with computers and internet connection. • Storage is required for records and stationery	Tables, chairs computers, cabinets

Hand Washing areas	• A hand wash basin is placed at the entrance to the neonatal unit and each baby should be within 6m of a hand washbasin, and there should be at least 1 basin for every 3 – 6 babies.
	• Handwashing stations shall be no closer than 0.9m from an infant bed.
	• Space shall also be provided for soap and towel dispensers and for appropriate waste receptacles.
	• Towel dispensers shall operate so that only the towel itself need be touched in the process of dispensing and constructed in such a fashion as to control noise.
	• The hand washing facilities should be large enough to contain splashing and not retain water, but not be too deep.
	• They should be wheelchair accessible points.
	• The hand washing sink should:
	  • Be 24" wide x 16" front to back x 10" deep (There should be no surrounding counter surface but space for soap, disposable towel dispensers and waste receptacles.
	  • Faucets must be operated by knee, elbow or pedal controls.
	  • Have adjacent walls that are constructed with non-porous /non-absorbent material to prevent growth of mold.
	  • Have no open floor drains.
	  • Have clean, adequate and consistent supply of hot and cold water supply.
		Have hand washing job aids displayed above all sinks.
		Soap and towel dispensers a Appropriate trash receptacles.

Milk Expression room	• Milk expression rooms should be available in all facilities offering inpatient newborn care • They should have hand washing facilities with running water and liquid soap	Chairs with backrest, Storage cabinets for clean cups, bowls etc. Milk expression/ feeding equipment, decontamination area with sink and running water. (should be separate from the hand washing facilities)

Counselling Room	• This is intended for counselling family members. Dimension: Size: • Ideal size: At least 23-28m² **Requirements of a counselling room** • **Privacy:** A sound proof, quiet, private space, with adjustable, covered windows, near waiting room/bathroom facilities. Entrances and exits must also be as private as possible to make clients feel protected. • **Aesthetics:** Calm blue/green based colour schemes with personalised comfortable spaces. Indoor plants and non-abstract artworks of nature/animals/people. • **Room Design:** Suitable room with moveable seating, soft to bright adjustable lighting sources, with ease of access to resources for therapist and clients. Separate office, desk space. • **Comfort:** Suitable adjustable room temperature, fresh air, comfortable flexible seating options, natural light.	• Moveable seating, soft to bright adjustable lighting sources, Separate office, desk • Stationery
Kangaroo Mother Area	• **Dimension:** 150m² KMC rooms are designated in close proximity with the delivery room/theatre areas and should be in close proximity with the newborn unit so as to support immediate KMC. • KMC rooms should have: • At least 10 beds • Beds each occupying a floor space of at least 7.2m² and/or recliner seats • Provision for central heating system or fixed heaters • Cabinets for mothers • Ablution block easily accessible to mother • Hand washing facilities with running water and liquid soap • Television (for both health education and entertainment) • Milk expression area with storage for the utensils, separate sink and fridge for storage	• Beds or recliner seats • Central heating system or fixed heaters • Cabinets for mothers • Audio vision for info-tainment • Storage
iKMC Room	In addition to the above specifications iKMC should have: • Each KMC bed in the iKMC room requires a service panel with lights, oxygen, and suction and 4 plugs	
Decontamination Area	**Dimension:** 12m² • There should be clear separations between soiled and clean areas • Decontamination work areas should be physically separated from clean and other work areas by walls or partitions to control traffic flow and to contain contaminants generated during the stages of decontamination • Walls or partitions should be constructed of materials capable of withstanding frequent cleaning with the cleaning and disinfecting products used in the health care setting. • Self-closing doors are recommended to restrict access and optimise ventilation control.	

	• Doors should be pass- through, to ensure one-way movement by staff from contaminated areas to clean areas.
	• There should be adequate space provided for decontamination equipment and materials used for cleaning and reprocessing
	• Work surfaces and surrounding areas should be designed to minimise crowding of work space;
	• Work surfaces shall be flat, cut-resistant, seamless and composed of a non-porous material so they can be cleaned, disinfected and dried; stainless steel surfaces are recommended.
	• Counter tops should be waterproof and have a backsplash
	• There should be at least two adjacent decontamination sinks
	• Decontamination sinks should:
	  • Be at a height that allows staff to use them without bending or straining;
	  • Be large enough to accommodate trays or baskets of instruments; Not have an overflow; and be equipped with water ports for the flushing of instruments with lumens, if appropriate.
	• There should be an area for donning or removing Personal Protective Equipment (PPE):
	• There must be easy access to hand hygiene facilities
	• There must be easy access to emergency supplies.
	• Eye-wash stations, deluge showers and spill equipment should be provided as necessary.
	• There should be an area for storage of dedicated housekeeping equipment and supplies.
		• Deluge showers
		• Protective Equipment (PPE)

Changing room	**Dimension** • Have lockable cabinets, toilets and showers, bench	Benches, Lockers

Other Infrastructural and Design Specifications

Table 13: Level IIA Special Newborn Care Unit other infrastructural and design specifications

REQUIREMENTS	SPECIFICATIONS
Electrical Needs	• The unit should have a 24hour uninterrupted power supply, as well as a backup power supply. • The unit should be connected to an automatic switch/changeover generator with 25-50 KVA capacity and a servo stabilized 3 phase connectivity. • In order to handle equipment each bed needs 4-6 central voltage stabilised outlets per bed: 2-3 of them should be of 5 amperes and another 2-3 of 15 amperes. • Each area should have 2 additional plugs for cleaning equipment. • The central supply should be able to power the ward air conditioning ducted system and be switched on permanently. • Each room should be connected to a stable UPS room.
Internet Access	• There should be stable internet connectivity within the unit. Each patient bed should have a port for internet access.

Lighting	• Lighting should be carefully planned and every effort should be made to prevent direct intense light from reaching the infant's eyes since this is harmful to the developing retina. Light fixtures should be easy to clean.
	
	A. Daylight
	• At least one source of natural daylight shall be visible from all infant care areas, either from the infant care station itself, or from an adjacent area.
	• Where a window or skylight is provided, the following requirements shall be met:
	• Exterior windows in infant areas or infant rooms should be:
	  • Glazed with a maximum U-value of 0.50nm.
	  • Situated at least 2 feet (0.6m) from the infant bed.
	  • Carefully placed to avoid direct sunlight from striking the infant, IV fluids, or monitor screens and to avoid glare and heat loss
	  • Allow easy cleaning.
	
	B. Ambient lighting
	• Light sources should provide accurate skin-tone recognition.
	• The unit should be well illuminated with adequate daylight. Panel of lights with cool white fluorescent tubes, preferably Compact Fluorescent Light (CFL) or LED (light-emitting diodes) is recommended.
	• Lights should be adjustable in order to direct them upwards to illuminate the ceiling.
	• Light sources should be as free as possible of glare or veiling reflections.
	• No direct view of the electric light source or sun shall be permitted in the newborn space; this does not exclude direct procedure lighting, as described below.
	• Any lighting used outside the baby area shall be located so as to prevent any newborn's direct line of sight to the fixture.

	C. Procedure lighting in baby care areas • Plan for the ability to have adequate procedure light as well as to achieve darkness. • Each light must be individually switch controlled and adjustable • Temporary increases in illumination necessary to evaluate a baby or to perform a procedure should be possible without increasing lighting levels for other babies in the room. • Procedure lights with adjustable intensity, field size and direction can help protect an infant's eyes from direct exposure and provide the best visual support to staff. • The luminaire shall be capable of providing no less than 1000 lux at the plane of the infant bed, and must be framed so that no more than 2% of the light output of the luminaire extends beyond its illumination field. • Procedure light that comes inbuilt with radiant warmers is often sufficient for procedures and no separate lights are required. Otherwise, can have portable procedural lighting (lamps). **D. Illumination of support areas** • Illumination of support areas within the newborn unit including the charting areas, medication preparation area, reception desk, and hand washing areas should be adequate. • Care must be taken to ensure that bright light from these locations does not reach an infant's eyes • In locations where infant care areas functions overlap (such as close proximity of the staff charting area to infant beds) with support area functions, separate light sources with independent controls so that the different needs of sleeping infants and working staff can be accommodated.
Temperature And Humidity	• Temperature and humidity control in the neonatal unit is extremely important. • The unit should be designed to provide an air temperature of 25-28° C. • 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 conditioner should supply 6 air changes per hour minimum. • The humidity should be between 30% and 60% RH. • There should be minimal draught and filtration should be 90% efficient.
Sound	• The acoustic conditions of the unit should favour clear and private communication for staff and families while promoting physiological stability, uninterrupted sleep and freedom from acoustic distraction for the newborn. (Normal conversation is approximately 60 db and whispers is 30db). • Sound levels in infant rooms shall not exceed a Leq of 50 dB and an L10 of 65 dB • Staff work areas, family areas, and staff lounge areas shall be designed to mitigate the combination of continuous background sound and operational sound of at least an Leq of 50dB and an L10 of 75dB. • If a refrigerator or freezer is located in the infant room or a hallway in open communication with it, the condenser and fan noise shall not exceed 40 dB. • Noise generating activities, phones, staff areas – should be away from the babies to reduce noise or have adjustable announcing signals • Alarms should be appropriately set for newborns and attended to immediately. • Soft music may be played. • Walls, floors, sinks and ceilings can all be designed to absorb sound

Floors and Walls	• Floor surfaces should be easy to clean and maintain, without the use of chemicals. It should be highly durable, impervious and jointless to minimize the ability to harbor bacterial pathogens.
	• Flooring material should be:
	  • Porcelain with a porcelain skirting of 10 cm in height. (alternative materials in the absence of porcelain are plastic or ceramic tiles)
	  • Resistant to degradation by ultraviolet light, bleach, hydrogen peroxide, and other exposure elements (including foot traffic).
	  • Have a light reflectance value not exceeding 30 percent.
	  • Able to minimize sound
	• Walls need to be:
	  • Covered with porcelain or ceramic tiles, or painted with a durable washable or anti-bacterial paint.
	  • White or light.
	  • Able to diminish noise.
	• Ceilings must be painted with a washable paint.

Ventilation	• Ventilation in the unit should inhibit particulate matter from moving freely in the space and to minimise drafts on or near the newborn beds.
	• General ventilation can be provided in two ways: exhaust- only and supply-and-exhaust.
	  • Exhaust fans pull stale air out of the unit while drawing fresh air in through cracks, windows or fresh air intakes.
	  • Exhaust-only ventilation is a good choice for units that do not have existing ductwork to distribute heated or cooled air.
	• Supply-and-exhaust ventilation is recommended for units with heating or cooling ducts, as it is an inexpensive way of providing fresh air

Doors	• A minimum of 1200mm clear opening is recommended for doors requiring cot/ trolley access. • In addition to the security guard, entrance doors need to be secured to prevent unauthorized access. • Staff reception complete with door release button for staff access control. • Security surveillance of the unit should include CCTV cameras and monitors. • Special baby monitoring security tags system must be employed throughout the unit and all doors connecting to it; including fire doors, smoke doors, public and staff entrance doors. • Swinging doors
Furnishings	• Built-in and freestanding furnishings such as cabinets and carts, especially those in the infant care areas, shall be easily cleanable with the fewest possible seams in the integral construction. • Edges exposed to impact should be rounded • Exposed surface seams shall be sealed. • Furnishings shall be of durable construction to withstand impact by movable equipment without significant damage • Metal surfaces should be free of rust and/or stains • Curtains are not allowed in the newborn care area.

Security	• The newborn care area shall be designed as part of an overall security program to protect the physical safety of infants, families, and staff in the newborn care area. The newborn care area shall be designed to minimize the risk of infant abduction. • Limit the number of exits and entrances to the unit. • All rooms shall have self-closing devices on all room exit doors • Closed circuit television access can be considered. • Panic buttons should be installed within staff areas and counselling rooms
Water Supply	• Water Supply – The unit should have 24-hour uninterrupted running safe water supply. • To ensure water supply, it is useful to have a separate reserve tank with a capacity of ≥ 5000 L which should always be full. • Quality of water-refer to the Kenya management and coordination (Water Quality regulations
Signage and Art	• Signage and art at the entrance and throughout the newborn unit shall reflect the diversity of the community served and shall convey to families that they are welcomed and supported as essential to the care of their infants. • This information shall be provided to families immediately after entering the newborn care area in languages and/or symbols understandable to the diversity of communities served.
Access to nature and other positive distractions	• Views of nature shall be provided in the unit in at least one space that is accessible to all families and one space that is accessible to all staff. • These nature environments may consist of outdoor spaces such as gardens or walking paths or indoor spaces such as greenhouses and atria. • Amenities in the nature environment might include water features, plant and animal life and solitary and group seating. • When possible, windows should have views of nature environments (consist of trees, plants, human and animal activity, gardens, and landscapes.) • In urban settings, appropriate nature elements might include planters or water features. • When such views are not possible, artwork with nature images or other nature simulations (e.g., video and artificial representations) should be provided throughout the unit. • Other positive distractions might include fitness centers and access to music
Oxygen Supply	• The unit should have piped oxygen and medical air supply with standalone backup cylinders to ensure consistent supply of oxygen. • Appropriate neonatal accessories and humidifiers should be available for oxygen use.
Internet Access	• There should be stable internet connectivity within the unit and access to telemedicine. Each patient bed should have a port for internet access.

Health products and technologies for level IIB (Equipment and Supplies)

In addition to the equipment in level IIA, a level IIB unit should have equipment available to provide: noninvasive respiratory support and invasive respiratory support (for less than 7 days). In addition to the equipment mentioned for level IIA, the level IIB unit has to fulfill the following additional requirements listed below in detail.

Level IIB newborn care facility should have 4 beds per 1000 births per year plus 30% to cater for extra mural admissions (40% of the total capacity shall cater for preterm admissions).

Table 14: Equipment for a level IIB newborn care facility

Equipment	Labour ward (LW) and postnatal ward	Level IIB Neonatal Unit	Installation	Training	Consumables
THERMOREGULATION					
Resuscitaire/radiant warmer with a temperature probe, fixed height with trolley and drawer	1 per bed	1 per room	Y	Y	Spare heating elements, disposable infant wraps, temperature probe
Transport incubator with oxygen cylinder	2 per unit	2 per NBU	Y	Y	Transport covers, power supply adapters, battery backups
Wall thermometer	1 per room	1 per room	Y	N	Wall mounting kits, calibration tools, display screens
Overhead servo Incubator	Not applicable	1 per 4 beds	Y	Y	Spare heating bulbs, temperature probes, safety covers
Thermometer, clinical, digital (32 - 43^{0}C)	1 per 3 LW bed	1 per bed	N	N	Batteries
Double walled incubator	Not applicable	15 % of the bed capacity	Y	Y	Thermal mattresses, temperature probes, disposable covers, humidity chambers
Heat Shield	Not applicable	1 per bed	Y	Y	N/A
Thermal mattress	1 per unit	1 per unit	N	Y	Disposable mattress covers
GENERAL NEONATAL EQUIPMENT					
Bassinet (Washable)	2 per unit	85% of the bed capacity	N	N	N/A
Phototherapy unit, LED with a high intensity mode (minimum 15)	Not applicable	1 per 2 beds	Y	Y	Eye shields, LED lights
Light meter for phototherapy unit	Not applicable	1 per phototherapy unit	N	Y	Batteries

Equipment	Labour ward (LW) and postnatal ward	Level IIB Neonatal Unit	Installation	Training	Consumables
Transcutaneous bilirubin meter	1 / Postnatal ward	1 for KMC and NBU	N	Y	Batteries
Point of care bilirubin meter	1 / Postnatal ward	1 for NBU	N	Y	Cartridges
Glucometer	1/ward	1 per room	N	Y	Glucometer strips
Precision Weighing scale (Diaper weighing)	Not applicable	1 per room			Batteries
Point of care ultra sound machine	Not applicable	1 per unit	Y	Y	Ultra sound Gel, tissues, printing paper, paper towels neonatal echo probe, cranial probe
Portable X- ray machine	Not applicable	1 per unit	Y	Y	X-ray films, discs
ANTHROPOMETRY EQUIPMENT					
Digital weighing scale	1 per 6 LW beds	1 per NBU cubicle	N	Y	Sterile scale pads
Tape measure, vinyl-coated 1.5M	1 per 6 LW beds 1 per 6 PN beds	1 per bed	N	Y	N/A
Infantometer	2 per unit	1 per 6 beds	N	Y	N/A
DRESSING / PROCEDURES / LAUNDRY					
Syringe Hub cutter/Sharp box	1 per bed	1 per 6 beds	N	Y	N/A
Surgical instrument /suture set	2 per 24hours	1 per 3 beds	N	Y	N/A
Stainless steel Basin/ kidney dish, 825 mls	2 per bed	1 per 3 beds	N	Y	N/A
Clear adhesive tape/ dressing	1 per 24 hours	1 per 3 beds	N	Y	N/A
Dressing tray, 300x200x30mm	1 per room	1 per 3 beds	N	Y	N/A
Tray with on castors	1 per 12 beds	1 per 12 beds	N	Y	N/A
Indicator, TST control spot/ Pack of 300	1 per 12 beds	1 per 12 beds	Y	Y	N/A
Autoclave, steam, bench top 20L, electric	1 per 12 bed	1 per unit	Y	Y	Sterilization pouches, chemical indicators, Autoclave bags, chemical indicators

Equipment	Labour ward (LW) and postnatal ward	Level IIB Neonatal Unit	Installation	Training	Consumables
Laundry washer, dryer, combo 15kg	1 per labour ward	1 per unit	Y	Y	Sterile laundry detergent, washing machine filters
Linen trolley	1 per labour ward	1 for NBU	N	Y	N/A
Wall clock	1 per labour ward	1 per room	Y	N	N/A
EQUIPMENT FOR RESPIRATORY SUPPORT AND OXYGEN THERAPY					
Wall suction unit	1 per suction point per 6 /PN beds	1 suction point per bed	Y	Y	Suction tubing, collection canisters, bacterial filters,
Portable neonatal suction	1 per 6 beds	1 per bed	Y	Y	Suction tubing, collection canisters, bacterial filters,
Nasal CPAP (minimum 20)	1 per 6 beds	1 per 3 beds	Y	Y	Nasal prongs, tubings, hats.
T-piece resuscitator	1 per bed	1 per bed	N	Y	
Pulse oximeters*	1 for Labour ward 1 for postnatal ward	1 per beds	N	Y	Neonatal pulse oximeter probes, batteries
Oxygen flow meter	1 double per oxygen point	1 per bed	Y	Y	N/A
Oxygen blender	1 per LW	1 per bed	Y	Y	N/A
Oxygen analyser	1 per unit	1 per 2 beds	Y	Y	
Back up oxygen manifold	1 per unit	1 per unit	Y	Y	
Trans-illumination Light (to check for pneumothorax)	1 per LW	1 per unit	Y	Y	N/A
BVM hand operated, neonate 200-300mls	1 per bed	1 per bed	N	Y	Manual resuscitation bags, spare valves
Resuscitation trolley/crash cart	1 per 6 labour ward beds	2 per room	N	Y	
Laryngoscope set (laryngoscope handle with neonatal straight blades size 00,0,1)	2 sets per unit	4 sets per unit	N	Y	Batteries, Bulbs
Nebulizer kit(electric)	Not applicable	2 per unit	Y	Y	Nebulizer cups, mouthpieces, masks

Equipment	Labour ward (LW) and postnatal ward	Level IIB Neonatal Unit	Installation	Training	Consumables
Ventilator	Not applicable	5 per unit	Y	Y	Breathing circuit sets, flow sensors, expiratory valves, filters, endotracheal tube ties/fixators, endotracheal tube introducer
BGA machine	Not applicable	1 per Unit	Y	Y	Cartridges
FLUID CONTROLLERS AND CARDIAC MONITORS					
Monitor - Portable	Not applicable	1 per bed	N	Y	BP cuffs. Pulse oximeter probes
Syringe/infusion pumps 10,20,50, mls, single phase	Not applicable	1 per bed	N	Y	Perfuser lines
Blood warmer	Not applicable	1 per unit	N	Y	
Stethoscope, neonatal	1	1 per bed	N	Y	Stethoscope earpieces, diaphragm covers
Drip stand	Not applicable	1 per bed	N	Y	N/A
ECG unit, 3 channel, portable /SET	Not applicable	1 per unit	Y	Y	Printing papers, Cartridges, ECG electrodes, gel
Cardiac monitor	1 per unit	1 per ventilator	Y	Y	ECG leads, disposable electrodes, BP cuffs, pulse oximeter probes
COLD CHAIN MANAGEMENT FOR DRUGS					
Fridge for drugs	Not applicable	1 per unit	Y	Y	Ice packs, digital thermometer
Cool box	1 per unit	5 per unit	N	Y	Ice packs
ADMINISTRATIVE EQUIPMENT					
Computers	Not applicable	1 per room	Y	Y	Cables
Printers	Not applicable	1 per room	Y	Y	Cartridges Printing papers

Minimum Specifications for equipment

1. Syringe Pump for infusion of drugs and fluids

Regulation	At least one of: CE marking, approved by US FDA or another stringent regulatory body of a founding member of IMDRF (e.g., Japan or Australia or Canada)
Size	Small footprint; portable
Decontamination	Easy to clean with common disinfecting agents
Alarm characteristics	Visual and auditory
Syringe requirements	Syringe 5-60 mL, works with multiple syringe type
Flow rate requirements	0.1 -60 mL/hr.
Benchtop measurement accuracy (for flow rate)	±3.0%
Occlusion Detection	Adjustable based on pre-set (5, 10, 25 psi)
Weight	< 5 kg (without batteries)
Voltage	Model must match the voltage and frequency of the power grid 220-240 VC at 50 Hz)

2. Bilirubinometer measuring bilirubin levels

Regulation	At least one of: CE marking, approved by: **US FDA or another stringent regulatory body of a founding member of IMDRF (e.g., Japan or Australia or Canada)**
Result format	Quantitative across whole linear range
Result units	Must display mg/dL or µmol/L
Sample	Whole blood heel=stick sample <50 µL; does not require user to separate serum using a centrifuge
Linear range	5-30 mg/dL (85.5 - 513 µmol/L)
Accuracy	± 20% from 5-30 mg/dL (85.5 - 513 µmol/L) 2

3. Phototherapy treatment of jaundice

Regulation	At least one of: CE marking, approved by US FDA or another stringent regulatory body of a founding member of IMDRF (e.g., Japan or Australia or Canada)
Irradiance	Standard Phototherapy: 8-10 uW/cm2/nm AND Intensive Phototherapy: >30 uW/cm2/nm
Light source	LED
Peak Wavelength	430-490 nm
Effective Treatment Area	>1300 cm2
Bulb Lifetime	>44,000 hours
Irradiance Meter	Available
Voltage	Model must match the voltage and frequency of the power grid 220-240 VAC at 50 Hz

4. Glucometer blood glucose monitoring

Regulation	At least one of: CE marking, approved by US FDA or another stringent regulatory body of a founding member of IMDRF (e.g., Japan, Australia, or Canada)
Result format	Quantitative across whole linear range (Should be able to switch between mg and mmol
Result units	mg/dL OR mmol/L
Precision	±2% or 2.5 mg/dL, whichever is greater

Linear range	0-20 mmol/L (0-360 mg/dL)
Accuracy	± 8% 2 ± 0.2 mmol/L at 3 mmol/L (± 3.6 mg/dL at 54 mg/dL)
Sample	Whole blood heel-stick sample <50 µL

4. Hemoglobinometer measuring Hb levels

Regulation	At least one of: CE marking, approved by US FDA or another stringent regulatory body of a founding member of IMDRF (e.g., Japan or Australia or Canada)
Result units	g/dL OR g/L
Sample	Whole blood heel-stick sample <25 µL; doesn't require user to separate serum using a centrifuge
Linear range	4.5-25 g/dL
Accuracy	± 1.75 g/dL
Result format	Quantitative; semi quantitative below 5 or above 25 g/dL
Power source	Mains with rechargeable battery

6. Oxygen Splitter delivery of oxygen

Regulation	At least one of: CE marking, approved by US FDA or another stringent regulatory body of a founding member of IMDRF (e.g., Japan or Australia or Canada)
Air Flow per Patient	0-2 L/min
Flow control	Each patient has individually controlled flow rate
Number of Output	At least 2

7. Pulse Oximeter measuring oxygen saturation levels

Regulation	At least one of: CE marking, approved by US FDA or another stringent regulatory body of a founding member of IMDRF (e.g. Japan or Australia or Canada)
Pulse rate	30-240 bpm
$Sp0_2$ Accuracy	+-3%
Alarms	Auditory
Alarm Limits - PR	80-180 bpm OR 100-180 bpm 2
Alarm Limits - Sp02	Adjustable
Continuous Measurement	Yes
Patient Interface	Neonate specific, biocompatible, and reusable
Weight	<500 grams, portable
Power Source	Mains with rechargeable battery

8. Suction Machine Pump

Regulation	At least one of: CE marking, approved by US FDA or another stringent regulatory body of a founding member of IMDRF (e.g., Japan, Australia, or Canada)
Size	Small footprint; portable, capacity 1 litre
Decontamination	Easy to clean with common disinfecting agents, collection bottle easy to clean and reusable
Pressure Alarm characteristics	60-120mmHg with continuous adjustment visual and auditory
Syringe requirements	Syringe 5-60 mL, works with multiple syringe type

Noise level Flow rate requirements	As low as possible 0.1 -60 mL/hr.
Benchtop measurement accuracy (for flow rate)	±3.0%
Occlusion Detection	Adjustable based on pre-set (5, 10, 25 psi)
Weight	< 5 kg (without batteries)
Voltage	Model must match the voltage and frequency of the power grid 220-240 VC at 50 Hz

9. Radiant Warmer/ Resuscitaire

Regulation	At least one of: CE marking, approved by US FDA or another stringent regulatory body of a founding member of IMDRF (e.g., Japan or Australia or Canada)
Skin temperature sensor	
Benchtop Measurement Accuracy	±0.1°C
Clinical Measurement Accuracy	±0.3°C
Stability	< 0.5°C
Includes Timer	Yes
Mobility	Has wheels; can be moved by one person
Uniformity	< 1°C
Alarm Characteristics	Visual and Auditory
Patient Accessibility and Visibility	Patient is visible and accessible to healthcare worker
Temperature Control	Based on infant's temperature and includes fail-safe mode
Power Source	Mains Power
Voltage	Model must match the voltage and frequency of the power grid 220-240 AC at 50 Hz

