



# **DEDER GENERAL HOSPITAL**

## **NICU LEVEL II SERVICES**

## **PROTOCOL**

***PREPARED BY: HSQU***

***July 2016E.C***

***Deder, Eastern Ethiopia***

**PROTOCOL APPROVAL SHEET**

|              |  |                              |              |             |
|--------------|--|------------------------------|--------------|-------------|
| TITLE        | <b>Title:</b> Deder General Hospital NICU Level II Services Protocol 2017E.C |                              |              |             |
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## **INTRODUCTION**

Newborns are among the most vulnerable patients in the healthcare system. Many require specialized monitoring and interventions beyond routine postnatal care. The Neonatal Intensive Care Unit (NICU) Level II provides care for moderately ill or recovering neonates who are at risk for complications but do not require prolonged invasive ventilation or complex surgical interventions.

In Ethiopia, neonatal mortality remains a significant contributor to under-five deaths, with preventable causes such as infections, prematurity, and birth asphyxia leading the burden. Deder General Hospital provides Level II Neonatal Intensive Care Unit (NICU) services to care for moderately ill newborns requiring specialized monitoring and treatment, but not prolonged invasive ventilation.

This protocol is aligned with the Ethiopian Ministry of Health **NICU Guideline 2021** and **EHSTG Maternal, Neonatal & Child Health Standards**, ensuring safe, effective, and evidence-based neonatal care.

## **PURPOSE**

To standardize the delivery of NICU Level II services, ensure patient safety, optimize clinical outcomes, and maintain quality of care in accordance with national and international best practices.

## **SCOPE AND APPLICABILITY**

This protocol applies to all healthcare professionals and support staff involved in the care of neonates admitted to the Level II NICU at Deder General Hospital, including:

- ☞ Pediatricians and General Practitioners assigned to NICU.
- ☞ NICU-trained nurses and midwives.
- ☞ Laboratory, pharmacy, radiology, and biomedical support staff.
- ☞ Cleaners and other NICU support personnel.

The protocol also guides coordination between the NICU and other departments, including maternity, operating room, postnatal ward, emergency department, and referral linkages.

## **DEFINITIONS OF TERMS**

- ☞ **NICU Level II** – A neonatal unit providing specialized care to stable or moderately ill newborns  $\geq 32$  weeks gestational age and/or birth weight  $\geq 1500\text{g}$ , requiring continuous monitoring, phototherapy, short-term respiratory support, or special feeding assistance.
- ☞ **Moderately ill newborn** – A baby who requires more than basic newborn care but is stable enough to not require invasive ventilation or complex multi-organ support.
- ☞ **Kangaroo Mother Care (KMC)** – Continuous skin-to-skin contact between mother (or caregiver) and newborn to promote thermal regulation, breastfeeding, and bonding.
- ☞ **Bubble CPAP** – A form of non-invasive ventilation providing continuous positive airway pressure to help keep the newborn's lungs open.
- ☞ **Thermal care** – Measures to maintain the newborn's body temperature within the normal range ( $36.5^{\circ}\text{C}$ – $37.5^{\circ}\text{C}$ ).

## SERVICE OBJECTIVES

- Stabilize and treat moderately ill newborns.
- Prevent complications in at-risk neonates.
- Support breastfeeding and nutrition.
- Promote early discharge with safe home care instructions.
- Facilitate timely referral for advanced care.

## ADMISSION AND TRANSFER CRITERIA

### Admission Criteria for Level II NICU

- **GA:** 32–36 weeks
- **Birth weight:** 1500–2500 g
- **Conditions requiring care include:**
  - **Respiratory distress** (mild to moderate; requiring oxygen therapy or CPAP, but not invasive ventilation)
  - **Feeding difficulties** (requiring NG/OG tube feeding or IV fluids)
  - **Hyperbilirubinemia** requiring phototherapy or exchange transfusion
  - **Sepsis** – confirmed or suspected, but clinically stable
  - **Hypoglycemia or electrolyte imbalance** requiring monitoring/treatment
  - **Temperature instability** requiring incubator or warmer
  - **Stable post-operative neonates**
  - **Recovery/convalescence** from Level III NICU

### **Exclusion Criteria (Require Level III or Referral)**

- ☒ Gestational age <32 weeks GA or <1500 g requiring prolonged mechanical ventilation.
- ☒ Unstable post-operative conditions
- ☒ Severe congenital anomalies needing advanced surgical or cardiac intervention
- ☒ Severe HIE (Hypoxic-Ischemic Encephalopathy) needing intensive ventilation.
- ☒ Unstable multi-organ failure.

### **Transfer Criteria to Lower Level of Care**

- ☒ Stable vital signs for at least 48 hours
- ☒ Feeding adequately without support
- ☒ No oxygen requirement for >24 hours
- ☒ Satisfactory weight gain trend

### **Escalation to Higher-Level NICU or Referral**

- ☒ Worsening respiratory distress requiring invasive ventilation
- ☒ Persistent or recurrent apnea/bradycardia despite CPAP
- ☒ Severe sepsis with hemodynamic instability
- ☒ Complicated surgical cases needing specialist intervention

## **CLINICAL SERVICES PROVIDED**

- ☞ The Level II NICU at Deder General Hospital provides the following essential services for moderately ill newborns.
  - ✚ Thermal regulation (incubators, radiant warmers, KMC).
  - ✚ Oxygen therapy and CPAP.
  - ✚ Phototherapy.
  - ✚ IV fluid therapy and medications.
  - ✚ NG/OG feeding and lactation support.
  - ✚ Continuous monitoring of vitals and oxygen saturation.
  - ✚ Infection prevention and control measures.
  - ✚ Family education and counseling.
- ☞ All care must adhere to the **Ethiopian National Newborn Care Standards, STGs, and WHO Quality Standards for Newborn Care:**

## **STAFFING REQUIREMENTS**

| <b>Category</b>        | <b>Requirement</b>   | <b>Responsibilities</b>  |
|------------------------|--|--|
| <b>Medical Doctors</b> | ☞ 1 Pediatrician (lead),<br>☞ 2 GPs = 1 GP per shift                 | ☞ Daily rounds by pediatrician <b>or</b><br>☞ medical Doctor trained in newborn care |
| <b>Nursing</b>         | NICU-trained nurse: 24   | 1 nurse for every 4–6 babies   |
| <b>Support</b>         | ☞ Cleaner trained in NICU IPC=2<br>☞ Biomedical technician on call=1 | 1 cleaner per shift (trained in NICU IPC)  |

## **STAFF COMPETENCIES**

All NICU staff must be trained and competent in:

- Neonatal resuscitation
- Thermoregulation and feeding support
- Oxygen therapy and CPAP use
- Infection prevention & control
- Pain assessment and comfort care
- Documentation and use of monitoring charts

## **ROLES AND RESPONSIBILITIES**

### **Nurse:**

- Admit and assess newborns per protocol
- Monitor and record vitals, feeding, and treatment
- Administer medications and fluids
- Educate and support parents
- Report deterioration promptly

### **Pediatrician/Medical Doctor:**

- Lead daily ward rounds and care planning
- Approve admission/discharge/referral
- Guide management of complex cases
- Supervise and train staff

### **Support Staff:**

- Maintain cleanliness of the NICU
- Assist in equipment cleaning/disinfection
- Ensure safe waste disposal

## EQUIPMENT & SUPPLIES

### Essential Equipment:

- Incubators & radiant warmers.
- Oxygen concentrators/cylinders & flow meters.
- CPAP machine.
- Multiparameter monitors.
- Phototherapy units.
- Suction machines.
- Feeding pumps & NG tubes.
- Pulse oximeters.
- Resuscitation trolley (Ambu bags, masks, laryngoscope).

