HMH Special Care Baby Unit (SCBU) Guidance Document

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HMH's work is the result of an ongoing collaboration between critical care providers, hospital administrators, regional and international health system partners including the Ministry of Health. Working closely with system partners, our implementation of improvement initiatives has facilitated a stronger networked system of care, the development of knowledge translation and educational opportunities, as well as data analytics to support performance management and system standards. HMH management provides leadership to facilitate system change and alignment to advance critical care services underpinned by a framework for system improvement. This has been applied across all program service areas including Adult, Paediatric and Neonatal Critical Care, as well as specialty programs in Neurosurgery, and Trauma and Burns.

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Introduction to Critical Care Services HMH

The purpose of the Special Care Baby Unit (SCBU) guidance document was to develop revised levels of care applicable to current practice and service within our SCBU. This document contains criteria that are based on evidence-informed practice and input from key stakeholders. The goal is to ensure that neonates have access to a consistent and appropriate level of care when required. This work has been undertaken by a task force composed of clinical and operational representatives from SCBU and the wider hospital staff at Halimatu Musa Hospital.

1. Introduction

1.1 Introduction to the Guidance Document

The purpose of this guide is to outline the expected service levels of care to be provided to neonates at our SCBU. The goal of these levels of care standards is to define and update the level of care required for the SCBU to reflect a consistent standard of unit capabilities and expectations, and to operationalize the level to support the following objectives:

• Establish a common standard/understanding regarding unit level capacity and capability;
• Provide a mechanism to ensure the SCBU is accountable for providing a level of care based on the updated defining criteria; and
• Facilitate efficient patient flow across SCBU critical care.

2. Enhancing SCBU Critical Care Levels in HMH

2.1 Background for the SCBU

By strengthening the existing maternal-newborn levels of care and adding SCBU-specific thresholds and targets when required, there will be more clarity around what is expected for specialised neonatal care in HMH. This will also establish accountability for the criteria and support of patient flow in the system.

3. Human Resource Requirements for SCBU

The following suggested Health Human Resource Requirements for HMH's SCBU does not specify staffing ratios and have only been considered based on HMH's specific SCBU level of care, infant acuity and evidence informed information.

3.1 Physician:

The provision of medical coverage may vary based on the level of neonatal care. For HMH's SCBU the Paediatricians are the medically responsible care provider with access to a Neonatologist for advanced consults as required. Neonatologists are required to be the most responsible care provider due to the complexity and acuity of infants.

3.2 Nursing:

The provision of clinical skills of registered paediatric nurses within HMH's SCBU is a mandatory requirement due to the level of care needed in the SCBU. The paediatric nurse is also an advocate for both the infant and family, who works collaboratively with and leveraging family strengths to other members of the interprofessional team to achieve mutually agreed upon goals of care.

3.3 Allied health:
The suggested professional staff listed below is not meant to be all inclusive and the number and type of additional professional staff may vary depending on the required SCBU level of care. Additional professional staff not listed here may also be included such as Social Workers and Physiotherapy.
• **Anaesthetists** should be available to support the SCBU 24/7/365.
• **Dietician/Nutritional nurse** should be available to the SCBU to support the provision of donor milk. Dietician/Nutritional nurse support for neonatal nutritional expertise is a requirement.
• **Pharmacists**, in addition to providing expertise on relevant medications, dosing, routes of administration etc., should also be available to the SCBU to support the provision of standardised TPN solutions as needed. Also, for the SCBU the expectation is for 7 days a week coverage of staff with neonatal pharmacological expertise.

4. SCBU Levels of Care

4.1 Gestational Age and Weight Criteria

The gestational age and birth weight criteria established by Medscape will be used for this iteration of the SCBU Levels of Care recommendations.

Intravenous (IV) Line Placement:

Central line insertion must be implemented upon admission. Any difficulties in doing so must be communicated immediately to both the Consultant Paediatrician (Neonatologist) and Consultant Anaesthesiologist.

Peripheral line insertion should be implemented only as a temporary measure after consultation with both the Consultant Paediatrician and Consultant Anaesthesiologist. Peripheral line insertion should be limited to a maximum of 3 attempts per clinician.