10. CPAP Machine

Regulation	At least one of: CE marking, approved by US FDA or another stringent regulatory body of a founding member of IMDRF (e.g., Japan or Australia or Canada)
Flow Driver	Integrated (on-board air compressor)
Oxygen Flow Capacity	0-10 L/min
Pressure	5-8 cm H20
Total (blended) Flow	0-10 L/min
Alarms	Audio Power
Accessories	Proprietary
Voltage	Model must match the voltage and frequency of the power grid 220-240 VAC at 50 Hz

11. Incubator

Air Temperature Control range	25°C ~ 38°C
Skin Temperature control range	32°C ~ 38.5°C
Humidity display range	0% ~ 100% RH
Humidity Control range	20% ~ 90% RH
Skin Temperature sensor accuracy	±0.5°C

Temperature fluctuation	±0.5°C
Environment Temperature	20°C ~ 30°C
Internal noise level	<55dB (A)
Infant bed tilt angle	±10°
Mattress Size	65cm (L) x 37cm (W)
X-ray cassette tray	Available
LED phototherapy	Available
Baby weighing system	Upto 7 kg
Power Supply	220-240V 60/50Hz
Power Input	420 VA
Safety class	Class I, type B

12. Transport Incubator: In addition to the specs of an infant incubator, a transport incubator should have;

- Microprocessor controlled Air mode and Baby skin mode Use AC Power and DC Power alternatively,
- Power on the ambulance to be DC12V or DC 24V LED
- Display of Set temperature, Air temperature, Skin temperature and internal battery power
- Double wall hood with side door.
- The infant bed can be pulled out easily
- Natural air flow humidity
- Adjustable Height Oxygen cylinder and Oxygen supply system
- LED Display, Brightness adjustable

Pharmaceuticals and specific drugs commonly used in level IIB

Table 15: Categories of pharmaceuticals and specific drugs commonly used in the NICU

Category	Pharmaceuticals
Analgesics/Local Anesthetics	Paracetamol oral (120mg/5ml) and IV 5mg/ml, 25% oral Sucrose, 2% Lidocaine for local anesthesia, iv morphine (10 mg/mL) and oral morphine (1mg/ml).
Antidotes	naloxone (400mcg/ml), acetylcysteine (200mg/ml)
Anticonvulsants	I.V/ I.M Phenobarbital(30mg/ml) and Oral phenobarb (30mg tab), IV levetiracetam (100mg/ml) and Oral levetiracetam (100mg/ml), IV Phenytoin (50mg/ml).
Emergency Drugs	Adrenaline (1mg/1ml), Adenosine (6mg/2ml), Alprostadil (500mcg/ml) Atropine (1mg/ml), Amiodarone (50mg/ml), Calcium Gluconate 10%, IV Chlorpheniramine (10mg/ml), Dexamethasone (4mg/ml), Dobutamine (12.5mg/ml), Dopamine (40mg/ml), Digoxin (250mcg), Esomeprazole 40mg, Glucagon 1mg, Glycopyrrolate 200 micrograms, Hydrocortisone 100mg, Ipratropium 500mcg, Lignocaine (preservative-free), Magnesium Sulphate 4%, Potassium Chloride 15%, Propranolol 1mg, Omeprazole 40mg, IV Salbutamol 1mg/ml for hyperkalemia , Salbutamol Nebulizing Solution (5mg/ml), Sodium Bicarbonate 8.4%, Water for Injection (Sterile 10ml)
Lubricant	K-Y Jelly Water based Lubricating Gel
Drugs relating to Coagulation	Vitamin K (1mg/ml) formulation), Tranexamic acid (100mg/ml).
Diuretics	Furosemide 10mg/ml, spironolactone 25mg, Hydrochlorothiazide 25 mg.
IV Fluids	Normal Saline 0.9% 500ml, Ringers Lactate Solution 500ml, Dextrose 10% 500ml, Dextrose 50% 50ml, Dextrose/Normal Saline 500ml, 30% Sodium Chloride, *IV fluids should have Autoseal

Antimicrobials	**First line antibiotics** – Benzylpenicillin (250000 iu vial), Gentamicin(20mg/ml), Flucloxacillin 125ml/5ml, Flucloxacillin 500ml vail PFI. **Second line antibiotics** -Ceftazidime 250mg, Cefotaxime 500mg, Cefepime 1gm Vancomycin(500mg/vial), Flucloxacillin 125ml/5ml, Flucloxacillin 500ml vail PFI, Amikacin (500mg PFI) **Topical antibiotics** - TEO 1% **Anti-fungal** - Fluconazole Oral liquid 500mg/5ml, injection 2mg/2ml **Anti-viral** - Acyclovir 250mg vail.
Nutrition Supplements	Enteral nutrition: Infant formula (preterm and term,), EBM fortifiers, donor human milk, Cholecalciferol (VIT D3)400 iu. Oral Ferrous sulphate (40mg/5ml of elemental iron). Calcium supplementation, folate 5mg, multivitamins drops (vitamin B 6, Pyridoxine.).
Antiseptics	chlorhexidine digluconate 7.1%, Povidone iodine10%, >70 % Alcohol
Disinfectants	Chlorhexidine Solution 5%, >70% Surgical Spirit, Presept Tablets, Sanitizer/Hand Scrub, Sodium Hypochlorite Solution 4-6%, Iodine Solution, glutaraldehyde 4%.
Detergents	Liquid soap, Enzymatic detergents.
Others	Caffeine citrate 10-20mg **Anti- malarials** - artemether / lumefantrine 20mg/120mg dispersible tab, artesunate injection 30mg/ml **PMTCT drugs** -Zidovudine 50mg/5ml, Nevirapine 10mg/ml **Anti- TBs** - Isoniazid 50mg tab,100mg, Rifampicin/isoniazid/pyrazinamide (75/50/150) Hepatitis B immunoglobulin, hepatitis B vaccine, IV immunoglobulin Albumin Insulin

Consumables and Supplies

Table 16: Consumables and Supplies for the unit

Airway management
Suction catheters (sizes 4,6,8)
Yankauer tubes
Breathing
Neonatal BVM sizes 200mls and 300mls
T-piece resuscitator
Nasal prongs (neonatal)
Neonatal non rebreather Oxygen mask with reservoir bag
Endotracheal tubes size 2.0 2.5 3.0, 3.5 mm (uncuffed)
Circulation
Three Way stop cocks
Perfuser lines
IV Cannulas (gauge 24 and 26)
IV butterfly cannulas (gauge 23)
Assorted syringes (1ml,2ml, 5ml, 10ml, 20ml, 50ml, 60 ml)
Insulin syringes
Needles G21, G22 G23 and G25

Burette infusion set- Solusets
Blood giving sets
Clear adhesive tape/transparent dressing/strapping
Umbilical catheters double and single lumen, 3Fr; 3.5Fr; 4Fr; 5F
Peritoneal dialysis catheters
General patient supplies
Eye shields for phototherapy
Urine bags, graduated, with inlet and outlet.
Patient identification bands
Urinary Catheters
Nutrition
NG tube
Calibrated feeding cups
Milk expression bowls
IPC
Liquid soap
Disposable hand paper towels
Color coded waste segregation bins- red, yellow, black
Bin liners- Red, yellow, black
Safety boxes
Disposable face masks
Disposable plastic aprons
Disposable gowns
Clean gloves
Sterile gloves (sizes 6.5, 7.0, 7.5, 8.0)
Other Supplies
Branded NBU linen
Staff scrubs branded NBU
Mothers' gowns branded NBU
Diapers
Cotton wool
Gauzes
Slippers
Top tailing
Stationery
Neonatal inpatient file (MOH 378)
Admission book
Neonatal inpatient register
KMC register
Mortality Book
Paper punch and staplers
Clip boards

Human Resource

Quality service provision by a Level IIB newborn unit depends not only on the equipped unit but on the availability of round-the-clock clinical expertise.

The health care providers working in the unit must undergo a 5 day comprehensive newborn care training and regular refresher courses at least once every 12 months. The unit should also hold regular mentorship sessions.

Table 17: Summary of the minimum number of all the cadres required in the unit

Cadre	Minimum number required	Description
Neonatologists	2 per unit	• The head of the unit should be a neonatologist • The neonatologist shall be the lead mentor • The neonatologist should conduct ward rounds and specialized clinics (Neonatal Outpatient Clinics) • A neonatologist must be available for emergency back-up 24 hours a day.
Paediatricians	3 per unit	• In the absence of a neonatologist, the head of the unit shall be a paediatrician • A consultant pediatrician should be available daily and for emergency back-up, 24 hours a day • Member of relevant hospital ethical committees • Must undergo annual licensure and credential reviews
Medical Officers	1 per every 10 patients Per shift	• Minimum in-house medical officer coverage for 24 hours • Must undergo annual licensure and credential reviews

Nurses	As per nurse to patient ratio in the next column	**Head nurse**
		• A level IIB unit requires a head nurse with neonatal training and management.
		• Responsible for coordinating inpatient activities and multidisciplinary care
		
		Clinical nurse educator
		• There should be at least 1 designated nurse for continuing education and training with specialised training in neonatal care.
		
		Other nurses within the unit
		• At least 75% of nurses working in the unit should be neonatal nurses
		  • KMC staffing ratio one professional nurse to every 6 -8 infants per 8 hr. shift
		  • Category C nursery staffing ratio is: 1 professional nurse to every 6 newborns infants
		  • Category B nursery staffing ratio is: 1 professional nurse to every 3 newborns infants
		  • Category A: 1 professional nurse to every one newborn infant
		• In addition, there should be 1 extra nurse available per shift.
		• Nurses in training should work under the supervision of an experienced nurse.
		  • 1 experienced nurse can supervise only 2 nurses in training.
		• There must be 1 nurse dedicated to IPC/equipment cleaning and sterilization
		• Must undergo annual licensure and credential reviews

Nutritionists	4	• Shall support exclusive breastfeeding (Positioning and attachment and expressing breast milk) • Shall offer nutrition counseling for the mother • Shall work with the clinical team to optimise nutritional interventions • Growth monitoring in collaboration with clinical team
Pharmacists	3 (one should be a clinical pharmacist paediatrics)	• One should be a clinical pharmacist paediatrics • Champion Anti-microbial stewardship activities • Shall perform prescription audit to check for drug-drug interaction and medication errors • Liaison with the hospital pharmacy • Shall take lead in extemporaneous preparation of neonatal drug dosaging • Shall participate in ward rounds and guide in treatment plans • Shall delegate roles to the pharmaceutical team
Pharmaceutical technologists	At least 2	• Dispensing of the drugs • Shall check treatment sheets • Execute roles as assigned by the pharmacist
Laboratory personnel	3 per unit	• Performing point of care lab test • Liaison with the hospital main lab • Communication of critical values • Routine quality checks and audits on neonatal laboratory processes
Biomedical Technologist	3 per unit	• Providing technical specifications of equipment • Installation of equipment • Planned preventive maintenance
Biomedical Technician	3 per unit	• Repair of equipment • Performing planned preventive maintenance
Clinical Psychological Counselor	1 per Unit	• Must have clinical background • Offer psychological support • Coordinate family conferences • Bereavement counseling
Social Worker	2 per unit	• Extracting psychosocial information from the patient and observation of causal factors that may be useful to the treatment plan and follow up post discharge • Placement of abandoned babies • Counselling of patients
Health Records Information Officer	1 per 8-hour shift	• Custodian of patient files • Registration of patients • Support the discharge process of patients • Overseeing data management • Ensures availability of relevant stationery • Death notification
Occupational Therapist	1 per unit	• Promoting neurodevelopmental care • Oral stimulation for newborns with no sucking reflex • Promoting self-regulation of the newborns • Counselling caregivers

Physiotherapist	1 per unit	• Respiratory management eg. chest physiotherapy • Neuromuscular and developmental support • Family centered care
Cleaners	2 per shift	• Daily Cleaning of the unit • Scrubbing of the unit as part of IPC
Hospital porters	2 per shift	Transporting specimens, investigations e.g. Xray films, lab reports etc.
Transport staff	1 per shift	Transport of patients for investigations e.g. MRI, transfer of patients
Spiritual advisor	1 per unit	

Other co-opted specialist include Ophthalmologist.

Guidelines and Relevant Tools

Summary of the minimum number of all the cadres required in the unit

Guidelines

- National guidelines for quality obstetric and perinatal care
- Essential newborn care guidelines
- KMC clinical implementation guidelines
- Guidelines for the use Chlorhexidine for Cord care
- HIV, STI and Viral Hepatitis guidelines
- ART guidelines
- Baby friendly hospital initiative guidelines
- IMNCI guidelines
- National IPC guidelines
- National MPDSR guidelines
- Neonatal, Child and Adolescent Death Audit guidelines
- Basic Paediatric Protocol Comprehensive newborn care protocols - to be availed everywhere

Job Aids

- Newborn resuscitation
- Cord care
- KMC
- Hand washing
- Breastfeeding positioning and attachment
- Breast milk expression
- Danger signs
- PMTCT
- Apgar Score
- Ballards Score
- Antibiotics and emergency drugs dosing charts
- Waste Segregation
- Equipment decontamination
- 50% dextrose for managing hypoglycemia (buccal/oral)
- Preparing 10% from 50% dextrose

Tools

- In-patient maternity file
- MOH 216 Mother Child handbook (MCH)
- Standardized Neonatal Inpatient file (MOH 378)
- Birth notification (B1)
- Death notification (D1)
- Neonatal death review form (MOH 527)
- MOH 333 Maternity register
- KMC (MOH 374) register
- MPDSR
- MOH 710 summary (immuni- zation)
- MOH 711 summary (Interven- tions)
- MOH 408 HEI Register
- Neonatal Death Review Form (NDRF) MOH - 527
- Neonatal Death Notification Form - MOH - 661
- Child and Adolescent Death Notification Form MOH- 670
- Child and Adolescent Death Review Form- MOH-671
- Community Neonatal Verbal Autopsy Form- MOH-109
- Community Child and Adolescent Verbal Autopsy Form MOH-110

Others

- SOPs (national)
- Manufacturer's instructions

LEVEL III
(NEONATAL INTENSIVE CARE)

Definition, Services and Criteria for Admission

A level III neonatal unit refers to a neonatal intensive care unit (NICU) in a tertiary perinatal center (level 5 and 6), where all critically ill newborns who require advanced care that cannot be offered at the lower levels are transferred or referred to. The referral should be done before birth (in utero) if complications that will require intensive care are anticipated. The NICU takes care of all neonatal pathologies from birth until the end of the neonatal period (28 days after birth or completed 44 postmenstrual weeks for preterm infants).

The unit will accept babies of any gestational age or weight who require complex, intensive care including but not limited to sustained life support, hemodynamic support, and/or mechanical ventilation

Services for Level III Newborn Care (Neonatal Intensive Care)

In addition to what is offered in level IIA and IIB, the following services are offered at level III:

1. Mechanical/Assisted ventilation
2. Chest drains placement and management
3. Inotropic support
4. Arterial catheterization and central lines placement
5. Invasive BP monitoring
6. Advanced feeding support (e.g. Parenteral nutrition)
7. Foetal screening and in-utero interventions for congenital malformations
8. Multi disciplinary sub-specialty neonatal care
9. Therapeutic cooling and advanced neurological monitoring
10. Basic and advanced diagnostic services e.g. Xray, ultrasound, Echocardiography, MRI, upper GI studies, interventional radiology
11. KMC including iKMC
12. Neonatal surgical interventions
13. Peritoneal dialysis
14. Conduct neonatal research (Ethics committee that protects research ethical rights of neonates)
15. Advanced skills lab and simulation
16. Developmental follow up clinic

Infrastructure & Design Specifications

The newborn unit includes a number of areas as follows:

Administrative Work Areas

Table 18: Administrative Work Areas at the Level III Neonatal Intensive Care Unit

AREA	SPECIFICATION	EQUIPMENT
Entrance to the newborn unit	• The neonatal unit should be clearly labeled	N/A
Reception area	• This is the organizational center for receiving patients and doing administrative work. • It should have a work area for 2 to 4 people, telephones and computers. • Families should have immediate and direct contact with staff when they arrive at the reception area. • The design should favour family-centred care (the area should contribute to positive first impressions for families and foster the concept that families are important members of their infant's health care team, not visitors). • Should have a handwashing area with signage to remind everyone on handwashing. • Should control traffic to the unit	Computers Telephone Printers Relevant furniture
Area for data clerk/ records personnel	• Storage is required for records and stationery	Relevant furniture
Doctor's office	• It should be appropriately equipped with internet connection. • Storage is required for records and stationery	Relevant furniture computers
Nurse in charge's office	**Dimensions: 72 square meters.** • It should be appropriately equipped with internet connection. • Storage is required for records and stationery	Relevant furniture Computers
Counselling room	**Dimensions: 23-28m²** Requirements of a counselling room: • **Privacy:** A sound- proof, quiet, private space, with adjustable, covered windows, that is near waiting room/bathroom facilities. Entrances and exits must also be as private as possible to make clients feel protected. If possible, an alarm button should be installed in case of security risk.	Moveable sitting Adjustable lighting source Desk Caregiver resources

	• **Aesthetics:** Calming blue/green based colour schemes with personalised comfortable spaces. Indoor plants and non-abstract artworks of nature/ animals/people are also acceptable. • **Comfortable.**	
CME Room	**Dimensions:** • Equipped with projection equipment, telemedicine facilities and public address system. Should be sound proofed if near NBU	
Simulation Room	**Dimensions:** 36m² • A room that can accommodate 10 staff and equipped with lockable storage areas among others.	Neonatal mannequins, high fidelity neonatal mannequins, Resuscitation equipment Breastmilk expression simulators, Oxygen delivery devices, Augmented Infant Resuscitator (AIR) device, Registers, Tables and chairs, Job aids, Tele mentoring Equipment.
Staff Lounge	**Dimensions:** 36m² • Should have toilets, rest room, lockers, a dining area	Comfortable chairs, lockers, fridge, microwave and kettle are required for staff.
Staff changing room	Should have lockable cabinets and toilets	
Doctors On Call Room	**Dimensions:** 15m² • It is an overnight room within the newborn unit for 24-hour medical officer cover. • Should have clean drinking water, lockable cupboard, internet connection and en-suite bathroom.	A bed, table and chair,
Storage and Utility 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 drug preparation room with 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 • A dirty utility area for dirty linen, so that dirty linen can be removed without going through the neonatal unit. • An equipment stores to keep clean equipment ready for use. • A cleaner's room to place and keep cleaning materials • A milk preparation and storage area with a dedicated fridge for expressed breast milk. • Level III NICU facilities should have access to breast milk banks.	

Patient Areas

Table 19: Patient Areas at the Level III Neonatal Intensive Care Unit

AREA	SPECIFICATIONS	EQUIPMENT
The Nursing Station	• The nursing station is situated where patients can be easily seen from the station. • The NICU should have a nursing station within the room • Should be equipped with computers and internet connection. • Storage is required for records and stationery	• Computers • Shelves • Cabinets

Hand washing areas	• A hand wash basin should be placed at the entrance to the neonatal unit
	• Each baby should be within 6m of a hand washbasin, and there should be at least 1 basin for every 3 – 6 babies.
	• Handwashing stations shall be no closer than 0.9m from an infant bed.
	• Space should be provided for soap, disposable towel dispensers and appropriate trash receptacles.
	• Towel dispensers shall operate so that only the towel itself need be touched in the process of dispensing.
	• The hand washing facilities should be large enough to contain splashing and not retain water, but not be too deep.
	• They should be wheelchair accessible points.
	• The hand washing sink should:
	  • Be 24" wide x 16" front to back x 10" deep (There should be no surrounding counter surface but space for soap, disposable towel dispensers and trash receptacles.
	  • Faucets must be operated handfree.
	  • Have adjacent walls that are constructed with non-porous /non-absorbent material to prevent growth of mold.
	  • Have no open floor drains.
	  • Have an clean , adequate and consistent supply of hot and cold water supply.
		• Have hand washing job aids displayed above all sinks.
		• Soap and towel dispensers a
		• Appropriate trash receptacles.

Milk Expression room	• Milk expression rooms should be available in all facilities offering inpatient newborn care • They should have hand washing facilities with running water and liquid soap	Chairs with backrest, Storage cabinets for clean cups, bowls etc. Milk expression/ feeding equipment, decontamination area with sink and running water. (should be separate from the hand washing facilities)

AREA	SPECIFICATIONS	EQUIPMENT
Intensive and highly specialised care unit (NICU)	• Each bed requires a minimum of 10m² of space, to accommodate a ventilator, recliner chair, sink, nursing station and service panel providing oxygen, medical air, suctioning and power source. • The power outlet should have capacity to accommodate several electric powered instruments. • There should also be effective backup power source. • Each bed space should have glass partitions between them for privacy and IPC.	• Stationery • Service panel providing oxygen, medical air and suctioning • Ventilator
Isolation space	• One isolation bed to ten NICU beds. • Each space should be at least 12m² with its own wash basin, an area for gowning and storage of clean and soiled material and should be engineered to have negative pressure.	• Ventilator • Resuscitaire
Laboratory	**Dimensions 20m²** • Lab room is required for onsite rapid analysis e.g. blood gas analysis, bilirubin, full hemogram measurement etc. • An additional laboratory should be present within the hospital to offer advanced investigation services(e.g. Microscopy, culture and sensitivity on various body fluids, screening of metabolic and common genetic disorders etc.) if the NICU lab is not able to do all the tests. • All labs analysing newborn samples should be able to utilise small aliquots of blood for analysis. • Access to a Blood Bank with the appropriate neonatal blood bags is required.	• Computers • Printers • BGA machines • Biochemistry machine • Full Haemogram machine • Fridge
Pharmacy	**Dimensions 20-30m²** • Pharmacy equipped with newborn formulations and run by a pharmacist.	• Shelves • Fridge • Source of clean water • Computer • Desk & Chair • Stationery • Internet
Storage for imaging equipment	**Dimensions 30m²** Lockable room for storing portable X Ray, ultrasound, echocardiography machine	• Shelves

Kangaroo Mother Area	**Dimensions: 150m²**
	• KMC rooms are designated in close proximity with the delivery room/theatre areas and should be in close proximity with the newborn unit so as to support immediate KMC.
	• KMC rooms should have:
	  • Should accommodate at least 10 beds
	  • Beds each occupying a floor space of at least 7.2 m² and/or recliner seats
		• Beds
		• Recliner seats
		• Cabinets for mothers
		• Sink
		• Television
		• Fridge

AREA	SPECIFICATIONS	EQUIPMENT
	• • Provision for central heating system or fixed heaters • Cabinets for mothers • Ablution block easily accessible to mother • Hand washing facilities with running water and liquid soap • Television (for both health education and entertainment) • Milk expression area with storage for the utensils, separate sink and fridge for storage	•
iKMC Room	In addition to the above specifications iKMC should have: • Each KMC bed in the iKMC room requires a service panel with lights, oxygen, and suction and 4 plugs	
Decontamination Area	**Dimension : 12m²** • There should be clear separations between soiled and clean areas • Decontamination work areas should be physically separated from clean and other work areas by walls or partitions to control traffic flow and to contain contaminants generated during the stages of decontamination • Walls or partitions should be constructed of materials capable of withstanding frequent cleaning with the cleaning and disinfecting products used in the health care setting. • Self-closing doors are recommended - to restrict access and optimise ventilation control. • Doors should be pass- through, to ensure one-way movement by staff from contaminated areas to clean areas. • There should be adequate space provided for decontamination equipment and materials used for cleaning and reprocessing • Work surfaces and surrounding areas should be designed to minimise crowding of work space; • Work surfaces shall be flat, cut-resistant, seamless and composed of a non-porous material so they can be cleaned, disinfected and dried; stainless steel surfaces are recommended. • Counter tops should be waterproof and have a backsplash • There should be at least two adjacent decontamination sinks	

AREA	SPECIFICATIONS	EQUIPMENT

	• Decontamination sinks should:
	  • Be at a height that allows staff to use them without bending or straining;
	  • Be large enough to accommodate trays or baskets of instruments;
	  • Not have an overflow; and be equipped with water ports for the flushing of instruments with lumens, if appropriate.
	• There should be an area for donning or removing Personal Protective Equipment (PPE)
	• There must be easy access to hand hygiene facilities
	• Eye-wash stations, deluge showers and spill equipment should be provided as necessary.
	• There should be an area for storage of dedicated housekeeping equipment and supplies;	

Changing room	**Dimension** • Have lockable cabinets, toilets and showers, bench	Benches, Lockers

Other infrastuctural and design specifications

Electrical Needs	• The unit should have a 24-hour uninterrupted power supply, as well as a backup power supply. • An industrial power meter • To ensure this, an automatic switch generator with 25-50 KVA capacity and a servo stabiliser (3 phase) of the same rating is needed. • In order to handle equipment each bed needs 6-12 central voltage stabilised outlets per bed: 6 of them should be of 5 amperes and another 6 of 15 amperes. • There shall be a minimum of 12 simultaneously accessible electrical outlets with UPS connection for individual beds. • Each area should have 2 additional plugs for cleaning equipment and portable X ray units. • The central supply should be able to power the ward air conditioning ducted system and be switched on permanently.
Oxygen supply	• The unit should have piped oxygen and medical air supply • The oxygen pressure supply should be 4-6 bars • Appropriate accessories e.g. flow meters, humidifiers, pressure gauge, should be available for oxygen use • Oxygen analysers for assessing the quality of oxygen should be available. • Standalone backup cylinders should be available to ensure consistent supply of oxygen.
Internet Access	• There should be stable internet connectivity within the unit and access to telemedicine. Each patient bed should have a port for internet access.

Lighting	• Should be carefully planned to prevent direct intense light from reaching the newborn's eyes since this is harmful to the developing retina.
	• Light fixtures should be easy to clean.
	
	E. Daylight
	• At least one source of natural daylight in all newborn care areas, either from the care area itself, or from an adjacent area.
	• Where a window or skylight is provided, exterior windows in newborn areas should be:
	  • Glazed with a maximum U-value of 0.50.
	  • Situated at least 2 feet (0.6 m) from the infant bed.
	  • Carefully placed to avoid direct sunlight from striking the infant, IV fluids, or monitor screens and to avoid glare and heat loss
	  • Allow easy cleaning.
	  • Equipped with shading devices contained within the window or easily cleanable.
	
	F. Ambient lighting
	• Light sources should provide accurate skin-tone recognition.
	• The unit should be well illuminated with adequate daylight. Panel of lights with cool white fluorescent tubes, preferably Compact Fluorescent Light (CFL) or LED (light-emitting diodes) is recommended.
	• Lights should be adjustable in order to direct them upwards to illuminate the ceiling.
	• Light sources should be as free as possible of glare or veiling reflections.
	• No direct view of the electric light source including direct procedure lighting or sun shall be permitted in the newborn space
	• Any lighting used outside the baby area shall be located so as to prevent any newborn's direct line of sight to the fixture.
	