### Essential Medicines:

- Antibiotics (ampicillin, gentamicin, cefotaxime).
- IV fluids (D10%, normal saline, Ringer's lactate).
- Vitamin K, surfactant, anticonvulsants.
- Paracetamol, phototherapy eye shields.

## INFECTION PREVENTION PROTOCOL

- Strict hand hygiene before/after patient contact.
- PPE according to task.
- Dedicated incubator/equipment per patient if possible.
- Disinfect surfaces twice daily and between patient use.
- No jewelry, artificial nails, or loose hair in NICU.

# **STANDARD OPERATING PROCEDURES (SOPs)**

## **1. Admission & Initial Assessment**

- ☒ Receive neonate from delivery room, maternity, or referral.
- ☒ Confirm eligibility for Level II care.
- ☒ Record admission details (weight, GA, vitals, Apgar score).
- ☒ Start treatment per diagnosis.

## **2. Oxygen Therapy & CPAP**

- ☒ Start oxygen if  $\text{SpO}_2 < 90\%$  on room air.
- ☒ Use humidified oxygen.
- ☒ CPAP initiation criteria: grunting, nasal flaring, retractions with  $\text{SpO}_2 < 90\%$ .
- ☒ Monitor hourly for improvement or deterioration.

## **3. Feeding**

- ☒ Start breastfeeding ASAP if stable.
- ☒ NG/OG feeding for infants unable to suck.
- ☒ Use expressed breast milk; formula only if breast milk unavailable.

## **4. Phototherapy**

- ☒ Initiate per bilirubin nomogram.
- ☒ Eye protection mandatory.
- ☒ Monitor bilirubin levels per protocol.

## **5. Discharge Criteria**

- ☒ Stable vitals without oxygen support for  $\geq 24$  hrs.
- ☒ Feeding well orally.
- ☒ Weight gain or stable weight for 3 days.
- ☒ Family educated on newborn care.

## **6. Documentation & Reporting**

- ☒ Daily progress notes.
- ☒ Nursing charts (feeding, medications, vitals).
- ☒ NICU register.
- ☒ Monthly quality report to Hospital Quality Unit.

## **7. Referral Procedure**

- ☒ Pre-transfer stabilization.
- ☒ Complete referral form.
- ☒ Communicate with receiving facility.
- ☒ Ensure neonatal transport incubator/portable warmer.

## **8. Monitoring & Review**

- ☒ Monthly clinical audit.
- ☒ Annual protocol review.
- ☒ Continuous training for NICU staff.

## **APPENDICES**

### **A. Standard Operating Procedures (SOPs)**

- ☒ **Appendix 1:** Admission Checklist
- ☒ **Appendix 2:** NICU Daily Monitoring Chart
- ☒ **Appendix 3:** Phototherapy Nomogram
- ☒ **Appendix 4:** Neonatal Sepsis Treatment Chart
- ☒ **Appendix 5:** Discharge Counseling Form

## Appendix 1: Admission & Initial Assessment SOP

| <b>Step</b> | <b>Action</b>  | <b>Responsible</b> | <b>Documentation</b> |
|-------------|--|--------------------|----------------------|
| 1           | Receive newborn from delivery, maternity, or referral facility                         | NICU Nurse         | Admission log        |
| 2           | Verify Level II eligibility (GA $\geq$ 32 wks, weight $\geq$ 1500 g, moderate illness) | Pediatrician/GP    | Admission form       |
| 3           | Record full history, weight, GA, Apgar, vitals   | NICU Nurse         | Neonatal chart       |
| 4           | Initiate stabilization (thermal care, oxygen if needed)                                | NICU Nurse         | Vital signs sheet    |
| 5           | Notify Pediatrician  | Nurse-in-charge    | —                    |

## Appendix 2: Oxygen Therapy & CPAP SOP

| <b>Step</b>          | <b>Criteria</b>   | <b>Action</b>   |
|----------------------|---|---|
| Start O <sub>2</sub> | SpO <sub>2</sub> <90% on room air                                       | Give humidified oxygen via nasal prongs                     |
| CPAP initiation      | Signs of respiratory distress with SpO <sub>2</sub> <90% despite oxygen | Set CPAP at 5–6 cmH <sub>2</sub> O, FiO <sub>2</sub> 21–40% |
| Monitoring           | Every 30–60 min   | Assess distress signs, SpO <sub>2</sub> , HR                |
| Weaning              | SpO <sub>2</sub> stable $\geq$ 94% on $\leq$ 30% FiO <sub>2</sub>       | Reduce gradually  |

### **Appendix 3: Feeding Protocol SOP**

| <b>Feeding Method</b> | <b>Indication</b>                | <b>Notes</b>                         |
|-----------------------|----------------------------------|--------------------------------------|
| Direct breastfeeding  | Stable, able to suck             | Encourage rooming-in/KMC             |
| NG/OG feeding         | Weak suck, moderate illness      | Use EBM; 2–3 hrly                    |
| IV fluids             | Unable to tolerate enteral feeds | Calculate per weight, avoid overload |

### **Appendix 4: Phototherapy SOP**

| <b>Criteria</b>                 | <b>Action</b>  |
|---------------------------------|--|
| TSB $\geq$ threshold for GA/age | Start phototherapy   |
| Before starting                 | Check TSB, rule out hemolysis, ensure hydration              |
| During therapy                  | Eye shield, monitor TSB daily, reposition infant every 2 hrs |
| Stop                            | TSB < threshold for 24 hrs and trending down                 |

### **Appendix 5: Neonatal Sepsis Management SOP**

| <b>Step</b>       | <b>Action</b>   |
|-------------------|---|
| Suspect sepsis    | Clinical signs or risk factors                        |
| Start antibiotics | Ampicillin + Gentamicin empirically                   |
| Supportive care   | Maintain warmth, feeding support, monitor vitals      |
| Duration          | 7 days for suspected, 10–14 days for confirmed sepsis |

## **Appendix 6. Discharge & Follow-Up SOP**

| <b>Criteria</b>                          | <b>Action</b>                      |
|--|------------------------------------|
| Stable vitals off O <sub>2</sub> ≥24 hrs | Educate mother on newborn care     |
| Feeding well orally                      | Demonstrate proper breastfeeding   |
| Weight stable/gaining                    | Schedule follow-up within 3–5 days |
| Completed antibiotics                    | Provide discharge summary          |

## **B. Checklists**

### **Admission Checklist**

- ☒ Confirm Level II eligibility
- ☒ Record weight, GA, vitals
- ☒ Thermal care initiated
- ☒ Feeding plan started
- ☒ ID band placed
- ☒ Family oriented to NICU rules

