



STANDARD OPERATING PROCEDURE (SOP)

For Newborn Care Services
At Primary and Secondary Level Hospitals



STANDARD OPERATING PROCEDURE (SOP)

For Newborn Care Services
At Primary and Secondary Level Hospitals

Background

Bangladesh has made significant progress in child survival during the last decade. Under-five mortality has declined remarkably in recent years and Bangladesh is on track to achieve Millennium Development Goal (MDG) 4 for a two-thirds reduction in child mortality by 2015.

Despite this encouraging trend, high rate and slow declines in neonatal mortality is one of the major concern for child survival and challenge for sustaining progress towards achieving MDG-4. An estimated 100,000 neonates die each year in Bangladesh which accounts for almost 70% of infant and 57% of under-five deaths (BDHS 2007). More than two-thirds of the neonates who die do so within 7 days of birth and half of the them die within 24 hours of birth.

Infections, including sepsis, birth asphyxia and complications of prematurity and low birth weight are the main causes of neonatal mortality and morbidity in Bangladesh. Lack of awareness regarding essential newborn care practices at home, inability for early identification of danger signs of newborns and prompt referral to appropriate facility or service provider often led to fatal outcome of the neonate.

The Government of Bangladesh (GoB) is committed to achieve the Millennium Development Goal 4 by reducing under-five mortality to 50 per 1000 live births and infant mortality to 31 per 1000 live births by 2015. These reductions can not be achieved without a significant reduction in neonatal mortality. The commitment by the GoB to the reduction of neonatal and child mortality is also reflected in the next Health Sector Programme, HPNSDP, 2011-16 as a priority objective with a goal to reduce the neonatal mortality to 22/1000 live birth by 2015.

The Government of Bangladesh along with its partners has, therefore, identified the improvement of neonatal health status as one of the key priority areas for policies, programming and interventions. The Ministry of Health and Family Welfare (MOH&FW) has developed and approved the National Neonatal Health Strategy and guidelines” in 2009 which now provides the strategic directions for neonatal health policies and programming in Bangladesh. A National Action Plan for Neonatal Health has also been developed to implement the National Neonatal Health Strategy through scaling up of both home/community and facility based newborn care within the preview of health sector programme.

The new Health Sector Programme, HPNSDP (2011-16) has incorporated ambitious plan to scale up home/community based essential newborn care services in 325 upazilas through community-IMCI with pro vision of a post-natal care visit within 2 days of delivery by a trained provider. Facility based newborn care services will also be strengthened through establishing Special Care Newborn Unit (SCANU) in the district hospitals and Newborn Stabilization Unit (NSU) in the Upazila Health Complexes (UHCs). MOH&FW has planned to scale up SCANUs in 59 district hospitals and NSUs in 275 UHCs/MCWCs by 2016 for the management of sick newborns.

In this backdrop, Directorate General of Health Services (DGHS) of MOH&FW has formed a Technical Committee on Standard Operating Procedure for Newborn Care Services was formed with representation from GOB managers, Service Providers, Professional bodies, Clinicians and Development Partners. A draft SOP was prepared by the technical sub-committee and was shared in a national consultation workshop on 8 October'11, which was participated by relevant GOB programme managers, experts, professionals and development partners. The final draft "Standard Operating procedures (SOP) for Newborn Care Services for the Primary and Secondary Level facilities" was then up-loaded in the web-site of DGHS to elicit public/ expert opinion. The final draft Sop was then endorsed by the National Core Committee on Neonatal Health (NCC-NH) and approved by the MOH&FW.

It is envisaged that this SOP will help and guide the managers and service providers in provisioning of necessary infrastructure, equipment, logistics as well as skills required to ensure quality newborn care services at the primary and secondary level facilities as per WHO/global standards.



SECTION – I

**Description of Newborn Care
facilities at different levels**

Description of Newborn Care facilities at different levels

Special Care Newborn Unit (SCANU)

The Special Care Newborn Unit (SCANU) is a neonatal unit in the vicinity of the labour room that provides care to all sick newborns (except for those requiring assisted ventilation or major surgery). Details of services provided and requirement for equipment, supplies, training and human resources are available in *Part-1*

Newborn Stabilization Unit (NSU)

The Neonatal Stabilization Unit is a facility within or in close vicinity of the maternity ward, where most sick and low birth weight newborns can be taken care of. All First Referral Units need to have a newborn Stabilization Unit in addition to a Newborn Care Corner. Details of services provided and requirement for equipment, supplies, training and staffing are available in *Part-2*

Newborn Care Corner

This is a space within the delivery room where immediate care is provided to all newborns. This area is MANDATORY for all health facilities where deliveries take place. Details of services provided and requirement for training, equipment and supplies are available in *Part-3*

The following table summarizes the required newborn care facilities at different levels:

Table 1: Newborn care facilities at different health care levels

Health Facility	All Newborns/Newborns at Birth	Sick Newborns
Community Clinics	Essential care (Breast feeding, thermal protection, hygiene, identify danger signs)	Quick identification and prompt referral
FWC	Newborn Care corner in labour rooms	Prompt referral
Upazila Health complex (First referral Unit)	Newborn care corner in labour rooms and in operation theatre (OT)	Newborn Stabilisation Unit
District Hospital	Newborn care corner in labour room and OT	Special Care Newborn Unit



Part -1
Special Care Newborn Unit

A. Setting up of a special Care Newborn Unit (SCANU) at District Hospital

The following principles are applicable for setting up an SCANU in a District hospital or in an equivalent facility. While many of these specifications are “minimums”, the intent is to optimize resources and facilitate quality health care for the newborns.

A.1 Services at the unit

The configuration of the SCANU at the district level should be such that it supports delivery of the necessary quality services and has the potential to expand in order to accommodate increased demand. The SCANU at the district hospital is expected to provide the following services:

- Care at birth, including resuscitation of asphyxiated newborns
- Managing sick newborns (except those requiring mechanical ventilation and major surgical intervention)
- Post-natal care
- Follow-up of high risk newborn
- Referral services

In addition, the unit should also provide training to medical doctors and paramedics on newborn care.

A.2 Location and size of the unit

A.2.1 Location within the district hospital

The unit should be in a distinct area within the healthcare facility, with controlled access and environment.

- The unit should be in close proximity to the labor room
- If obstetric and neonatal service units are on different floors, quick access like a ramp or an elevator should be available
- Transport of newborns within the hospital should be possible without using public corridors. It should provide effective movement for staff, family, and equipment

A.2.2 Size (projected bed demand) of the Unit

As a general guide for all deliveries occurring within the health facility, three beds for every 1, 000 annual deliveries may be dedicated to the newborn care unit. This demand is for intramural deliveries (those occurring within the hospital). Additionally, for newborns delivered outside the hospital (extramural) and being brought to the hospital for special care, an extra allowance of 50 per cent of the estimated beds should be considered.

For example, if a hospital conducts 3, 000 deliveries per year, the number of beds required would be:

- For intramural: $3/1000 \times 3000 = 9$ beds
- For extramural : $50\% \times 9 = 4.5$ (4-5) beds
- Total beds required = 13-14

No patient, whether intramural or extramural, should be refused admission into the unit if any bed is available.

It is universally felt that units providing special care should have a minimum of eight beds and a maximum of 16 beds. A unit with fewer beds become available and with more than 16 beds becomes unwieldy.

However, an on-site assessment of needs and review of available resources is advisable to determine the size of the unit.

Consideration of factors such as availability of resources management capacity, technology and maintenance of a minimum level clinical experience point towards a minimum capacity of 10 to 12 beds.

Part-1 A.3 Minimum space requirements

Each newborn space shall contain a minimum of 100 square feet (9.9 square metres) of clear floor space excluding hand washing stations and columns.

The 100 sq ft per bed of space should be utilized as follows:

- Baby care area : 50 sq ft per bed
- General support and ancillary areas: 50 sq ft per bed

Part-1 A.4 Configuration of the unit

The SCANU design should be driven by a systematic plan of space utilization, projected bed space demand, staffing requirements and other basic information related to the unit. Opinions are too divergent on what is the best design for a unit that will satisfy all requirements. The ideal design should provide constant surveillance of each bed area from the nurse's station, with minimal walking distance for the staff, the design should allow for flexibility and creativity to achieve the stated objective.

A.4.1 Baby care area

The baby care area may be divided into two interconnected rooms separated by transparent observation windows with the nurses, work place in between. This facilitates temporary closure of one section for disinfection.

A.4.2 Space for ancillary (Supplementary) Services

Distinct support space should be provided for all clinical services that are routinely performed in the SCANU. The ancillary area should include space for the following:

- Gowning area at the entrance
- Hand washing stations
- Examination area
- Clean area for mixing intravenous fluids and medication
- Mother's area for expression of breast milk, breastfeeding and learning mother crafts

- Mini-laboratory
- Boiling and autoclaving

A.4.2.1 Gowning room

The unit should provide clear floor space, excluding entry work area, for gowning.

- A hands- free, elbow-operated hand-washing station for hand hygiene and areas for gowning and storage of clean and soiled materials should be provided near the entrance
- The room should have self-closing devices on all exits

*** A.4.2.2 Hand washing stations**

Hand washing stations should be so positioned that every newborn bed is within 20 feet (6 meters). Hand washing stations should be no closer than three feet (0.9 meters) from a newborn bed or clean supply storage. Protocols for asepsis and hand washing are in Annexure-1.

- It should be a hands-free, elbow operated hand washing station
- Hand washing sinks should be large enough to control splashing and designed to prevent standing or retained water. Preferably, the hand washing sink should be 24" wide 16" front to back x 10" deep. The size of a sink is also a consideration in infection control. Very deep sinks create big splashes, as the water usually strikes from a distance. The splashed water must be considered to be contaminated whether the sink is made of stainless steel or porcelain. Very wide (front to back) sinks cause the hand washer to lean into the sink, again contaminating clothing. Countertops around sinks should also be avoided as staff and parents tend to put items on them. These counters must also always be considered to be contaminated. Space for pictorial hand washing instructions should be provided above all sinks
- Walls adjacent to hand washing sinks should be constructed of non-porous/non-absorbent material to prevent growth of moulds
- Space should be provided for soap and towel dispensers, and for appropriate trash receptacles

*** A.4.2.3 Examination area**

This should include comfortable seating and allow complete visual and acoustic privacy.

A.4.2.4 Mother's area

Comfortable seating and privacy should be provided to allow mother to breastfeed comfortably. This area should have communication aides/booklets in bangla, so that families can learn newborn care practices.

A.4.3 General Support space

Distinct facilities should be provided for clean and soiled utilities, medical equipment storage and unit management services.