	G. Procedure lighting in baby care areas
	• Should have the ability to provide adequate procedure light as well as to achieve darkness.
	• Each light must be individually switch controlled and adjustable
	  • Increases in illumination necessary to evaluate a baby or to perform a procedure should be possible without increasing lighting levels for other babies in the room.
	  • Adjustable intensity, field size and direction can help protect an infant's eyes from direct exposure and provide the best visual support to staff.
	• Procedure light that comes inbuilt with radiant warmers is often sufficient for procedures and no separate lights are required. If not available, can have portable procedural lighting (lamps)
	H. Illumination of support areas
	• Illumination of support areas within the newborn unit e.g. nursing station, medication preparation area and hand washing areas should be adequate.
	• Care must be taken to ensure that bright light from these locations does not reach a newborn's eyes

	• In locations where newborn care areas overlap with the support areas, separate light sources with independent controls should be provided so that the different needs of sleeping infants and working staff can be accommodated.
Temperature and Humidity	• Temperature and humidity control in the neonatal unit is extremely important. • The unit should be designed to provide an air temperature of 25-28° C. • 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 conditioner should supply 6 air changes per hour minimum. • The humidity should be between 30% and 60% RH. • There should be minimal draught and filtration should be 90% efficient.
Sound	• The acoustic conditions of the unit should favour clear and private communication for staff and families while promoting physiological stability, uninterrupted sleep and freedom from acoustic distraction for the newborn. (Normal conversation is approximately 60 db and whispers is 30db). • Sound levels in infant rooms shall not exceed a Leq of 50 dB and an L10 of 65 dB • Staff work areas, family areas, and staff lounge areas shall be designed to mitigate the combination of continuous background sound and operational sound of at least an Leq of 50 dB and an L10 of 75 dB. • If a refrigerator or freezer is located in the infant room or a hallway in open communication with it, the condenser and fan noise shall not exceed 40 dB. • Noise generating activities, phones, staff areas – should be away from the babies to reduce noise or have adjustable announcing signals • Alarms should be appropriately set for newborns and attended to immediately. • Soft music may be played. • Walls, floors, sinks and ceilings can all be designed to absorb sound

Floors and Walls	• Floor surfaces should be:
	  • Easy to clean and maintain, without the use of chemicals.
	  • Highly durable, impervious and jointless to minimize the ability to harbor bacterial pathogens.
	• Flooring material should be:
	  • Porcelain with a porcelain skirting of 10 cm in height. (alternative materials in the absence of porcelain are plastic or ceramic tiles)
	  • Resistant to degradation by ultraviolet light, bleach, hydrogen peroxide, and other exposure elements (including foot traffic).
	  • Have a light reflectance value not exceeding 30 percent.
	  • Able to minimize sound

	• Walls need to be:
	  • Covered with porcelain or ceramic tiles, or painted with a durable washable or anti-bacterial paint.
	  • White or light.
	  • Able to diminish noise.
	• Ceilings must be painted with a washable paint.

Ventilation	• Ventilation in the unit should inhibit particulate matter from moving freely in the space and to minimise drafts on or near the newborn beds.
	• General ventilation can be provided in two ways: exhaust- only and supply-and-exhaust.
	  • Exhaust fans pull stale air out of the unit while drawing fresh air in through cracks, windows or fresh air intakes.
	  • Exhaust-only ventilation is a good choice for units that do not have existing ductwork to distribute heated or cooled air.
	  • Supply-and-exhaust ventilation is a good choice for units with heating or cooling ducts, as it is an inexpensive way of providing fresh air

Furnishings	• Built-in and freestanding furnishings e.g. cabinets and carts, in the newborn care areas, should be easy to clean with the fewest possible seams in the integral construction. • Edges exposed to impact should be rounded • Exposed surface seams shall be sealed. • Furnishings shall be of durable construction to withstand impact by movable equipment without significant damage • Metal surfaces should be free of rust and/or stains • Curtains are not allowed in the newborn care area.

Security and doors	• The newborn care area shall be designed as part of an overall security program to protect the physical safety of infants, families and staff.
	• The need for security should be balanced with the needs for comfort and privacy of families and their infants.
	• The newborn care area shall be designed to minimize the risk of infant abduction.
	  • A minimum of 1200mm clear opening is recommended for doors requiring cot/ trolley access.
	  • In addition to the security guard, entrance doors need to be secured to prevent unauthorized access. The control point should be situated so that all visitors must walk past the station to enter the unit.
	  • Doors shall be designed for visual and acoustic privacy. All rooms shall have self-closing devices on all room exit doors
	  • Security surveillance of the Unit should include CCTV cameras and monitors.
	  • Staff reception complete with door release button for staff access control.
	  • Panic buttons should be installed within staff areas and counselling rooms

Water Supply	• The unit should have 24-hour uninterrupted running safe water supply. • To ensure continuous water supply, it is useful to have a separate reserve tank with a capacity of ≥ 10000 L, which should always be full.
Signage and Art	• Signage and art at the entrance and throughout the unit should reflect the diversity of the community served • It conveys to families that they are welcomed and supported as essential to the care of their infants.
Family facilities	• Mothers who are discharged from the postnatal ward or not providing KMC, need rooms/hostels where they can stay until their babies are discharged. • The facility should ensure that mothers don't share beds in the rooms/hostels • The rooms should have an ablution area and a laundry area. • A visitor's lounge, with comfortable chairs as well as hot and cold water is required, for family and visitors to support the mother.

	• When possible, families should have access to or the windows should have views of nature environments (consist of trees, plants, human and animal activity, gardens, and landscapes.) • When such views are not possible, artwork with nature images or other nature simulations should be provided. • Other positive distractions might include fitness centres and access to art and music

Health products and technologies for Level III (Equipment and Supplies)

Each NICU space should have equipment and supplies required to perform intensive care such as mechanical ventilation, haemodynamic support and very close patient monitoring.

There must be round the clock access to resuscitation equipment and key point of care laboratory services adapted to the neonatal patients' needs. Timely diagnostic services are also critical hence the need for portable Xray machine, portable ultra sound machine and portable echocardiography machine to be used within the unit.

A level III unit has to fulfill the following requirements listed below in detail:

Table 20: Table of equipment for a level III unit

Equipment	Labour ward (LW) and postnatal ward	Level III Neonatal Unit	Installation	Training	Consumables
THERMOREGULATION					
Resuscitaire/radiant warmer with a temperature probe, fixed height with trolley and drawer	1 per bed	1 per room	Y	Y	Spare heating elements, disposable infant wraps, temperature probe
Transport incubator with oxygen cylinder	2 per unit	2 per NBU	Y	Y	Transport covers, power supply adapters, battery backups
Wall thermometer	1 per room	1 per room	Y	N	Wall mounting kits, calibration tools, display screens
Overhead servo Incubator	Not applicable	1 per 4 beds	Y	Y	Spare heating bulbs, temperature probes, safety covers
Thermometer, clinical, digital (32 - 43^{0}C)	1 per 3 LW bed	1 per bed	N	N	Batteries
Double walled incubator	Not applicable	15 % of the bed capacity	Y	Y	Thermal mattresses, temperature probes, disposable covers, humidity chambers
Heat Shield	Not applicable	1 per bed	Y	Y	N/A

Equipment	Labour ward (LW) and postnatal ward	Level III Neonatal Unit	Installation	Training	Consumables
Thermal mattress	1 per unit	1 per unit	N	Y	Disposable mattress covers
GENERAL NEONATAL EQUIPMENT					
Bassinet (Washable)	2 per unit	85% of the bed capacity	N	N	N/A
Phototherapy unit, LED with a high intensity mode (minimum 15)	Not applicable	1 per 2 beds	Y	Y	Eye shields, LED lights
Light meter for phototherapy unit	Not applicable	1 per phototherapy unit	N	Y	Batteries
Transcutaneous bilirubin meter	1 / Postnatal ward	1 for KMC and NBU	N	Y	Batteries
Point of care bilirubin meter	1 / Postnatal ward	1 for NBU	N	Y	Cartridges
Glucometer	1/ward	1 per room	N	Y	Glucometer strips
Precision Weighing scale (Diaper weighing)	Not applicable	1 per room			Batteries
Point of care ultra sound machine	Not applicable	1 per unit	Y	Y	Ultra sound Gel, tissues, printing paper, paper towels neonatal echo probe, cranial probe
Portable X- ray machine	Not applicable	1 per unit	Y	Y	X-ray films, discs
Therapeutic cooling machine with aEEG monitor	Not applicable	2 per unit	Y	Y	Rectal probe, Cooling blankets, Distilled water aEEG leads, and gels
ANTHROPOMETRY EQUIPMENT					
Digital weighing scale	1 per 6 LW beds	1 per NBU cubicle	N	Y	Sterile scale pads
Tape measure, vinyl-coated 1.5M	1 per 6 LW beds 1 per 6 PN beds	1 per bed	N	Y	N/A
Infantometer	2 per unit	1 per 6 beds	N	Y	N/A
DRESSING / PROCEDURES / LAUNDRY					
Syringe Hub cutter/Sharp box	1 per bed	1 per 6 beds	N	Y	N/A
Surgical instrument /suture set	2 per 24hours	1 per 3 beds	N	Y	N/A

Equipment	Labour ward (LW) and postnatal ward	Level III Neonatal Unit	Installation	Training	Consumables
Stainless steel Basin/ kidney dish, 825 mls	2 per bed	1 per 3 beds	N	Y	N/A
Clear adhesive tape/ dressing	1 per 24 hours	1 per 3 beds	N	Y	N/A
Dressing tray, 300x200x30mm	1 per room	1 per 3 beds	N	Y	N/A
Tray with on castors	1 per 12 beds	1 per 12 beds	N	Y	N/A
Indicator, TST control spot/ Pack of 300	1 per 12 beds	1 per 12 beds	Y	Y	N/A
Autoclave, steam, bench top 20L, electric	1 per 12 bed	1 per unit	Y	Y	sterilization pouches, chemical indicators, Autoclave bags, chemical indicators
Laundry washer, dryer, combo 15kg	1 per labour ward	1 per unit	Y	Y	Sterile laundry detergent, washing machine filters
Linen trolley	1 per labour ward	1 for NBU	N	Y	N/A
Wall clock	1 per labour ward	1 per room	Y	N	N/A
EQUIPMENT FOR RESPIRATORY SUPPORT AND OXYGEN THERAPY					
Wall suction unit	1 per suction point per 6 /PN beds	1 suction point per bed	Y	Y	Suction tubing, collection canisters, bacterial filters,
Portable neonatal suction	1 per 6 beds	1 per bed	Y	Y	Suction tubing, collection canisters, bacterial filters,
Nasal CPAP (minimum 20)	1 per 6 beds	1 per 3 beds	Y	Y	Nasal prongs, tubings, hats.
T-piece resuscitator	1 per bed	1 per bed	N	Y	
Pulse oximeters*	1 for Labour ward 1 for postnatal ward	1 per beds	N	Y	Neonatal pulse oximeter probes, batteries
Oxygen flow meter	1 double per oxygen point	1 per bed	Y	Y	N/A
Oxygen blender	1 per LW	1 per bed	Y	Y	N/A
Oxygen analyser	1 per unit	1 per 2 beds	Y	Y	
Back up oxygen manifold	1 per unit	1 per unit	Y	Y	
Trans-illumination Light	1 per LW	1 per unit	Y	Y	N/A

Equipment	Labour ward (LW) and postnatal ward	Level III Neonatal Unit	Installation	Training	Consumables
BVM hand operated, neonate 200-300mls	1 per bed	1 per bed	N	Y	Manual resuscitation bags, spare valves
Resuscitation trolley/crash cart	1 per 6 labour ward beds	2 per room	N	Y	
Laryngoscope set (laryngoscope handle with neonatal straight blades size 00,0,1)	2 sets per unit	4 sets per unit	N	Y	Batteries, Bulbs
Nebulizer kit(electric)	Not applicable	2 per unit	Y	Y	Nebulizer cups, mouthpieces, masks
Ventilator	Not applicable	5 per unit	Y	Y	Breathing circuit sets, flow sensors, expiratory valves, filters, endotracheal tube ties/fixators, endotracheal tube introducer
BGA machine	Not applicable	1 per Unit	Y	Y	Cartridges
FLUID CONTROLLERS AND CARDIAC MONITORS					
Monitor - Portable	Not applicable	1 per bed	N	Y	Bp cuffs. Pulse oximeter probes
Syringe/infusion pumps 10,20,50, mls, single phase	Not applicable	1 per bed	N	Y	Perfuser lines
Blood warmer	Not applicable	1 per unit	N	Y	
Stethoscope, neonatal	1	1 per bed	N	Y	Stethoscope earpieces, diaphragm covers
Drip stand	Not applicable	1 per bed	N	Y	N/A
ECG unit, 3 channel, portable /SET	Not applicable	1 per unit	Y	Y	Printing papers, Cartridges, ECG electrodes, gel
Cardiac monitor	1 per unit	1 per ventilator	Y	Y	ECG leads, disposable electrodes, BP cuffs, pulse oximeter probes
COLD CHAIN MANAGEMENT FOR DRUGS					
Fridge for drugs	Not applicable	1 per unit	Y	Y	Ice packs, digital thermometer
Cool box	1 per unit	5 per unit	N	Y	Ice packs

Equipment	Labour ward (LW) and postnatal ward	Level III Neonatal Unit	Installation	Training	Consumables
ADMINISTRATIVE EQUIPMENT					
Computers	Not applicable	1 per room	Y	Y	Cables
Printers	Not applicable	1 per room	Y	Y	Cartridges Printing papers

Minimum Specs for Equipment

Table 21: Minimum Specs for equipment at a level III Neonatal Intensive Care Unit

Syringe pump for infusion of drugs and fluids

Regulation	At least one of: CE marking, approved by US FDA or another stringent regulatory body of a founding member of IMDRF (e.g., Japan or Australia or Canada)
Size	Small footprint; portable
Decontamination	Easy to clean with common disinfecting agents
Alarm characteristics	Visual and auditory
Syringe requirements	Syringe 5-60 mL, works with multiple syringe type
Flow rate requirements	0.1 -60 mL/hr.
Benchtop measurement Accuracy (for flow rate)	±3.0%
Occlusion Detection	Adjustable based on pre-set (5, 10, 25 psi)
Weight	< 5 kg (without batteries)
Voltage	Model must match the voltage and frequency of the power grid 220-240 VC at 50 Hz

Bilirubinometer Measuring Bilirubin Levels

Regulation	At least one of: CE marking, approved by US FDA or another stringent regulatory body of a founding member of IMDRF (e.g., Japan or Australia or Canada)
Result format	Quantitative across whole linear range
Result units	Must display mg/dL or µmol/L
Sample	Whole blood heel=stick sample <50 µL; does not require user to separate serum using a centrifuge
Linear range	5-30 mg/dL (85.5 - 513 µmol/L)
Accuracy	± 20% from 5-30 mg/dL (85.5 - 513 µmol/L) 2

Phototherapy Machine for management of jaundice

Regulation	At least one of: CE marking, approved by US FDA or another stringent regulatory body of a founding member of IMDRF (e.g., Japan or Australia or Canada)
Irradiance	Standard Phototherapy: 8-10 uW/cm2/nm AND Intensive Phototherapy: >30 uW/cm2/nm
Light source	LED
Peak Wavelength	430-490 nm
Effective Treatment Area	>1300 cm2

Bulb Lifetime	>44,000 hours
Irradiance Meter	Available
Voltage	Model must match the voltage and frequency of the power grid 220-240 VAC at 50 Hz

Glucometer Blood Glucose Monitoring

Regulation	At least one of: CE marking, approved by US FDA or another stringent regulatory body of a founding member of IMDRF (e.g., Japan, Australia, or Canada)
Result format	Quantitative across whole linear range (should be able to switch between mg and mmol
Result units	mg/dL OR mmol/L
Precision	±2% or 2.5 mg/dL, whichever is greater
Linear range	0-20 mmol/L (0-360 mg/dL)
Accuracy	± 8% 2 ± 0.2 mmol/L at 3 mmol/L (± 3.6 mg/dL at 54 mg/dL)
Sample	Whole blood heel-stick sample <50 µL

Hemoglobinometer Measuring Hb Levels

Regulation	At least one of: CE marking, approved by US FDA or another stringent regulatory body of a founding member of IMDRF (e.g., Japan or Australia or Canada)
Result units	g/dL OR g/L
Sample	Whole blood heel-stick sample <25 µL; doesn't require user to separate serum using a centri- fuge
Linear range	4.5-25 g/dL.
Accuracy	± 1.75 g/dL
Result format	Quantitative; semi quantitative below 5 or above 25 g/dL
Power source	Mains with rechargeable battery

CPAP Machine

Regulation	At least one of: CE marking, approved by US FDA or another stringent regulatory body of a founding member of IMDRF (e.g., Japan or Australia or Canada)
Flow Driver	Integrated (on-board air compressor)
oxygen Flow Capacity	0-10 L/min
Pressure	5-8 cm H20
Total (blended) Flow	0-10 L/min
Alarms	Audio Power
Accessories	Proprietary
Voltage	Model must match the voltage and frequency of the power grid 220-240 VAC at 50 Hz

Oxygen Splitter Delivery of Oxygen

Regulation	At least one of: CE marking, approved by US FDA or another stringent regulatory body of a founding member of IMDRF (e.g., Japan or Australia or Canada)
Air Flow per Patient	0-2 L/min
Flow control	Each patient has individually controlled flow rate
Number of Output	At least 2

Pulse Oximeter Measuring Oxygen Saturation Levels

Regulation	At least one of: CE marking, approved by US FDA or another stringent regulatory body of a founding member of IMDRF (e.g., Japan or Australia or Canada)
Pulse rate	30-240 bpm
Sp02 Accuracy	+-3%
Alarms	Auditory
Alarm Limits - PR	80-180 bpm OR 100-180 bpm 2
Alarm Limits - Sp02	Adjustable
Continuous Measurement	Yes
Patient Interface	Neonate specific, biocompatible, and reusable
Weight	<500 grams, portable
Power Source	Mains with rechargeable battery

Suction Pump

Regulation	At least one of: CE marking, approved by US FDA or another stringent regulatory body of a founding member of IMDRF (e.g., Japan, Australia, or Canada)
Size	Small footprint; portable
Decontamination	Easy to clean with common disinfecting agents
Alarm characteristics	Visual and auditory
Syringe requirements	Syringe 5-60 mL, works with multiple syringe type
Flow rate requirements	0.1 -60 mL/hr
Benchtop measurement accuracy (for flow rate)	±3.0%
Occlusion Detection	Adjustable based on pre-set (5, 10, 25 psi)
Weight	< 5 kg (without batteries)
Voltage	Model must match the voltage and frequency of the power grid 220-240 VC at 50 Hz

Warmer/ Resuscitaire with a skin temperature sensor

Regulation	At least one of: CE marking, approved by US FDA or another stringent regulatory body of a founding member of IMDRF (e.g., Japan or Australia or Canada)
Benchtop Measurement Accuracy	±0.1°C
Clinical Measurement Accuracy	±0.3°C
Stability	< 0.5°C
Skin temperature sensor accuracy	±0.5°C
Includes Timer	Yes
Mobility	Has wheels; can be moved by one person
Uniformity	< 1°C
Alarm Characteristics	Visual and Auditory
Patient Accessibility and Visibility	Patient is visible and accessible to healthcare worker
Temperature Control	Based on infant's temperature and includes fail-safe mode
Power Source	Mains Power
Voltage	Model must match the voltage and frequency of the power grid 220-240 VAC at 50 Hz

Double walled Incubator

Air Temperature Control range	25°C ~ 38°C
Skin Temperature control range	32°C ~ 38.5°C
Humidity display range	0% ~ 100% RH
Humidity Control range	20% ~ 90% RH
Skin Temperature sensor accuracy	±0.5°C
Temperature fluctuation	±0.5°C
Environment Temperature	20°C ~ 30°C
Internal noise level	<55dB (A)
Infant bed tilt angle	±10°
Mattress Size	65cm (L) x 37cm (W)
X-ray cassette tray	
LED phototherapy	
Baby weighing system	
Power Supply	220-240V 60/50Hz
Power Input	420 VA
Safety class	Class I, type B

Transport Incubator	In addition to the specs of an infant incubator, a transport incubator should have; • Microprocessor controlled Air mode and Baby skin mode, • Use AC Power and DC Power alternatively • Collapsible trolley with provision to keep re-fillable oxygen cylinder and battery. 2D or 2E size tank mount which permits mounting gas cylinders with a diameter of up to 4.5 in (11.6 cm) and up to 34 in (85 cm) in length. • Double Wall Canopy • Front and head end access doors with access porthole and tubing access ports. (2 access doors, 2 disposable infant restraint straps, 1 iris port, 2 quiet touch port doors. 6 tubing ports). • Indicators for Mains and Battery Modes of Operation. • Power mode Illuminates AC, DC, or external DC, AC and 12V DC Connectors. • Display of Set temperature, Air temperature, Skin temperature and internal battery power • Comprehensive Alarm System : Alarm indicators for High temp, Power fail, Sensor fault, Heater temp, Air flow, Low DC.. • The infant bed can be pulled out easily • Natural air flow humidity • Adjustable Height Oxygen cylinder and Oxygen supply system • Examination light, LED Display, Brightness adjustable
Neonatal Mechanical Ventilator	• Should be built with neonatal and pediatric patient concept design • Should have inertia flow technology for oscillation • Should be Microprocessor Control suitable for Pediatric ventilation • Should be equipped with newer modes of ventilation: • Assist/ Control, Volume Control, Pressure • control, Pressure Support • SIMV with pressure support (pressure and volume control) • PEEP • Inverse ratio ventilation • Noninvasive ventilation –BIPAP, CPAP • Apnea ventilation, user selectable, volume & pressure control • Should have capability to give high frequency oscillation

- The high frequency oscillation should be quiet
- Should have PRVC and NAVA modes
- CPAP
- Should have facility for Invasive and Non-invasive ventilation
- Should have built in color screen TFT/LCD display for display of waveforms and monitored values.
- Pressure range and settings
  - Delivered pressure (cmH2O)
  - Delivered tidal volume (mL)
  - Respiratory rate
  - $Fi0_2$ monitoring alarms
  - Should Weigh not more than 35kgs
  - Should have an inbuilt rechargeable battery with at least 90 minutes of backup power or more
- Therapy:
  - Valve circuit therapy: CPAP, (A)CV, P(A)CV, P-SIMV, PS
  - Lak circuit therapy: CPAP, (s)T, P(A)C, Ivaps3 AND OPTIONAL Auto EPAP4
  - Mouthpiece ventilation therapy: (A)CV, P(A)CV, PS/SVT
  - Manual breath
  - Sigh breath (recruitment)
  - Apnea ventilation
  - Present programs
- Should have a humidifier
  - should all humidifier accessories
  - should have integrated nebulizer and accessories
  - • should provide circuits for high frequency oscillation
  - should have a y sensor and its accessories
- Should have facility to measure and display the following parameters:
  1. Airway pressure (peak & mean)
  2. tidal Volume (inspired & expired)
  3. Minute Volume (Inspired & Expired)
  4. Respiratory mechanics.
  5. Spontaneous Minute Volume
  6. Total Frequency
  7. FIO2 dynamic
  8. Plateau Pressure
  9. Intrinsic PEEP
  10. Resistance and Compliance
  11. User selector Alarms for all measured & monitored parameters
  12. Occlusion Pressure
  13. Pressure flow & Volume curves
  14. should display volumetric capnography
  15. rump
  16. I:E ratio

Should have following settings;

1. Tidal volume (minimum 2ml, Maximum up to 2000ml) pre-set range for both neo-natal & pediatric modes to be provided
2. Inspiratory pressure (up to 60cm of H2O)
3. Respiratory rate 2 to 160 bpm
4. Apnea back up rate
5. CPAP/PEEP
6. Pressure support

	7. FIO2 setting range between 21 and 100% 8. Pause time 9. Pressure and flow/ Volume Trigger 10. Inspiratory flow up to 120Lpm 11. Apnea ventilation selectable to both volume and pressure • Should have Automatic compliance and leakage compensation for circuit and ET tube. Should also possess the ability to measure cuff pressure • Alarms: The following alarm should be audio visual 1. Should have facility for events and alarms logs with date & time 2. High pressure alarm 3. Low pressure alarm 4. FiO2 5. Battery operation alarm 6. Mains failure alarm 7. High and low-rate alarm 8. Circuit Leak • Disposable heat moisture exchanger, Qty 100 to be supplied with unit • Power input can be either through adaptor or direct source in arrange of 100-240VAC 50/60Hz switch mode or better • Warranty: At least two years warranty should be provided with at least a one-off service during warranty. Cost of consumables and spares should be indicated that will support the unit for its entire life cycle • Training and commissioning: • The machine will be considered commissioned after technical staff and user are satisfactorily trained. • All documentations including user manual, technical manual, calibration and testing certificates should be submitted on delivery both in soft and hard copy

Pharmaceuticals and Specific Drugs Commonly used in the NICU

Table22: Pharmaceuticals and specific drugs commonly used in the level III Neonatal Intensive Care Unit

This table lists the categories of pharmaceuticals and specific drugs commonly used in the NICU	
Category	**Pharmaceuticals**
Analgesics/Local Anesthetics	IV morphine (10 mg/mL) and oral morphine (1mg/ml), Fentanyl 50mcg, 100mcg, Remifentanil 2mg, 5mg, Pethidine 50mg, 100mg, Paracetamol oral (120mg/5ml) and IV 5mg/ml, Lidocaine 2%
Anticonvulsants	I.V/ I.M Phenobarbital (30mg/ml) and Oral phenobarbital (30mg tab), IV levetiracetam (100mg/ml) and Oral levetiracetam (100mg/ml), IV Phenytoin (50mg/ml).
Antidotes	Naloxone (400mcg/ml), acetylcysteine (200mg/ml)
Sedatives	Midazolam 1mg/ml (5mg), Propofol 10mg/ml (200mg), Dexmedetomidine 100mcg/ml, Diazepam 5mg/ml, Ketamine 50mg/ml, Remifentanil 2mg/2ml, Fentanyl 50mcg/ml, Chlorohydrate 100mg/ml
Emergency Drugs	Adrenaline (1mg/1ml), Adenosine (6mg/2ml), Alprostadil (500mcg/ml) Atropine 0.1mg/ml (1mg), Amiodarone 50mg/ml (300mg), Calcium Gluconate 10%, IV Chlorpheniramine 10mg/ml, , Dobutamine 12.5mg/ml (5 mg), Dopamine 40mg/ml, Glucagon 1mg, Glycopyrolate 200 micrograms, Hydrocortisone 100mg, Ipratropium 500mcg, Lignocaine (preservative-free), Magnesium Sulphate 4%, Potassium Chloride 15%, Propranolol 1mg, IV Salbutamol 1mg/ml for hyperkalemia, Salbutamol Nebulizing Solution 5mg/ml, Sodium Bicarbonate 8.4%, Water for Injection (Sterile 10ml), Sodium Chloride 30%. Dinoprostone 1mg.