Baseline Investigations to be carried out on admission:

- Full Blood Count (FBC)
- Total Bilirubin test (all newborns) - Must be carried out initially using non-invasive Transcutaneous Bilirubinometer with result recorded on the EMR. Subsequent result (**1.0-12.0 mg/dL** = normal reading as per Medscape) and clinical judgement of medical officer/Consultant will determine if serum bilirubin test is also required.
- EUCR (after 24 hours)
- Blood culture
- Screening of the mother (Serology - Viral markers)
- C-reactive Protein

Medications to be administered upon admission:

- The SCBU medical and nursing team will prescribe and administer the following as per the SCBU guidance (Neonatal Formulary) as soon as IV access is available:
- Vitamin K (intramuscular)
- Cefotaxime and/or Gentamicin (if required)
- Maintenance iv fluids (10% Glucose 60ml/kg/day)
- Inotropes: if there are concerns with shock, (consider ECHO if available) discuss with Paediatric cardiologist.

Monitoring:

- Strict monitoring of vitals submitted via EMR on an hourly basis
- NG tube insertion - input and output (effluent) noted and recorded on the EMR
- Ensure amount of fluid intake is adequate
- Urinary output should be monitored on an hourly basis
- General state of patient must be observed at all times - little to no movement is indicative of a serious issue, medical officer and neonatologist should be alerted immediately
- Medication must be administered as and when due
- A gastric lavage may be required if the neonate continues to throw up after feeding. Medical Officers on duty and Neonatologist should be alerted immediately.

It should be noted that all blood samples for neonates and paediatric patients must be taken by Medical Officers or Consultants only.

Accident and emergency (adult and geriatric) patient blood samples should be taken by Medical Officers, Consultants or Nurses only.

Gentamicin should only be administered using the following criteria:

- High risk factors for infection (i.e. preterm, out-of-hospital birth (OOHB) etc.), clinical indicators and laboratory evidence of possible infection are established
- **EUCR** has been completed with normal value results for:
  UREA: Newborns: 3-12 mg/dL; Infants: 5-18 mg/dL; Children: 5-18 mg/dL
  CREATININE: Newborns: 0.3-1.2 mg/dL; Infants: 0.2-0.4 mg/dL; Children: 0.3-0.7 mg/dL
  POTASSIUM: 3.5-5.3 mmol/L
- **CRP** levels above 20mg/L

Criteria for Sepsis Diagnosis includes the following:

- SIRS, Sepsis and Septic Shock Criteria
- Sepsis markers from Lab investigations: CRP **> 20 mg/L**; Procalcitonin **> 2ng/mL**
- qSOFA score of 2 or more

Seizures & Epilepsies:

Status epilepticus:
*Status epilepticus, defined as **a seizure that lasts 5 minutes or longer, or recurrent seizures without recovery in between,** should be managed as a medical emergency to prevent neurological injury and death. Status epilepticus may be convulsive or non-convulsive. Non-convulsive status epilepticus can be difficult to detect and its management requires specialist advice (as per NICE guidelines).*

Generalised Tonic-Clonic Seizures:
This type of seizure (also called a convulsion) is what most people think of when they hear the word "seizure." Tonic means stiffening, and clonic means rhythmical jerking.

- *The tonic phase comes first:*
- *All the muscles stiffen.*
- *Air being forced past the vocal cords causes a cry or groan.*
- *The person loses consciousness and falls to the floor.*
- *A person may bite their tongue or inside of their cheek. If this happens, saliva may look a bit bloody.*
- *These seizures generally last 1 to 3 minutes.*

Complex Partial Seizures:
Complex partial seizures, now termed focal impaired awareness seizures, are a type of partial seizure originating in one part of the brain that results in impaired consciousness, often accompanied by automatisms (e.g., repetitive movements) or altered sensations like déjà vu.

Pharmacotherapy

Most patients with status epilepticus who are treated aggressively with a benzodiazepine, fosphenytoin, and/or phenobarbital experience complete cessation of their seizures. If status epilepticus does not stop, general anesthesia is indicated.
Medications used in the treatment of status epilepticus include the following:

- Benzodiazepines (eg, lorazepam, midazolam, diazepam): **First-line agents**
- Anticonvulsant agents (eg, levetiracetam, phenytoin, fosphenytoin): **Second-line agents**
- Barbiturates (eg, phenobarbital, pentobarbital)
- Anaesthetics (eg, propofol)

Status Epilepticus (Phenobarbitol/Phenytoin):
15-20 mg/kg IV in single or divided dose; if necessary, administer an additional dose of 5-10 mg/kg 10 minutes after loading dose in accordance with Medscape guidelines.
Maintenance: 4-8mg/kg/day IV divided twice daily