### **Daily Care Checklist**

- ☒ Hand hygiene before every patient contact
- ☒ Vitals charted 3–4 hourly
- ☒ Feeding recorded
- ☒ Phototherapy settings checked
- ☒ Oxygen source functioning
- ☒ Incubator/radiant warmer temperature within range

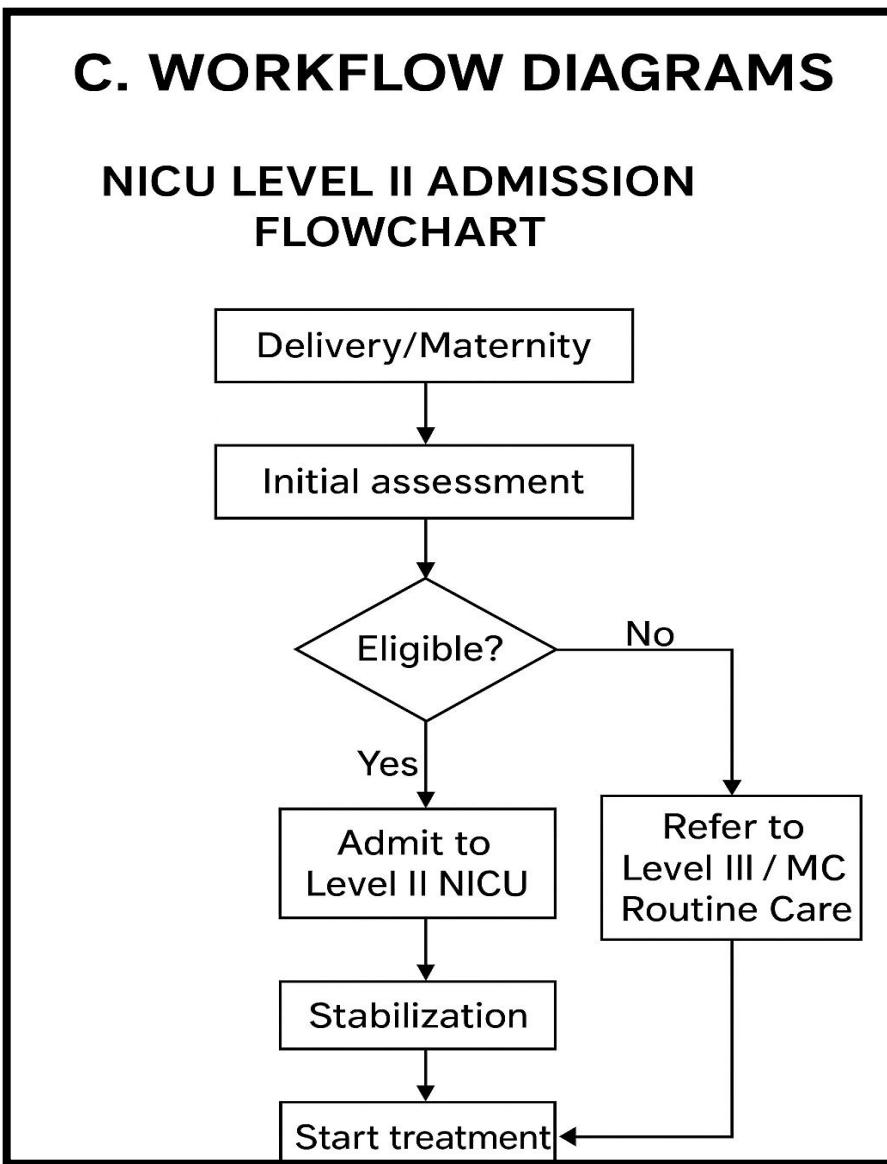
### **Discharge Checklist**

- ☒ Meets discharge criteria
- ☒ Mother counseled on feeding, danger signs

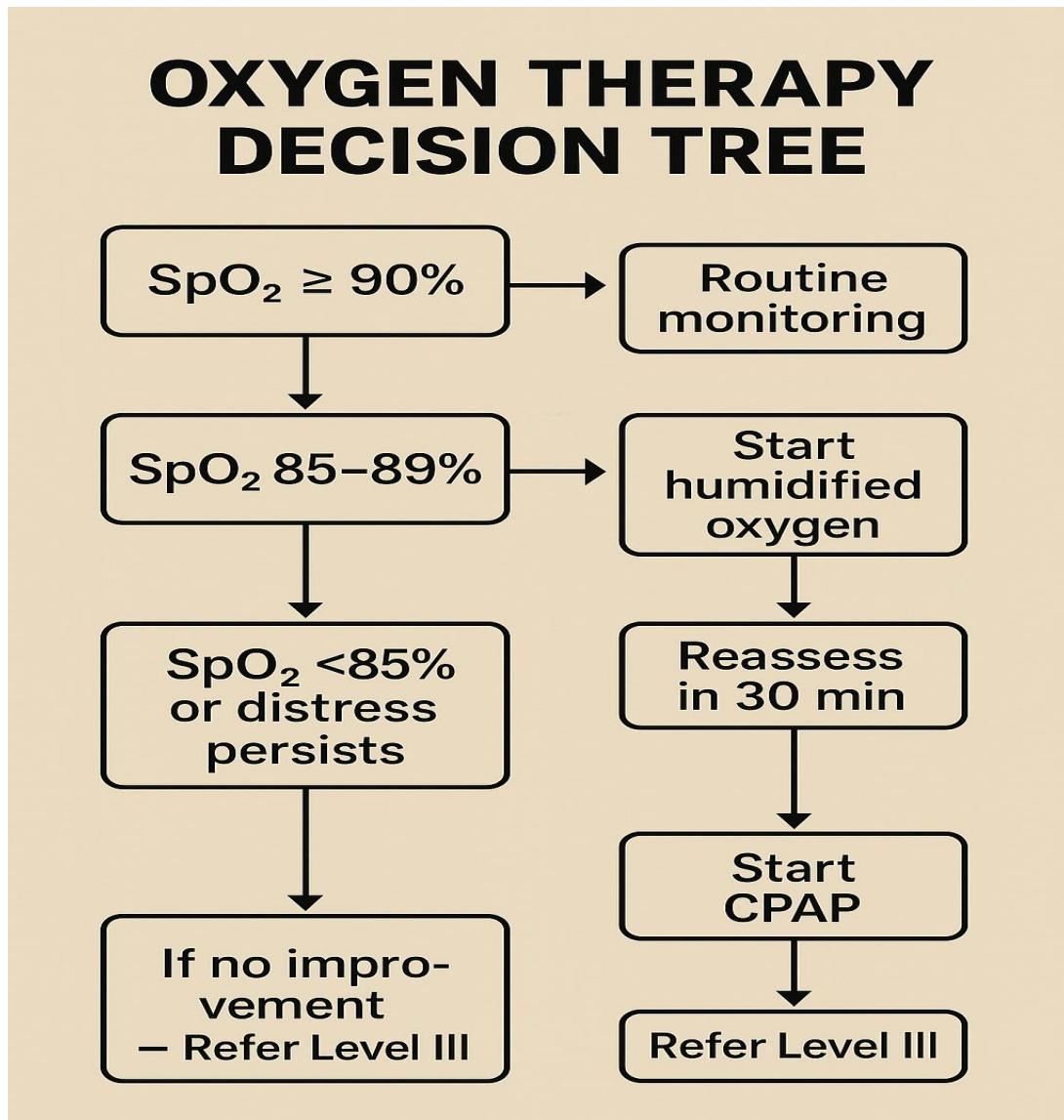
- ☛ Immunization status updated
- ☛ Follow-up date given
- ☛ Discharge summary completed