A.4.3.1 Clean utility/holding area(s)

Clean utility/holding area should be there for storage of frequently used supplies. Routinely used supplies such as diapers, linen, cover gown, charts etc. may be stored in this space. Space should also be provided for storage of syringes, needles, intravenous infusion sets and sterile trays.

*** A.4.3.2 Soiled utility/holding room**

This is essential for storing used and contaminated material before its removal from the care area.

- Unless used only as a utility room, this room should contain a counter and a hands-free hand washing station separate from any utility sinks
- Ideally the ventilation system in the soiled utility room should be engineered to have negative air pressure with all air being exhausted to the outside; a simple exhaust fan can also improve ventilation in the area.
- The location of the soiled utility room should be as such which will enable removal of soiled materials without passing through the baby care area

A.4.3.3 Charting/staff work areas

Along with the provision of charting space on each bedside, an additional separate area or desk for tasks, such as compiling records, completing requisitions, etc. should be provided. Dedicated space can also be allocated for electronic medical record keeping.

- A clerical area in a 12-bedded SCANU should be located near the entrance to the supervise traffic into the unit
- Newborns charts, computer terminals and hospital forms may be located in this space
- Design of the unit must anticipate use of electronic medical record devices, such as computers, so that their introductions does not significantly disrupt functions of the unit or impinge on the space designed for other purpose

A.4.3.4 Linen washing/laundry area

If laundry facilities are not provided, a separate laundry room can serve the functions of laundry. Space should accommodate a washing machine with dryer which promotes the efficiency and effectiveness of the aseptic cleaning process.

A.4.4 Staff support space

Space should be provided within the unit to meet the professional, personal and administrative needs of the staff.

- These areas include doctors' duty room, nurses' changing room etc
- Rooms should be sized and located to provide easy access to the SCANU

A.4.5 Step down area (rooming facility)

An additional five bed step down area where recovering neonates can stay with their mothers before discharge is of added advantage to a SCNU. This will relieve the pressure on the SCANU to some extent. However it depends on the availability of adequate space in the facility.

The additional space requirement should be about 40-50 sq ft per bed: the space can be within the SCANU or in the vicinity or in the postnatal ward.

***A.5 Electrical and mechanical needs**

Electrical and mechanical requirements of each newborn bed should be organized keeping in mind the safety, easy access and ease of maintenance.

A.5.1 Electrical Needs

- Power supply- The unit should have 24-hours uninterrupted established power supply. Back up power supply is a must, with one or two outlets. To ensure this, a generator with 25-50KVA capacity and voltage stabilizer (3 Phase) of the same rating is needed. Monitors must have UPS
- Electrical outlet for individual beds- To handle equipment, 6-8 central voltage stabilized outlets are required per bed: 4 of them should be of 5 amperes and another 4 of them should be of alternate sockets for mobile bed-side X ray equipment or USG machine need to be planned
- Lighting of the unit- The unit should be well illuminated with adequate daylight. Panel of lights with cool white fluorescent tubes, preferably CFL or LED (light-emitting diodes) will be required for adequate illumination

A.5.2 Mechanical needs

- Floor surfaces- Floor surfaces should be easily cleanable and should minimize the growth of microorganisms. Materials should permit cleaning without the use of chemicals. At the same time, floors should be highly durable to withstand frequent cleaning and heavy traffic. Vitrified tiles are preferred. Large sized tiles should be used to minimize junctions
- Walls- Ease of cleaning, durability and acoustical properties of wall surfaces must be considered. Walls should be glaze-tiled up to a height of at least seven feet. Large sized tiles should be used to minimize junctions
- Water Supply- The unit should have 24-hour uninterrupted running water supply. To ensure water supply it is useful to have a separate overhead tank with a capacity of 1, 000 to 2, 000 liters

A.6 Lighting

A.6.1 Ambient lighting

Perception of skin tones is critical in a SCANU, light sources should provide accurate skin-tone recognition. 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 spaces; 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.

Lighting fixture should be easily cleaned.

A.6.2 Procedure lighting in baby care areas

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. Since intense light may be unpleasant and harmful to the developing retina, every effort should be made to prevent direct light from reaching an infant's eyes. 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.

A.6.3 Illumination of support areas

Illumination of support areas within the SCANU, including the charting area, medication preparation area, reception desk and hand washing area should be adequate.

In locations where these functions overlap infant care areas (such as close proximity of the staff charting area to infant beds), the design should nevertheless permit separate light sources with independent controls so the very different needs of sleeping infants and working staff can be accommodated to the greatest possible extent.

Care must be taken, however, to ensure that bright light from these locations does not reach an infant's eyes.

* A.6.4 Day lighting

At least one source of daylight be visible from baby care areas, either from each room itself or from an adjacent staff work area. When provided, external windows in the rooms should be glazed to minimize heat gain or loss, and should be situated at least two feet (0.6 metres) away from any part of a newborn's bed to minimize radiant heat loss. Placing newborns too close to external windows can cause serious problems with radiant heat loss or gain and glare. Therefore, provision of windows in the unit requires careful planning and design.

***A.7 Ambient temperature and ventilation**

A.7.1 Temperature

The unit should be designed to provide an air temperature of 78.8° F to 82.4° F (26-28°C).

A.7.2 Ventilation

Ventilation in the unit should inhibit particulate matter from moving freely in the space in the space and to minimize drafts on or near the newborn beds. General ventilation can be provided in two ways:

- i) exhaust-only and ii) supply-and-exhaust. Exhaust fans pull stale air out of the unit while drawing fresh air in through carks, 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.

A.8 Acoustic environment

The acoustic conditions of the unit should favour speech indelibility intelligibility, normal or relaxed vocal effort, speech privacy for staff and parents, and physiological stability, uninterrupted sleep and freedom from acoustic distraction for the newborn and the staff.

Noise-generating activities and gadgets (Such as telephone sounds, staff areas, and equipment) should be acoustically isolated.

Note: * Must be ensured

Figure: 1 Sample Layout/Design of (10 bed) SCANU in a district Hospital with limited space:

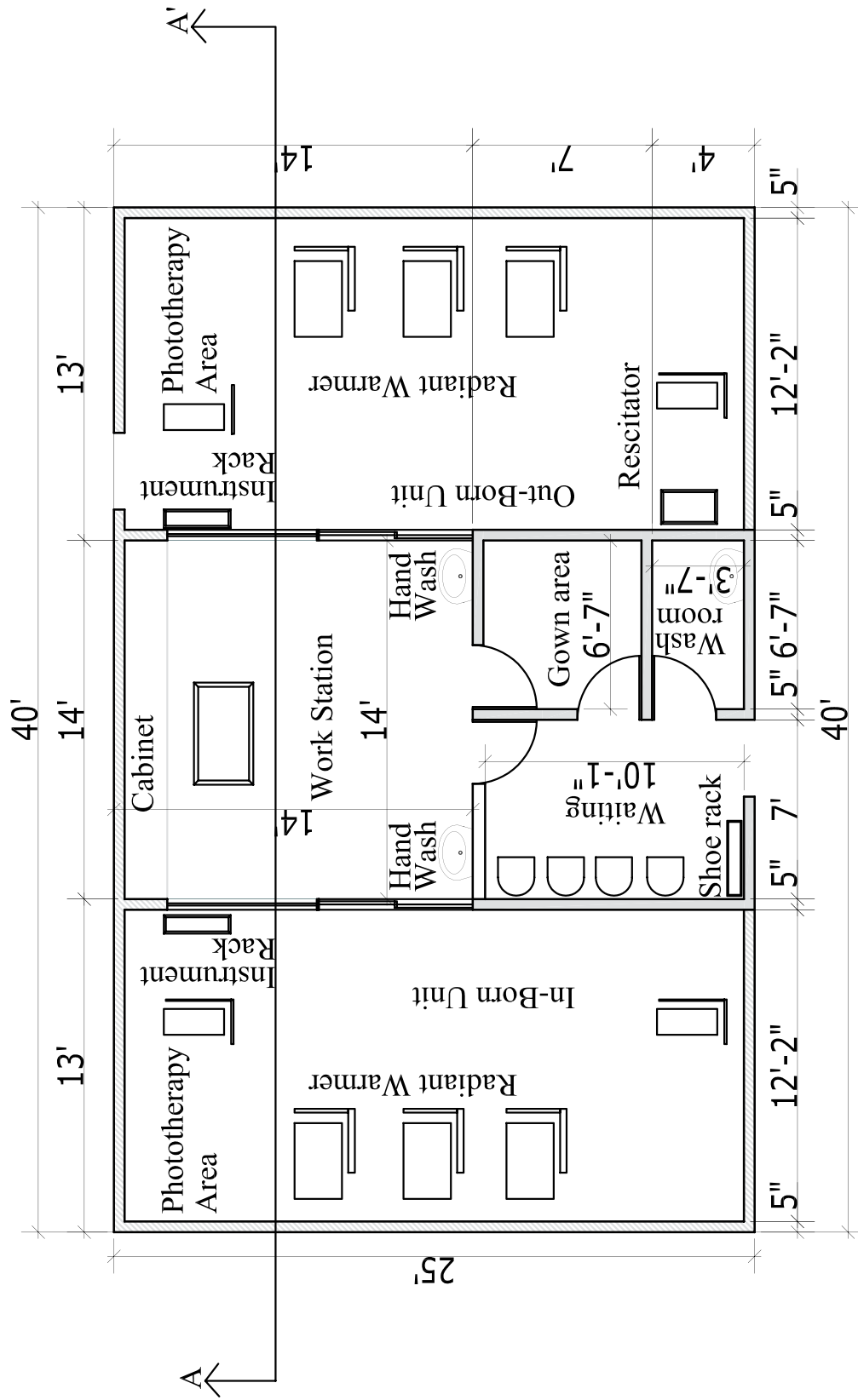


Figure: 2 Electrical Drawing for 10 Bed SCANU

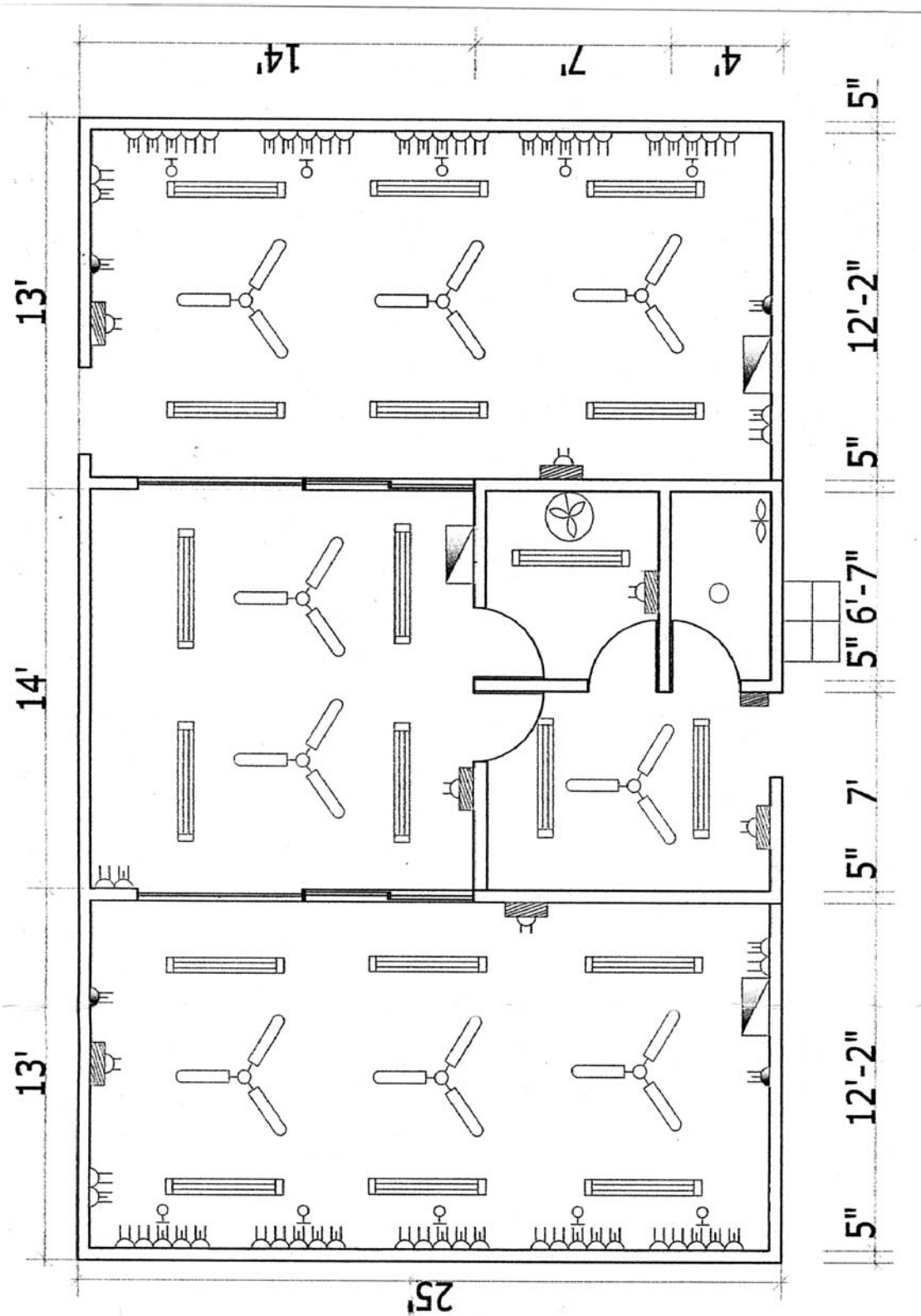
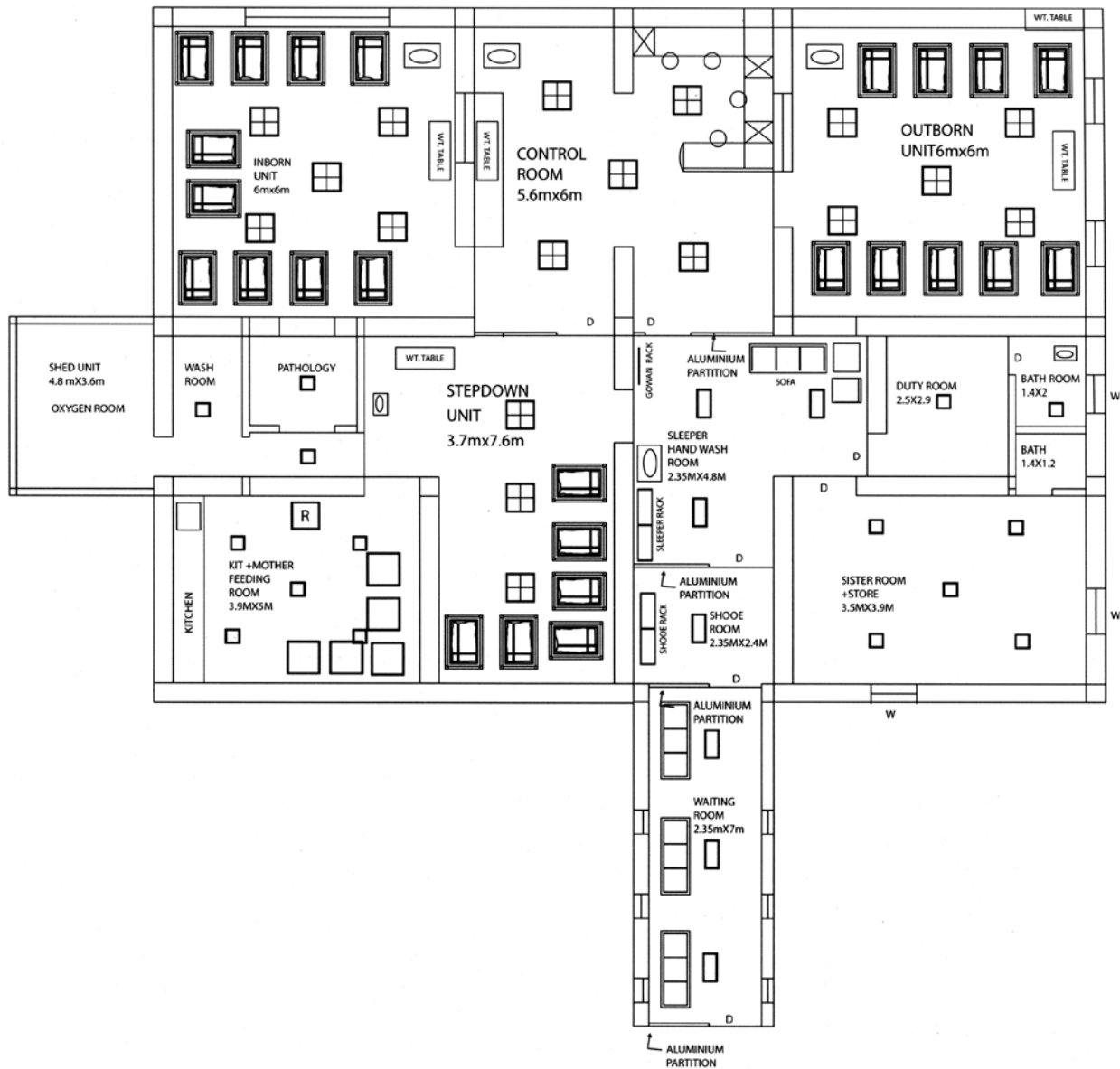


Figure: 3 Sample Layout/Design of an ideal SCANU (Level II Care) at the secondary/Tertiary level Hospital*



* Adapted from Indian Toolkit for Setting up Special Care Newborn Unit)

B. Equipment and renewables for SCANU

B.1 Equipment

Item No	Item Description	Essential	Desirable	Quantity for 10 bed unit*	Installation	Training	Civil	Mechanical	Electrical
1.	Open care system: radiant warmer, fixed height, with trolley, drawers, O ₂ -bottles	E		2	X	X	X	X	X
2.	Open care system: radiant warmer, fixed height, with trolley	E		4	X	X		X	X
3.	Radiant warmer, fixed height stand	E		2	X	X			X
4.	Basinet on trolley, neonatal, with mattress	E		2					
5.	Phototherapy unit, single head, high intensity	E		4	X	X			X
6.	Bag and mask, penguin sucker, neonate, 250-500ml	E		6		X			
7.	Laryngoscope set, neonate	E		2		X			
8.	Pump, suction, portable, 220V, w/access	E		2	X	X			X
9.	Pump, suction, foot-operated	E		2		X			
10.	Surgical instrument. suture/Set	E		2					
11.	Syringe pump, 10, 20, 50 ml, single phase	E		2	X	X			X
12.	Oxygen hood, S and M, set of 3 each, including connecting tubes	E		6					
13.	Thermometer, clinical, digital, 32-43°C	E		20					
14.	Scale, baby, electronic, 10 kg <5g>	E		2	X	X			X
15.	Pulse oxymeter, bedside, neonatal	E		6	X	X			X
16.	Apnoea monitor	D		3					
17.	Stethoscope, neonate	E		12					
18.	Sphygmomanometer, neonate, electronic	E		2		X			X
19.	Light, examination, mobile, 220-12V	E		3	X				X
20.	Centrifuge, hematocrit, benchtop, upto 12000 rpm, including rotor	D		1	X	X			X
21.	Photometer, Hb estimation	D		1		X			X
22.	Hub cutter, syringe		D	2		X			
23.	Tape, measure, vinyl-coated, 1.5m.	E		6					
24.	Tray, kidney, stainless steel, 825ml	E		8					

Item No	Item Description	Essential	Desirable	Quantity for 10 bed unit*	Installation	Training	Civil	Mechanical	Electrical
25.	Tray, dressing, ss, 300x200x30mm	E		4					
26.	Stand, infusion, double hook, on castors	E		10					
27.	X-Ray, mobile		D	1	X	X	X		X
28.	Glucometer	E		2		X			X
29.	Neonatalie Complete, Light (Neo Natalie Newborn Simulator + Bag & Mask + Penguin sucker)		D	4		X			
General Equipment and supplies:									
30.	IPS 25-50 KVA	E		1	X				X
31.	Room Heater	E		4					X
32.	Computer with printer, with accessories	E		1	X	X			X
33.	Wall Clock	E		1					
34.	Gowns for staffs and mothers	E		20	X	X			X
35.	Washable Slippers/shoe rack	E		20 pairs/1		X			X
36.	Liquid soap dispenser with Hand dryer,	E		1					
37.	Ain Conditions (1.5-2 ton)	E		1	X	X	X	X	X
38.	Refrigeretor, hot zone, 110L	E		1	X				X
39.	Washing machine	E		1	X	X			X

- Depending on the priority of services, the listed items are classified as essential, designated as 'E' (those must be available) and desirable, designated as 'D' (these could be available if resource are available). For each of the items, it has been identified whether installation, commission and training is necessary
- Equipment, which has potential implication on civil, mechanical and electrical systems of the unit, are also identified in the list
 - Civil implications: Equipment that has implications on the physical structure of the unit/building, such as item that are wall or ceiling mounted
 - Mechanical implications: Items that have implications for the mechanical infrastructure, such as items require hot/cold water supply, oxygen supply etc
 - Electrical implications: Items that have implications for the electrical installation of the unit, such as equipment which require high/low voltage/uninterrupted electric supply