Inotropes/ Vasopressors	Noradrenaline 1mg/ml, Ephedrine, Adrenaline, Phenylephrine, Milrinone, Dobutamine 12.5mg/5mg, Dopamine 40mg/ml, Vasopressin
Lubricant	Lubricating Gel, water soluble lubricating gel
Drugs relating to Coagulation	Heparin 5000 i.u/ml, Enoxaparin 40mcg/0.4ml, Warfarin 3mg tab, Rivaroxaban, Vitamin K 2mg/0.2ml, Protamine sulphate 10mg/ml, Tranexamic acid
Diuretics	Mannitol 500ml, Furosemide 10mg/ml, Spironolactone 25mg, Hydrochlorothiazide 25mg.
IV Fluids	Albumin 5%, 20%, Normal Saline 0.9% 500ml, Ringers Lactate Solution 500ml, Dextrose 10% 500ml, Dextrose 50% 50ml, Dextrose/Normal Saline 500ml, 30% Sodium Chloride, 3% hypertonic saline
Muscle Relaxants	Suxamethonium 100mg/2ml, Atracurium 10mg/ml50mg, Cisatracurium 2mg/ml20mg, Rocuronium 10mg/ml
Antimicrobials	**First line antibiotics:** Benzylpenicillin (250000iu/ vial), Gentamicin(20mg/ml), Flucloxacillin 250mg, Amoxicillin DT, Metronidazole **Second line antibiotics:** Ceftazidime 250mg vial, Cefotaxime 500mg, Vancomycin 500mg per vial, Amikacin (250 125mg/ml), ceftriaxone 500mg/ml, Cefepime, meropenem 500mg, Piperacillin/tazobactam 4mg/500mg. **Topical antibiotic:** TEO 1%, Mupirocin cream **Antifungals:** IV Fluconazole 2mg/ml, Oral Fluconazole 2mg/ml, Nystatin oral drops. **Antivirals:** IV Acyclovir, Ganciclovir 500mg/vial, Valganciclovir 50/ml Palivizumab 100mg/ml.
Blood and blood com- ponents	Whole blood, Packed red blood cells, Platelets, Fresh Frozen Plasma, cryoprecipitate, Special blood component (Irradiated, Leucoreduced) in neonatal bags
Nutrition Supplements	Pabrinex (I & II), Total parenteral nutrition: Vaminolact, Intralipids, Peditrace, Soluvit, Enteral nutrition: Infant formula (preterm and term, partially hydrolysed, extensively hydrolysed); EBM fortifiers, Cholecalciferol(VIT D3)400iu, Oral Ferrous sulphate (40mg/5ml of elemental iron), Calcium, Folate 5mg, Multivitamin drops
Antiseptics	Endozyme Solution, Chlorhexidine Solution, Methylated Spirit, Presept Tablets, Sanitizer/ Hand Scrub, Sodium Hypochlorite Solution (Jik), Povidone Iodine Solution
Special Neonatal Medications	Surfactant - (4ml, 8ml), Caffeine citrate 10mg/ml and 20mg/ml, IV and oral/IV Sildenafil
Others	Soluble Insulin 100IU/ml Hyaluronidase Cyclopentolate 1% Phenylephrine drops 5% Anti- malarials: Artemether / lumefantrine 20mg/120mg dispersible tab, Artesunate injection 30mg/ml, Anti-retroviral: As per national guidelines Anti- TBs: Isoniazid 50mg tab,100mg, Rifampicin/Isoniazid/Pyrazinamide (75/50/150), Hepatitis B immunoglobulin and Hepatitis B Vaccine IV immunoglobulin Digoxin 250mcg, Esomeprazole 40mg/2ml, Aminophylline 250mg Dexamethasone 4mg/ml Omeprazole 40mg

Consumables and Supplies

Table 23: Consumables and Supplies used in the level III Neonatal Intensive Care Unit

Airway management
Suction catheters (Fr sizes 4,6,8)
Yankauer tubes
Oropharyngeal airways (00, 0)
Tracheostomy tubes (size 2 to 4)
Tracheal dilators
Breathing
Neonatal BVM sizes 200mls - 300mls
T-piece resuscitator
Nasal prongs (neonatal)
Neonatal non rebreather oxygen mask
Spirometers
End tidal CO_2 probes
Endotracheal tubes size 2 - 4mm (uncuffed)
Supraglottic Laryngeal Mask Airway - size1
Chest tubes: Fr Size 8 - 12
Neonatal CPAP with Accessories
Neonatal Ventilator with accessories
Laryngoscope
Laryngoscope Straight blades 00 - 0 -1
Nebulization kit
Circulation
Three way stop cocks
Perfuser lines
IV Cannulas (gauge 24 and 26)
IV butterfly cannulas (gauge 23)
Assorted syringes (1ml,2ml, 5ml, 10ml, 20ml, 50ml, 60 ml)
Insulin syringes
Needles G21, G22 G23 and G25
Burette infusion set- Solusets
Burette Blood giving sets
Clear adhesive tape/transparent dressing/strapping
Peripherally Inserted Central Catheter lines 1Fr; 2Fr
Umbillical Arterial catheters - Fr Sizes 2.5-5
Arterial pressure tubing
Invasive Blood Pressure Monitoring Transducers
Vein finder
General patient supplies
Eye shields for phototherapy
Urine bags, graduated, with inlet and outlet -200ml
Urinary Catheters Sizes 4, 6, 8
Patient identification bands

Branded NBU linen, Flannel sheets
Staff scrubs branded NBU
Mothers' gowns branded NBU
Diapers
Nutrition
NG tube Fr Size 4 - 8
Calibrated feeding cups
Milk expression bowls
IPC
Liquid soap
Disposable hand paper towels
Color coded waste segregation bins- red, yellow, black
Bin liners- Red, yellow, black
Safety boxes
Disposable face masks
Disposable plastic aprons
Disposable gowns
Clean gloves
Sterile gloves (sizes 6.5, 7.0, 7.5, 8.0)
Cotton wool
Gauzes
Stationery
Neonatal inpatient file (MOH 378)
Neonatal inpatient register (MOH 373)
KMC register (MOH 374)
Mortality Book
Paper punch and staplers
Clip boards
Carbon paper

Human Resource

Successful provision of quality services by a Level III newborn unit depends not only on the equipped unit but on the availability of round-the-clock clinical expertise, backed up by monitoring devices and equipment. Well-trained nurses and medical staff form the backbone of the service. Thus, the unit should have the required number of appropriately trained and qualified nurses. There should be the following cadres within the unit:

Table 24: Cadres within the level III Neonatal Intensive Care Unit

Cadre	Minimum number	Description
Neonatologists	4 per unit	• The head of the unit should be a neonatologist • The neonatologist shall be the lead mentor • The neonatologist should conduct ward rounds and specialized clinics (Neonatal Outpatient Clinics) • A neonatologist must be available for emergency back-up 24 hours a day. • The Head of the unit or his/her substitute should be a member of the Hospital's Ethic committee, Morbidity and Mortality committee, Resuscitation committee, Antimicrobial Stewardship committee, IPC committee, MPDSR committee and other relevant positions within the hospital
Paediatricians	8 per unit	• A consultant pediatrician should be available daily and for emergency back-up, 24 hours a day • Member of relevant hospital ethical committees • The paediatrician shall be the lead mentor
Ophthalmologist assigned to the unit	1 per unit	• ROP screening and treatment • Screening and treatment of other ophthalmic conditions

Paediatric Subspecialists or access to paediatric subspecialists	1 per subspecialty	• To review newborns with conditions relevant to their subspecialty
		• The services of the following paediatric (sub-)specialists should be available:
		  • 24 hours/7: cardiology, paediatric surgery, anesthesiology, radiology.
		  • Within 24 hours: other paediatric (sub-)specialists from infectious diseases, neurology, nephrology, gastroenterology, pulmonology, ophthalmology, metabolic diseases, perinatal pathology, genetics, endocrinology and surgical subspecialties (such as neurosurgery, ENT, orthopaedics, etc.).

Medical officers	NICU 1 per every 6 patients per 8 hour shift Other area 1 per every 10 patients per 8 hour shift	• Minimum in-house physician coverage for 24 hours

Nurses	As per the nurse to baby ratio	**Head nurse**
		• A nurse with a Bachelor's degree in nursing with additional Neonatal nursing training,
		• Responsible for coordinating inpatient activities and multidisciplinary care
		• Responsible for coordinating inpatient activities and multidisciplinary care
		Clinical nurse educator
		• There should be at least 1 designated nurse for continuing education and training with specialised training in neonatal care.
		
		Other nurses within the unit
		• At least 75% of nurses working in the unit should be neonatal nurses
		• The nurse-to-patient ratio below should be ensured:
		  • KMC 1 professional nurse to every 6-8 newborn per 8-hour shift
		  • Category C: 1 professional nurse to every 6 newborns
		  • Category B: 1 professional nurse to every 3 newborns
		  • Category A (NICU): 1 professional nurse to every one newborn. **Some instances may require a ratio of 2 nurses for 1 patient (therapeutic cooling, exchange transfusion, dialysis)**
		• In addition, there should be 1 extra nurse available per shift.
		• Nurses in training should work under the supervision of a qualified nurse.
		  • 1 experienced nurse can supervise only 1 nurse in training.
		• There must be 1 nurse dedicated to IPC/equipment cleaning and sterilisation

Nutritionists	4 per unit	• Shall support exclusive breastfeeding (Positioning and attachment and expressing breast milk) • Shall offer nutrition counseling for the mother • Shall work with the clinical team to optimise nutritional interventions • Growth monitoring in collaboration with clinical team
Pharmacist	3	• One should be a clinical pharmacist paediatrics and a mentor • Champion Anti-microbial stewardship activities • Shall perform prescription audit to check for drug-drug interaction and medication errors • Liaison with the hospital pharmacy • Shall take lead in extemporaneous preparation/ compounding of neonatal drug dosaging • Shall participate in ward rounds and guide in treatment plans • Shall delegate roles to the pharmaceutical team

Pharmaceutical technologists	4	• Dispensing of the drugs • Shall check treatment sheets • Execute roles as assigned by the pharmacist
Laboratory personnel	10 (2 per shift)	• Performing point of care lab test • Liaison with the hospital main lab • Communication of critical values • Routine quality checks and audits on neonatal laboratory processes
Biomedical engineer	2 per unit	• Providing technical specification of equipment and machines • Offering leadership and mentorship • Installation and commission of devices • Management of inventory • Quality and safety assurance for equipments • Member in appropriate committees ie. IPC, MPDSR, OSHE etc
Biomedical technologists	3 per unit	• Installation of devices • Planned preventive maintenance and calibration of devices • Repair and trouble shooting of devices • Quality assurance and safety checks for equipments
Clinical Psychological Counselor	1 per Unit	• Must have clinical background • Offer psychological support • Coordinate family conferences • Bereavement counseling
Social worker	2 per unit	• Extracting psychosocial information from the patient and observation of causal factors that may be useful to the treatment plan and follow up post discharge • Linkage and followup to support services • Placement of abandoned babies
Health Records Information officer	2 per 8-hour shift	• Custodian of patient files • Registration of patients • Support the discharge process of patients • Overseeing data management • Ensures availability of relevant stationery • Death notification
Occupational therapist	1 per unit	• Promoting neurodevelopmental care • Oral stimulation for newborns with no sucking reflex • Promoting self-regulation of the newborns • Counselling caregivers
Cleaner	At least 2 per shift	• Daily Cleaning of the unit • Scrubbing of the unit as part of IPC
Porters	At least 2 per shift	• Transporting specimens, investigations e.g. X-ray films, lab reports etc.
Transport staff	1 per shift	• Transport of patients for investigations e.g. MRI, transfer of patients
Spiritual advisors of various religions	Access to 1 per religion	• Spiritual support

Guidelines and Relevant Tools

Summary of the minimum number of all the cadres required in the unit

Guidelines

- National guidelines for quality obstetric and perinatal care
- Essential newborn care guidelines
- KMC clinical implementation guidelines
- Guidelines for the use Chlorhexidine for Cord care
- HIV, STI and Viral Hepatitis guidelines
- ART guidelines
- Baby friendly hospital initiative guidelines
- IMNCI guidelines
- National IPC guidelines
- National MPDSR guidelines
- Neonatal, Child and Adolescent Death Audit guidelines
- Basic Paediatric Protocol Comprehensive newborn care protocols - to be availed everywhere

Job Aids

- Newborn resuscitation
- Cord care
- KMC
- Hand washing
- Breastfeeding positioning and attachment
- Breast milk expression
- Danger signs
- PMTCT
- Apgar Score
- Ballards Score
- Antibiotics and emergency drugs dosing charts
- Waste Segregation
- Equipment decontamination
- 50% dextrose for managing hypoglycemia (buccal/oral)
- Preparing 10% from 50% dextrose

Tools

- In-patient maternity file
- MOH 216 Mother Child handbook (MCH)
- Standardized Neonatal Inpatient file (MOH 378)
- Birth notification (B1)
- Death notification (D1)
- Neonatal death review form (MOH 527)
- MOH 333 Maternity register
- KMC (MOH 374) register
- MPDSR
- MOH 710 summary (immuni- zation)
- MOH 711 summary (Interven- tions)
- MOH 408 HEI Register
- Neonatal Death Review Form (NDRF) MOH - 527
- Neonatal Death Notification Form - MOH - 661
- Child and Adolescent Death Notification Form MOH- 670
- Child and Adolescent Death Review Form- MOH-671
- Community Neonatal Verbal Autopsy Form-MOH-109
- Community Child and Adolescent Verbal Autopsy Form MOH-110

Others

- SOPs (national)
- Manufacturer's instructions

CROSS CUTTING AREAS FOR ALL THE LEVELS OF NEWBORN CARE

General Layout and Infrastructure

- The Newborn Unit shall be a distinct area in the health care facility, with controlled access and a controlled environment.
- The Newborn Unit shall be in close and controlled proximity to the area of the hospital where births occur inclusive of operating theatres.
- When obstetric and neonatal services must be on separate floors of the hospital, an access shall be provided for access between the birthing unit and the Newborn Unit.
- Units receiving infants from other facilities shall have ready access to the hospital's transport receiving area and shall designate a space for transport equipment.
- When making alterations to existing buildings, plan to incorporate as many of the elements of the service in one location. Whatever the opportunities or constraints, the following should be considered:
    1. Workflow patterns should allow for efficient equipment, family and staff movements.
    2. The need for constant surveillance of each bed from the nurses' station.
    3. All sections of the neonatal unit in one physical area, including the KMC area where possible.
    4. A dual corridor rather than a central corridor is ideal.
    5. All mothers should lodge near the neonatal unit whenever possible.
    6. All mothers should have access to wash and laundry facilities specifically assigned to the newborn unit.
    7. Baby sections partitioned into functional units of 4 – 8 babies per area.
    8. Access for mothers on wheelchairs.
    9. Access for portable X-ray and ultrasound machines.

Size of the newborn unit:

Physical Structure Room Specifications

1. Each room should be no less than 15-20m².
2. Floors must be covered with porcelain or plastic tiles.
3. Walls must be painted with a washable paint or covered with ceramic tiles.
4. Paint and ceramic tiles must be light in colour so that dirt is easily visible

Bed capacity:

Level III newborn care facility should have 4 beds per 1000 births per year plus 30% to cater for extra mural admissions (40% of the total capacity shall cater for preterm admissions).

Standard clinical guidelines/protocols

Clinical guidelines/protocols are statements that summarise medical knowledge and provide recommendations with the aim of standardising and improving patient care. They are based on evidence reviews and assessments of the benefits and harms of different care options. Clinical guidelines should be properly drafted and include supporting clinical evidence, while having review dates. These guidelines, once discussed and drafted, should be disseminated and implemented effectively, in order to inform care processes.

In Kenya the guidelines used for neonatal care across the different levels of care include:

- Comprehensive newborn care protocols
- Basic paediatric protocol
- ETAT+ guidelines
- KMC guidelines

- National HIV, STI and Viral Hepatitis guidelines
- National guideline for the screening and Management of Retinopathy of Prematurity
- Apnoea of Prematurity Guidelines
- Chlorhexidine (cord care) guidelines
- Antimicrobial stewardship guideline
- Palliative care guidelines
- Comprehensive Newborn Care Training Guideline
- National standards for improving the quality of care for children including small and sick newborns
- Newborn Child and Adolescent Death Audit
- National guidelines for MPDSR
- IPC guideline
- Kenya Health Sector Referral Implementation Guideline
- BFHI guidelines
- BFCI guidelines
- National MIYCN guidelines

In addition to the above national guidelines, level III newborn care unit should develop protocols/Standard Operating Procedures (SOPs) that standardize care within the units, especially for the management as well as monitoring of conditions that require advanced care and are not comprehensively covered in the national guidelines. SOPs can include; Preterm care bundles, central line care bundles etc.

Infection Prevention and Control

Introduction

Newborns are highly susceptible to infections due to their immature immune systems. Additionally premature babies (<37 weeks) are even more vulnerable due to lack of exposure to third-trimester passive immunity from the mother.

Hand hygiene and other strict infection control measures are essential to minimize risks in healthcare settings.

General principles of IPC in the newborn unit

Multi-intervention infection prevention and control strategies are available include a combination of the following interventions:

Table 26: Multi-intervention infection prevention and control strategies

Measure	Description

Hand Hygiene	• Hand washing is the single most important way to prevent infection.
	• All Health care workers should adhere to the WHO's "5 Moments of Hand Hygiene": before patient contact, before aseptic procedures, after fluid exposure, after patient contact, and after touching surroundings
	• Hand hygiene should be performed using either:
	  • Liquid soap and running water
	  • Alcohol based hand rubs (70–95%) when hands are not visibly soiled
	• Hand washing job aids with clear washing instructions above all sinks

Patient isolation and cohorting	• All babies suspected to have neonatal sepsis should have appropriate antimicrobial sensitivity testing on the appropriate specimen. • Isolate neonates with culture-positive sepsis or serious infectious risks (e.g., varicella, measles). • During outbreaks, cohort affected babies in a single cubicle until discharge. • Report any notifiable diseases to the Integrated disease surveillance and response team • Establish referral protocols • Screen out born and referred newborn for sepsis

Patient Decolonization	• A primary goal of decolonization is to remove pathogens on specific places on newborn's body, such as skin (e.g., surgery sites) and mucosal surfaces (e.g., nose, gastrointestinal tract, respiratory tract, urinary tract). • Decolonize patients with infections such as Methicillin Resistant Staphylococcus Aureus (MRSA) and during outbreaks
Environmental Interventions	Infection prevention requires adherence to norms on spacing, cleaning, and disinfection. Key measures include: • At least 1m spacing per incubator/bassinet • Have 4–8 babies per functional area with dedicated handwashing stations, • The unit should be air-conditioned at 26–28°C, have negative air pressure and ventilation • Limit the number of people coming into the unit • Use swing or no doors between sections to reduce contamination.
	CLEANING • Maintain a housekeeping schedule to keep the nursery clean and dust-free. • Floors and surfaces should be cleaned 1–2 times daily with approved disinfectants and windows weekly. • Spills of blood or fluids must be cleaned immediately and disinfected with 0.5% sodium hypochlorite. • A bucket with fresh disinfectant should always be available. • Dustbins should be emptied daily and washed with soap and water. • During outbreaks - clean and fumigate rooms using aerosolized hydrogen peroxide, ultraviolet C and pulsed- xenon ultraviolet radiation systems.
Healthcare Personnel interventions	Involves: Staffing ratios, staff cohorting, screening, decolonization, work restrictions or removal of colonised personnel **Staffing:** Adequate staff is important for infection prevention. Maintain adequate staffing ratios as above. (see section on staffing) **Protective attire** • Health care providers and caregivers should be in short-sleeved clothing. • HCWs and caregivers should have short nails with no artificial colours • Routine use of personal protective gowns • Hair needs to be held up and behind (away from the face). (Alternatively, one can wear a surgical cap • Others measures: No phones in patient care areas, use of clean closed shoes and clean attire. **Staff cohorting** • Personnel with airborne infections and skin infections should not work directly with patients until they are better. • Personnel should be immunised against measles, rubella, Hepatitis B.

Equipment Interventions	• Use separate equipment for each baby, including incubators, stethoscopes, blood pressure cuff, BVM devices, thermometers, and pulse oximeters.
	  • Clean these equipment with at least 70% alcohol before and after use.
	• Keep records, files, and X-rays at the nurses' station, not on incubators.
	• Cleaning and disinfection depend on equipment type (refer to the Kenya National IPC guidelines).
	• Clean swab containers, injection, and medicine trays daily with soap and water.
	• **Incubators and bassinets** should have waterproof mattresses and should be cleaned daily with detergent-soaked cloths.
	  • After use or every 7 days, disinfect incubators and bassinets with 0.5% sodium hypochlorite and allow to dry before reuse.
	• **Respiratory circuits /CPAP generators and nasal prongs for CPAP**
	  • For reusable breathing circuits should be cleaned after every patient or if soiled. If the baby had a gram-negative infection, discard respiratory circuits.
	  • Oxygen tubing should be single use.
	• **Humidifier chambers:** Fill with sterile water daily. After each baby or after one week, wash with soapy water, rinse, dry thoroughly and gas sterilise
	• **Infant feeding cups and syringes** - Wash and disinfect cups used for feeding. Discard disposable syringes after use if used for feed.

Antimicrobial stewardship (AMS)	• There shall be an Antimicrobial Stewardship Committee to:
	  • Optimise antimicrobial use, minimise adverse drug reactions and curb antimicrobial resistance (AMR) and missuse by promoting appropriate drug selection, dosage and administration routes.
	  • Ensure active monitoring and surveillance - Analysing resistance patterns and monitoring antimicrobial use,
	  • Mentorship on AMS

Patient care measures	• Umbilical cord care - Refer to MOH cord care protocol • For neonates <14 days or <30 weeks GA, cleanse skin with sterile water after antiseptic use. Prefer 0.1% chlorhexidine gluconate in preterm newborns. • For perineal care, bathing, eye care, oral care, IPC for adhesives and monitoring equipment refer to annex on IPC below
Device Specific measures	• There shall be SOPs at level III on preventing CLABSIs (Central line Bloodstream Associated Infections), CAUTI (Catheter Associated Urinary Tract Infections) and VAP (Ventilator Associated Pneumonia), Refer to appendix below on IPC

IPC Committee	• The unit IPC committee shall be composed of a multidisciplinary team including all the relevant departments
	• The committee should meet at least once a month
	• The role of the IPC committee will include:
	  • Ensuring that all the IPC measures outlined are being implemented
	  • Training of new staff/students on IPC
	  • Conduct regular CMEs on IPC
	  • Surveillance on organisms isolated and sensitivity patterns
	  • Conducting audits, e.g. hand washing audits, to assess the level of IPC in the unit with an aim of improving.

Referral of Newborns Across the Various Levels of Care

Introduction

Referral or transfer of the newborn occurs in 2 main directions:

- From a lower level of newborn care to higher levels of newborn care when the care needed cannot be provided at the initial level of care.
- Newborns can also be referred from a higher level of newborn care, once stable, to a lower level to continue standard care, kangaroo mother care and/or follow up. For this to be effective:
  - It has to be planned and the lower-level facility must have the expertise to take care of the newborn.
  - The receiving facility should be informed and a standard counter-referral form with all the necessary information should be completed.

Referrals can also occur across the same level of care e.g. when a client requests to continue care at a facility offering the same level of care.

Appropriate care should be provided to stabilize the newborns before referral (pre-referral care) and the referral should be done within 30 minutes of stabilisation. Care should be continued during transport and whenever possible the mother should accompany the baby to ensure family centered care.

In utero transfers

In utero transfers are required when a pregnant woman is anticipated to deliver at a gestation which cannot be cared for at the health facility she has presented to or if there are any maternal/fetal conditions that require expertise or other resources not available in the health facility. Mothers who present for delivery before 36 weeks should be transferred, before delivery, to facilities that are able to provide level II or III newborn care depending on the gestation or the anticipated needs of the baby.