### C. Workflow Diagrams

**Figure 1: NICU Level II Admission Flowchart**

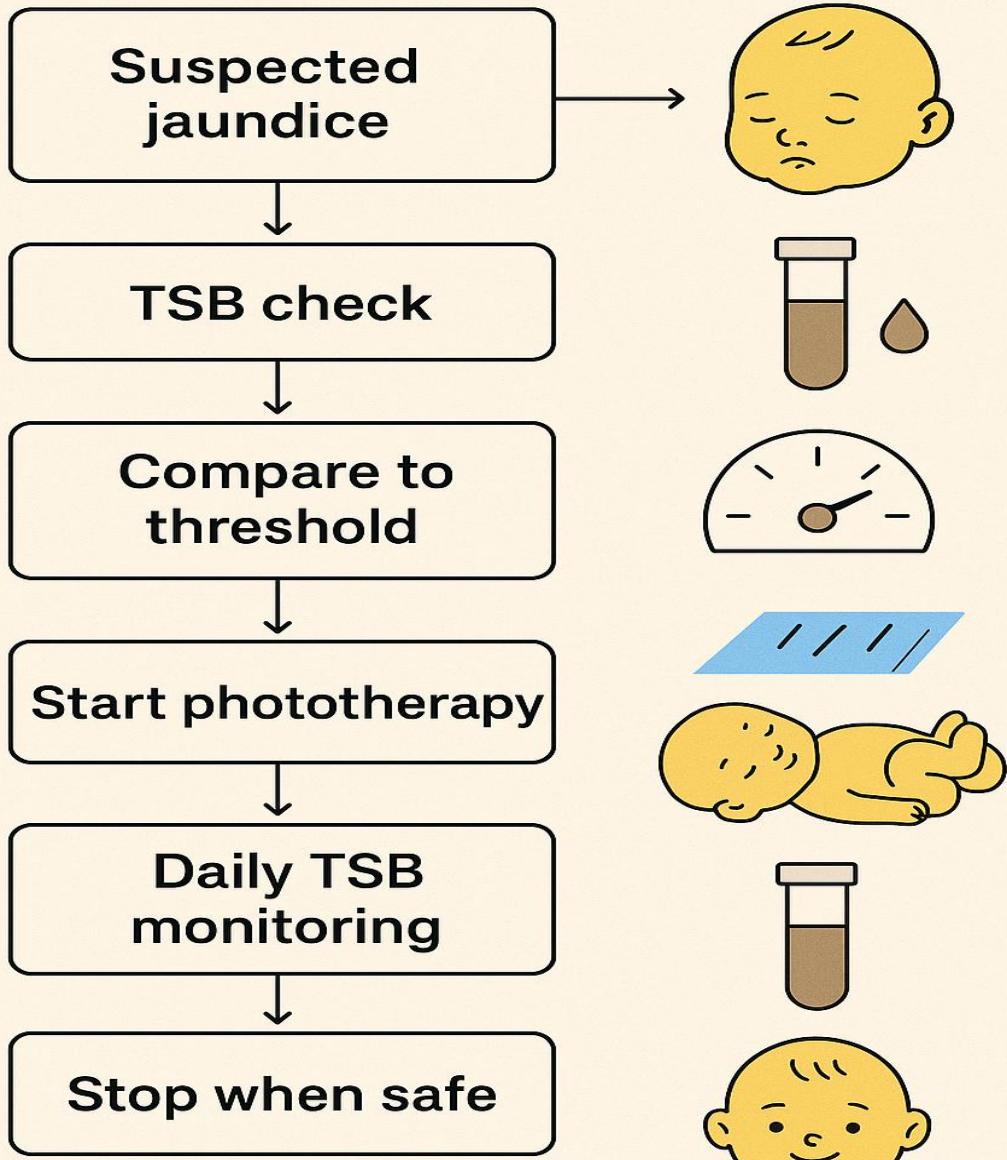


**Figure 2: Oxygen Therapy Decision Tree**



**Figure 3: Phototherapy Workflow**

## Phototherapy Workflow



## **D. Clinical Algorithms & Flowcharts**

These algorithms provide quick visual guidance for common neonatal conditions in the Level II NICU.

**Figure 4: NICU Level II Admission & Triage Algorithm**

# **NICU LEVEL II ADMISSION & TRIAGE ALGORITHM**

## **1. Newborn Identified for NICU Admission**



### **Assess Gestational Age & Weight**

$\geq 32$  weeks &  $\geq 1500$ g → Continue

$< 32$  weeks or  $< 1500$ g → Refer Level III  
Regional Hospital



## **3. Assess Condition Severity**

Mild–moderate distress → Admit Level II

Severe distress (ventilation required)



## **4. Stabilization Measures**

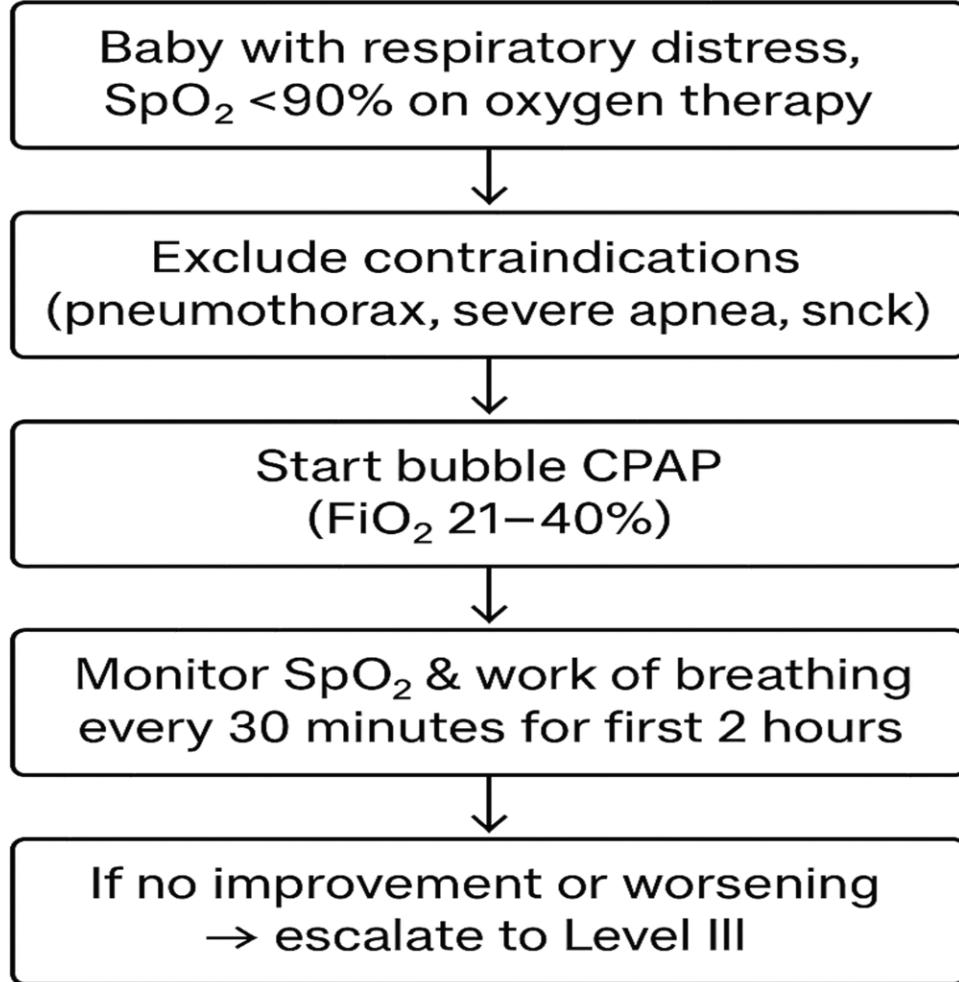
Thermal care, oxygen, glucose check,  
IV access if needed