Tonic-Clonic, Myoclonic and Complex Partial Seizures:
5mg/kg/day in 2 divided doses (or at the Paediatrician's discretion)
6 months to 16 years: 5 mg/kg/day in 2-3 divided doses (or at the Paediatrician's discretion) in accordance with Medscape guidelines.
Neonates (<28 days): - Initial: 5-8 mg/kg/day IV/PO divided q8-12hr
Age-based maintenance dose: - 6 months-4 years: Usual range, 8-10 mg/kg/day IV/PO divided two or three times daily - 4-7 years: Usual range, 7.5-9 mg/kg/day IV/PO divided two or three times daily

Levetiracetam should also be considered if seizures continue:

- Levetiracetam injection 60mg/kg loading dose, then 30mg/kg 12 hourly maintenance
- Levetiracetam injection 40mg/kg loading dose, then 20mg/kg 12 hourly maintenance if used in combination with phenytoin or phenobarbitone.

Cerebral Edema diagnosis:

- Transfontanelle ultrasound scan must be completed

Blood Transfusions/Exchange Blood Transfusion:

- Should not take place after 8pm
- Nurse Anaesthetist and skilled Neonatal Ventilator Champion/Technician must be present

Antibiotics not safe to be prescribed for patients under the age of 6 months:

- Levofloxacin
- Imipenem
- Amikacin
- Vancomycin
- Ciprofloxacin (under 1 year)

4.2 Required Standard Criteria for SCBU

The following tables reflect the criteria for neonatal levels of care for SCBU. The criteria include practices that are evidence-informed and considered to be the standard level of care for neonatal intensive care units.

Required Standard Treatment for SCBU: General Laboratory Testing

Bacterial and viral studies	24/365
Bacterial smear	24/365
Blood type and combs	24/365
Continuous O2 saturation monitoring	24/365
Drug screening	Within 30 minutes
Metabolic screening	Results available within 12-24 hours depending on the test requested
Micro technique for neonates – all routine blood work and newborn screening	24/365
Therapeutic drug monitoring	24/365 or available within 24 hours
Umbilical cord blood pH	24/365 or available via on-call within 30 minutes

Required Standard Criteria for all Special Care Baby Units: Criteria for SCBU Acute Care Criteria: Gestational age ≥ 34 weeks and 0 days **and** a birth weight of > 1800 grams

Repatriation Criteria: Stable infants with a corrected age of > 32 weeks and 0 days and a weight of > 1500 grams and not requiring ventilator support or advanced treatments or investigations.

Criteria (category)	Detail of Criteria (as needed)	Availability
Neonatal resuscitation	A minimum of 1 person who attends every delivery must be current in the provision of neonatal resuscitation as per International Guidelines for Neonatal Resuscitation.	24/365
Administration of blood products		24/365
Catheterization of the umbilical vein		24/365
Drainage of pneumothorax		24/365
Enteral feeds	Gavage feeding available Use of pumps for enteral feeds – via slow bolus &/or continuous feeds	24/365
Lumbar puncture		24/365
Management of substance-exposed infants requiring oral pharmacologic management		24/365
Oxygen therapy	Short term for stabilisation or management	24/365
Prostaglandin E1	Available for IV administration	24/365
Ventilation Recommend consultation with the Neonatologist if the baby still requires CPAP at 4-6 hours of age.	Surfactant is available for administration after consultation with Neonatologist Intubation	24/365

	Ability to initiate positive pressure ventilation with or without initiation of CPAP CPAP management – including ongoing evaluation and management of an infant for up to 4-6 hours	
IV management for up to 48 hours (short term)		24/365

Standard Treatment – All Level Standards Plus Additional Items SCBU

Acute Care Criteria: Babies born at a gestational age of ≥ 32 weeks and 0 days **and** a birth weight of > 1500 grams

Repatriation Criteria: Stable infant with a corrected age > 30 weeks and 0 days **and** a weight > 1200 grams and not requiring any form of invasive or non-invasive ventilation, or advanced treatments or investigations.

Criteria	Detail Criteria	Availability
Surfactant administration	Ability to intubate and administer surfactant, extubate to CPAP for short term (< 4 hours) management	24/365
CPAP duration and management Recommend consultation with Consultant Paediatrician (Neonatologist) if baby requires CPAP at 4-6 hours of age	CPAP management can be provided for up to 48 hours of age. NOTE: Maximum Parameters for CPAP (Must consult with the Neonatologist if these are reached or exceeded at any time): FiO2 ≥ 30% and/or PEEP Pressure > 8 cm H20	24/365

	and/or rapidly increasing pressure requirements.	
Saturation levels < 85%	CPAP administration is required immediately	24/365
Invasive Ventilation Requires consultation via Neonatologist.	Ability to initiate as a temporary intervention until Neonatologist arrives. Non-invasive respiratory support using any form of high flow nasal cannula FiO2 and noninvasive ventilation is not recommended	24/365
Central line maintenance - umbilical &/or peripheral or Percutaneous Intravenous therapy.	Includes surveillance for Catheter-related bloodstream infection (CRBSI)	24/365
Intravenous Therapy	Able to provide IV therapy for greater than 1 week (long term)	24/365
Total Parenteral Nutrition (TPN)	Standard solutions available for administration	7 days/week or Dietician/Nutritional nurse expertise required if patient-specific TPN to be ordered.
Use of Donor Milk	For information on eligibility requirements, please refer to WHO Guidelines	Able to provide donor milk as required