General principles of referral applicable across the different levels of newborn care

Table 27: General principles of referral

Measure	Description
Establish clear referral protocols	The health facilities/units should establish clear protocols/ guidelines for referral
Staff training and capacity building	All health care providers involved in the care of newborns at the different levels of care should receive comprehensive training and CMEs on the referral protocols/ guidelines
Pre referral stabilization	The facility/unit should ensure that the newborn is clinically stable for transport to higher levels of care
Effective communication and coordination	• The health facilities or units should establish reliable communication channels with the receiving and/or referring facilities • The facility should appoint a referral coordinator with clear roles and responsibilities • There should be prompt and accurate information sharing using The SBAR (Situation Background Assessment and Recommendation) communication tool should be used (See annex)

Transportation and logistics	• The health facility should ensure timely availability or access to transportation for referral that is functional and adequately equipped (see section below on equipment and supplies required during transportation)
	• Thermal care should be provided through the use of a transport incubator or by transporting the newborn in skin-to-skin contact
	• A transport team should be in place, during each shift, to refer newborns.
	  • A health care provider competent in neonatal emergency care must be part of the team
	  • 1 driver should be available for referral per shift
	  • The composition of the team may vary depending on the condition of the newborn and level of care required

Monitoring and Evaluation	• The health facilities/units should establish a system for regularly monitoring its referral system including referral rates, timeliness of referrals and outcomes of referred cases • Periodic audits should be conducted to identify areas of improvement/adherence to protocols

Specifications of the ambulance

Table 28: Ambulance Specifications

Ambulance	The ambulance should have; • Aerodynamic roof design incorporated with LED warning lights (2 clear flashers & 2 red flashers & 2 oscillators) for greater visibility • Ergonomically designed interiors with optimal lighting (roof lights, handheld light wired to driver's seat base with options for mounting) • Mulitplex control for heater or A/C systems as per treatment/patient care requirements (with pre-wiring for inverter) • Dual protection with inside/outside locking latches for the double doors • 2 rows of LED fluorescent dome lighting in interior ceiling with dimmer • Advanced control with separate frontal and rear OEM console for power distribution to emergency light points and sirens • Hand-held 500,000 CP spotlight with momentary switch, hard wired, to driver's seat base with alternate option of mounting location • 200-watt siren with Microphone located in front console and 2 100-watt drivers mounted under front bumper • Modular equipment paneling • Graphics, custom designing, and painting of ambulance (including window-tinting) • Radio communication • If possible, GPS location for easy access to health facilities

Neonatal transport equipment and supplies that should be available in the ambulance

Table 29: Ambulance equipment and supplies for Neonatal transport

Equipment	Consumables to be used with the equipment
Airway	
Portable and fixed suction apparatus with a regulator	Suction catheters (Fr sizes 4,6,8) Yankauer tubes Oropharyngeal airways (00, 0) Tracheostomy tubes (size 2 to 4) Tracheal dilators Laryngeal mask airways (i-gel for babies >2000g or >34 weeks gestational age) ET tube size 2, 2.5.3.0,3.5,4.0. Lubricating gel

Penguin suckers	N/A
Breathing Equipment	
BVM device	Masks size 00, 0 and 1, reservoir bags
Portable and fixed oxygen supply with its accessories (humidifier, flow meter, pressure gauge)	Neonatal nasal prongs, neonatal non-rebreather masks, oxygen connecting tubes of appropriate length, high flow nasal cannulas,
Pulse oximeters with neonatal probes	Batteries
Portable neonatal CPAP	Patient tubing, prongs, hats
Transport mechanical ventilator	Compatible neonatal breathing circuit Heat moisture exchanger
Functional Laryngoscope with straight (Miller) blades, sizes 0,00,1	Batteries
Magill forceps	N/A
Stylet	N/A
Nebulizer kit	Neonatal nebulization masks, nebulizer ventilator kit
Circulation	
Syringe pumps	Perfuser lines, assorted syringes including tuberculin, intravenous cannulas- 24G, 26G
Infusion pump	Compatible infusion set
Monitoring	
Portable, battery-operated cardiac monitors with neonatal BP cuffs and neonatal pulse oximeter sensor	Prewired ECG leads, gel
Neonatal glucometer	Glucometer strips
Thermoregulation	
Digital thermometer	N/A
Comfortable bed / seat for KMC	Linen
Plastic bag/wrap	N/A
Transport incubator	N/A
Neonatal transport incubator trolley	N/A
Immobilization devices	Neonatal transport restraints
IPC equipment	Clean and sterile gloves, antiseptic, sharp box, colour coded bins, Alcohol >70%, hand sanitizer
Emergency medications	Atropine, Adrenaline, calcium gluconate, anti- convulsants (phenobarbital, levetiracetam/phenytoin), Soluble Insulin, sodium bicarbonate, hydrocortisone, IV fluids (12.5% dextrose, 10% dextrose, 5% dextrose, NS, RL), inotropes
Stationery	Referral form, in transit form

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3. MOH, Kenya (2018) Kenya Health Sector Strategic Plan, transforming health systems: achieving Universal Health Coverage by 2022, 2018-2023. Available at WHO Kenya Health Sector Strategic Plan fa.indd
4. MOH, Kenya (2024) Newborn In-patient file
5. World Health Organization. (2019). Survive and thrive: transforming care for every small and sick newborn.
6. World Health Organization. (2014). Every newborn: an action plan to end preventable deaths.
7. MOH (2022) Basic Paediatric Protocols
8. MOH (2022) Comprehensive Newborn Care protocols
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10. (Murphy GAV et al Estimating the need for inpatient neonatal services: an iterative approach employing evidence and expert consensus to guide local policy in Kenya. BMJ Glob Health 2017;2:e000472. doi:10.1136/bmjgh-2017-000472)
11. MOH (2014) Kenya Health Sector referral implementation guidelines (1st edition). ministry-of-health-referral- guidelines.pdf (universalhealth2030.org)
12. UNICEF, N., 2009. Toolkit for setting up special care newborn units, stabilisation units and newborn care corners. Website https://nrhm. gujarat. gov. in/images/pdf/unice_scnu_toolkit. pdf. Accessed Sept, 16, p.2017.
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14. Minstry of health Kenya. Kangaroo Mother Care Clinical Implementation Guidelines, 2023.

ANNEXES:

Annex 1: Neonatal Transport in Ambulance Monitoring Form

(Please fill in all required fields). Ensure the checklist of mandatory neonatal transport equipment is filled in.

1. Patient Information:

Name: _____ Date of Birth: ____ /____ /_____ Time: _____

Gestational Age at Birth: _____ weeks, Birth Weight: _____ g, Current Weight: _____ g

Diagnosis: _____ Reason for Transport: _____

Referring Facility: _____ Receiving Facility: _____

2. Transport Team Details:

Date of Transport: ____ /____ /_____ . Departure Time: _____ Arrival Time: _____

Mode of Transport: ☐ Ambulance ☐ Air Ambulance

Team Members:

- Neonatologist/Paediatrician: _____
- Nurse: _____
- Paramedic: _____

3. Neonatal Vital Signs & Monitoring (Record at Intervals)

Time	HR (bpm)	RR (bpm)	SpO2 (%)	BP (mmHg)	Temp (°C)	Blood Glucose (mg/dL)	Comments

Respiratory Support:

Mode of Ventilation:

☐ Room Air ☐ Oxygen via Nasal Cannula _____ L/min ☐ CPAP _____ cmH2O

☐ Mechanical Ventilation (Settings): _____

- FiO2: _____%
- ET Tube Size: _____ cm (if intubated)
- Suctioning Performed: [ ] Yes [ ] No Frequency: _____
- Other: _____

5. Intravenous (IV) Therapy & Medications:

IV Access: ☐ Peripheral ☐ Umbilical Venous ☐ Umbilical Arterial ☐ PICC

Fluid Type: _____ Rate: _____ mL/hr.

Medications Administered (Dose/Route/Time): _____

Infusions:

☐ Dextrose _____% ☐ Adrenaline _____ mcg/kg/min

Other: _____

6. Procedures Performed During Transport:

☐ ET Intubation ☐ Chest Tube Placement ☐ UVC/UAC Placement ☐ CPR

☐ Other: _____

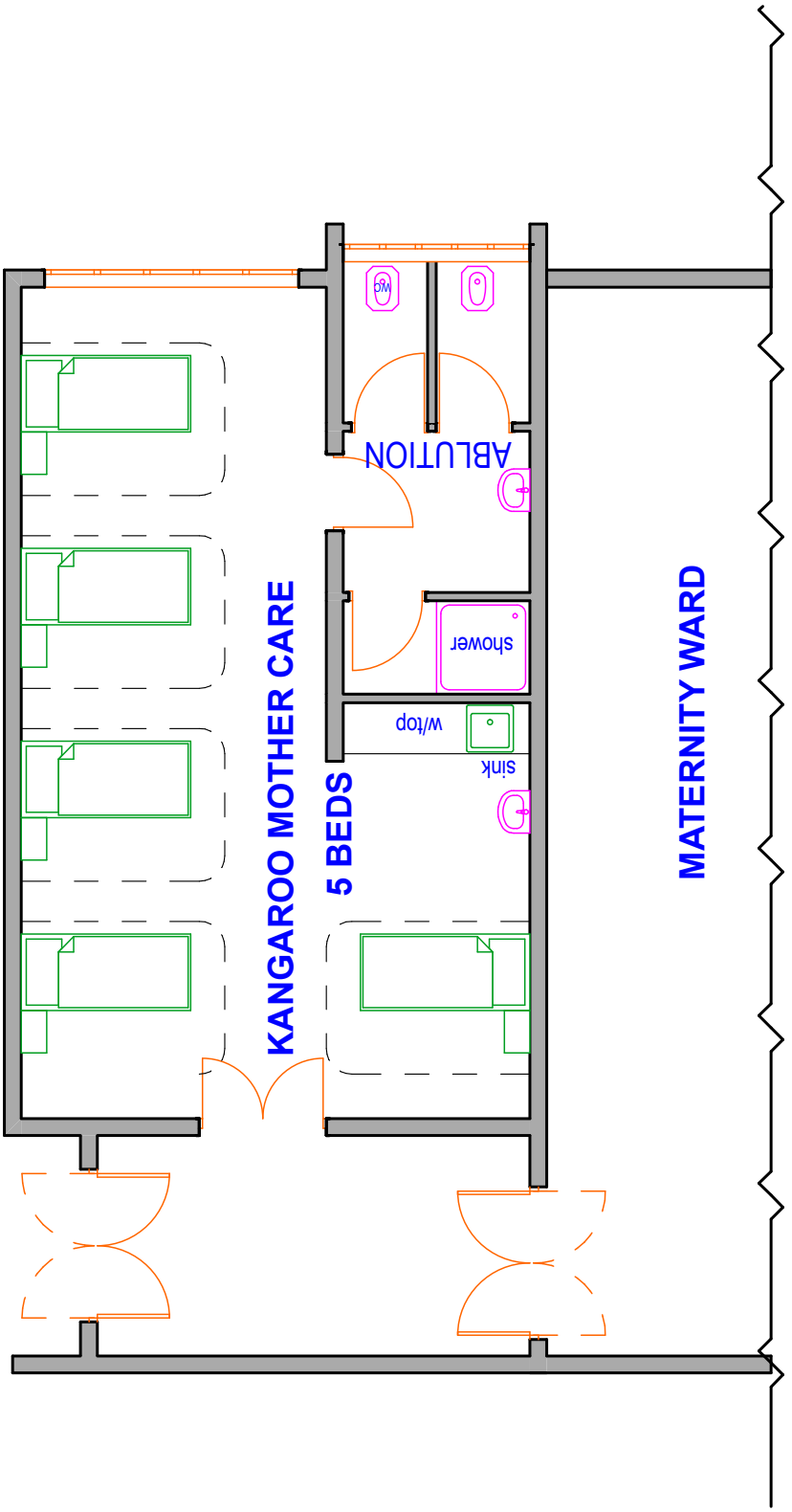
7. Notes & Events During Transport:

8. Arrival & Handover:

- Arrival Condition: ☐ Stable ☐ Unstable ☐ Critical
- Handover Given To: _____
- Additional Comments: _____
- Receiving Team Signature: _____ Date: ____ /____/____
- Transport Team Signature: _____ Date: ____ /____/____

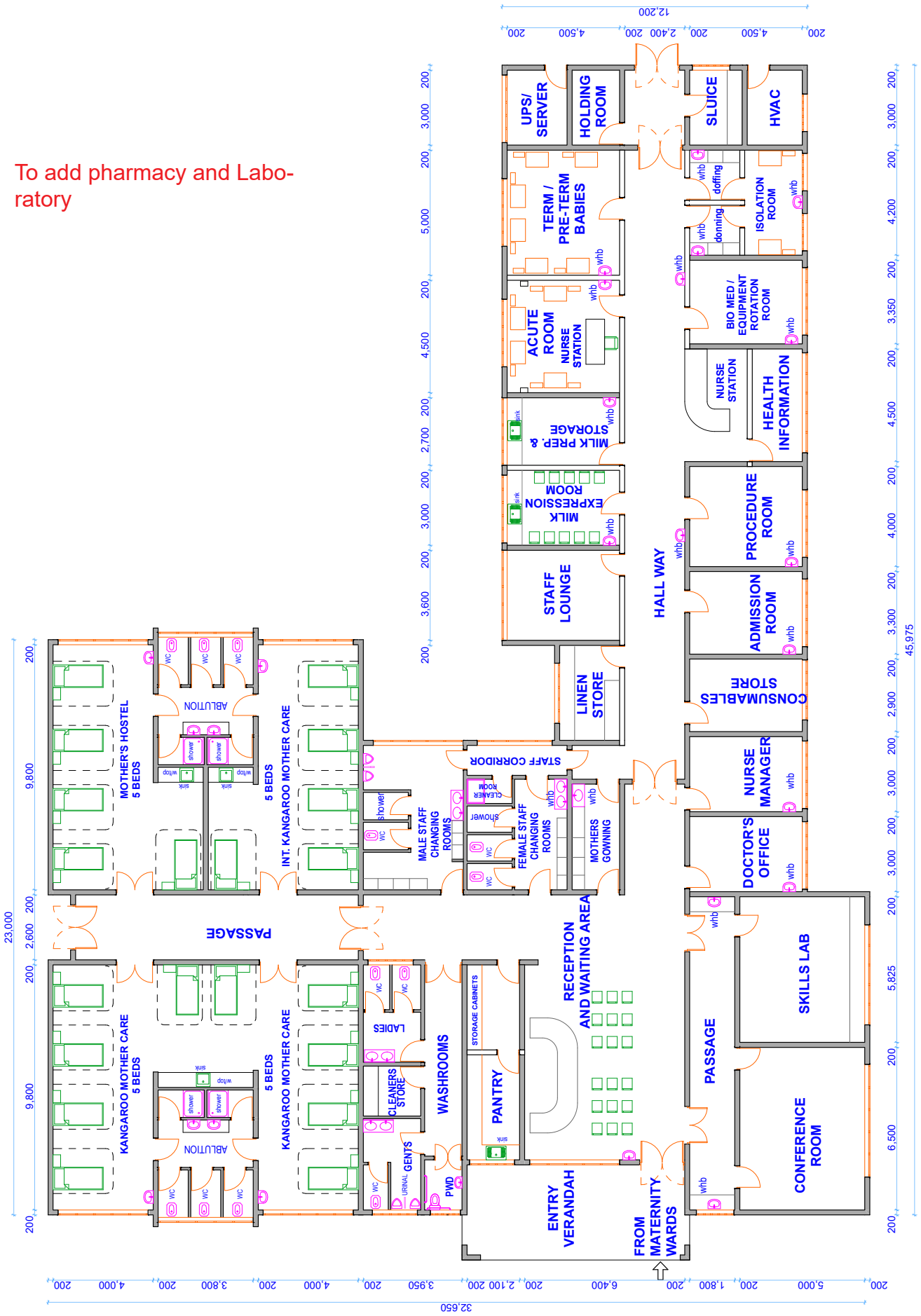
9. Follow-Up Recommendations:

LEVEL 1: 5 BED KMC ROOM (EXTENSION TO MATERNITY)



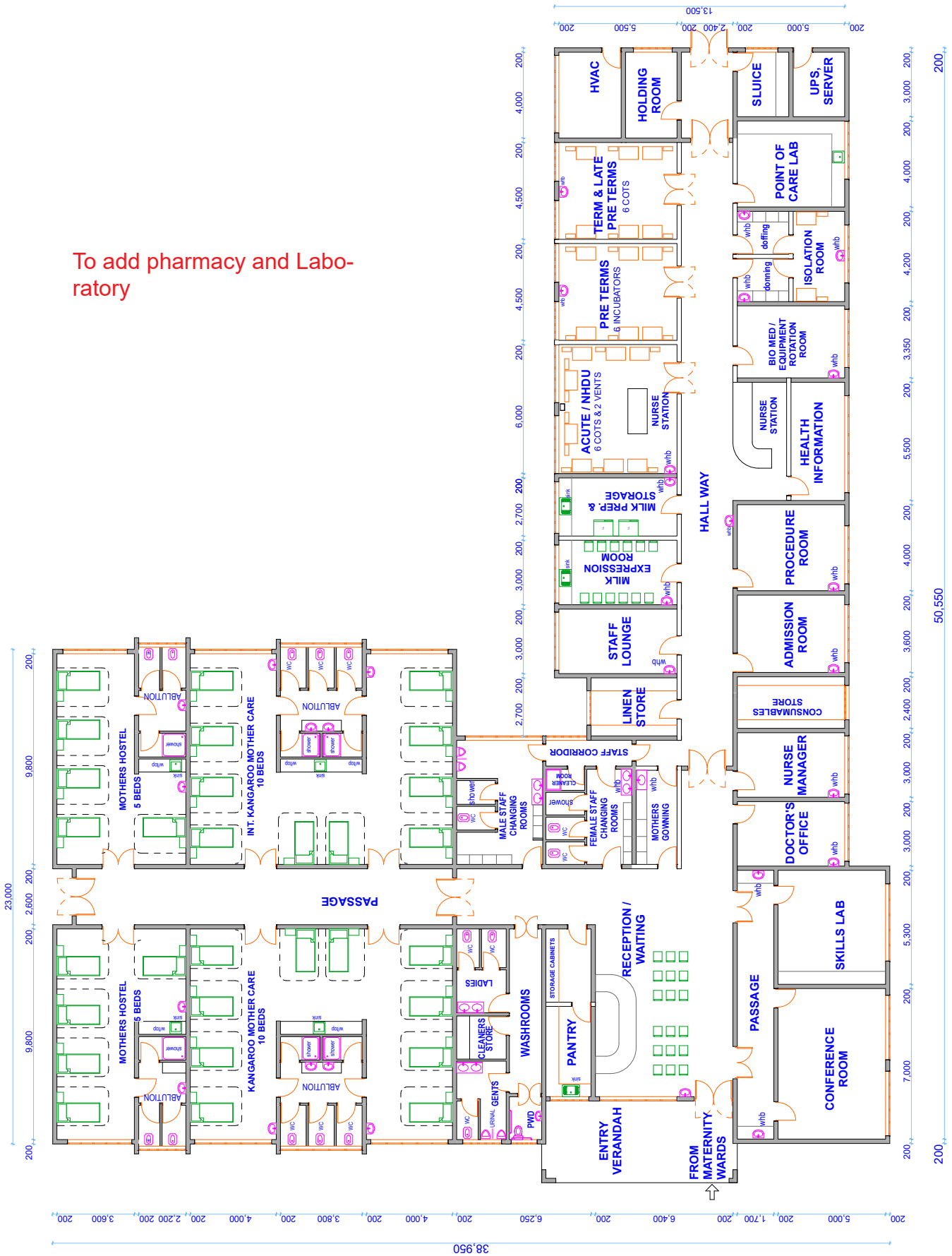
Annex 2: Level IIA Floor Plan

To add pharmacy and Laboratory



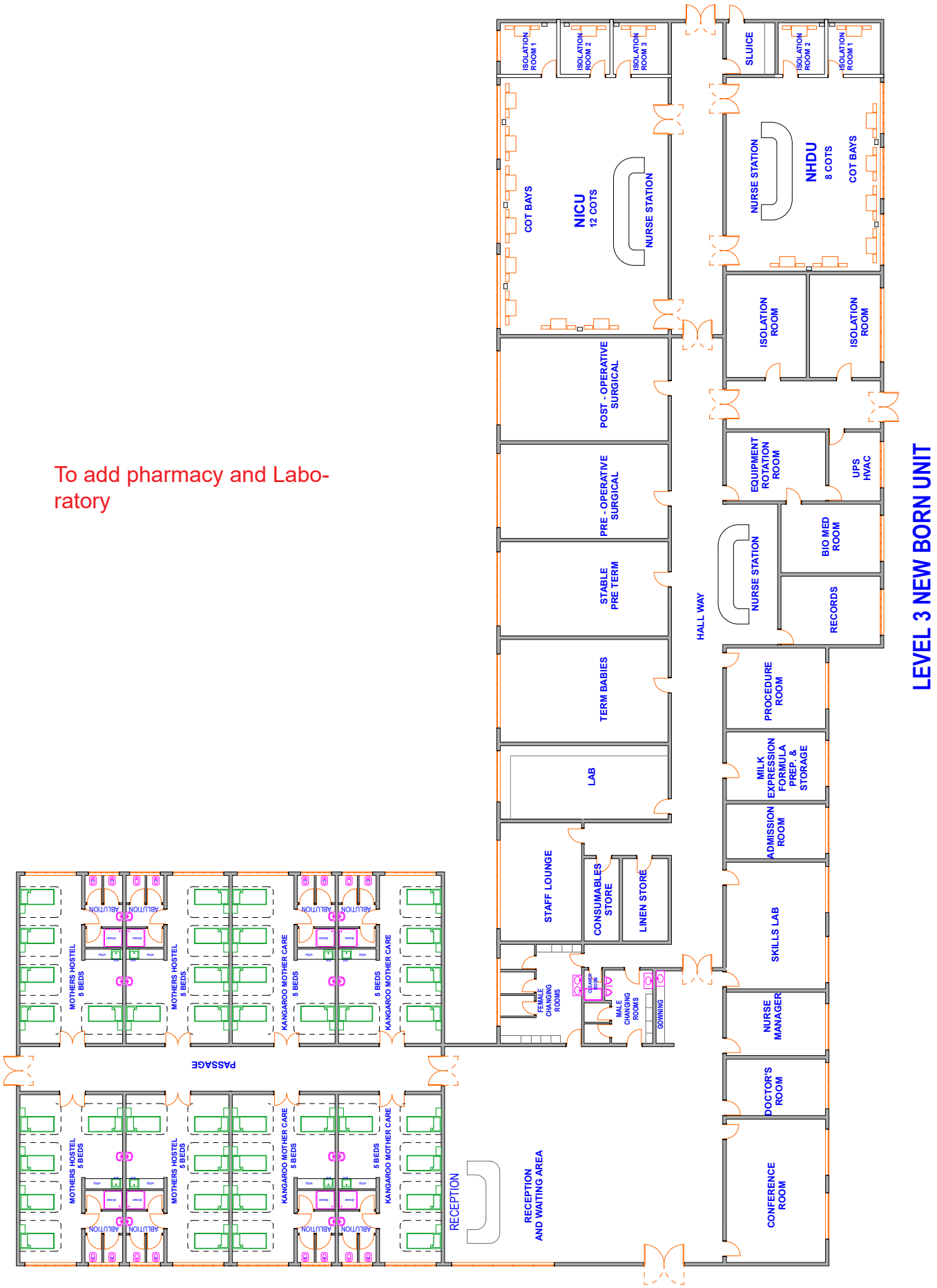
Annex 3: Level IIB Floor Plan

To add pharmacy and Laboratory



Annex 4: Level III Newborn Unit

To add pharmacy and Labo-ratory



Annex 5: Client in Transit Monitoring Form

Referring facility name..... **Service area**..... **Vehicle No**.....

Client	**Incident**	**Transit times**
Name:	Date: __/__/____ [dd/mm/yyyy]	Call received: __:__
Age [Yrs]:	Time: __:__	Dispatched: __:__
Sex: M ☐ F ☐	Location of Incident: ***(tick as appropriate)***	Arrived at scene: __:__
Mobile No:	☐ Home ☐ Medical Facility	Departed: __:__
Next of Kin	☐ School ☐ Work	Arrived at hospital: __:__
Name:	☐ Public	Hand over time: __:__
Mobile No:	☐ Other (*Specify*)	

History of illness/Injury:

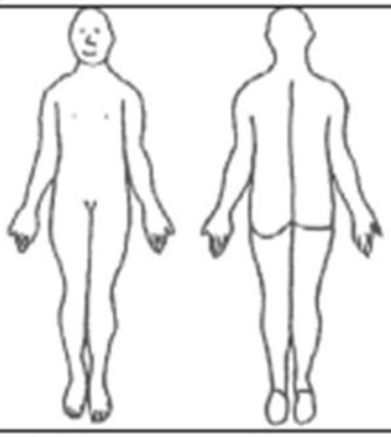
Medication client is using:

Allergies:

Observations	**Time**	**Time**	**Time**
	__:__	__:__	__:__
SPO2 *Rate*			
Description			
Pulse *Rate*			
Description			
Breathing *Rate*			
Description			
Blood Pressure			
Temperature			

Initial assessment

Abrasion
Burn
Contusion
Deformity
Fracture
Haemorrhage
Laceration
Pain
Rigidity
Swelling
Tenderness



Lung sounds ***(tick as appropriate)***

Left		**Right**
☐	Clear	☐
☐	Stridor	☐
☐	Diminished	☐
☐	Wet rales	☐
☐	Hyper-resonant	☐
☐	Rhonchi	☐

Glasgow coma scale ***(circle as appropriate)***

Eye opening	**Motor response**	**Verbal response**
4 Spontaneously	**6** Obeys commands	**5** Oriented
3 To voice	**5** Locates pain	**4** Confused
2 To pain	**4** Withdraws from pain	**3** Inappropriate words
1 No response	**3** Flexion to pain	**2** Incomprehensible sounds
	2 Extension to pain	**1** No response
	1 No response	

Pertinent medical history:

Chief complaint:

Assessment/General Impression:

Treatment/Interventions:

Receiving Facility	**Ambulance Personnel**
Name:.....	Crew 1 [Name]:..... Sign: .....
Staff handed over to [Name]:.....	Crew 2 [Name]:..... Sign: .....
Signature:..... Time: __:__	Crew 3 [Name]:..... Sign: .....