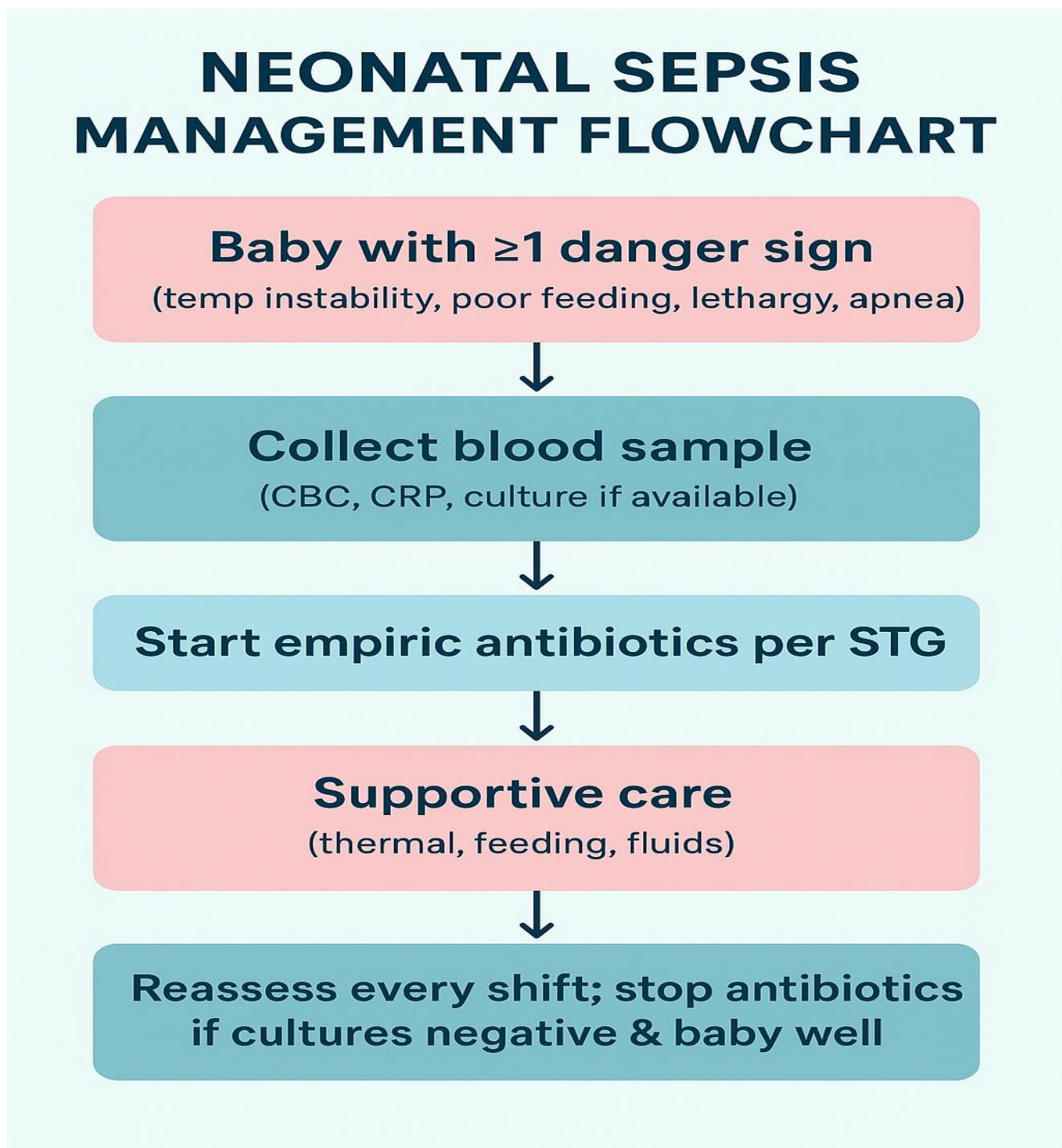
## **5. Assign Bed & Begin Monitoring**

**Figure 5: CPAP Initiation Flowchart**

## CPAP Initiation Flowchart

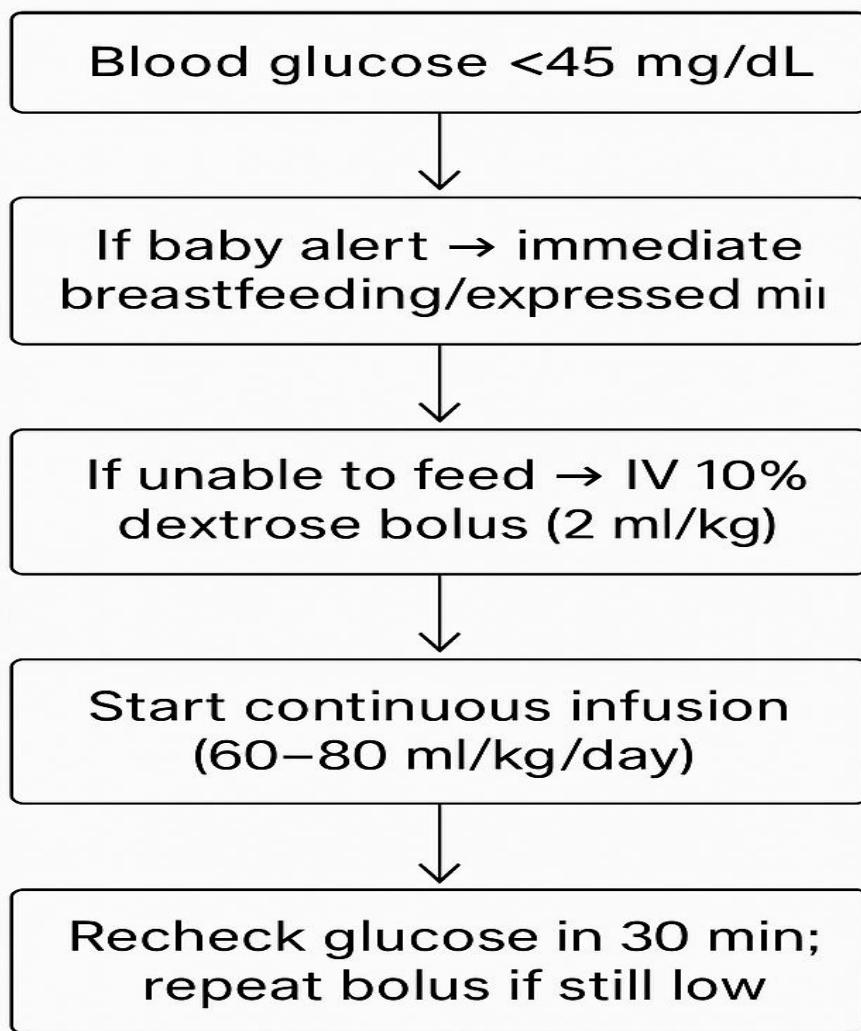


**Figure 6: Neonatal Sepsis Management Flowchart**



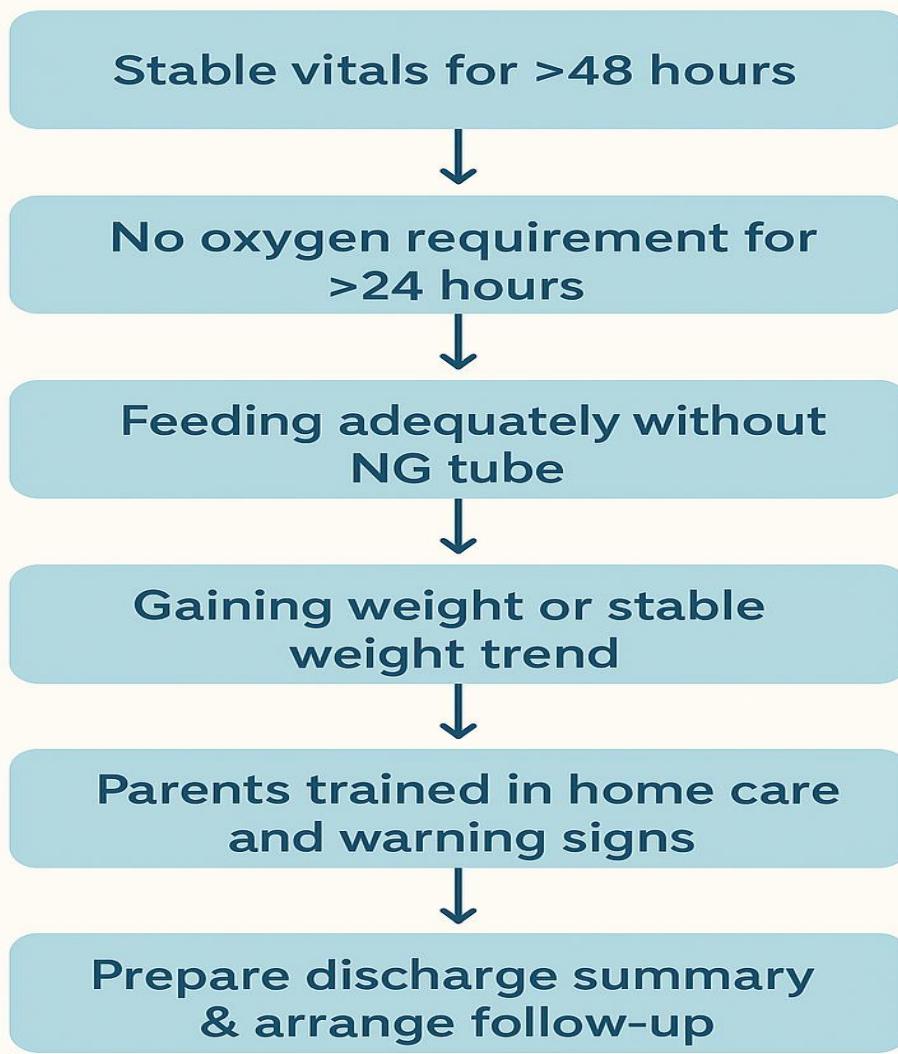
**Figure 7: Hypoglycemia Management Flowchart**

## **HYPOGLYCEMIA MANAGEMENT FLOWCHART**



**Figure 8: Discharge Readiness Flowchart**

## **Discharge Readiness Flowchart**



#### **D. Infection Prevention Checklist for NICU**

- ☒ Hand hygiene station at entry
- ☒ No outdoor shoes inside
- ☒ Dedicated equipment for each baby
- ☒ Twice daily cleaning of surfaces
- ☒ Linen changed daily or if soiled
- ☒ Visitors limited & hand washed

#### **E. Monitoring & Quality Indicators Form**

| <b>Indicator</b>                     | <b>Target</b> | <b>Frequency</b> | <b>Responsible</b>   |
|--------------------------------------|---------------|------------------|----------------------|
| Neonatal mortality ≥1500g            | <5%           | Monthly          | Pediatrician         |
| HAI's per 100 admissions             | <10           | Monthly          | NICU Nurse-in-charge |
| Exclusive breastfeeding at discharge | >80%          | Monthly          | Nutritionist         |
| Readmission within 7 days            | <5%           | Monthly          | Quality Office       |

### **DOCUMENTATION & FORMS**

All NICU Level II admissions must be documented using **standard forms** to ensure continuity of care, accurate reporting, and medico-legal safety.

#### **10.1 NICU Admission Form**

**Patient ID:** \_\_\_\_\_

**Name:** \_\_\_\_\_

**DOB:** \_\_\_\_\_

**Gestational Age:** \_\_\_\_\_

**Birth Weight:** \_\_\_\_\_

**Admitting Diagnosis:** \_\_\_\_\_

**Date/Time of Admission:** \_\_\_\_\_

**Condition on Admission:**

Stable  Unstable  Critical