B.2 Renewables for SCANU

Item No	Item Description	Essential	Desirable
1.	Adaptor/connector, Meconium aspirator, disposable (for suction pump)	E	
2.	Glucostix	E	
3.	Lancet, safety, sterile, single-use/PAC-200 (1.8mm)	E	
4.	Mask, surgical, disposable, box 100	E	
5.	Cap, surgical, disposable, box 100	E	
6.	Cord clamp, disposable, set of 10	E	
7.	Extractor, mucus, 20ml, ster, disp	E	
8.	Tube, suction, CH10, L50cm, ster, disp	E	
9.	Tube, suction, CH14, L50cm, ster, disp	E	
10.	Tube, feeding, CH05, 06, 07, 08, ster, disp	E	
11.	Syringe, dispos, 1ml, ster/BOX-100	E	
12.	Syringe, dispos, 2ml, ster/BOX-100	E	
13.	Syringe, dispos, 5ml, ster/BOX-100	E	
14.	Syringe, dispos, 10ml, ster/BOX-100	E	
15.	Syringe, dispos, 20ml, sterile/BOX-80	E	
16.	Syringe, dispos, 50ml, sterile/BOX-80	E	
17.	Needle, disp, 23G(0.6x25mm), ster/BOX-100	E	
18.	Needle, disp, 25G(0.5x16mm), ster/BOX-100	E	
19.	Needle, scalp vein, 23G, ster, disp	E	
20.	Needle, scalp vein, 25G, ster, disp	E	
21.	Cannula, 24G, 22G, ster, disp	E	
22.	Gloves, exam, latex, medium, disp/BOX-100	E	
23.	Gloves, surg, 6, 7, ster, disp, pair	E	
24.	Infusion set, pediatric, with chamber 100ml, ster, disp,	E	
25.	Cotton wool, 500g, roll, non-ster	E	
26.	Compress, gauze, 10x10cm, n/ster/PAC-100	E	
27.	Compress, gauze, 10x10cm, ster/PAC-5	E	
28.	Connector, 3-way, stop cock valve, ster, disp	E	
29.	Disinfectant, chlorhexidine, 20%	E	
30.	Disinfectant, bleach percentage	E	
31.	Disinfectant, handsoap	E	

Item No	Item Description	Essential	Desirable
32.	Antiseptic, betadine	E	
33.	Tape, adhesive, micropore, 2.O., 2.5cmx5m	E	
34.	Scalpel blade, ster, disp, no.22 box of 100	E	
35.	Blood transfusion, set		D
36.	Nasal prongs, disposable, neonate, set of 3		D
37.	Paper sheets, crepe, for sterilisation pack		D
38.	Tape adhesive, for sterilization pack		D

C. Technical specifications of the equipment

Generic specifications of the medical devices need to be standardized taking into consideration the following perspectives:

- Functional services available in the unit
- Capacity of the user in handling the equipment
- Capacity of the facility for civil, mechanical and electrical implications
- Capacity for maintenance
- And above all technical integrity and safety of the equipment as per defined standard

Detail specifications of the newborn care equipment for SCANU are provided in Annex-2.

D. Asepsis and housekeeping protocols

Maintenance of asepsis is extremely critical in newborn care units. It requires laying down of clear housekeeping protocols and following them stringently. Details of asepsis and housekeeping protocols are mentioned in Annexure-1.

E. Annual maintenance requirement for critical equipment

A mechanism for maintenance of critical newborn care equipment is essential to ensure effective functioning of the medical devices, their longevity and best possible services. The maintenance starts right from the time of installation and training of the users are critically as important as maintenance. Thus on-site user level training should include user training, technical training and basics of the clinical application of the device.

The technical training should enable hospital technicians to undertake first-line corrective intervention that do not require specific spare parts. They should also be able to recognize and report correctly the technical malfunctions requiring on-site services of the supplier.

Annual maintenance covers both preventive maintenance and on-call corrective interventions.

Preventive maintenance

The objective is to ensure maximum uptime of the medical equipment, assuring accuracy, efficiency and clinical efficacy. Preventive maintenance, therefore, consists of at least two planned technical visits per year, and includes and covers:

- Exchange of information with the end-user and technical staff about the status of the device
- Function and performance check-up of the device
- Technical check-up of device based on the manufacture's technical checklist
- Assessment of wear and tear of the device with notification if incorrect use of the device is noted
- Cleaning parts beyond reach, or capability, of the end-user
- Adjustment and calibration of the device
- All necessary materials to complete the preventive maintenance
- Repetition of user and technical training for current and new hospital staff
- All parts to be replaced; those which are most likely to break down within the next 6 months

On-call corrective intervention

The objective is to intervene immediately and repair, limiting the downtime to the minimum. Hence, it includes and covers:

- On-site visit of service engineer/technician (s) with necessary spare parts, within a specified period of notification of the malfunction
- All necessary materials and spare parts to complete the repair
- Availability of spare parts for the technical lifetime of the device, approximately five years
- In case the device can not be repaired on-site and the device is to be evacuated, a similar replacement model should be provided for the period of the repair

It is recommended that the procurement should include installation, commissioning, training and maintenance contract for a reasonable period (not less than 2 years) as well.

Detailed instructions on use of open care radiant warmer, phototherapy units, resuscitation bags, foot operated suction machine, electrically operated suction machine and weighing scale are provided in Annexure 2.

F. Human Resources

Staffing for SCANU

The SCANU should have the required number of appropriately trained and qualified doctors, nurses and supporting staffs. There should be a designated consultant pediatrician responsible for the clinical standards of the care of newborn babies.

While the available manpower for SCANU will differ by level of care, the basic principles are;

- At least two dedicated staff nurses per shift are necessary for a 10-bedded unit. Thirty per cent extra staffing is recommended to account
- 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 unit at least once every shift and more often, depending on the need

For a 10-bed unit, the recommended staffing is

- Staff Nurses :8
- Consultant : 1
- Medical officer: 3
- Support Staff: 4

Training

It is suggested that the medical and paramedical staff working in an SCANU should undergo:

- An initial skill based training on Emergency Triage Assessment and Treatment (ETAT) and Sick Newborn Care training program for 5 days in the designated training centers with provision of SCANU/ NICU and
- Hands-on training at medical college hospital or an equivalent facility with SCANU/SCABU/NICU, for at least four weeks

G. Cost

Cost can be broken down into capital cost and recurrent cost. While the cost will vary widely due to various factors, an indicative cost for a 10-beds unit is summarized below:

One-time establishment cost per year		Average cost (TK)
Renovations and civil works	Tk.15, 00, 000-25, 00, 000	20, 00, 000
(Highly variable depending on the status of the health facility)		
Equipment and furniture	40, 00, 000- 60, 00, 000	50, 00, 000
Trainings	3, 00, 000 – 4, 00, 000	3, 50, 000
Sub total	58, 50, 000- 89, 00, 000	73, 50, 000

Recurring or running cost per year <i>(does not include the salaries of staff)</i>	
Consumables	Tk. 50, 000
Maintenance cost	Tk. 50, 000
Sub total	Tk. 1, 00, 000



Part -2
Stabilization Unit

A Setting up of stabilization units in the Upazila Health Complex (first referral facility for newborn care)

Every first referral unit must have clearly established arrangements for the prompt, safe and effective resuscitation of babies and for the care of sick newborns. Most sick newborns can be stabilised at this level.

B Services at a stabilisation unit

A stabilisation Unit provides the following services:

- Provision of thermal care
- Resuscitation
- Monitoring of vital signs
- Initial care and stabilisation of sick newborns
- Care of low birth weight newborns not requiring intensive care
- Breast feeding and feeding support
- Referral services

C Configuration of a stabilisation unit

- The stabilization unit should be located in close proximity of the labour ward or OT. If space is not available adjacent to labour ward/OT, part of the female ward may be allocated for stabilization unit
- Space of approximately 200-300 sq.ft (40-50 sq ft per bed) is needed, where four radiant warmers can be kept
- Provision of hand washing and infection control should be in place
- The stabilization unit should be separated from the labor/female ward by partitions (Aluminum and glass) to prevent cross-infection

D Equipments and renewables required for a stabilization unit (4-6 Bed)

Item No.	Item Description	Quantity	E	D
1	Open care system: radiant warmer, fixed height, with trolley, drawers, O ₂ -bottles	2	E	
2	Open care system: radiant warmer, fixed height, with trolley, drawers	2	E	
3	Bag and Mask, hand-operated, neonate, 250-500ml	2	E	
4	Scale, baby, electronic, 10kg<5g>	2	E	
5	Pump suction, foot operated	1	E	
6	Thermometer, clinical, digital	10	E	
7	Light examination, mobile, 220-12v	2	E	
8	Stand, infusion, double hook, on castors	4	E	
9	Phototherapy unit, single head, high intensity	2	E	
10	Pump, suction, portable, 220V, w/access	2	E	
11	Stethoscope, neonate	6	E	
12	Glucometer	2		D
13	Tape, measure, vinyl-coated, 1.5m.	6	E	
14	Infantometer, plexi, 3½ft/105cm	1	E	
15	Hub cutter, syringe	1		D
16	Room thermometer	1	E	
17	Oxygen hood, S and M, set of 3 each, including connecting tubes	2		D
Renewable Resources				
18	I/V cannula 24G, 26 G	X	E	
19	Microburette		E	
20	Extractor, mucus, 20ml, ster, disp, Dee Lee	X	E	
21	Tube, feeding, CH05, CH06, CH07, ster, disp	X	E	
22	Oxygen cylinder 8F	X	E	
23	Sterile Gloves	X	E	
24	Syringe, disp, 1cc, 3cc, 5cc, 10cc, 20cc, 50cc			
25	Tube, suction, CH 10, L50 cm, ster, disp	X	E	
26	Cotton wool, 500g, roll, non-ster,	X	E	
27	Disinfectant, chlorhexidine 20%, savlon, betadine	X	E	
28	Glucostix	X	E	

E Human Resource

Staffing

One dedicated nursing staff needs to be available round-the-clock for newborn care in the stabilisation unit. One Medical Officer skilled in newborn care or pediatrician is required for clinical care and/or oversight.

Training

Doctors and nurses posted in the stabilization unit must undergo skill-based training for 5 days on Emergency Triage Assessment and Treatment (ETAT) and Sick Newborn Care at the designated training institute(s).

Hands-on training at medical college hospital or an equivalent facility with SCANU/NICU for at least four weeks

F Referral services

Each unit accepting sick newborns and required to make neonatal referrals should have, or have access to, an appropriately staffed and equipped transport service.