Annex 6: Newborn Transfer Form

(HEALTH FACILITY NAME)

NEWBORN UNIT TRANSFER FORM

Date: D D M M Y Y Y Y Time (24 hour clock): H H M M

A: Mother's details

Name				IP No.			
Age (in years)		Parity		Gestation (in weeks)		Attended ANC?	Y N
LMP	D D M M Y Y Y Y			EDD	D D M M Y Y Y Y		
Blood group	A B AB O Unkn			Rhesus	Pos Neg Unkn	Fever	Y N
Treated for TB	Y N Unkn			VDRL	Pos Neg Unkn	Diabetes	Y N Unkn
PMTCT status	Pos Neg Unkn			Mother on ARVs	Y N	APH	Y N
Antibiotics	Y N			Multiple PG	Y N	*If YES, number*	
HTN in pregnancy	Y N Unkn			Pre-eclampsia	Y N	Eclampsia	Y N
Any other maternal condition							
Current Maternal Drugs							

B: Labour and Birth

Labour	1st Stage	hours		Time of delivery (24 hr clock)	H H M M		
	2nd Stage	minutes		ROM	<18 >=18h Unknown		
Fetal distress	Y N	Meconium	Y N	Antenatal steroids	Y N	No of doses	
Delivery	SVD CS Breech Forceps Vacuum			*If CS, type*	Emergency Elective		
Reasons for emergency CS							
BVM resuscitation	Y N	Chest compressions?	Y N	Resuscitation duration (min)			
Preventive care given	Vitamin K Y N	TEO Y N	OPV Y N	BCG Y N			
	Hep B Y N	CPAP Y N	Oxygen Y N	Chlorohexidine Y N			
Maternal Status	Well Unwell Deceased	Where is the mother currently					

C: Infant Details

Date of birth	D D M M Y Y Y Y	IP No.			
Age units	In days In hours	Age		APGAR Score	1M 5M 10M
Sex	F M Intermediate	Birth weight(grams)		Weight now(grams)	
Baby from?	Theatre Labour ward Postnatal ward	Paeds ward Referral in Home			
If referral, facility name					
Reasons for referral					
Completed by (Name):		Signature			
Baby received in NBU by (Name):					
Signature:		Time (24 hour clock)	H H M M		

Annex 7: Newborn Discharge form

(HEALTH FACILITY NAME)

NEWBORN UNIT DISCHARGE FORM

Name		IP No.	
Date of Birth	D D / M M / Y Y Y Y	Gestational age at birth (weeks)	Age (days)
Sex	F ☐ M ☐ Intermediate ☐	Birth weight (grams)	Discharge weight (grams)
Mode of delivery	SVD ☐ CS ☐ Breech ☐ Forceps ☐ Vacuum ☐	Infant HIV exposed?	Y ☐ N ☐
If infant is HIV exposed, ARVs given?	Y ☐ N ☐	Date of Admission	D D / M M / Y Y Y Y
Date of Discharge/ Referral/ Death			D D / M M / Y Y Y Y
Outcome	Died ☐ Alive ☐	If outcome is alive	Discharged ☐ Absconded ☐ Referred ☐
Referred to		Reason	

Neonatal Diagnoses. Select ONE primary diagnosis (tick box indicating "1") and ANY secondary diagnoses (tick box indicating "2")

Birth Asphyxia	1 ☐ 2 ☐	Jaundice	1 ☐ 2 ☐	*If Jaundice, highest total serum bilirubin*	☐☐☐ µmol/L
Severe/Encephalopathy ☐ Mild/ moderate ☐		Anaemia	1 ☐ 2 ☐	*If Anaemia, discharge HB*	☐☐☐ g/dL
		Meningitis	1 ☐ 2 ☐	*Other diagnoses (List below)*	
Preterm	1 ☐ 2 ☐	Congenital Anomaly	1 ☐ 2 ☐		1 ☐ 2 ☐
Newborn RDS	1 ☐ 2 ☐	Meconium Aspiration	1 ☐ 2 ☐		1 ☐ 2 ☐
Neonatal Sepsis	1 ☐ 2 ☐	Multiple Gestation	1 ☐ 2 ☐		1 ☐ 2 ☐

Supportive care given

KMC	Y ☐ N ☐	CPAP	Y ☐ N ☐	Phototherapy	Y ☐ N ☐	Transfusion	Y ☐ N ☐

Preventive care given

OPV	Y ☐ N ☐	BCG	Y ☐ N ☐	TEO	Y ☐ N ☐	Vit K	Y ☐ N ☐	Chlorohexidine	Y ☐ N ☐
Feeding at discharge	Breast milk only ☐	Formula Only ☐	Formula & Breastmilk ☐	Fortified breastmilk ☐					

Summary of key investigations, interventions, progress & needs at discharge

Condition on Discharge	Normal ☐ Neuro Sequelae ☐ Screened for ROP Y ☐ N ☐ Referred? ☐ Other complication? ☐
Follow up	CWC ☐ POPC/NOPC ☐ KMC Clinic ☐ OT ☐ PMTCT ☐ Other facility ☐ If other facility: (Specify name) Weeks after discharge ☐☐ Date D D / M M / Y Y Y Y Time ☐☐ : ☐☐ Linked to Community Health Promoter (CHP)? Y ☐ N ☐ If yes, indicate name and contacts of CHP:
Discharge drugs	

Name of clinician ~~discharging~~: _____ Signature: _____

Consultant in ~~charge~~: _____

Annex 8: Newborn Referral form (draft)

Neonatal In-Patient File - **MOH XXX**

18. REFERRAL FORM

Date: _____ Time: _____ *(Decision to refer)*

County ☐ Inter county ☐ National referral ☐ International ☐ Emergency ☐

Urgent ☐ Not Urgent ☐

Health Facility Details

Referring From:	Referring To:
Department:	Department:
County:	County:
Sub-county:	Sub-County:
Keph level of care: [L1] [L2] [L3] [L4] [L5] [L6]	Keph level of care: [L1] [L2] [L3] [L4] [L5] [L6]
Facility Ownership: Private [ ] Public [ ] FBO [ ]	Facility Ownership: Private [ ] Public [ ] FBO [ ]

Patient Details

Name of patient: _____ Sex: _____ Age: _____ Weight(kg): _____

Date of Admission: _____ IP/OP No.: _____

Caregivers Name: _____ Phone Number: _____

Patient Diagnosis: _____

_____

History: _____

_____

Investigations: _____

Reason for referral: _____

Mode of transport: Ambulance: ☐ Self ☐ (Specify): _____

Referral facility contacted: Yes ☐ No ☐

Name of health care provider contacted: _____

Condition During Referral (Tick As Appropriate)

General Condition

☐ level of consciousness /A_V_ P_U_

☐ Unable to drink or [ ] Vomits everything

☐ Is lethargic or unconscious

☐ convulsions in this illness

☐ Severe Pallor

☐ Severe Respiratory Distress (Fast breathing/Grunting /Stridor)

☐ Severe Wasting / Oedema [Foot/Knee/Face] / Loss of Muscle tone (floppy)

Others specify?

VITAL SIGNS:

Temperature ☐ Respiratory Rate: ☐ Pulse Rate ☐ Cap Refill: ≤3sec / >3 sec: ☐ SPO2 ☐ RBS ☐

Interventions:

Resuscitation: Yes ☐ No ☐ _____ Oxygen Yes ☐ No ☐

Fluids _____ Amount Start Time: _____ Stop Time: _____

Drugs given: _____

Additional Notes: _____

Referred by: Name: _____ Designation: _____

Signature: _____ Telephone No: _____ Date: _____

Feeding mode: Breastfeeding ☐ Cup ☐ NGT ☐

Newborn referred in KMC position: Yes ☐ No ☐

Date: _____ Time: _____

(the ambulance/patient left the referring health facility).

Condition of Patient on Arrival

Stable ☐ Critical ☐ dead ☐

Temperature: _____ Pulse: _____ Respiratory rate: _____ SPO_2: _____

Name of receiving officer: _____

Designation: _____ sign: _____

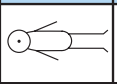
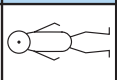
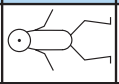
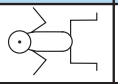
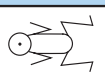
Date: _____ Time: _____

Annex 9: Ballards Score (page 1)

AGE WHEN EXAMINED: _____ SEX: ☐ M ☐ F ☐ I BIRTH WEIGHT: _____

ASSSESSED BY: _____

NEUROMUSCULAR MATURITY

NEUROMUSCULAR MATURITY SIGN	SCORE							RECORD SCORE HERE
	-1	0	1	2	3	4	5	
POSTURE								
SQUARE WINDOW (Wrist)	 >90°	 90°	 60°	 45°	 30°	 0°		
ARM RECOIL		 180°	 140 –180°	 110 –140°	 90 –110°	 <90°		
POPLITEAL ANGLE	 180°	 160°	 140°	 120°	 100°	 90°	 <90°	
SCARF SIGN								
HEEL TO EAR								
							TOTAL NEUROMUSCULAR MATURITY SCORE	

PHYSICAL MATURITY

PHYSICAL MATURITY SIGN	SCORE							RECORD SCORE HERE
	-1	0	1	2	3	4	5	
SKIN	sticky friable transparent	gelatinous red translucent	smooth pink visible veins	superficial peeling & / or rash, few veins	cracking pale areas rare veins	parchment deep cracking no vessels	leathery cracked wrinkled	
LANUGO	none	sparse	abundant	thinning	bald areas	mostly bald		
PLANTAR SURFACE	heel-toe 40–50 mm: -1 < 40 mm: -2	>50 mm no crease	faint red marks	anterior transverse crease only	creases ant. 2/3	creases over entire sole		
BREAST	imperceptible	barely perceptible	flat areola no bud	stippled areola 1–2 mm bud	raised areola 3–4 mm bud	full areola 5–10 mm bud		
EYE / EAR	lids fused loosely: -1 tightly: -2	lids open pinna flat stays folded	sl. curved pinna; soft; slow recoil	well-curved pinna; soft but ready recoil	formed & firm instant recoil	thick cartilage ear stiff		
GENITALS (Male)	scrotum flat, smooth	scrotum empty faint rugae	testes in upper canal rare rugae	testes descending few rugae	testes down good rugae	testes pendulous deep rugae		
GENITALS (Female)	clitoris prominent & labia flat	prominent clitoris & small labia minora	prominent clitoris & enlarging minora	majora & minora equally prominent	majora large minora small	majora cover clitoris & minora		
							TOTAL PHYSICAL MATURITY SCORE	

Reference
Ballard JL, Khoury JC, Wedig K, et al: New Ballard Score, expanded to include extremely premature infants. J Pediatr 1991; 119:417–423. Reprinted by permission of Dr Ballard and Mosby—Year Book, Inc.

SCORE

Neuromuscular _____
Physical _____
Total _____

MATURITY RATING

SCORE	WEEKS
-10	20
-5	22
0	24
5	26
10	28
15	30
20	32
25	34
30	36
35	38
40	40
45	42
50	44

GESTATIONAL AGE (weeks)

By dates _____
By ultrasound _____
By exam _____

The new Ballard score is used to estimate gestational age from Physical features.
The scores of each feature are added to calculate a maturity rating that correlates with gestational age

Ballards Score (page 2)

New Ballard Score

Physical maturity							
	–1	**0**	**1**	**2**	**3**	**4**	**5**
Skin	Sticky; friable; transparent	Gelatinous; red; translucent	Smooth; pink; visible veins	Superficial peeling and/or rash; few veins	Cracking pale areas; rare veins	Parchment deep cracking; no vessels	Leathery; cracked; wrinkled
Lanugo	None	Sparse	Abundant	Thinning	Bald areas	Mostly bald	
Plantar creases	Heel-toe 40 to 50 mm: –1 <40 mm: –2	>50 mm; no crease	Faint red marks	Anterior transverse crease only	Crease anterior 2/3	Creases over entire sole	
Breast	Imperceptible	Barely perceptible	Flat areola; no bud	Stippled areola; 1 to 2 mm bud	Raised areola; 3 to 4 mm bud	Full areola; 5 to 10 mm bud	
Eye/ear	Lids fused Loosely: –1 Lightly: –2	Lids open; pinna flat, stays folded	Slightly curved pinna; soft with slow recoil	Well-curved pinna; soft but ready recoil	Formed and firm with instant recoil	Thick cartilage; ear stiff	
Genitals (male)	Scrotum flat, smooth	Scrotum empty; faint rugae	Testes in upper canal; rare rugae	Testes descending; few rugae	Testes down; good rugae	Testes pendulous; deep rugae	
Genitals (female)	Clitoris prominent; labia flat	Prominent clitoris; small labia minora	Prominent clitoris; enlarging minora	Majora and minora equally prominent	Majora large; minora small	Majora cover clitoris and minora	

Maturity rating													
Score	–10	–5	0	5	10	15	20	25	30	35	40	45	50
Gestational age (weeks)	20	22	24	26	28	30	32	34	36	38	40	42	44

The new Ballard score is used to estimate gestational age from neuromuscular and physical features. The scores of each feature are added to calculate a maturity rating that correlates with gestational age.

Annex 10: Birth defects assessment (page 1)

EARLY IDENTIFICATION OF CONGENITAL ABNORMALITIES

(Tick as appropriate if a sign is observed)

Neonatal Data			
Time of delivery		Date of delivery	
Gender			
		Normal Ranges (For Term baby = >37 weeks Gestation)	
Birth Weight		≥ 2.5 < 4	
Head circumference		35 ± 2	
Birth Length		50 ± 2	
Foot Length		7cm ± 1	

Head size:	Normal ☐ _____cm	☐ Abnormal • Extra small (micro cephalic): ☐ _____cm • Extra big (hydrocephalic): ☐ _____ cm • Others Specify: _____	**Remarks**
Eyes	Normal ☐	☐ Abnormal White reflex Yes ☐ No ☐ Others specify_____	
Mouth and Gums	Normal ☐	☐ Abnormal • Cleft lip: ☐ • Palate: ☐ • Others Specify _____	
Ears	Normal ☐	☐ Abnormal If yes, specify: _____	
Heart	Normal heart sounds ☐	☐ Abnormal heart sounds If yes, specify: _____	
Arms and legs	Normal Arms: R ☐ L ☐ Normal Legs: R ☐ L ☐	☐ Abnormal • Club foot: R ☐ L ☐ • Congenital hip dislocation: R ☐ L ☐ • Webbed fingers or toes: R ☐ L ☐ ☐ Extra fingers and toes: R ☐ L ☐ • Others Specify: _____	
Shoulders	Normal ☐	☐ Abnormal Specify: _____	
Muscle Tone	Normal ☐	☐ Abnormal • Floppiness ☐ Rigidity ☐ • Other specify: _____	
Joints move-ment	Flexible ☐	☐ Abnormal • Not Flexible ☐ • Other specify: _____	

Birth defects assessment (page 2)

Spine/ neck/ back	Normal ☐	☐ Abnormal • Any neck swellings ☐ • Protrusions along the spine ☐ • Dimple/hair/marks along the spine ☐ • Specify: _____	
Body Move-ment	Normal ☐	☐ Abnormal • Baby becomes floppy when lying in certain position ☐ If yes, specify: _____	
Abdomi-nal wall	Normal ☐	☐ Abnormal Specify: _____	
Genitalia	Normal: M ☐ F ☐	☐ Abnormal Specify: _____	
Anus	Perforate (Normal) ☐	Imperforate (Abnormal) ☐	

List any abnormal findings (not captured above): _____

NB: Assessment to be done within 48 hours after childbirth. To be repeated at 6 weeks.

Mother's medical history(hx):

Diabetes: Yes ☐ No ☐
Epilepsy: Yes ☐ No ☐
Anticonvulsant use: Yes ☐ No ☐
Smoking in pregnancy: Yes ☐ No ☐
Radiation exposure in pregnancy: Yes ☐ No ☐
Alcohol intake in pregnancy: Yes ☐ No ☐
Folic acid supplement: Yes ☐ No ☐ unknown ☐
Before pregnancy: Yes ☐ No ☐
During pregnancy: Yes ☐ No ☐

Previous pregnancies

Number of previous pregnancies: _____ No of births (live/still): _____
Neuro Tube Defects in previous babies: Yes ☐ No ☐
Other birth defects in previous pregnancies: Yes ☐ No ☐
If yes, specify type of other birth defects: _____
_____

Annex 11: Neonatal Escalation SBAR Table- A 60 second report

SBAR	Details
Situation	My name is: _____ I am calling from: _____ Who am I speaking to? _____ I am calling about Baby (Boy/Girl) who is _____ old. I'm calling because… (the baby is blue, grunting, irritable, jaundiced, hypoglycaemic etc.) Include vital signs here in an emergency situation.
Background	The baby was admitted because of… (e.g., very low birth weight, respiratory distress, etc.) Gestation: _____ weeks Weight: _____ Born via: (C/S - give reason, NSVD, Forceps, Ventouse) Apgar score: _____ Maternal history: (HIV Y/N) _____ Problem list: _____ Ventilation/O_2: (Intubated, CPAP, Nasal prongs, _____ litres O_2) Medications: _____ Test results: _____
Assessment	**Vital signs:** Airway/Breathing (RR: _____, Oxygen Saturations: _____) Circulation (HR: _____, BP: _____) Temperature: _____ Blood Glucose: _____ I think this patient might have… (an infection, Hypoxic Ischaemic Encephalopathy, RDS, etc.) Or "I'm not sure what's wrong with this patient, but I am worried."
Recommendation	I have already… (e.g., increased oxygen, put baby on monitoring, started phototherapy, etc.) I think this baby needs… (CPAP, intubation, antibiotics, review, etc.) I think this needs doing within the next _____ minutes/hours/days. How often should I do observations? When shall I call you back if there is no improvement? Can I repeat the plan back to you?

Annex 12: NEONATAL IN-PATIENT FILE - MOH 378

INFORMED CONSENT FOR ADMISSION, INVESTIGATIONS AND TREATMENT

NAME:		IP No. :	
AGE:		WEIGHT:	
DATE:	TIME AT TRIAGE:	DIAGNOSIS:	

INFORMED CONSENT FROM PARENT/GUARDIAN FOR A MINOR REQUIRING INVESTIGATION, MEDICAL OR SURGICAL TREATMENT/ INTERVENTION

This form is to be completed giving due consideration to "Informed consent to treatment at this facility"

Declaration of clinician obtaining consent

Tick the appropriate information to the stated procedure

- I have informed the parent/guardian of the child's medical condition and prognosis. I have also explained the relevant diagnostic treatment options that are available for the child and associated risks and benefits
- I have recommended the treatment/procedures/investigations noted below on this form. I have discussed the proposed procedure(s) and foreseen outcomes with the parent/guardian.
- I have given the parent/ guardian the opportunity to discuss the proposed procedure, benefits and risks (both general and specific) and the risk of not having the procedure.
- I have provided the parent/guardian with information specific to the procedure identified.

Treatment/Procedure/Investigation

List the treatment/procedures/investigations to be performed, noting correct site.

_____

_____

_____

_____

_____

_____

_____

_____

Signature of the clinician obtaining consent

Full name: _____

Designation:_____

Signature: _____ Date: _____ Time: _____

Parent/Guardian's Declaration *(Read To The Guardian/Parent If Not Able To Read)*

Please read the information carefully and tick either the following to indicate that you have understood and agree with the information provided in this form. Any specific concerns should be discussed with you doctor performing the procedure prior to signing this consent form.

- The doctor has explained the child's medical condition and prognosis to me, the relevant diagnostic treatment options that are available and associated risks, including the risk of not having the procedure
- The risks of the procedure have been explained to me, including the risks that are specific to the child and likely outcomes.
- I have had the opportunity to discuss and clarify any concerns with the doctor.

- I understand that any procedure, in addition to those described on this form will only be carried out if it is necessary to save the child's life or prevent serious harm to the child's health.
- I understand that if immediate life-threatening events happen during the procedure, the child will be treated as necessary to save the child's life or to prevent serious harm to the child's health.
- On behalf of the child, I give consent for my/ this child to undergo the procedure(s) or treatment(s) as documented in this form.
- I consent to the child having a blood transfusion.
- I consent to the child receiving prescribed donated human milk if needed.
- My questions and concerns have been discussed and answered to my satisfaction.

Confirmation of patient's consent

Parents/ Guardians full name: (Please print) _____

Parent/Guardians signature/ Thumb print: _____Date: _____

Time: _____

Relationship to patient: _____

Interpreters Declaration (in case of sign language)

- I have given a right translation in (state patients the language here) _____ of the consent form and assisted in the provision of any verbal and written information given to the patient/ substitute decision maker by the doctor.
- I declare I have interpreted the dialogue between the patient and the doctor to the best of my ability, and I have advised the doctor on concerns of any kind.

Interpreter's full name: _____

Interpreter's signature: _____Date: _____Time: _____

NEWBORN TRANSFER-IN FORM

Complete for all newborns requiring admission to the Newborn Unit

Date: ..... (dd/mm/yyyy) Time:..... (am/pm) Birth notification number.....

Mother's details												
Name						Age		IP No.				
Parity	+		Gestation	wks		LMP		dd/mm/yyyy		EDD	dd/mm/yyyy	
ANC attendance	Y ☐ N ☐ visits ☐		Blood Grp	A ☐ B ☐ AB ☐ O ☐ unkn ☐				Rhesus	Pos ☐ Neg ☐ unkn ☐			
VDRL	Pos ☐ Neg ☐ unkn.☐		PMTCT Status	Pos☐ Neg☐ unkn.☐				Mother ARVs	Y ☐ N ☐			
Diabetes	Yes☐ No☐ unkn.☐		Current TB treatment	Y ☐ N ☐ unkn.☐				Antibiotics	Y ☐ N ☐			
Fever	Y ☐ N ☐		APH	Y☐ N☐	Multiple PG	Y☐ N☐ if YES number? =						
HTN in Pregnancy	Y ☐ N ☐ unkn. ☐		Pre-eclampsia	Y ☐ N ☐	Eclampsia	Y ☐ N ☐						
Any other maternal condition												
Current Maternal medication												

Labour and Birth								
Labour	1st Stg	hr	2nd Stg	min	Time of Delivery	_____ am/pm	ROM	<18h ☐ >=18h ☐ unkn. ☐
Fetal Distress	Y ☐ N ☐		Meconium Y ☐ N ☐ If yes, indicate grade: 1 ☐ 2 ☐ 3 ☐				Antenatal steroids Y ☐ N ☐ If yes No of doses_____	
Delivery	SVD ☐ CS ☐ Breech ☐ Vacuum ☐ Forceps ☐				If CS, type? Elective ☐ Emergency ☐		Reason for Emergency CS:	
Delivery complications? Y ☐ N ☐ If yes specify _____		BVM Resuscitation? Y ☐ N ☐			Chest compressions? Y ☐ N ☐		Resuscitation duration(min)	
Oxygen? Y ☐ N ☐		CPAP Y ☐ N ☐		Delayed Cord clamping within 1 - 3min: Y ☐ N ☐				
Preventive care given	TEO Y ☐ N ☐	IM Vit K Y ☐ N ☐	CHX Y ☐ N ☐	OPV Y ☐ N ☐	BCG Y ☐ N ☐	Hep B Y ☐ N ☐		
Maternal status	Well ☐ Unwell ☐ Deceased ☐		Where is the mother currently					

Infant's Details								
Date of Birth	(dd/mm/yyyy)	Sex	F ☐ M ☐ Indeterminate ☐	IP. No				
Apgar	1m	5m	10m	Birth Wt.	_____ grams	Weight now:	_____ grams	
Baby from?	Theatre ☐ Labour ward ☐ Postnatal ward ☐ paeds ward ☐ Referral in ☐ Home ☐					Age	Days/hours	
Vital signs at labor ward:	Temparature	RR	SPO_2	PR				
If referral, name of referring facility: _____								
Reasons for referral to NBU: _____								
_____								
_____								
Completed by(Name):				Signature				
Baby received in NBU by: Name_____								
Signature: _____ Time: _____am/pm								

NEWBORN UNIT ADMISSION FORM

Infant's details									
Name			Date of Admission		IP No.		Unique No.		
DOB	days		Age hrs		Sex	F ☐ M ☐ Indeterminate ☐	Gestation	LMP U/S wks	
ROM	<18h ☐ >=18h ☐ unkn. ☐		Mode of child birth	SVD ☐ CS ☐ Breech ☐ Forceps ☐ Vacuum ☐			If CS, type	Elective ☐ Emergency ☐	
Multiple Delivery	Y ☐ N ☐		If YES number? _____		BVM Resuscitation at birth? Y ☐ N ☐				
APGAR Score	1m	5m	10m	Born outside this facility? Y ☐ N ☐	If Yes, where? Home/Roadside ☐ Other facility ☐				

Mother's details							
Name		IP No.		Age		Parity	
Blood Grp	A ☐ B ☐ AB ☐ O ☐ unkn. ☐		Rhesus	Pos ☐ Neg ☐ unkn. ☐		Anti D	Y ☐ N ☐ unkn. ☐
Hep B	Pos ☐ Neg ☐ unkn. ☐		VDRL	Pos ☐ Neg ☐ unkn. ☐		If pos, treatment given? Y ☐ N ☐	
PMTCT Status	Pos ☐ Neg ☐ unkn. ☐		Mother on ARVs?	Y ☐ N ☐	Diabetes	Y ☐ N ☐ unkn. ☐	
Hypertension in Pregnancy	Y ☐ N ☐ unkn. ☐	APH		Y ☐ N ☐	Prolonged 2nd Stage	Y ☐ N ☐ unkn. ☐	

Mother's problems during pregnancy / labour & relevant maternal treatment/ ultra sound results
Any maternal illness / fever? Any maternal treatment for TB or antibiotics in labour? (Describe)

Any other important history and family / social history?
Problems in previous pregnancies

Vital Signs	Temp(°c)		Resp Rate bpm		RBS mmol/l	Pulse	/min	0_2 Sat	%	BP mmhg
Anthropometry	Birth wt	grams	Weight now	grams	Head circumference		cm	Length	cm	
Time baby seen		am/pm								
Fever	Y ☐	N ☐	Reduced/Absent movement					Y ☐	N ☐	
Difficulty breathing	Y ☐	N ☐	Passed meconium/stool					Y ☐	N ☐	
Difficulty feeding	Y ☐	N ☐	Vomiting					Y ☐	N ☐	
Convulsions/twitching	Y ☐	N ☐	Passed urine in the last 12 hours					Y ☐	N ☐	
Apnoea	Y ☐	N ☐								

Infant's Presenting Problems & any treatment given? When did problems start, how did they progress and what are problems now?