**Interventions on Admission:**

Oxygen  CPAP  IV fluids  NG tube  Phototherapy

### 10.2 Daily Monitoring Chart

| Date | Time | Temp<br>(°C) | HR<br>(bp<br>m) | RR<br>(/mi<br>n) | Sp<br>O <sub>2</sub><br>(%) | Fee<br>d<br>Ty<br>pe | Feed<br>Amo<br>unt<br>(ml) | Uri<br>ne | Sto<br>ol | Notes/Ev<br>ents | Nur<br>se<br>Sign |
|------|------|--------------|-----------------|------------------|-----------------------------|----------------------|----------------------------|-----------|-----------|------------------|-------------------|
|      |      |              |                 |                  |                             |                      |                            |           |           |                  |                   |

### 10.3 Feeding Chart

| Date | Time | Method<br>(Breast/NG/Cup) | Amount<br>(ml) | Tolerance | Notes | Sign |
|------|------|---------------------------|----------------|-----------|-------|------|
|      |      |                           |                |           |       |      |

### 10.4 Phototherapy Record

| Date | Time | Bilirubi<br>n Level | Type<br>of<br>Phototherap<br>y | Lamp<br>Distanc<br>e (cm) | Eye<br>Shiel<br>d<br>(Y/N) | Tem<br>p (°C) | Notes | Sig<br>n |
|------|------|---------------------|--------------------------------|---------------------------|----------------------------|---------------|-------|----------|
|      |      |                     |                                |                           |                            |               |       |          |