G Cost of setting up a Stabilization Unit

The costs mentioned below are indicative and could vary widely:

One time establishment Cost	
Renovations and civil works	TK.2, 50, 000 – 50, 000
<i>(Highly variable depending on the state of the health facility)</i>	
Equipment and furniture	TK.10, 00, 000 – 20, 00, 000
Capacity building/Training	TK. 1, 50, 000
Average <i>(does not include the salaries of staff)</i>	TK. 20, 25, 000
Recurring or running cost per year <i>(Does not include the salaries of staff)</i>	
Consumables	TK. 25, 000 – 50, 000
Maintenance cost	TK. 30, 000
Average	TK. 69, 000



Part -3

Newborn Care Corner

A Setting up of Newborn Care Corners in the labour room and obstetric OT

Labour room and obstetric OT in every facility at every level are required to have appropriate facility for providing essential care to newborns and for resuscitating those who might require it.

Thus, Newborn Care Corner refers to the space within the labour room or obstetric OT with essential equipment and logistics for providing immediate care to all newborns.

B Services at the corner

Newborn care corner provides an acceptable environment for all infants at birth. Services provided in the Newborn care corner include:

- Routine/immediate care at birth
- Resuscitation
- Provision of warmth
- Early initiation of breastfeeding
- Weighing the neonate
- Quick baby-check

C Configuration of the corner

- Clear floor area should be provided for in the room for newborn care corner. It should be within the labour room, 20-30 sq ft in size, where a radiant warmer is kept
- Resuscitation kit should be placed in the radiant warmer. Availability of oxygen source is desirable but not essential
- The area should be away from draughts of air and should have appropriate power connection for plugging in the radiant warmer

D Equipment and renewables required for the corner

Item No.	Item description	Essential/ Desirable	Quantity
01	Open care system: radiant, fixed height, with trolley, drawers, O ₂ -bottles	E	1
02	Bag and Mask, neonate, 250-500ml	E	1
03	Scale, baby, electronic, 10kg<5g>	E	1
04	Pump suction, foot operated	D	1
05	Room Thermometer	E	1
06	Light examination, mobile, 220-120-V	D	1
07	I/V Cannula 24 G, 26 G	E	
08	Extractor, mucus, 20ml, ster, disp, Dee Lee	E	
09	Towels for drying and wrapping the baby	E	
10	Sterile equipment for cutting and tying the cord	E	
11	Tube, feeding, CH07, L40cm, ster, disp	E	
12	Oxygen cylinder 8 F	D	
13	Sterile Gloves	E	

E Human Resources

Staffing

One medical officer/staff nurse is desirable in addition to the one conducting the delivery or assisting C-section to provide appropriate care at birth.

Training

All staff posted at the labor rooms should be trained in providing essential care at birth and basic resuscitation (Delivery room management of newborn).

Doctors and nurses working at the labor rooms/OT should also have 5 days skill based training on Emergency Triage Assessment and Treatment (ETAT) and Care of Sick Newborn.

F Cost of setting up newborn care corner

The following costs are indicative and may vary widely:

One time establishment cost	
Equipment and furniture	Tk. 5,00,000
Capacity building	Tk. 20,000
Sub Total	Tk. 5,20,000

Recurring or running cost per year	
Consumables	Tk. 5,000
Maintenance cost	Tk. 10,000
Sub Total	Tk. 15,000

Summary

1. This document provides specific guidance for setting up newborn care services for different level of health services/facilities.
 - All health facilities where deliveries are conducted must have skilled staff and facilities for care at birth to all newborns and to provide resuscitation of those who require it
 - In addition, FRUs should be equipped to provide initial care and stabilisation of sick newborns and care of most low birth weight newborns that do not require intensive care.
 - Every district hospital or sub-district hospitals that conducts more than 3000 deliveries should have a Special Care Newborn Unit that is equipped to provide special care to most sick newborns (except those requiring mechanical ventilation or surgical interventions)
2. There should be agreed procedures for transport of sick newborns from one level of facilities to another
3. SCNU within the district hospital must have continuous availability to qualified medical and nursing staff and resources to meet the needs of all sick babies
4. Technical specification standard for the expected levels of equipment have been established and should be adhered to. Local systems for procurement, maintenance and replacement of equipment are necessary
5. All neonatal units should comply fully with:
 - Clinical guidelines
 - Quality assurance
 - Follow up of high risk survivors
 - Monitoring service provision and access
 - Training and continuing education

Mothers should be encouraged to be involved in care of their sick newborns at every level. All units should provide the environment that supports mothers to be involved in the care of their newborn.



Annexure

Annexure 1: Asepsis and Housekeeping Protocols

1. Basics

1.1 Basic requirements for asepsis in a baby care area

- Running water supply
- Soap
- Elbow or foot operated taps
- Strict hand washing
- Avoid overcrowding optimal number of nurses for care of more babies
- Plenty of disposables
- Rational antibiotic policy
- Obsession with good housekeeping and asepsis routines

Guidelines for ENTRY in the baby care area

- Remove shoes, socks, woolens, watch bangles and rings, Roll up the sleeves up to elbow
- Put on the earmarked slippers, wash hands with soap and water for two minutes (follow six steps of hand washing)
- Put on sterile half sleeve gown

Personnel with active infection should not be allowed entry into the baby care area.

1.2 Sterile gloves

- Always use sterile gloves for invasive procedures like sampling, starting intravenous lines, giving intravenous injections, etc
- Wash gloved hands to remove the blood stains and secretions. Remove gloves and put in the polar bleach bucket. Wash hands again with soap and water
- Used gloves should be cleaned, dried, powdered and packed in paper (e.g., a piece of newspaper) for re-autoclaving
- Adequate number of pairs should be prepared every day. Once can use disposable gloves, if available

1.3 Full sleeve gowns and masks.

- Use them for all invasive procedures e.g. lumbar, puncture, blood exchange transfusion, etc

1.4 Other basics

- Keep separate sprite and betadine swab containers, stethoscope, tape measure and thermometer for each baby
- Change intravenous sets daily or as per set routine
- Feeding tubes as long as baby can keep
- Do not keep FOMITES, e.g. files, X-ray films, pens, etc. on the baby cot
- Change antiseptic solution in SUCTION BOTTLES and sterile water in oxygen humidification chambers everyday and sterilise the bottles/chambers daily by dipping in 2% gluteraldehyde for 4 to 6 hours

1.5 Nursery environment

- Floor should be cleaned with diluted phenyl once in each nursing shift and when required
- No dry mopping, only wet cleaning should be done
- Clean the walls with 2% of bacillocid once in each nursing shift
- Dustbin should be washed daily with soap and water. Polythene should be changed daily or whenever full

2. Hand Washing

- It is the single MOST IMPORTANT means of preventing nosocomial infections
- It is VERY SIMPLE and CHEAP

2.1 Hand washing norm

- Two- MINUTES hand washing (6 steps) to be done before entering the unit.
- 20 second hand washing with alcohol based hand rubs to be done before and after touching babies

2.2 Steps of effective hand washing

- Roll Sleeves above elbow
- Remove wrist watch, bangles, rings etc
- Using plain water and soap, wash parts of the hand in the following sequence
- Palms and fingers and web spaces
 1. Back to hands
 2. Back of hands
 3. Fingers and knuckles
 4. Thumbs
 5. Fingers tips
 6. Wrists and forearm up to elbow

Once you have washed your hands, do not touch anything, e.g. hair, pen or any fomite, till you carry out the required job.

- Keep elbows always dependent, i.e. lower than your hands
- Close the tap with elbow
- Dry hands using single-use sterile napkin or autoclaved newspaper pieces
- Discard napkin to the bin kept for the purpose. If newspaper pieces, discard in the black bucket
- Do not keep long or polished nails

Remember- Rinsing hands with alcohol is NOT A SUBSTITUTE for proper hand washing.

Poster on hand washing should be displayed at all hand washing stations.

3. Skin preparation for venepuncture and other procedures

Skin preparation is an important part of asepsis routines. It should be performed meticulously to avoid entry of pathogens during insertion of IV cannula, pricks or procedure. Always wear sterile gloves after two minutes of thorough hand washing. The procedure of skin preparation is given in the box below.

Skin preparation for venepuncture

Steps

1. Wash and dry hands
2. Wear sterile gloves
3. Prepare skin site, confine to smallest possible area of skin
4. Swab with alcohol first, allow it to dry
5. Swab iodine on site and allow it to dry
6. Swab again and alcohol to wipe off iodine, allow it to dry
7. Skin is now ready for puncture or prick

4. Other recommendations

- Never use stock IV fluids. Do not use a single dextrose/saline bottle for > 24 hours
- Label the bottle with date and time of opening
- After seal is removed, first clean with spirit swabs, then use Betadine soaked sterile cotton to cover the stopper of the bottle
- Change the burette set every 24 hours or as per policy of your unit

- Use syrups within 1 week of opening, write the opening date
- Antibiotics vials to be changed after 24 hours. E.g. injections Ampicillin or Cefotaxime
- There is no need for flushing with heparins saline to keep the IV line patent
- Use separate IV line of giving antibiotics (do not open the IV fluid line for giving injection)

Safe disposal of hospital waste

Proper disposal of hospital waste is important to keep the environment clean. The waste should be disposed of in a proper way. All health professionals should be well conversant with their local hospital policies for waste disposal, which may vary from place to place.