Standard Treatment – Additional for Level SBCU

Acute Care Criteria: Babies born at a gestational age of ≥ 30 weeks and 0 days and a birth weight of > 1200 grams

Repatriation Criteria: Baby with a corrected gestational age of ≥ 28 weeks and 0 days and a weight of ≥ 1000 grams; stable on CPAP for a minimum of 48 hours and not requiring non-invasive or invasive ventilatory support.

Criteria	Detail Criteria	Availability
Thoracentesis and/or chest tube initiation and maintenance		24/365
Echocardiography		On-call or alternate availability within 48 hours and remote reporting to cardiology.
Electroencephalogram (EEG)		On-call or availability within 48-72 hours Ability to have remote reporting to neurology
Invasive BP monitoring capabilities		24/365
Non-invasive ventilation	Must consult the Neonatologist if any of the following occur: • FiO2 ≥ 30% • PEEP > 8 cmH2O and/or • Rapidly increasing pressure requirements. May be able to provide non-invasive support for up to 14 days of age	24/365
Invasive Ventilation.	Ability to initiate as a temporary intervention until Neonatologist arrives. Requires consultation with Consultation if baby requires invasive ventilatory support at 4-6 hours of age. If invasive	24/365

	ventilation is required it may be continued up to 48 hours of age in consultation with the Neonatologist.	
Neonatal Follow up Clinic	Specific services offered for Neonatal Follow-up.	Follow up appointments booked as and when required
PICC line maintenance		24/365

Standard Treatment – Additional for Level SCBU

Acute Care Criteria: Babies born at a gestational age of ≥ 30 weeks and 0 days and a birth weight of > 1200 grams

Repatriation Criteria: Baby with a corrected gestational age of ≥ 28 weeks and 0 days and a weight of ≥ 1000 grams; stable on CPAP for a minimum of 48 hours and not requiring non-invasive or invasive ventilatory support.

Criteria	Detail Criteria	Availability
Retinopathy of Prematurity screening	Screening may be done by Ophthalmology or through the use of a RetCam™ if available.	Ability to provide screening 52 weeks/year and to do weekly screening when required.
Use of Donor Milk	For information on eligibility requirements, please refer	Able to provide donor milk as required

Standard Treatment – Additional for Level 3a and 3b SCBU

Acute Care Criteria: Babies born of any gestational age and birth weight

Criteria	Detail Criteria	Availability
Amplitude integrated Electroencephalography (aEEG)	Optional	24/365

Echocardiography		24/365
Unstable respiratory and cardiovascular systems	Long term management of high acuity infants and medically complex and fragile infants	24/365
Ventilation	All modalities, unlimited duration	24/365
Optional for 3a: Management of babies with Hypoxic Ischemic Encephalopathy (HIE) with the use of an active thermal device		24/365
Pathology	Laboratory analysis	Available within 12-24 hours

Additional Requirements Level 3b (optional for Level 3a)

Management of babies with Hypoxic Ischemic Encephalopathy (HIE) with the use of an active thermal device	24/7/365	
Continuous EEG capabilities	Available within 12-24 hours/Optional	
On-site surgical and/or sub-specialty capabilities	24/365 or available on call within 30 minutes	

5. Conclusion

HMH and its partners have updated the SCBU Levels of Care to develop clear and measurable definitions, the scope of services and admission criteria according to the designations. All revisions and updates incorporate evidence informed current practices where possible and consensus of the workforce in circumstances when published evidence was not available.

To ensure neonates are receiving appropriate care in the SCBU with corresponding capabilities, HMH SCBU will be accountable for maintaining their self-identified Levels of Care. The updated Levels of Care will allow better understanding of the SCBU's capabilities and promote improved

patient flow in the system. Using data analysis and a Performance Management framework, HMH will work to ensure accountability of the SCBU to its designation and ensure that Nigeria's youngest patients and their families have access to the most appropriate level of care when required.

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