## 10.5 Discharge Summary Form

**Patient ID:** \_\_\_\_\_

**Name:** \_\_\_\_\_

**DOB:** \_\_\_\_\_

**Gestational Age at Birth:** \_\_\_\_\_

**Birth Weight:** \_\_\_\_\_

**Discharge Weight:** \_\_\_\_\_

**Primary Diagnosis:** \_\_\_\_\_

**Secondary Diagnosis:** \_\_\_\_\_

**Summary of Hospital Course:** \_\_\_\_\_

**Feeding at Discharge:**  Exclusive Breastfeeding  Cup Feeding

**Follow-up Date:** \_\_\_\_\_

**Caregiver Education Given:**  Yes  No

**Warning Signs Explained:**  Yes  No

**Prepared by:** \_\_\_\_\_ **Sign:** \_\_\_\_\_

### Discharge Criteria & Follow-Up

#### 11.1 Discharge Criteria (All must be met unless otherwise specified)

- ☒ Stable vital signs for **at least 48 hours**
- ☒ Feeding adequately by breast or cup without NG tube support
- ☒ No oxygen requirement for **>24 hours**
- ☒ Weight gain trend or stable weight for **3 consecutive days**
- ☒ Completion of planned antibiotic or other treatment course
- ☒ Caregiver competent in home care, feeding, and recognition of danger signs
- ☒ Follow-up appointment arranged and documented

## **11.2 Caregiver Education Before Discharge**

- ☞ **Feeding techniques:** Proper latch, feeding frequency, expressing breast milk
- ☞ **Thermal care:** Keeping baby warm, KMC at home
- ☞ **Hygiene:** Handwashing before handling the baby
- ☞ **Danger signs:**
  - ✚ Fast or difficult breathing
  - ✚ Fever or low temperature
  - ✚ Poor feeding
  - ✚ Convulsions
  - ✚ Yellowing of eyes/skin worsening after discharge
- ☞ **Immunization schedule:** First doses given before discharge, with follow-up dates

## **11.3 Follow-Up Plan**

- ☞ **First follow-up:** Within 48–72 hours of discharge
- ☞ **Subsequent visits:** As per pediatrician's advice
- ☞ **High-risk neonates:** More frequent follow-ups (weekly until stable weight gain and good feeding established)

## **Quality Assurance & Safety Measures**

### **12.1 Monitoring Quality of Care**

- ☞ **Monthly Mortality and Morbidity Review (MMR)** to analyze deaths and near-misses
- ☞ **Quarterly Protocol Adherence Audit** using standardized checklist
- ☞ **Annual NICU performance report** (admissions, survival rates, average length of stay)

## **12.2 Infection Prevention and Control (IPC)**

- ☒ **Hand hygiene compliance** monitored by IPC focal person
- ☒ **Daily environmental cleaning log** maintained and signed by cleaner and nurse-in-charge
- ☒ **HAI surveillance** in collaboration with hospital IPC team
- ☒ **Equipment disinfection checklist** completed after each use

## **12.3 Patient Safety Measures**

- ☒ Double-checking medication doses before administration
- ☒ Two-person verification for blood transfusions
- ☒ Clear patient identification bands on all admitted neonates
- ☒ Preventing hypothermia during transfers by using pre-warmed blankets or KMC

## **REFERENCES**

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2. Ethiopian Hospital Service Improvement Guidelines (EHSIG, 2024 Edition)
3. Ethiopian Standard Treatment Guidelines (STGs) – Neonatal Conditions
4. WHO Standards for Improving the Quality of Care for Small and Sick Newborns in Health Facilities (2020)
5. WHO Pocket Book of Hospital Care for Children – 2nd Edition (2013)
6. Ethiopian National Kangaroo Mother Care Guidelines (2022)

# DEDER GENERAL HOSPITAL

## NICU LEVELLING CHECKLIST

**Name off assessors:** \_\_\_\_\_  
**Role: Quality officers** **sign** \_\_\_\_\_ **Date:** \_\_\_\_\_

| <b>Configuration of the unit</b>  | <b>1/0</b> | <b>Remark</b> |
|---|------------|---------------|
| <ul style="list-style-type: none"> <li>Does the design provide constant surveillance of each bed area from the nurses' station, with minimal walking distance for the staff?. The design should allow for flexibilityand creativity to achieve the stated objective.</li> </ul>   |            |               |
| <b>• Does the room fulfill Minimum space requirements?</b>  |            |               |
| <ul style="list-style-type: none"> <li>Each newborn space shall contain a minimum 8 - 12 m<sup>2</sup> of clear floor space, excluding handwashing stations and columns.</li> </ul>   |            |               |
| <b>• This should be utilized as follows :</b>   |            |               |
| <ul style="list-style-type: none"> <li>The baby care area ( 3-4 M<sup>2</sup> per bed) while the general support and ancillary area is 5 M<sup>2</sup>.</li> <li>This should be divided into two interconnected rooms separated by transparent observation windows with the nurses' work place in between..</li> <li>This facilitates temporaryclosure of one section for disinfection</li> <li>Space for ancillary (supplementary) services</li> <li>Distinct support space should be provided for all clinical services that are routinely performed in the SCNU. The ancillary area should include space for the following: <ul style="list-style-type: none"> <li>Gowning area at the entrance</li> <li>Main Hand washing stations outside of the NICU preferably to be handled by elbow orfoot</li> <li>Small Hand washing area after procedure in the procedure room</li> <li>Examination area</li> </ul> </li> </ul> |            |               |

|   |  |  |
|---|--|--|
| • Clean area for mixing intravenous fluids and medications  |  |  |
| • Mother's area for expression of breast milk, breastfeeding and learning mother crafts   |  |  |
| • Side laboratory (selected investigations) is shared with Emergency and critical care unit Laboratory service  |  |  |
| • Boiling and autoclaving   |  |  |
| • General support area  |  |  |
| • Procedure room  |  |  |
| • <b>Step down area</b>   |  |  |
| There should be a Six bed kangaroo mother care room in the special newborn unit,  |  |  |
| • with a facility of toilet and shower  |  |  |
| • TV and chair (reference to adult ward)  |  |  |
| • The unit provides service 24/7  |  |  |
| <b>HUMAN RESOURCES</b>  |  |  |
| • At least 12 dedicated staff nurses per shift are necessary for a 24-bedded unit (1:2 ratio).  |  |  |
| • Thirty per cent extra staffing is recommended to account for nights off and leave vacancies. There should be staff uniformly assigned for 24 hours a day and 7 days a week. |  |  |
| • There should be an adequate number of doctors to be able to take a round of the newborns once in each shift (every eight hours) and to be on call round-the-clock.          |  |  |
| • Dedicated support staff should be there to clean the nursery at least once every shift and more often, depending on the need.   |  |  |

|   |  |  |
|---|--|--|
| • Porter to transport the waste product and                           |  |  |
| • Guard to prevent over crowding                                      |  |  |
| • For a 24-bed unit, the recommended staffing is:                     |  |  |
| • Staff Nurses: 24 (at least 25% being neonatal nurses)               |  |  |
| • Physicians: (a Pediatrician and two general practitioners)          |  |  |
| • <b>Training:</b>  |  |  |
| • An initial training program for 4-5 days and,                       |  |  |
| • Neonatal nurses with formal pre service education on newborn health |  |  |
| • An observership at level III NICU at least two weeks                |  |  |