Disinfection protocols

Name of equipment	Disinfection method	Other considerations
Baby line, blanket, Blanket Cover	Wash and autoclave	Use autoclaved linen each time
Cotton gauze	Autoclave, as required	Every time use autoclaved cotton
Feeding utensils (cup, spoon, etc.	Wash with soap and water before each use then boil for 10 minutes.	
Swab container, injection and medicine tray	wash with soap and water/ autoclave	Daily morning shift use separates swab containers for each baby.
Sets for procedures	Autoclave	After each use every 72 hours if unused
Chattel forceps	Autoclave	Daily. Put in sterile autoclaved bottle contain gin dry sterile cotton.
Stethoscope, measuring taps, thermometer, swabs BP cuffs, probes of Radiant warmer/ Incubator pulse oximeter	Clean with sprite	Daily.
Laryngoscope	Clean with spirit swab thorough daily and after each use	If used for an infection baby, wash with soap and water. Put the blade in 2% glutaraldehyde warp in autoclaved cover and mark date on the cover.
Oxygen hood	Wash: soap & water	Daily; dry with clean linen.
Face mask	Clean with soap and water, immerse in glutaraldehyde for 20 min. rinse in distilled/ running water, dry and warp with autoclaved	Daily and after each use.

resuscitation bag and reservoirs, oxygen tubing, bottle and tubing of suction machine	Clean with soap and water after dismantling. Immerse in gluteraldehyde for 4-6 hours. Rinse in distilled water. Dry wrap in autoclaved lined and put a date.	Weekly for resuscitation bag and reservoir. Daily for others. Use savlon for suction bottles, Change daily.
Weighing machine	Wipe with 2% Bacillocid	Daily morning shift and when required.
Radiant warmer and incubator	Clean with soap water daily, if occupied. If unoccupied, clean with 2% Bacillocid	Daily

Color coded disposal drums/bags

The following are the different colour drums with different colour polythene for different types of waste, to be disposed of in a different way.

a. Black drums/bags

Left-over food, fruit, feeds, vegetables, waste paper, packing material, empty boxes, bags, etc. This waste is disposed of by routine municipal machinery.

b. Yellow drums/bags

Infected non-plastic waste, e. g human anatomical waste, blood. baby fluids, placenta, etc. This type of waste requires incineration.

c. Blue drums/bags

Infected plastic waste such as used disposable syringes, needles (first destroy the needle in the needle destroyer). Used sharps, blade and broken glass should be discarded in puncture proof containers before discarding. patients IV set, BT set, Et tube, catheter, urine bag, etc. Should be cut into pieces and disposed of in blue bag. This waste will be autoclaved to make it non-infectious. This is then shredded and disposed of.

Annexure 2: Specifications of Newborn Care Equipment

Table, resuscitation, newborn, w/access

Technical Specifications

- Mobile newborn resuscitation table with radiant warmer
- Sturdy and stable construction on 4 antistatic ball-bearing swivel castors, 2 with breaks
- Two side handles facilitate positioning
- Table surface: 0.75 x 0.60 m (w x l)
- Side panels in transparent acrylic, drop down and lockable
- With 2 storage drawers, under table surface
- Integrated support for two 10 L oxygen bottles
- Side rails to the table surface allows for mounting of accessories
- Fixed-height hood above the table integrates heating element and overhead light
- Vertical column integrates controls and displays
- Overhead examination light: 2 x 50 W halogen
- Heating element: emitter with parabolic reflector and protected by metal grid
- Preset skin temperature, range approx: 34 to 38 C, increments 0.1 C
- Temperature preset drives heater output in servo mode
- Easy switch between servo and manual mode
- Skin temperature monitoring via sensor, range: 30 to 42 C (sensitivity 0.2 C)
- Sensor thermistor based and factory calibrated
- Preset heater output: 0 to 100 %, in 5 % increments
- Integrated timer, preset: 1 to 59 min with up/down count feature, increments 1 min
- Auto-off at time elapse
- Audiovisual alarm on skin temperature (+1/- 1 C of preset value) and time elapse
- Large LED display shows:
 - Heater output preset in Watt, Mode (servo or manual), Preset skin temperature
 - Actual skin temperature, Air temperature, Elapsed or remaining time
 - Display reports system errors such: sensor malfunction, low/high temperature
- Mattress covering entire table surface, thickness 5 cm
- Cover is waterproof, flame retardant and resistant to common disinfection and cleaning solutions

Dimensions

1.10 x 0.65 x 1.90 m (l x w x h), Power requirement: 220 V / 50 Hz

Power consumption

1100W

Supplied with

1 x Mattress

1 x Reusable skin temperature probe, incl. connection cable and plug (Ref: BH)

2 x Spare reusable skin temperature probes, incl. connection cable and plug (Ref: BH)

1 x Spare heating element (Ref: HE)

1 x Set of spare fuses

Clear instructions for use / diagrams for assembly in English.

Radiant warmer, fixed height stand

- Mobile fixed-height radiant warmer
- Antistatic castors, 2 with breaks
- Hood integrates heating element and overhead light
- Overhead light: 2 x 50W halogen spot, with dimming function
- Heating element: emitter with parabolic reflector and protected by metal grid
- Control unit allows air and skin temperature preset (LED indicator) and drives radiant heater output (servo and manual)
- Integrated timer: 1 to 59 min, with count-up and count-down feature
- Temperature range, skin: 34 to 38°C (user pre-settable)
- Monitoring of skin temperature by means of sensor, range: 30 to 42°C
- Heater output: 0 to 100 % in increments of 5 %
- Control unit: audiovisual alarms according to timer and temperature presets avoiding overheating
- Display reports systems errors, sensor failure

Power requirement

220 V / 50 Hz

Power consumption

800 W

Device is produced by ISO 9001 certified manufacturer (Certificate to be submitted

Device is safety certified according CE 93/42, FDA 510k or equivalent (Certificate to be submitted

Supplied with

1 x skin temperature probe (including connection cable)

1 x spare skin temperature probe (including connection cable)

1 x spare heating element

1 x spare set of fuses

User manual with trouble shooting guidance, in English

Technical manual with maintenance and first line technical intervention instructions, in English

List of priced accessories

List of priced spare parts

Syringe pump, 10, 20, 50 ml, elec 220V

- Digital and self regulating volume controlled portable syringe pump
- Can be mounted on standard bed/wall rail or mobile pole/stand (supplied with fixation)
- Suitable for all intravenous and intra-arterial infusions
- Continuous volumetric delivery with syringes 10, 20 and 50 ml
- Open system, suitable for different brands of syringes
- Programmable, user entry: infusion volume and time or flow rate
- Rate, adjustable: 1 to 999 ml/h, steps of 1 ml/h
- Accuracy: ca 1 % of total volume delivered
- With occlusion detection and alarm
- Display reports systems errors, end of infusion and built-in battery status
- Audio visual alarm with silencing feature for audio alarm
- Automatic switch from mains to batteries in case of power failure

Power requirements

220 V / 50 Hz or internal re-chargeable battery (autonomy approx 6 hrs, automatic recharge)

Power consumption

50 W

- Device is produced by ISO 9001 certified manufacturer (Certificate to be submitted)
- Device is safety certified according CE 93/42, FDA 510k or equivalent (Certificate to be submitted)

Supplied with

1 x spare battery

1 x spare set of fuses

User manual with trouble shooting guidance, in English

Technical manual with maintenance and first line technical intervention instructions, in English

List of priced accessories

List of priced spare parts

Bilirubin meter

- Bench top bilirubin meter
- Open system, automatic
- Suitable for intensive care, emergency departments or other low-volume settings in hospitals.
- With auto zero and self check
- With LCD display + Built-in printer
- Sample volume: 1 capillary of 70 ul
- Dual wavelength measurement, correcting for Hb at 550 nm
- Main light source: 2,5 W tungsten lamp
- Measuring range: 5-30mg/dl or 85/510 umol/l. Please see remark below
- Accuracy of measurement < 5%
- Read-out switch able between mg / 100 ml of $\mu\text{mol} / \text{L}$
- Fast analysis time: 3s approx.
- Alarm indicator informs abnormalities
- With built-in USB port allowing data transfer

Power requirements

220 V / 50 Hz

Power consumption

25W

Supplied with

1 AC power cable, 1 spare lamp, 1 thermal paper roll,
1 tube with 100 capillaries, 1 bar of capillary sealing compound,
1 dust cover

Supplied with

UPS of sufficient size to ensure uninterrupted sample testing
in case of power variations or power interruption.

Supplied with

Instructions for use, for preventive maintenance and troubleshooting
in English.

Neonatalie Resuscitator

Includes Resuscitator, mask size 0, mask size 1, directions for use

Neonatalie Suction

Bulb Suction (Penguin Suction)

Neonatalie complete (light)

Neonatalie newborn simulator,
light complexion with standard accessories &
resuscitation care kit

Pulse oximeter, portable, w/access

Technical Specifications

- Compact portable pulse oximeter
- Robust design allow use in demanding environments
- Suitable for all patient categories: neonate, infant, adult
- Monitors arterial blood oxygen saturation (SpO₂), pulse rate (HR) and signal strength
- Measuring range:
 - SpO₂: 30 to 100 % (min graduation 1 %)
 - HR: 20 to 250 bpm (min graduation 1 bpm)
- Accuracy SpO₂: $\pm 3\%$ (30 to 69 %) and $\pm 2\%$ (70 to 100%)
- Large LCD has protective cover and allows distant reading

- Continuous display of SpO2 (%), HR (bpm), signal strength and battery status
- Reporting of system errors such as probe malfunction, loss of signal and power failure
- User pre-settable low and high alarms for SpO2 and HR
- Auditable pulse rate
- Alarms audio-visual with silencing feature
- Automatic switch from mains to batteries in case of power failure
- Auto-off when not in use
- Dimensions, approx: 0.15 x 0.15 x 0.30 m (w x d x l)
- Power requirements: 220 V / 50 Hz and internal battery (autonomy approx 30 hrs, automatic recharge)
- Power consumption, approx; 50 W

Supplied with

1 x Interconnect cable with MC connector and UN connector (3m) (bx/1) (Ref: OXY-MC3)

2 x Finger sensor with UN connector (1m) (bx/1) (Ref: OXY-F-UN) ?Durable sensor for short-term non-invasive SpO2 monitoring of patients weighing 20 kg or more.

2 x Wrap sensor with UN connector (1m) (bx/1) (Ref: OXY-W-UN) ? Durable sensor for short-term or long-term non-invasive SpO2 monitoring of all patients. The tape and foam wrap are single-patient use.

1 x All-fit adhesive sensor (0.9m) extra adhesive tape included (bx/10) (Ref: OXY-AF-10) ? Single-patient use adhesive sensor for short-term or long-term non-invasive SpO2 monitoring.

1 x Sensitive skin sensor with UN connector (0.9m) (bx/3) (Ref: OXY-SE-3) ? Multiple patient use sensor for short-term or long-term non-invasive SpO2 monitoring of all patients, including premature infants. The tape and foam wrap are single-patient use.

1 x Spare rechargeable battery pack (Ref: 6050-0006-579)

Clear instructions for use I diagrams for assembly in 3 languages (English, French and Spanish), list of accessories/ parts.