Circle the findings

General Exam	Appearance	Well	Sick	Dysmorphic		
	Nutrition status	Normal	SGA/ Wasted	Large (>4kg)		
	Odour	Normal	Foul smelling			
	Jaundice	None	+ (tinge)	++ (Gum)		
	Pallor	None	+		+++ (palm and Sole of the foot)	
	Skin	Normal	Bruising	Rash Pustules	Dry/Peeling/Wrinkled	Others
Airway / Breathing	Cry	Normal	Hoarse	Weak / Absent		
	Airway	Normal	Stridor	Noisy breathing		
	Grunting	None	Audible with stethoscope		Audible	
	Nasal flaring	None	Minimal	Marked		
	Cyanosis	None	Central	Peripheral		
	Chest wall indrawing	None	Mild	Severe		
	Xiphoid retraction	None	Minimal	Marked		
	Intercostal retraction	None	Minimal	Seesaw respiration		
	Chest movement	Symmetrical	Respiratory lag	Crackles	Rt Lt	Other:
	Breath Sounds	Normal	Reduced Rt Lt			
Circulation	Pulses Present	Radial R L	Brachial R L	Femoral R L		
	Skin warm up to	Wrist	Elbow	Sholder		
	Capillary refill (Sternum)	≤3sec	>3sec			
	Preductal SpO_2 right hand	_____ %	Post ductal SpO_2 left foot done simultaneously	_____ %		
	Heart sounds	Normal Yes ☐ No ☐	Murmur Yes ☐ No ☐	Site		
Disability	Movements	Normal Active	Not spontaneous only if stimulated	None	**Moro:** Complete / Incomplete	
	Abnormal movements	None	Jittery	Convulsions		
	Tone	Normal	Floppy/ Reduced	Stiff/ Increased		
	Suck reflex/ feeding	Normal	Weak / Partial	Absent		
	Fontanelle	Normal	Bulging	Sunken		
	Head shape	Normal	Caput / Cephalohaematoma	Other trauma: (Specify)		
Abdomen	Abdomen	Normal	Distended	Scaphoid / Bowel sounds Yes ☐ No ☐	Liver _____cm	Spleen _____ cm
	Umbilicus	Normal	Flare/red skin	Pus / Bleeding	Defect/ Abnormality	
Others	Genital	Normal Male / Female	Ambiguous	Testes descended R L		Other abnormalities
	Anus/	Normal/patent	Imperforate	Other Abnormality		
	Meconium	Meconium passed	Meconium not passed	Meconium not passed within the first 24 hours		
	Hips	Stable	Unstable			

Reflexes: (✓normal, X Absent, ↓Reduced)
Palmar grasp R L
Plantar grasp R L
Rooting R L

Others	Spine/ Back	Normal	Abnormal: (Specify)	
	Mouth	Normal	Abnormal: (Specify)	
	Eyes	Normal	Abnormal: (Specify)	
	Ears	Normal	Abnormal: (Specify)	
	Neck	Normal	Abnormal: (Specify)	
	Limbs	Normal	Abnormal: (Specify)	
	Other Abnormalities			
GAge	GA by Ballard Score _____ Wks		AGA ☐ SGA ☐ LGA ☐	

Admission Diagnoses or Impression. Select ONE primary diagnosis (tick box indicating "1") and ANY secondary diagnoses (tick box indicating "2")						
Prematurity	1 ☐	2 ☐	Meconium Aspiration Syndrome	1 ☐	2 ☐	Others (List below)
LBW	1 ☐	2 ☐	Multiple Gestation	1 ☐	2 ☐	
Perinatal Asphyxia	1 ☐	2 ☐	Meningitis	1 ☐	2 ☐	
RDS	1 ☐	2 ☐	Congenital Anomaly	1 ☐	2 ☐	
Neonatal sepsis	1 ☐	2 ☐	Jaundice	1 ☐	2 ☐	

Investigations done at admission and results							
Investigation	Done		Results	Investigation	Done		Results
Random blood sugar	Y ☐	N ☐	_____mmol/L	U/E/C	Y ☐	N ☐	
Full blood count	Y ☐	N ☐		Bilirubin	Y ☐	N ☐	
C - Reactive Protein	Y ☐	N ☐		Blood Culture	Y ☐	N ☐	
Blood Gas Analysis	Y ☐	N ☐		CSF analysis	Y ☐	N ☐	
Chest X- Ray	Y ☐	N ☐		Coangulation profile	Y ☐	N ☐	
LFTs	Y ☐	N ☐		Others			

Interventions at admission							
IM Vit K	Y ☐	N ☐	Prophylaxis for PMTCT	Y ☐	N ☐	CPAP	PEEP:_____ FiO_2: _____
TEO	Y ☐	N ☐	Blood Transfusion	Y ☐	N ☐	Mechanical ventilation Y ☐ N ☐	
Nutrition/ Feeds Breastfeeding EBM Infant Formula	 Y ☐ Y ☐ Y ☐	 N ☐ N ☐ N ☐	Phototherapy	Y ☐	N ☐	Others	
IV Fluids	Y ☐	N ☐	Caffeine citrate	Y ☐	N ☐		
Incubator care/ Keep warm	Y ☐	N ☐	Surfactant	Y ☐	N ☐		
KMC	Y ☐	N ☐	Oxygen	Via: NRM/ Nasal Prongs		Flow rate	Target SPO_2
Antibiotics	Y ☐	N ☐	Specify: _____				
Other Interventions / Treatment							

Completed By:			
Date: _____ (dd/mm/yy)	Time: _____ Am/pm	Name: _____ (Capital Letters)	Sign: _____

BIRTH DEFECTS ASSESSMENT FORM

EARLY IDENTIFICATION OF CONGENITAL ABNORMALITIES

(Tick as appropriate if a sign is observed)

Neonatal Data			
Time of delivery		Date of delivery	
Gender			
		Normal Ranges (For Term baby = >37 weeks Gestation)	
Birth Weight		≥ 2.5 < 4	
Head circumference		35 ± 2	
Birth Length		50 ± 2	
Foot Length		7cm ± 1	

Head size:	Normal ☐ _____cm	☐ Abnormal • Extra small (micro cephalic): ☐ _____cm • Extra big (hydrocephalic): ☐ _____ cm • Others Specify: _____	**Remarks**
Eyes	Normal ☐	☐ Abnormal White reflex Yes ☐ No ☐ Others specify_____	
Mouth and Gums	Normal ☐	☐ Abnormal • Cleft lip: ☐ • Palate: ☐ • Others Specify _____	
Ears	Normal ☐	☐ Abnormal If yes, specify: _____	
Heart	Normal heart sounds ☐	☐ Abnormal heart sounds If yes, specify: _____	
Arms and legs	Normal Arms: R ☐ L ☐ Normal Legs: R ☐ L ☐	☐ Abnormal • Club foot: R ☐ L ☐ • Congenital hip dislocation: R ☐ L ☐ • Webbed fingers or toes: R ☐ L ☐ • Extra fingers and toes: R ☐ L ☐ • Others Specify: _____	
Shoulders	Normal ☐	☐ Abnormal Specify: _____	
Muscle Tone	Normal ☐	☐ Abnormal • Floppiness ☐ Rigidity ☐ • Other specify: _____	
Joints move-ment	Flexible ☐	☐ Abnormal • Not Flexible ☐ • Other specify: _____	

Spine/ neck/ back	Normal ☐	Abnormal ☐ • Any neck swellings ☐ • Protrusions along the spine ☐ • Dimple/hair/marks along the spine ☐ • Specify: _____	
Body Move-ment	Normal ☐	☐ Abnormal • Baby becomes floppy when lying in certain position ☐ If yes, specify: _____	
Abdomi-nal wall	Normal ☐	☐ Abnormal Specify: _____	
Genitalia	Normal: M ☐ F ☐	☐ Abnormal Specify: _____	
Anus	Perforate (Normal) ☐	Imperforate (Abnormal) ☐	

List any abnormal findings (not captured above): _____

NB: Assessment to be done within 48 hours after childbirth. To be repeated at 6 weeks.

Mothers medical history before pregnancy	**Mothers medical history during pregnancy**
Diabetes: Yes ☐ No ☐	Diabetes: Yes ☐ No ☐
Epilepsy: Yes ☐ No ☐	Epilepsy: Yes ☐ No ☐
Anticonvulsant use: Yes ☐ No ☐	Anticonvulsant use: Yes ☐ No ☐
Smoking: Yes ☐ No ☐	Smoking: Yes ☐ No ☐
Radiation exposure: Yes ☐ No ☐	Radiation exposure: Yes ☐ No ☐
Alcohol intake: Yes ☐ No ☐	Alcohol intake: Yes ☐ No ☐
Folic acid supplement: Yes ☐ No ☐ unknown ☐	Folic acid supplement: Yes ☐ No ☐ unknown ☐
Others	Others

Mother's medical history(hx):

Previous pregnancies

Number of previous pregnancies: _____ No of births: Live Births: _____ Still Births: _____

Neuro Tube Defects in previous babies: Yes ☐ No ☐

Other birth defects in previous pregnancies: Yes ☐ No ☐

If yes, specify type of other birth defects: _____

_____

BALLARD SCORE

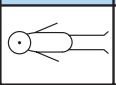
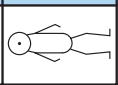
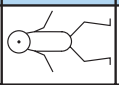
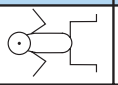
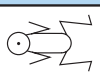
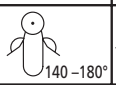
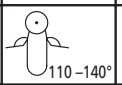
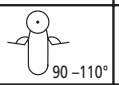
NAME: _____ IP NO.: _____

DATE/TIME OF BIRTH: _____ DATE/TIME OF EXAM: _____

AGE WHEN EXAMINED: _____ SEX: ☐ M ☐ F ☐ I BIRTH WEIGHT: _____

ASSSESSED BY: _____

NEUROMUSCULAR MATURITY

NEUROMUSCULAR MATURITY SIGN	SCORE							RECORD SCORE HERE
	-1	0	1	2	3	4	5	
POSTURE								
SQUARE WINDOW (Wrist)	 >90°	 90°	 60°	 45°	 30°	 0°		
ARM RECOIL		 180°	 140 –180°	 110 –140°	 90 –110°	 <90°		
POPLITEAL ANGLE	 180°	 160°	 140°	 120°	 100°	 90°	 <90°	
SCARF SIGN								
HEEL TO EAR								
							TOTAL NEUROMUSCULAR MATURITY SCORE	

PHYSICAL MATURITY

PHYSICAL MATURITY SIGN	SCORE							RECORD SCORE HERE
	-1	0	1	2	3	4	5	
SKIN	sticky friable transparent	gelatinous red translucent	smooth pink visible veins	superficial peeling & / or rash, few veins	cracking pale areas rare veins	parchment deep cracking no vessels	leathery cracked wrinkled	
LANUGO	none	sparse	abundant	thinning	bald areas	mostly bald		
PLANTAR SURFACE	heel-toe 40–50 mm: -1 < 40 mm: -2	>50 mm no crease	faint red marks	anterior transverse crease only	creases ant. 2/3	creases over entire sole		
BREAST	imperceptible	barely perceptible	flat areola no bud	stippled areola 1–2 mm bud	raised areola 3–4 mm bud	full areola 5–10 mm bud		
EYE / EAR	lids fused loosely: -1 tightly: -2	lids open pinna flat stays folded	sl. curved pinna; soft; slow recoil	well-curved pinna; soft but ready recoil	formed & firm instant recoil	thick cartilage ear stiff		
GENITALS (Male)	scrotum flat, smooth	scrotum empty faint rugae	testes in upper canal rare rugae	testes descending few rugae	testes down good rugae	testes pendulous deep rugae		
GENITALS (Female)	clitoris prominent & labia flat	prominent clitoris & small labia minora	prominent clitoris & enlarging minora	majora & minora equally prominent	majora large minora small	majora cover clitoris & minora		
							TOTAL PHYSICAL MATURITY SCORE	

Reference
Ballard JL, Khoury JC, Wedig K, et al: New Ballard Score, expanded to include extremely premature infants. J Pediatr 1991; 119:417–423. Reprinted by permission of Dr Ballard and Mosby—Year Book, Inc.

SCORE

Neuromuscular _____
Physical _____
Total _____

MATURITY RATING

SCORE	WEEKS
-10	20
-5	22
0	24
5	26
10	28
15	30
20	32
25	34
30	36
35	38
40	40
45	42
50	44

GESTATIONAL AGE (weeks)

By dates _____
By ultrasound _____
By exam _____

The new Ballard score is used to estimate gestational age from Physical features.
The scores of each feature are added to calculate a maturity rating that correlates with gestational age

THOMPSON ENCEPHALOPATHY SCORE SHEET (ASSESSED FOR ASPHYXIA)

Name:					Date of Birth:								IP Number:							
Score																				
Sign	0	1	2	3	<6hrs	12hrs	D2	D3	D4	D4	D5	D6	D7	D8	D9	D10	D11	D12	D13	D14
Tone	Normal	Hyper	Hypo	Flaccid																
LOC	Normal	Staring	Lethargic	Comatose																
Fits	Normal	<3/day	3or more/day																	
Posture	Normal	Fisting	Strong data flexion	Decerebrate																
Moro	Normal	Partial	Absent																	
Grasp	Normal	Poor	Absent																	
Suck	Normal	Poor	Absent+/-bites																	
Respiration	Normal	Hyper	Apnea	IPPV*																
Fontanelle	Normal	Full	Tense																	
LOC= Level of consciousness				Total:																
IPPV=* Intermittent Positive Pressure Ventilation				Initials:																
Interpretation: 0-10 Mild, 10-14 Moderate, >15 Severe				Sign:																

IN-PATIENT CONTINUATION SHEET

Name:_____ IP No._____

IN PATIENT TREATMENT SHEET

IP NO_____

PATIENT'S NAME: _____AGE _____SEX_____

DATE OF ADMISSION: _____WEIGHT _____ HEIGHT _____

WARD: _____RM: _____ BED_____

DRUG ALLERGIES

Considerations for choice of drug and dose adjustments (Tick as appropriate: attach laboratory reports when ordering medicines)

- ☐ Renal Impairment
- ☐ Hepatic impairment
- ☐ IV Fluids
- ☐ FBC
- ☐ Culture and sensitivity

Others (Specify) _____

STAT MEDICINES / ONCE ONLY MEDICINES

					NURSING			PHARMACY USE ONLY			
Date	Drug	Dose	Route	Sign	Name	Sign	Time	Date	Qty	DISP. by	Sign

FLUIDS AND PARENTERAL NUTRITION SECTION
(Administration details to be indicated in the fluid chart)

Date	ITEM & ADMINISTRATION INSTRUCTIONS (Volume, Frequency, Rate, Duration)	Prescribed by			Pharmacy use only		
		Name	Sign	Date	Qty	Disp. by	Sign

OXYGEN PRESCRIPTION

Date	Time	Mode of delivery	Flow Rate	Frequency of monitoring	Target SpO_2	Name	sign

IP NO ____________________

ANTIMICROBIAL SECTION

Antibiotic, Antiviral, Antifungal

Prophylactic antibiotic orders will lapse after 24 hours; Empiric antibiotic orders will lapse After 72 hours unless renewed or extended; Therapeutic, antibiotic order will lapse after 72 hour unless renewed

Drug			**Date**										
			Time								**Pharmacy use only**		
Dose	Route	Freq.	6 AM								Date	Qty	Sign
Duration	Rate of Admin		10 AM										
Date	Time		12 AM										
Doctor's name		Sign	2 PM										
Special Instructions			6 PM										
☐ Prophylaxis ☐ Empiric ☐ Therapeutic			10 PM										
Drug			**Date**										
			Time								**Pharmacy use only**		
Dose	Route	Freq.	6 AM								Date	Qty	Sign
Duration	Rate of Admin		10 AM										
Date	Time		12 AM										
Doctor's name		Sign	2 PM										
Special Instructions			6 PM										
☐ Prophylaxis ☐ Empiric ☐ Therapeutic			10 PM										
Drug			**Date**										
			Time								**Pharmacy use only**		
Dose	Route	Freq.	6 AM								Date	Qty	Sign
Duration	Rate of Admin		10 AM										
Date	Time		12 AM										
Doctor's name		Sign	2 PM										
Special Instructions			6 PM										
☐ Prophylaxis ☐ Empiric ☐ Therapeutic			10 PM										
Drug			**Date**										
			Time								**Pharmacy use only**		
Dose	Route	Freq.	6 AM								Date	Qty	Sign
Duration	Rate of Admin		10 AM										
Date	Time		12 AM										
Doctor's name		Sign	2 PM										
Special Instructions			6 PM										
☐ Prophylaxis ☐ Empiric ☐ Therapeutic			10 PM										

NARCOTICS PRESCRIPTIONS ONLY (IN WORDS)

Drug			**Date**										
			Time								**Pharmacy use only**		
Dose	Route	Freq.	**6 AM**								Date	Qty	Sign
Duration	Rate of Admin		**10 AM**										
Date	Time		**12 AM**										
Doctor's name		Sign	**2 PM**										
Special Instructions:			**6 PM**										
			10 PM										

GENERAL MEDICINES SECTION

IP NO ______________________

Drug			**Date**										
			Time								**Pharmacy use only**		
Dose	Route	Freq.	**6 AM**								Date	Qty	Sign
Duration	Rate of Admin		**10 AM**										
Date	Time		**12 AM**										
Doctor's name	Sign		**2 PM**										
Special Instructions			**6 PM**										
☐ Prophylaxis ☐ Empiric ☐ Therapeutic			**10 PM**										
Drug			**Date**										
			Time								**Pharmacy use only**		
Dose	Route	Freq.	**6 AM**								Date	Qty	Sign
Duration	Rate of Admin		**10 AM**										
Date	Time		**12 AM**										
Doctor's name	Sign		**2 PM**										
Special Instructions			**6 PM**										
☐ Prophylaxis ☐ Empiric ☐ Therapeutic			**10 PM**										
Drug			**Date**										
			Time								**Pharmacy use only**		
Dose	Route	Freq.	**6 AM**								Date	Qty	Sign
Duration	Rate of Admin		**10 AM**										
Date	Time		**12 AM**										
Doctor's name	Sign		**2 PM**										
Special Instructions			**6 PM**										
☐ Prophylaxis ☐ Empiric ☐ Therapeutic			**10 PM**										
Drug			**Date**										
			Time								**Pharmacy use only**		
Dose	Route	Freq.	**6 AM**								Date	Qty	Sign
Duration	Rate of Admin		**10 AM**										
Date	Time		**12 AM**										
Doctor's name	Sign		**2 PM**										
Special Instructions			**6 PM**										
☐ Prophylaxis ☐ Empiric ☐ Therapeutic			**10 PM**										
Drug			**Date**										
			Time								**Pharmacy use only**		
Dose	Route	Freq.	**6 AM**								Date	Qty	Sign
Duration	Rate of Admin		**10 AM**										
Date	Time		**12 AM**										
Doctor's name	Sign		**2 PM**										
Special Instructions			**6 PM**										
☐ Prophylaxis ☐ Empiric ☐ Therapeutic			**10 PM**										

Drug			**Date**								**Pharmacy use only**		
			Time										
Dose	Route	Freq.	**6 AM**								Date	Qty	Sign
Duration	Rate of Admin		**10 AM**										
Date	Time		**12 AM**										
Doctor's name		Sign	**2 PM**										
Special Instructions ☐ Prophylaxis ☐ Empiric ☐ Therapeutic			**6 PM**										
			10 PM										
Drug			**Date**								**Pharmacy use only**		
			Time										
Dose	Route	Freq.	**6 AM**								Date	Qty	Sign
Duration	Rate of Admin		**10 AM**										
Date	Time		**12 AM**										
Doctor's name		Sign	**2 PM**										
Special Instructions ☐ Prophylaxis ☐ Empiric ☐ Therapeutic			**6 PM**										
			10 PM										
Drug			**Date**								**Pharmacy use only**		
			Time										
Dose	Route	Freq.	**6 AM**								Date	Qty	Sign
Duration	Rate of Admin		**10 AM**										
Date	Time		**12 AM**										
Doctor's name		Sign	**2 PM**										
Special Instructions ☐ Prophylaxis ☐ Empiric ☐ Therapeutic			**6 PM**										
			10 PM										

	DISCHARGE MEDICINES	**Pharmacy use only**		
		Qty	**Name**	**Sign**
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13				

Prescriber Name: _____ **Sign:** _____

Designation: _____ **Date:** _____

BLOOD TRANSFUSION OBSERVATION CHART

Name of Patient: _____

IP NO: _____

Ward: _____

Age: _____ Sex M ☐ F☐ I☐

Date of transfusion: _____

Type of Blood Transfused:

Whole Blood ☐ Packed Red Cells ☐ FFP ☐ Platelets ☐ Others _____

Blood Unit Donor Number: _____

Transfusion Started By: _____

Counter Checked by: _____

Time Transfusion Started: _____ Rate of Transfusion: _____-ml/minute

Observations

HOURS OF OBSERVATION	EXACT TIME	BP	TEMP 0^C	PR	RR	SpO_2	RBS	REMARKS
00 Mins								
15 Mins								
45 Mins								
1 hr. 15 Mins								
1 hr 45 Mins								
2 hrs 15 mins								
2 hrs 45 Mins								
3 hrs 15 Mins								
3 hrs 45 Mins								
4 hrs. 15 Mins								
4 hrs 15 Mins after Blood Transfusion								

Time Transfusion Ended: _____

Amount Transfused: _____ml

Sysmptoms Or Signs Of Transfusion Reactions Observed

1. General: Fever, Chills/ Rigors, Flushing, Nausea/ Vomiting
2. Dermatological: Urticaria, Other Skin rash
3. Cardiac/ Respiratory: Chest Pain, Dispones Hypotension, Tachycardia
4. Renal: Hemoglobinuria, Oliguria, Anuria
5. Hematological: Unexplained bleeding
6. Others

Interventions?

Drugs given: _____

Name of the clinician: _____

Signature: _____

COMPREHENSIVE NEWBORN MONITORING CHART

Name:	IP No.	Sex: M ☐ F ☐ Indeterminate ☐	D. O. A.	D.O.B
Date Today:	Diagnosis			
Birth Wt _____ gm	Interventions: CPAP ☐ Oxygen ☐ Phototherapy ☐ Blood transfusion ☐ Exchange transfusion ☐ KMC ☐			

Daily Children Feed and Fluid prescription

Day of Life	Current Wt = _____ gm

Total feed + fluid= _____ mls/kg/day = _____ mls

Feed: BF ☐ EBM ☐ Term Formula ☐
Pre-term Formula ☐
Route: Cup ☐ NGT ☐ OGT ☐
Volume & Frequency _____mls 3hrly ☐ 2hrly ☐
24hr Feed Volume _____mls

IV Fluid & Additives	Vol (ml)	Duration

Other Prescribing instructions

Clinician's Name: _____ Time: _____

Daily IV Fluid Nursing Plan

Start Time:
Hourly rate = _____ mls (_____ drops/min)
Planned vol = _____ mls in _____hrs

Vitals	Monitoring Freq _____ hrs | Time																
	Temp (^{0}C)																
	Pulse (b/min)																
	Resp Rate (b/Min)																
	Oxy Sat (%) or Cy^0 Cy$^+$																
Assessment	Resp Distress 0, +, +++																
	CPAP Pressure (cm H_2O																
	FiO_2 (%)																
	Jaudice 0, +, +++																
	Apnoea Y/N																
	Blood Sugar (mmol/l)																
	Completed by (Name)																
Feed	Breastfeeding sufficient Y/N																
	EBM vol given (ml)																
	Formula vol given (ml)																
Fluid	IV volume given (ml)																
	IV Line working Y/N																
Output	Vomit Y/N																
	Urine Y/N																
	Stool Y/N																
	Completed by (Name)																

Morning shift notes:
Category: A ☐ B ☐ C ☐

Total feed + Fluid in this shift _____ mls
Shift deficit _____ mls

Completed by: (Name) _____

Afternoon shift notes:
Category: A ☐ B ☐ C ☐

Total feed + Fluid in this shift _____ mls
Shift deficit _____ mls

Completed by: (Name) _____

Night shift notes:
Category: A ☐ B ☐ C ☐

Total feed + Fluid in this shift _____ mls
Shift deficit _____ mls
Total feed + fluid input in 24hrs _____ mls

Completed by: (Name) _____
24hr deficit _____ mls

Note: 0 (None): no jaundice, + (Mild): visible on the face or upper body, +++ (Severe): has extended to soles of the feet
Resp Distress: 0: Normal respiratory rate, no signs of respiratory distress. +: Mild increase in respiratory rate or slight difficulty breathing +++: Severe respiratory distress, nasal flaring, grunting, or chest retractions.

NURSING CARDEX

Name: _____ IP No: _____

Medical diagnosis:_____

Date	Time	Notes	Name	Sign

NURSING CARE PLAN

NAME: _____ IP NO: _____ DATE: FROM: _____ TO: _____

DOA: _____ DIAGNOSIS: _____ WARD: _____ BED: _____

DATE	TIME	ASSESSMENT / CLUSTER O CUES	NURSING DIAGNOSIS	GOAL/ EXPECTED OUTCOME	INTERVENTION/ PLAN OF ACTION	RATIONALE	IMPLEMENTATION	EVALUATION	SIGN & NAME

COMPILED BY: _____ SIGNATURE: _____ DESIGNATION: _____

KMC DAILY SCORE SHEET

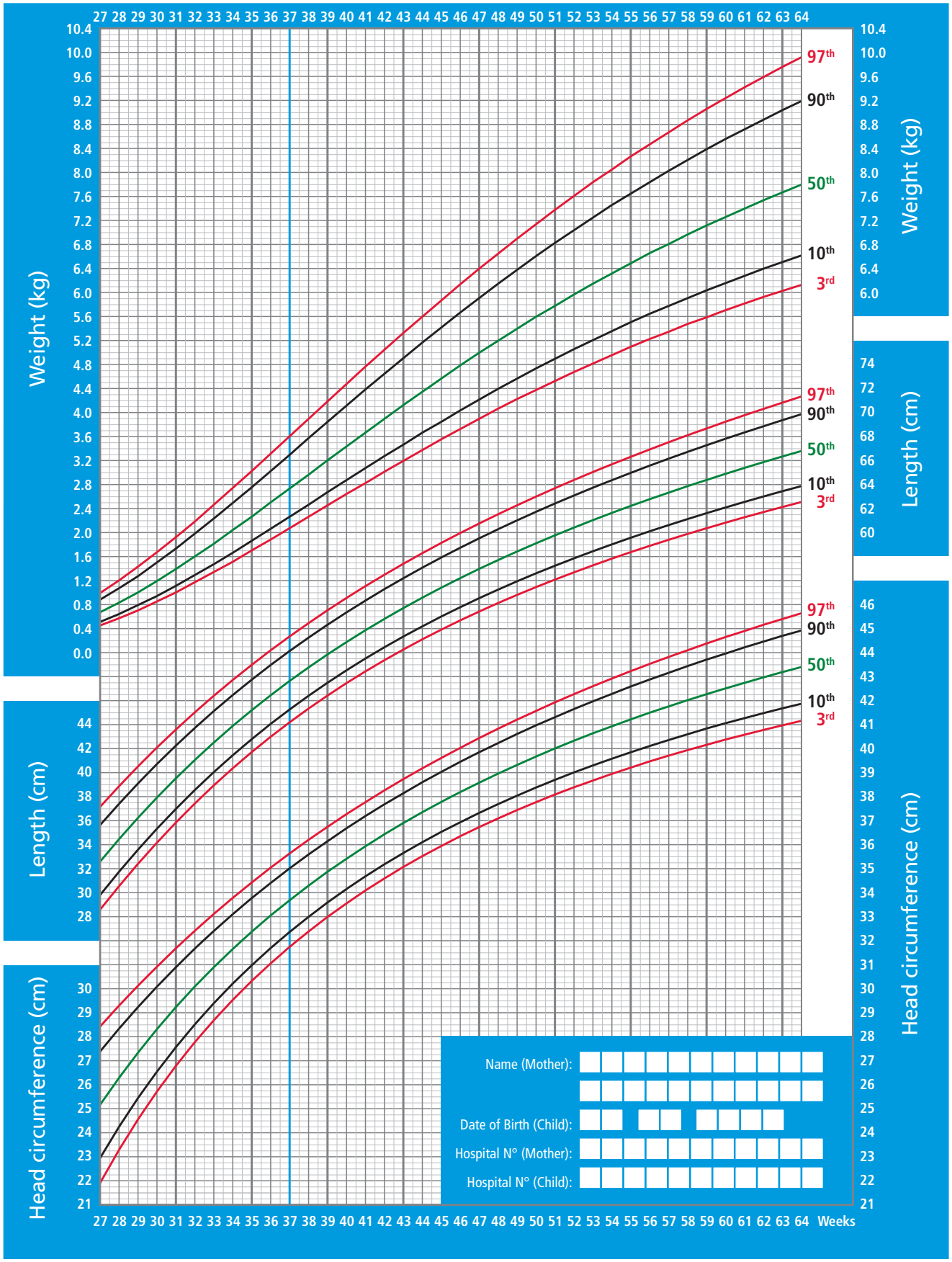
KMC Daily Score Sheet				Date:	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Day 11	Day 12	Day 13	Day 14	Day 15	Day 16
Name:		Breastfeeding:		Started 24h KMC																
IP No:		Formula:																		
Evaluation	Score			Weight																
	0	1	2	Remarks																
Socio-economic support	No help or support	Occasional help or support	Good support system																	
Mother's milk production	Expresses 0-10ml breast milk	Expresses 10-20ml breast milk	Expresses 20-30 ml breast milk	Must score 2 before discharge. N/A for formula																
Positioning and latching baby onto breast	Always needs assistance	Occasionally needs assistance	No assistance needed	Not applicable for formula feeding																
Baby's ability to suckle at the breast	Gets tired very quickly	Gets tired infrequently	Takes all feeds well																	
Confidence in handling baby i.e. feeding, Top tailing	Always needs assistance	Occasionally needs assistance	No assistance needed																	
Baby's weight gain per day	0-10g	10-20g	20-30g	Must score 1 or 2for a few daysbefore discharge																
Confidence in administering vitamin and iron drops	No confidence	Some confidence	Fully confident																	
Knowledge of KMC	No Knowledge	Some Knowledge	Knowledgeable																	
Acceptance & application of KMC	Does not accept or apply KMC method	Partly accepts& applies KMC method	Fully accepts and applies KMC method	Applies KMC without having to be told																
Confidence in caring for baby at home	Does not feed sure or able	Feels slightly unsure & unable	Feels confident																	
TOTAL SCORE per day:																				
				Sign																