## EQUIPMENT LISTS

| Item No | Item description  | Essential | Desirable | Quantity for 12 bed unit | 1/0 | Remark |
|---------|---|-----------|-----------|--------------------------|-----|--------|
| 1       | Open care system: radiant warmer, fixed height, with trolley, drawers, O2-bottles | E         |           | 6                        |     |        |
| 2       | Bubble CPAP   | E         |           | 6                        |     |        |
| 3       | Incubator   | E         |           | 4                        |     |        |
| 4       | Phototherapy unit, single head, high intensity with LED light                     | E         |           | 5                        |     |        |
| 5       | Resuscitator, hand-operated, neonate, 250ml                                       | E         |           | 2                        |     |        |
| 6       | Resuscitator set, hand-operated, neonate, 500ml [includes ambubags, face mask]    | E         |           | 4                        |     |        |
| 7       | Laryngoscope set, neonate   | E         |           | 6                        |     |        |
| 8       | Pump, suction, portable, 220V, w/access   | E         |           | 2                        |     |        |
| 9       | Pump, suction, foot-operated  | E         |           | 2                        |     |        |
| 10      | Surgical instrument suture/SET  | E         |           | 2                        |     |        |
| 11      | Syringe pump 10, 20, 50 ml, single phase  | E         |           | 3                        |     |        |
| 12      | Oxygen hood, S and M, set of 3 each, including connecting tubes                   | E         |           | 5                        |     |        |
| 13      | Oxygen concentrator   | E         |           | 4                        |     |        |
| 14      | Thermometer, clinical, digital, 32-43°C   | E         |           | 12                       |     |        |
| 13      | Scale, baby, electronic, 10 kg <5g>   | E         |           | 4                        |     |        |
| 14      | Pulse oximeter, bedside, neonatal   | E         |           | 6                        |     |        |
| 15      | Stethoscope, binaural, neonate  | E         |           | 12                       |     |        |

|    |   |   |   |            |  |  |
|----|---|---|---|------------|--|--|
| 16 | Sphygmomanometer, neonate, electronic                           | E |   | 6          |  |  |
| 17 | Light, examination, mobile,220-12V                              | E |   | 6          |  |  |
| 18 | Umbilical catheter  | E |   | Consumable |  |  |
| 19 | Exchange transfusion set  | E |   | Consumable |  |  |
| 20 | Nasal prong, oxygen tube  | E |   | Consumable |  |  |
| 21 | Newborn Bed   | E |   | 24         |  |  |
| 22 | KMC bed   | E |   | 6          |  |  |
| 23 | Maternal bed (Short-leg)  | E |   | 20         |  |  |
| 24 | Hub cutter, syringe   | E |   | 2          |  |  |
| 25 | Tape, measure, vinyl-coated, 1.5m.                              | E |   | 2          |  |  |
| 26 | Basin, kidney, stainless steel, 825ml                           | E |   | 4          |  |  |
| 27 | Tray,dressing,ss,300x200x30mm                                   | E |   | 4          |  |  |
| 28 | Stand, infusion, double hook, on castors                        | E |   | 1          |  |  |
| 29 | Indicator, TST control spot/PAC-300                             |   | D | 1          |  |  |
| 30 | Irradiance meter for phototherapy units                         |   | D | 2          |  |  |
| 31 | Monitor, vital sign, NIBP, HR,SpO2, ECG, RR, Temp               |   | D | 6          |  |  |
| 32 | Infantometer, plexi, 3½ ft/105cm                                | E |   | 1          |  |  |
| 33 | X-Ray, mobile   |   | D | 1          |  |  |
| 34 | Ultrasound  |   | D | 1          |  |  |
| 35 | Oxygen System; Oxygen cylinder with blender and Flow meter,     |   | D | 1          |  |  |
| 36 | Transport incubator, basic, with battery and O2, w/o ventilator |   | D | 1          |  |  |

|    |  |   |   |            |  |
|----|--|---|---|------------|--|
| 37 | Autoclave, steam, bench top, 20L, electrical | D | 1 |            |  |
| 38 | Laundry washer dryer, combo, 5kg             | D | 1 |            |  |
| 39 | Embrace                                      | E | 2 |            |  |
| 40 | LP set                                       | E | 3 |            |  |
| 41 | Bilirubin meter                              | E | 3 |            |  |
| 42 | Photometer, HemoCue <b>Hb</b> 301/SET        | E |   | Consumable |  |
| 43 | Three-way valve, Luer, w/caps, box/50        | E |   | „          |  |
| 44 | Tube,endotrach,3,w/o cuff,ster,disp          | E |   | „          |  |
| 45 | Photometer, HemoCue <b>Glucose</b> 201+/SET  | E |   | „          |  |
| 46 | Infusion pump, with accessories              | E |   | 4          |  |
| 47 | Neonatal room Thermometer                    | E |   | 2          |  |
| 48 | Glucometer                                   | E |   | 3          |  |
| 49 | Computer                                     | E |   | 1          |  |
| 50 | TV   | E |   | 1          |  |

| Laboratory service (all services should be provided by the general hospital laboratory)                  | 1/0 | Remark |
|--|-----|--------|
| ✓ CBC (WBC& Diff, RBC, Hgb, HCT Platelet count) using small size test tubes for newborns (0.5 ml volume) |     |        |
| ✓ Blood Morphology   |     |        |
| ✓ Blood Film   |     |        |
| ✓ Bleeding time & Coagulating time   |     |        |
| ✓ C-Reactive Protein   |     |        |

|  |  |  |
|--|--|--|
| ✓ Reticulocyte count   |  |  |
| ✓ Blood group & Rh   |  |  |
| ✓ VDRL   |  |  |
| ✓ Blood Chemistry (SGOT/AST, SGPT/ALT, Bilirubin direct & total, BUN, Creatinine, RBS/FBS, Total Protein, Albumin) |  |  |
| ✓ Serum electrolytes (Sodium, Potassium, Chloride, Phosphorous, Calcium)   |  |  |
| ✓ HBSAg.   |  |  |
| ✓ Blood Gas Analysis   |  |  |
| ✓ CSF  |  |  |
| ✓ Gram stain   |  |  |
| ✓ FNAC   |  |  |
| ✓ Urine analysis   |  |  |
| ✓ Stool for Occult blood   |  |  |
| ✓ Culture and sensitivity of any body fluid  |  |  |
| <b>Imaging</b>   |  |  |
| ✓ X-Ray (Chest, skull, plain abdomen, contrast, bones)   |  |  |
| ✓ Ultrasound   |  |  |
| <b>Procedures</b>  |  |  |
| ✓ IV- Canalization   |  |  |
| ✓ Lumbar Puncture  |  |  |
| ✓ Insertion of Naso-Gastric Tub  |  |  |

|                             |  |  |
|-----------------------------|--|--|
| ✓ Umbilical Catheterization |  |  |
| ✓ Blood/Plasma Transfusion  |  |  |
| ✓ Partial Exchange          |  |  |
| ✓ Double Exchange           |  |  |
| Dressing 1-5                |  |  |
| Wound care and stitching    |  |  |
| Life-saving surgery         |  |  |