Phototherapy unit, w/access

Technical Specifications

- Mobile freestanding height adjustable overhead phototherapy unit
- Can be used in combination with a newborn and infant bed
- Sturdy and stable construction on 4 antistatic ball-bearing swivel castors, 2 with breaks
- Single head, surface size, approx: 470x285x90mm
- Head height adjustable, approx: 1150x1600mm
- Blue light, 4 compact fluorescence tubes (CFL), each approx: 20 W
- White light, 2 compact fluorescence tubes (CFL), each approx: 15 W
- Tubes are protected by metal grid
- Irradiance: standard up to 35 uW/cm² Amelux with 6 blue light CFLs = 43 uW/cm²
- Wavelength: 400 to 550nm
- Integrated electronic timer: 1 to 59 min, with automatic shut-off at time elapse

Total run hour timer, for replacement of the lamps after 2'000 hours / Therapy timer with zero reset button to count the therapy hours separate from the total run hour timer

- Power requirement: 220 V / 50 Hz
- Power consumption, approx: 108 W

Supplied with

2 x Spare blue light tubes 20W (Ref: 99.02.682)

1 x Spare white light tube 15W (Ref: 99.02.683)

1 x Set of fuses Ref: T2.5A (set of 5 pieces)

Standard included German/English; available also French and Italian

Thermometer, max/min

- Filled with mercury-alternative thermometer to measure ambient temperature
- Double scale, min and max and current temperature
- With reset button
- Range: -30°C to 60°C
- Graduation: 1°C
- Sturdy plastic construction

Annexure 3: Instructions for equipment and use

Radiant warmer

- Ensure that the temperature of the room is 22°C
- Place the warmer away from air currents
- Clean the mattress and platform, and cover the mattress with clean linen sheet.
- When it is known beforehand that a baby is to arrive in the newborn unit, turn of the warmer at least 20 minutes prior to pre-warm the linen and mattress so that the baby does not lie on a cold surface initially
- Read temperature on display. Adjust heater output to

High : If baby temperature is below 36°C

Medium : If baby temperature is between 36-36.5°C and to

Low : If baby temperature is between 36.5-37.5°C

- Once the baby's temperature is between 36.5-37.5°C, switch on the servo mode/skin mode
- If baby is in supine position place the skin probe on the right hypochondrium. when in prone position, place the probe on the lion area. To prevent skin injury, place tegaderm and fix the probe on it with an adhesive
- Ensure that the baby's head is covered with cap and feet secured in socks and the baby is clothed or covered unless it is necessary for the baby to be naked or partially undressed for observation or for a procedure
- Place only one baby frequently while under the warmer, if possible
- Check the temperature of the warmer and of the room every hour, and adjust the temperature setting accordingly. Record the heater output in each shift (every 6 hours). Any sudden increase in heater output is an early indicator of sickness
- Move the baby to be with the mother as soon as the baby no longer requires frequent procure and treatment. If servo mode the heater output is <20%, it safe to shift the baby to mothers side

Servo Mode

- Set temperature at 36.5°C, heater output will adjust automatically to keep baby at set temperature. If baby temperature is below the set temperature, the heater output will increase, if baby is at set temperature or higher the heater output will become zero
- Look for probe displacement when the baby is in servo mode. Check for and ensure proper probe placement every hour

Manual Mode

- Once connected to mains heater output regulated by knob on front panel. The output is displayed as % or bars or bulbs
- Use maximum (100%output) for repaid warming of bassinet in labor room 10 minutes before delivery. Reduce output to 25-75% after 10 minutes depending on ambient temperature. If left on with heater output>80% alarm is activated within 15 or 20 minutes later there after the heater output goes to 40% if alarm is silenced the heater will kept on for another 15 to 20 minutes as per manufactures recommendation
- For low birth weight or sick neonate adjust heater output depending on baby temperature
- Never use full (100%) heater output unsupervised
- Record baby temperature every 2-4 hourly
- Use this mode only for pre-warming, during resuscitation and initial stabilization

For disinfection

- For daily cleaning of front panel use damp cloth soaked in mild detergent (soap water)
- Don't use spirit or other chemical
- Bassinet, cot should be disinfected daily using soap/detergent solution or disinfection solution

Alarms on the servo radiant warmer (No alarms in manual mode)

Alarm	Problem	Response
" Power alarm"	This alarms if the mains power fail	Find alternative means for heating if power cannot be fixed (KMC). Check the fuse
"System"	This alarms if there is an error in the electrical/electronic circuit	Change WARMER, needs repair.
"Skin probe failure alarm"	This alarm sounds if the temperature probe sensor is not connected properly or if it is not functioning properly.	Try to re-connect the sensor correctly. If this does not work it requires changing.
"Skin temperature alarms High or Low.	This alarm operates in servo mode only. It sounds when the patient temperature differs from the SET temperature by $>0.5^{\circ}\text{C}$	Change to manual mode with maximum output if baby is having low temperature and adjust the temperature to try and normalize the baby's temperature. If baby is having fever, shift to manual mode and set appropriate heater output. Check for signs of infection.
Heater Failure	Indicate heater is not working	Change warmer, needs repair.

Phototherapy Unit

- Protect the eyes from light using eye patches once the lights are on
- Keep baby naked with a small nappy to cover the genitalia
- Change position supine to prone after each 3-hourly
- Place the baby as close to the lights as the manufactures instructions allow. Use white curtains or linen as slings so as to reflect back as much light as possible to the baby, making sure not to cover top surface of unit which allows air flow for cooling the bulbs
- Encourage frequent breast feeding. No need to supplement breastfeeding with any other type of feed or fluids
- Temporary interruptions for feeding or procedures re allowed. But not for oro-gastric feeding or for IV fluids
- If baby is on IV fluids or expressed breast milk, increase the volume by 10%
- Monitor for and ensure urinary frequency 6-8 times/day
- Monitor temperature 4 hourly and weight every 24 hours
- Estimate serum bilirubin frequently q 12 hourly. Clinical or visual assessment of jaundice under lights becomes fallacious
- Change tube lights every 6 months (or usage time >1000 hrs) whichever is earlier; or if tube ends blacken or if tubes flicker
- Monitor irradiance of the phototherapy machine once every week. Use a flux meter to monitor irradiance. Change light source if irradiance fall below 6-8 $\mu\text{W}/\text{cm}^2/\text{nm}$
- Don't place anything on the phototherapy unit (this blocks air vents)

Caution

- Do not use phototherapy unit under a warmer
- Ensure eye patches do not obstruct nostrils
- For babies below 2kg, preferably use phototherapy over incubator
- After switching on the unit, check if all tubes/bulbs are on

Trouble shooting

If unit is not switching on, check the following:

- Mains Socket (change to another socket)
- Fuse
- Loose contact in the plug or a damaged mains cord

If any tube is flickering, do the following and check

- Change starter of the lamp
- Change lamp

After doing the above procedure(s), if the unit is still having problem, call qualified technician to repair the unit.

Cleaning/disinfection

- Use moist or dry cloth to clean unplugged unit
- Ensure the reflectors remain dust free

Resuscitator/self inflating bag with mask

A. Part

- Valve assembly
- Patient outlet
- Air inlet
- Oxygen inlet
- Safety valve
- Body of the bag

B. Test function

- Block patient outlet or mask by palm of your hand
- Squeeze the bag
 - 1) You should feel pressure against your hand
 - 2) With higher pressure one can open pop-off safety valve

C. Procedure

- Choose appropriate size of the bag and mask
- Position the baby in a sniffing position/Slight extension
- Provide tight seal. Use finger tips to generate enough pressure to move the chest of the baby, observe for improvement in heart rate, colour and chest movement
- Follow a rhythm "Squeeze two three to ensure 40 to 60 breathes per minute. For prolonged bag and mask, insert an orogastric tube and then continue bag and mask
- Do not use bag and mask for suspected diaphragmatic hernia and babies born through meconium stained amniotic fluid

D. Decontamination

i) Washing and rising- Disassemble parts

- Wash in warm water using as detergent
- Rise in clean water

ii) Disinfection/Sterilization

Except reservoir, whole bag can be boiled, autoclaved or soaked in disinfectant, clean with distilled water or running water. Dry the valves and then reassemble.

Suction Machine (Foot operated)

Parts

- Suction catheter
- Suction tubing
- Suction bottles

Using the foot suction

1. Connect suction catheter to patient end of silicone tubing of machine
2. Place the foot suction on floor across and in front of resuscitation trolley, with bellows on right side (if you use your right foot) and fluid collection jar o left side
3. Ensure that foot suction is close to resuscitation trolley so that it can be operated while resuscitating the baby
4. Ensure that suction catheter is placed on baby mattress and tube length is not short. Use 8Fr to 10Fr catheters for oropharyngeal suction
5. Place right foot on bellows and press down ensuring that it slides down in contact with the central vertical metal plate. This ensures that the bellows do not tilt outwards, preventing slipping of foot
6. Foot pressure can be adjusted to ensure adequate suction pressure
7. Pinching that suction catheter end press bellows and check for suction pressure

N.B: for safety of newborn maximum suction pressure is limited to 100mm Hg, irrespective of foot pressure.

8. In case thick mucous plug blocks the suction inlet, switch suction tubing to alternate suction inlet provided on the rubber stopper

Cleaning/sterilization

1. The foot suction must be cleaned immediately after use. Empty the fluid collection jar
2. The fluid collection jar and silicone tubing can be autoclaved at 124°C. This can also the washed with soap and water

3. Wash the rubber stopper with soap and water and rinse thoroughly
4. Re-assemble when dry
5. Replace in carry case

N.B: Rubber lid for fluid collection jar cannot be autoclaved. Wash thoroughly with soap water, rinse and dry.

6. Empty fluid jar immediately when filled to more than half mark

Do's

- Suction gently
- Maintain asepsis during the suctioning procedure
- Use only disposable suction catheters
- Check adequacy of suction pressure

Don's

- Do not do vigorous and deep suction
- Troubleshooting
- Check for leakage in the bottle/tubing
- In case fluid jar cannot be emptied immediately when full, to prevent overflow of fluid into the bellows, open the alternate suction inlet. No suction pressure will be created even if bellow is compressed

Maintenance

- Check for adequacy of suction pressure
- Change tubing, if leaky or broken

Suction matching (Electric)

Parts

- Motor
- Vacuum gauge with precision regulator
- Suction bottles
- Suction catheter
- Suction tubing

Working

- Connect to mains
- Switch on the unit and occlude distal end to check the pressure. Ensure it does not exceed 100cm of water
- Take disposable suction catheter
- Connect to suction tubing
- Perform suction gently
- Switch off the suction machine

Cleaning & Disinfection

- Wash suction bottle with soap & water
- Change bottle solution every day

Do's

- Suction gently
- Maintain asepsis during the suctioning procedure
- Use only disposable suction catheters
- Check adequacy of suction pressure

Don'ts

- Do not do vigorous and deep suction

Maintenance

- Check for adequacy of suction pressure
- Change tubing, if leaky or broken

Weighing machine (Electronic)

Parts

- Pan or baby tray
- Weight scale display
- Machine proper

Working

- Put on a firm even surface. Wipe clean the weighing pan
- Plug on and wait till the display panel registers zero
- Check for and adjust zero error
- Place the clean cloth/paper
- Press the knob to reset the reading to zero or else you will have to subtract the weight of the cloth from the total weight when baby is weighed along with the sheet
- Place the baby over the cloth/paper
- Keep the baby in the middle of the weighing pan; hold the remaining tubes and lines in hand
- Detach as many tubes/equipment as possible prior to weighing. Keep the naked baby on the towel and record the weight (subtract the weight of the cloth if the scale has no facility to reset to zero)
- Read the weight to nearest 5-10 gms
- Record weight on baby record and plot on growth chart

Do's

- Put the weighing scale on a flat, stable surface
- Record weight prior to feeding
- If using pre-weighed splint, reduce the weight from baby's weight
- Always look for and adjust zero error
- Remove excessive clothing
- Record weight only when display is stationary & not fluctuating

Don'ts

- Do not stack up line or other objects on the weighing pan when not in use
- Do not pour water on the electronic display

Cleaning and disinfection

- Clean with soap and water; use damp cloth to clean
- Wipe with spirit swab between patient use

Troubleshooting

- Place on a flat firm surface
- Check for power cord
- Check for fuse
- Calibrate using a known standard weight every two weeks
- Record zero error if it cannot be corrected and account for it

Record keeping and reporting in SCANU/Stabilization Unit/ Newborn Corner:

All type of newborn care units (SCANU/Stabilization Unit/Newborn Corner) should have appropriate record keeping and reporting tools. Sample of record keeping registers for SCANU/Stabilization unit and Newborn care corner in the Delivery Room have been given in this section of the SOP.