GROWTH MONITORING CHART

UNIVERSITY OF OXFORD

International Postnatal Growth Standards for Preterm Infants (Boys)

INTERGROWTH-21st

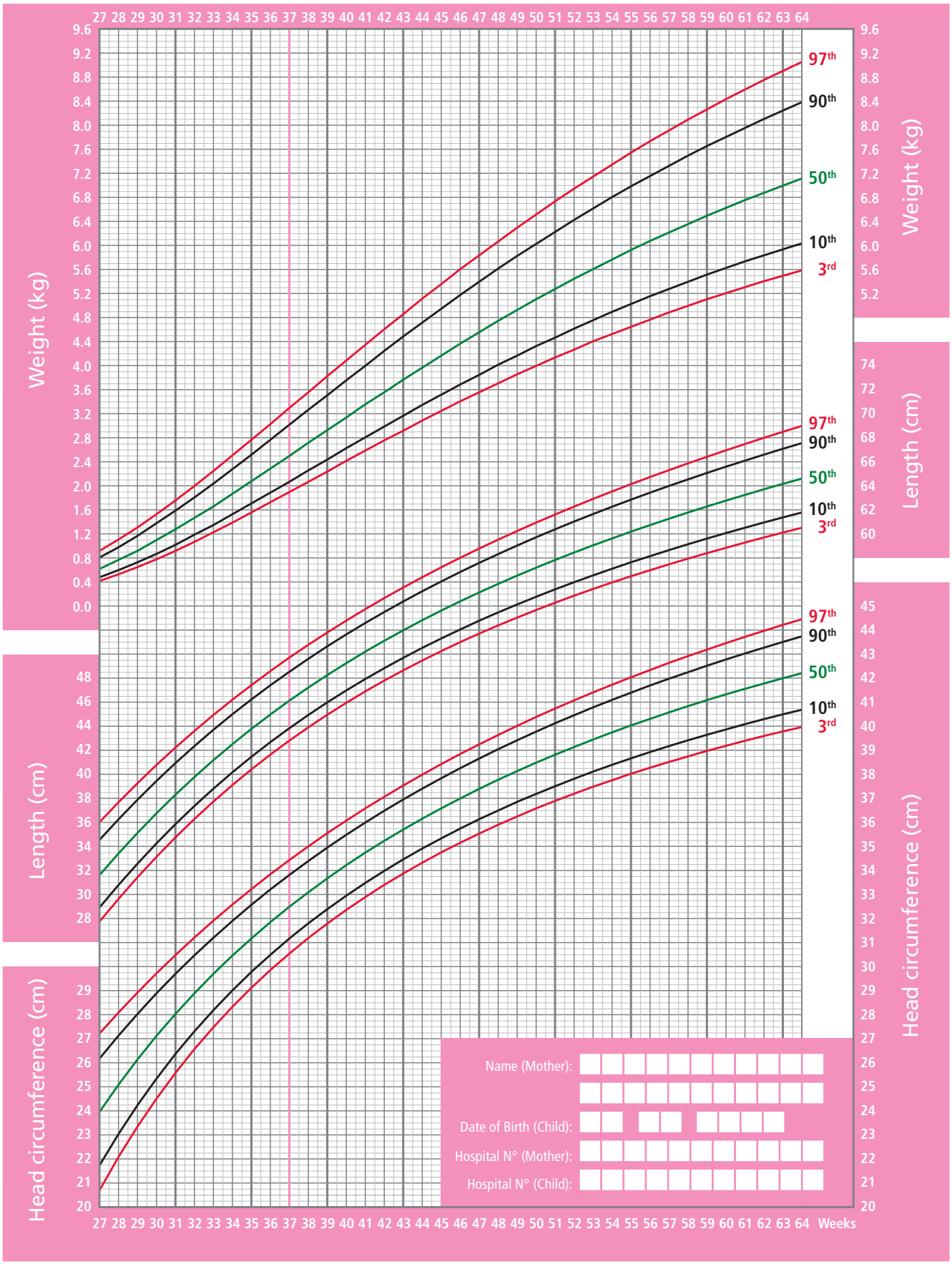


Ref: Villar et al *Lancet Glob Heath* 2015;3:e681-91.

UNIVERSITY OF OXFORD

International Postnatal Growth Standards for Preterm Infants (Girls)

INTERGROWTH-21st



Ref: Villar et al *Lancet Glob Heath* 2015;3:e681-91.

REHABILITATION FORMS

Name: _____ Age: _____ IPNO: _____

SEX: M ☐ F ☐ I ☐ Ward: _____

Date of first Assessment: _____

Patients Assessment report: _____

Occupational therapy diagnosis: _____

Treatment plan: _____

Treatment sessions given

	Date	sign		Date	sign		Date	sign
1			1			1		
2			2			2		
3			3			3		
4			4			4		

Total No of sessions Given: _____

Discharge summery_____

Date of Discharge from Occupational Therapy_____

PHYSIO THERAPY FORM

Name: _____ Age: _____ IPNO: _____

SEX: M ☐ F ☐ I ☐ Ward: _____

Date of first Assessment: _____

Patients Assessment report: _____

Occupational therapy diagnosis: _____

Treatment plan: _____

Treatment sessions given

	Date	sign		Date	sign		Date	sign
1			1			1		
2			2			2		
3			3			3		
4			4			4		

Total No of sessions Given: _____

Discharge summery_____

Date of Discharge from Occupational Therapy_____

NEWBORN UNIT DISCHARGE FORM *(To be filled in duplicate and perforated)*

Health Facility Name:_____

Community Health Unit Name: _____

Patient Name				IP No.			
Date of birth		Gestational age at birth		Corrected GA at discharge			
Age days	Sex F ☐ M ☐ Indeterminate ☐			Birth wt grams		Discharge wt grams	
Mode of delivery	SVD ☐ CS ☐ Breech ☐ Vacuum ☐ Forceps ☐			Date of Admission	dd/mm/yyyy		
Infant HIV sero-exposed?	Y ☐ N ☐	If yes ARVs given?	Y ☐ N ☐	Date of Discharge/ Referral	dd/mm/yyyy		
Outcome	Discharged ☐ Absconded ☐ Referred ☐						
If dead, Underlying causes:							
Discharged through		Reason					

Neonatal Diagnoses: Select ONE primary diagnosis (tick 1) and for secondary diagnoses (tick 2)

Birth asphyxia Encephalopathy severity: Mild ☐ Moderate ☐ Severe ☐	1 ☐	2 ☐	Neonatal sepsis	1 ☐	2 ☐	Jaundice	1 ☐	2 ☐	Highest bilirubin =_____	
			Meningitis	1 ☐	2 ☐	Anaemia	1 ☐	2 ☐	Discharge HB =_____	
Preterm	1 ☐	2 ☐	Other diagnoses-name and indicate if primary(1) or secondary(2)							
Newborn RDS	1 ☐	2 ☐		1 ☐	2 ☐		1 ☐	2 ☐		
Meconium aspiration	1 ☐	2 ☐		1 ☐	2 ☐		1 ☐	2 ☐		

Supportive Care given									
iKMC KMC	Y ☐ N ☐ Y ☐ N ☐	CPAP	Y ☐ N ☐	Phototherapy	Y ☐ N ☐	Transfusion	Y ☐ N ☐		

Preventive Care given											
OPV	Y ☐ N ☐	BCG	Y ☐ N ☐	HEP B	Y ☐ N ☐	TEO	Y ☐ N ☐	Vit K	Y ☐ N ☐		
CHX	Y ☐ N ☐										

Feeding at Discharge	Breast Milk only ☐ Formula only ☐ Formula & Breastmilk ☐ Fortified breastmilk ☐

Summary of Key Investigations, Interventions, Progress & Needs at Discharge

Condition on Discharge	Normal ☐ Neuro Sequelae ☐ Screened for ROP: Y ☐ N ☐ Screened for hearing: Y ☐ N ☐. If yes Pass: ☐ Fail: ☐ Other Complication ☐ = _____
Follow up:	CWC ☐ POPC/NOPC ☐ OT ☐ PMTCT ☐ CHU ☐ Other facility ☐ If other facility: (Specify name) _____
	Weeks after discharge = _____ Date: _____ Time: _____
	CHP Name_____ CHP Contacts: _____
Discharge Drugs:	

Name of Clinician Discharging: _____ Signature: _____

Consultant in-charge: _____

DISCHARGE CHECKLIST FROM THE NEWBORN UNIT – TARGETING MOTHERS OF SMALL AND SICK NEWBORNS

Essential checklist for the mother and baby while in the NBU before discharge	Yes	No	Response (Feedback)
Confirm the mother has been counselled on the following danger signs:			
• Baby poorly feeding or refusing to breastfeed	☐	☐	
• Baby is breathing fast	☐	☐	
• Baby is convulsing	☐	☐	
• Baby is cold (Hypothermia <36.50C)	☐	☐	
• Baby has Fever (>37.50C)	☐	☐	
• No movement or movement only when stimulated	☐	☐	
• Baby has any yellowing	☐	☐	
• Discharge or bleeding from umbilicus	☐	☐	
• Inconsolable cry or irritability	☐	☐	
Confirm essential newborn care interventions have been provided as per the national guidelines:			
• Newborn immunizations and multivitamins given	☐	☐	
• TEO	☐	☐	
• Cord care	☐	☐	
• Vit K	☐	☐	
• Ensure that breastfeeding has been established	☐	☐	
• Proper physical exam (head to toe) with documentation of findings	☐	☐	
• Ensure the baby has passed urine and meconium	☐	☐	
Conduct physical examination for the mother:			
• Temperature	☐	☐	
• Blood pressure	☐	☐	
• Heart rate	☐	☐	
Confirm you have counselled the mother on postpartum family planning, including the benefits of birth spacing:	☐	☐	
Confirm the woman has a plan to start a contraceptive method of her choice	☐	☐	
Confirm that the woman has selected a contraceptive method of choice as part of Postpartum contraception (before discharge from the NBU)	☐	☐	Family Planning Method selected: _____
Confirm the women has been referred to access the contraceptive method of choice: – within the hospital (MCH clinic / other department)	☐	☐	Referral Date: _____
Confirm the women has been referred to access the contraceptive method of choice: - In another facility post discharge	☐	☐	Referral Facility: _____ Referral Date: _____
Confirm you have counselled the mother on the following:			
• General hygiene including hand washing and cord care	☐	☐	
• How to keep the baby warm	☐	☐	
• Danger signs for the baby and the mother	☐	☐	
• Where to seek care if any danger sign occurs	☐	☐	
• Breastfeeding (positioning, attachment, latching)	☐	☐	
• Exclusive breastfeeding for the first 6 months	☐	☐	
• Nutritional support for the mother	☐	☐	
• Sleeping under long-lasting insecticide treated nets	☐	☐	
• Follow up care and when to return	☐	☐	
• Prevention of infections including protection from STDs (including HIV)	☐	☐	
• Adherence to antiretroviral therapy (where applicable)	☐	☐	

NEWBORN DISCHARGE FORM *(Copy)*

(HEALTH FACILITY NAME):_____

Community Health Unit Name: _____

NEWBORN UNIT DISCHARGE FORM: _____

Patient Name				IP No.			
Date of birth		Gestational age at birth		Corrected GA at discharge			
Age days	Sex	F ☐ M ☐ Indeterminate ☐		Birth wt grams		Discharge wt	grams
Mode of delivery	SVD ☐ CS ☐ Breech ☐ Vacuum ☐ Forceps ☐			Date of Admission	dd/mm/yyyy		
Infant HIV sero-exposed?	Y ☐ N ☐	If yes ARVs given?	Y ☐ N ☐	Date of Discharge/ Referral / Death	dd/mm/yyyy		
Outcome	Died ☐ Alive ☐	If alive: Discharged ☐	Absconded ☐	Referred ☐			
Referred to		Reason					

Neonatal Diagnoses: Select ONE primary diagnosis (tick 1) and for secondary diagnoses (tick 2)

Birth asphyxia Encephalopathy severity: Mild ☐ Moderate ☐ Severe ☐	1 ☐	2 ☐	Neonatal sepsis	1 ☐	2 ☐	Jaundice	1 ☐	2 ☐	Highest bilirubin =___
			Meningitis	1 ☐	2 ☐	Anaemia	1 ☐	2 ☐	Discharge HB =_____
Preterm	1 ☐	2 ☐	Other diagnoses-name and indicate if primary(1) or secondary(2)						
Newborn RDS	1 ☐	2 ☐		1 ☐	2 ☐		1 ☐	2 ☐	
Meconium aspiration	1 ☐	2 ☐		1 ☐	2 ☐		1 ☐	2 ☐	

Supportive Care given

iKMC KMC	Y ☐ N ☐ Y ☐ N ☐	CPAP	Y ☐ N ☐	Phototherapy	Y ☐ N ☐	Transfusion	Y ☐ N ☐

Preventive Care given

OPV	Y ☐ N ☐	BCG	Y ☐ N ☐	HEP B	Y ☐ N ☐	TEO	Y ☐ N ☐	Vit K	Y ☐ N ☐
CHX	Y ☐ N ☐								

Feeding at Discharge	Breast Milk only ☐ Formula only ☐ Formula & Breastmilk ☐ Fortified breastmilk ☐

Summary of Key Investigations, Interventions, Progress & Needs at Discharge

Condition on Discharge	Normal ☐ Neuro Sequelae ☐ Screened for ROP: Y ☐ N ☐ Referred? ☐ Screened for hearing: Y ☐ N ☐. If yes Pass: ☐ Fail: ☐ Other Complication ☐ = _____
Follow up:	CWC ☐ POPC/NOPC ☐ OT ☐ PMTCT ☐ Other facility ☐ If other facility: (Specify name) _____
	Weeks after discharge = _____ Date: _____ Time: _____
	Linked Community Health Promoter Y ☐ N ☐ If Y, indicate Name and contacts of CHU: _____
Discharge Drugs:	

Name of Clinician Discharging: _____ Signature: _____

Consultant in-charge: _____

REFERRAL FORM

Date: _____ Time: _____*(Decision to refer)*

Referral category

County referral ☐ Inter county ☐ National referral ☐ International ☐

Emergency ☐ Urgent ☐ Not Urgent ☐

Health Facility Details

Referring From:	Referring To:
Department:	Department:
County:	County:
Sub-county:	Sub-County:
Keph level of care: [L1] [L2] [L3] [L4] [L5] [L6]	Keph level of care: [L1] [L2] [L3] [L4] [L5] [L6]
Facility Ownership: Private [ ] Public [ ] FBO [ ]	Facility Ownership: Private [ ] Public [ ] FBO [ ] NGO [ ]

Patient Details

Name of patient: _____ Sex: ☐ M ☐ F ☐ I Age: _____ Weight(kg): _____

Date of Admission: _____ IP/OP No.: _____

Caregivers Name: _____ Phone Number: _____

Patient Diagnosis: _____

_____

History: _____

_____

_____

_____

_____

_____

Investigations: _____

Reason for referral: _____

Mode of transport: Ambulance: ☐ Self ☐(Specify): _____

Referral facility contacted: Yes ☐ No ☐

Name of health care provider contacted: _____

Prereferral instructions: _____

Officer taking the decision to refer Name: _____ Designation: _____

Department physician/ specialist

Name: _____ Designation: _____-_____

Condition During Referral (Tick As Appropriate)

General Condition

☐ level of consciousness /A_V_ P _U_

☐ Unable to drink or [ ] Vomits everything

☐ Is lethargic or unconscious

Feeding mode: Breastfeeding ☐ Cup ☐ NGT ☐

Newborn referred in KMC position: Yes ☐ No ☐

☐ Convulsions in this illness

☐ Severe Pallor

☐ Severe Respiratory Distress (Fast breathing/ Grunting /Stridor)

☐ Severe Wasting / Oedema {Foot/Knee/Face} / Loss of Muscle tone (floppy)

Others specify? _____

_____

VITAL SIGNS:

Temperature_____ Respiratory Rate: _____ Pulse Rate _____

Cap Refill: ≤3sec / >3 sec: _____ SpO_2_____ RBS _____

Date: _____ Time: _____

(the ambulance/patient left the referring health facility).

Interventions during referral:

Resuscitation: Yes ☐ No ☐ _____ Oxygen Yes ☐ No ☐

Fluids _____ Amount Start Time: _____ Stop Time: _____

Drugs given: _____

Additional Notes: _____

Accompaning or referring officer:

Name: _____Designation: _____

Signature: _____Telephone No: _____ Date: _____

Condition of Patient on Arrival

Stable ☐ Critical ☐ dead ☐

Temperature: _____ Pulse: _____ Respiratory rate: _____ SPO_2: _____

Name of receiving officer: _____

Designation: _____ sign: _____

Date: _____ Time: _____

* To be filled in duplicate

OUT-PATIENT FOLLOW UP FORM

Name:_____ IP No:_____

ADVERSE TRANSFUSION REACTION FORM

(FOM20/MIP/PMS/SOP/001)

MINISTRY OF HEALTH
PHARMACY AND POISONS BOARD
P.O. Box 27663-00506 NAIROBI
Tel: (020)-3562107 Ext 114, 0720 608811, 0733 884411 Fax: (020) 2713431/2713409
Email: pv@pharmacyboardkenya.org

IN CONFIDENCE

ADVERSE TRANSFUSION REACTION FORM

In the event of a severe reaction following transfusion of blood or blood products please complete this form and send it to the laboratory with the specimens listed below.

PATIENT INFORMATION

Patient name:_____ Age: _____
Gender: ☐ Male ☐ Female Patient No.: _____

Diagnosis: _____
Ward: _____
Pre-transfusion HB: _____
Reason for transfusion: _____
Current Medications: _____

Obstetric History: ☐ N/A ☐ Gravid_____ ☐ Para ____
Previous Transfusion: ☐ Yes ☐ No
Comment: _____
Previous Reactions: ☐ Yes ☐ No
Comment: _____

REACTION INFORMATION

Type of reaction
1. General: ☐ Fever ☐ Chills/Rigors ☐ Flushing
☐ Nausea/ Vomiting
2. Dermatological: ☐ Urticaria, ☐ Other skin rash
3. Cardiac/Respiratory: ☐ Chest pain ☐ Dyspnoea
☐ Hypotension ☐ Tachycardia

4. Renal: ☐ Haemoglobinuria- Dark urine ☐ Oliguria
☐ Anuria
5. Haematological: ☐ Unexplained bleeding
6. Others (Specify): _____

Vital Signs: At Start: BP_____ During (15min) BP _____ At stop: BP_____
T_____ T_____ T_____
P_____ P_____ P_____
R_____ R_____ R_____

COMPONENT INFORMATION

Name of Nurse/Doctor: _____
Signature: _____

Type of component	Pint No	Expiry Date	Volume Transfused

Specimens required by the laboratory
1. *10mls post-transfusion whole blood from patient from plain bottle*
2. *2mls of blood in EDTA bottle*
3. *10mls First Void Urine*
4. *The blood that reacted together with the attached transfusion set*
5. *All empty blood bags of already transfused unit*

LAB INVESTIGATION: (Transfusion manager)

1. Recipient's blood supernatant:
Hemolysis ☐Present ☐ Absent ☐ Equivocal
If present ☐ Mild ☐ Moderate ☐Marked
2. Recipient's blood:
Agglutination ☐ Present ☐ Absent
3. Haematological results: WBC_____HB_____RBC_____HCT_____MCV _____
MCH_____MCHC_____PLT _____
Film Rbc:_____Wbc:_____PLt: _____

4. Donor blood supernatant:
Hemolysis ☐ Present ☐ Absent
5. Age of donor pack: _____
6. Culture donor pack: Results: _____
7. Culture recipient blood: Results: _____

8. Compatibility testing recipient serum (pretransfusion sample) and donor cells (pack)

Compatible	Saline Rt	☐	Saline 37	☐	AHG	☐	Albumin 37 ☐
Incompatible	Saline Rt	☐	Saline 37	☐	AHG	☐	Albumin 37 ☐

9. If negative (inconclusive results in 8) set up compatibility with enzyme treated cells Result: _____
10. In case of blood group O transfused to A or B or AB individual: Establish from the donor unit
Anti A titres_____Anti B titers_____

11. Urinalysis _____
12. Evaluation: Diagnosis
13. Was the adverse reaction related to transfusion?
☐ Yes ☐ No ☐ Inconclusive

Reporter Details

Name of Initial reporter:	Cadre/designation:	Mobile no: Email:	Date of report:
Name of Person Submitting to PPB if different from reporter:	Cadre/designation:	Mobile no: Email:	Date of Submission:

You need not be certain..... just be suspicious!

Your support towards the National Pharmacovigilance system is appreciated
Submission of a report does not constitute an admission that medical personnel or manufacturer or the product caused or contributed to the event.
Patient's identity is held in strict confidence and program staff is not is not expected to and will not disclose reporter's identity in response to any public request.
Information supplied by you will contribute to the improvement of drug safety and therapy in Kenya. Once completed please send to:
The Pharmacy and Poisons Board on the above address

FOR OFFICIAL (PPB USE ONLY)

ADR Report No: ...../...../..... Date Received.....
Vigiflow Entry Number ..... Date Committed: .....

ADR REPORTING FORM

(FOM001/MIP/PMS/SOP/001)

MINISTRY OF HEALTH
PHARMACY AND POISONS BOARD
P.O. Box 27663-00506 NAIROBI
Tel: (020)-3562107 Ext 114, 0720 608811, 0733 884411 Fax: (020) 2713431/2713409
Email: pv@pharmacyboardkenya.org

IN CONFIDENCE

SUSPECTED ADVERSE DRUG REACTION REPORTING FORM

REPORT TITLE: .....

The report is on:
☐Suspected adverse drug reaction ☐Therapeutic ineffectiveness

Report Type:
☐Initial Report ☐Follow Up Report

Product category (Tick appropriate box)
☐Medicinal product ☐Blood and blood products. ☐Herbal product. ☐Cosmeceuticals. ☐Others.....

Institution details

Name of Institution	Contact/Tel No.	Facility Code:	County:

1. Patient Information
Patient name/initials: ..... IP/OP. No: .....
D.O.B/Age: ..... Patient address: ..... WARD/CLINIC:.....
(NAME/NUMBER)
Gender: ☐ Male ☐ Female

Any known allergy ☐No ☐Yes (specify).....
Pregnancy status
☐ Not Applicable ☐ Not pregnant
☐ 1st Trimester ☐ 2nd Trimester ☐ 3rd Trimester
Weight: ..... kg Height: .....cm

2. Suspected Adverse Reaction
Date of onset of reaction: .....
Brief description of reaction:.....

3. Medical History. (Other relevant history including pre-existing medical conditions e.g. allergies, smoking, alcohol use, hepatic/ renal dysfunction etc)
.....
.....

4. List all medicines being currently used by the patient including OTC, and herbal products (* Tick the suspected medicine)**

Tick (√) Suspected drug	INN/ Generic Name	Brand Name	Batch/ Lot No.	Manufacturer	Dose	Route	Frequency	Treatment Period		Indication
								Start date	Stop Date	

5. Past medication history (List all medicines used in the last 3 months including OTC, herbals, if pregnant indicate medicines used in the 1st trimester)

INN/Generic Name	Brand Name	Batch/Lot No.	Manufacturer	Dose	Route	Frequency	Treatment Period		Indication
							Start date	Stop date	

6. Dechallenge/Rechallenge
Did the reaction resolve after the drug was stopped or when the dose was reduced?
☐Yes. ☐No ☐Unknown. ☐N/A
Did the reaction reappear after the drug was reintroduced?
☐Yes. ☐No. ☐Unknown ☐N/A

7. Any lab investigations and results.....
.....

8. Grading of the reaction /event
I. Severity of reaction : ☐ Mild ☐ Moderate ☐ Severe ☐ Fatal ☐ Unknown
II. Is the reaction serious? ☐Yes ☐No
III. Criteria/reason for seriousness : ☐ Hospitalization/Prolonged Hospitalization ☐ Disability. ☐ Congenital anomality ☐ Life threatening ☐ Death
IV. Action taken : ☐ Drug withdrawn. ☐ Dose reduced. ☐ Dose increased. ☐ Dose not changed ☐ Not applicable. ☐ Unknown
V. Outcome : ☐ Recovered. ☐ Recovered with sequelae. ☐ Recovering ☐ Not recovered ☐ Death. ☐ Unknown

9. Any other comment .....
.....

10. Reporter Details

Name of Initial reporter:	Cadre/designation:	Mobile no: Email:	Date of report:
Name of Person Submitting to PPB if different from reporter:	Cadre/designation:	Mobile no: Email:	Date of Submission:

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The Pharmacy and Poisons Board on the above address

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REPUBLIC OF KENYA

MINISTRY OF HEALTH