The following indicators need to be tracked and monitored in the SCANU/Stabilization Unit/newborn Care Corner:

Input Indicators:

1. Number and percentage of service providers trained on ETAT and Sick Newborn Care
2. No stock out of medicine and supplies in the newborn care unit during last 3 months
3. Essential equipment in the newborn care unit available and functioning
4. Protocols for newborn care available and displayed in the newborn care unit
5. Number and percentage of sick newborn (by disease) admitted in the newborn care unit

Output indicators:

6. Number and percentage of newborn received essential newborn care
7. Number and percentage of sick newborn received appropriate management as per standard protocol
8. Number and percentage of newborn with asphyxia received resuscitation as per standard protocol
9. Number and percentage of newborn with infection/sepsis received appropriate management as per standard protocol
10. Number and percentage of newborn with low birth weight received appropriate management as per standard protocol
11. Number and percentage of neonatal death review done

Impact indicators:

12. Case fatality rate
13. Cause specific facility mortality rate
14. Number and percentage of low birth weight in the facility

Sample Format for Sick Newborn Register in the SCANU/Stabilization Unit

SL	Name/ Moth- er's name	Fa- ther's name and ad- dress	Hospital Registra- tion #	Bed #	Sex	In- born	Out- born	Reason for admission	Weight in KG	Temp at admis- sion	Diagno- sis	Management Given:	Prognosis	Dis- charge/ Referral	Remarks
					M F			New- born Danger Sign Present (Y/N)				1. ENC 2. Resuscitation 3. KMC 4. Thermal Care in Radiant warmer 5. Phototherapy 6. Antibiotics 7. Tube/Cup Feeding 8. Other			

Sample Format for Newborn Register in the Delivery Unit

SL	Name/ Moth- er's name	Fa- ther's name and ad- dress	Hospital Regis- tration #	Bed #	Sex	Birth	Time of birth	Birth Weight (KG)	Time of Ther- mal care given	Time of EBF giv- en	Any Danger Signs found :	Status of the newborn	Management Given:	Discharge/ Referral/ Transfer	Remarks
					M F	Live (L) Still (S)					1. Not feeding well 2. Convulsions 3. Fast breathing (>60 breath/min on second count) 4. Severe chest indrawing 5. Low body tem- perature (less than 35.5°C or 95.9°) 6. Fever (more than 37.5 °C or 99.5°F) 7. Movement only when stimulated or no movement at all 8. Other	Healthy (H) Sick (S)	1. Essential New- born Care (ENC) 2. Resuscitation 3. Kangaro Mother care (KMC) 4. Antibiotics 5. Other		

Resources and Guidelines

1. Toolkit for setting up Special Care Newborn Units, Stabilization Units and Newborn Care Corners by National Neonatology Forum & UNICEF India
2. Bangladesh National Neonatal Health Strategy and Guidelines, 2009
3. Pocketbook of Hospital care for children: guidelines for the management of common illnesses with limited resources, World Health organization 2005
4. STPs by WHOCC- All India Institute of Medical Sciences. New Delhi
5. Pakistan Initiative for Mothers and Newborn (PAIMAN)-USAID, JSI
6. Philippines Protocol
7. Tricia L. Gomella, M. Douglas Cunningham, Fabien G. Eyal. Neonatology: Management, Procedures, On-Call Problems, Diseases, and Drugs, 6th Ed. Mc Graw Hill, 2009
8. Jhon P. Cloherty, Eric C. Eichenwald, Ann R. Stark. Manual of Neonatal Care, 6th Ed. Lippincott Williams & Wilkins, 2008
9. Textbook of Neonatal Resuscitation, 5th Ed. Editor, John Kattwinkel, MD, FAAP. American Academy of Pediatrics and American Heart Association, 2006
10. Essential Newborn Nursing for Small Hospitals, 2nd Ed. Editor, Asoke Deorari, Division of Neonatology, Department of Pediatrics, AIIMS, New Delhi, 2009

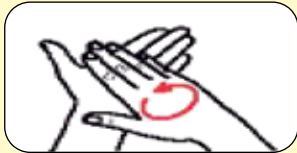


SECTION – II

Management Protocols for Newborn Care

HAND WASHING^{1,2}

Wet hands up-to wrists. Apply soap, make thick leather



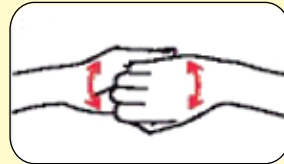
1. Rub hands palm to palm



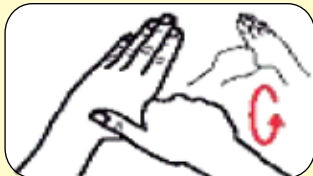
2. Right palm over dorsum of the left with interlaced fingers, and left over the right



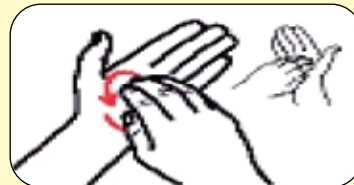
3. Palm to palm, with fingers interlaced



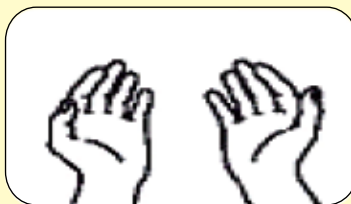
4. Backs of fingers to opposing palm, fingers interlocked and vice versa



5. Rotational rubbing of left thumb clasped in right palm and vice versa



6. Rotational rubbing backwards and forwards with clasped finger tips of right hand in left palm and vice versa



Rinse hands thoroughly with running water. Air dry or dry with a single-use towel

¹Types of hand washing

- Hand washing with soap and running water
- Hand washing using alcohol based hand rub

²Norms for Hand washing

- 40-60 second hand wash with soap and water in 6 steps has to be done before entering the neonatal ward. Then wash hands with hand rub for 20-30 seconds before and after touching each baby. For hand rub take a cupped palm-full of alcohol based solution and follow the same 'six steps'.

ALGORITHM FOR IMMEDIATE OR ROUTINE CARE AT BIRTH

Steps of Routine/Immediate Care^{1,2}

Deliver the baby onto mother's abdomen

(In case of c-section, keep the baby next to the mother on a clean, warm surface)

Dry the baby thoroughly.

If amniotic fluid is meconium stained, clear mouth and then both nostrils with a mucous sucker before drying the baby

Remove wet clothe and Cover the baby's head with a cap/cloth

Cover both mother and the baby with a warm cloth

Assess color, cry/breathing while drying.

If color, cry/breathing is normal, proceed to next steps³

Keep the baby skin-to-skin with the mother

Tie/clamp and cut the umbilical cord

after 1-3 minutes of delivery with a sterile instrument⁴

Give a quick look to see if there is any malformations/birth injury

Place an identity label on the baby

Help mother to initiate breastfeeding

as soon as possible (no later than 1 hour)

Weigh the baby

(after the first breastfeed), keep baby note

¹Preparation for Delivery

- Identify a helper and explain role
- Make an emergency plan. Be prepared to act quickly to manage problems such as asphyxia
- Prepare the environment (privacy, light, warmth)
- Prepare a place for resuscitation
- Wash hands
- Prepare and check equipment

²Equipment and supplies

- Gloves
- Cap
- Two or more warm clothes
- Threaed/cord clamp
- Scissors
- Suction device
- Bag & mask
- Stethoscope
- Clock /timer
- Weighing scale
- Light source

³Start Resuscitation at once if the baby is not crying/breathing or if gasping.

⁴Give the 1st knot 2 cm from the abdomen, a 2nd knot 1 cm from the 1st one and the 3rd, 4 cm from the 2nd. Cut the cord 1 cm from the 2nd knot.

ERGENCY TRIAGE¹: ASSESSMENT AND TREATMENT(ETAT)

Look for following emergency signs:

- Severe hypothermia {(temp <32° C, cold to touch(abdomen)}
- Apnea or gasping respiration
- Severe respiratory distress (respiratory rate ≥ 60/min, severe chest indrawing, grunting)
- Central cyanosis
- Shock {(capillary refill time(CRT) longer than 3 seconds, and weak and fast pulse)}
- Coma or convulsing (now)

Present

Initiate emergency
Treatment² until
Stable

Absent

Look for following priority signs

Priority cases

- LBW babies (<1800gms)
- Cold stress/ moderate hypothermia
- Respiratory distress (rate ≥60/min, no retractions)/grunting
- Irritable/lethargy
- Refusal to feed
- Abdominal distension
- Significant jaundice (yellow palms and soles)
- Severe pallor
- Bleeding manifestations
- Major congenital malformations

Present

Manage as per Priority sign Algorithm³

Absent

Non-urgent cases

- Non-pathological Jaundice
- Developmental peculiarities
- Superficial infections
- Transitional stools
- Minor birth trauma
- Minor malformations

These neonates are not categorized as emergency or priority cases.

¹ Triage is the process of rapidly screening sick newborn soon after their arrival in hospital in order to identify:

- those with emergency signs; who require immediate emergency treatment
- those with priority signs; who should be given priority while waiting in the queue so that they can be assessed and treated without delay
- non-urgent cases; who have neither emergency nor priority signs

By triaging, patients are sorted into priority groups according to their need(s) and the resources available.

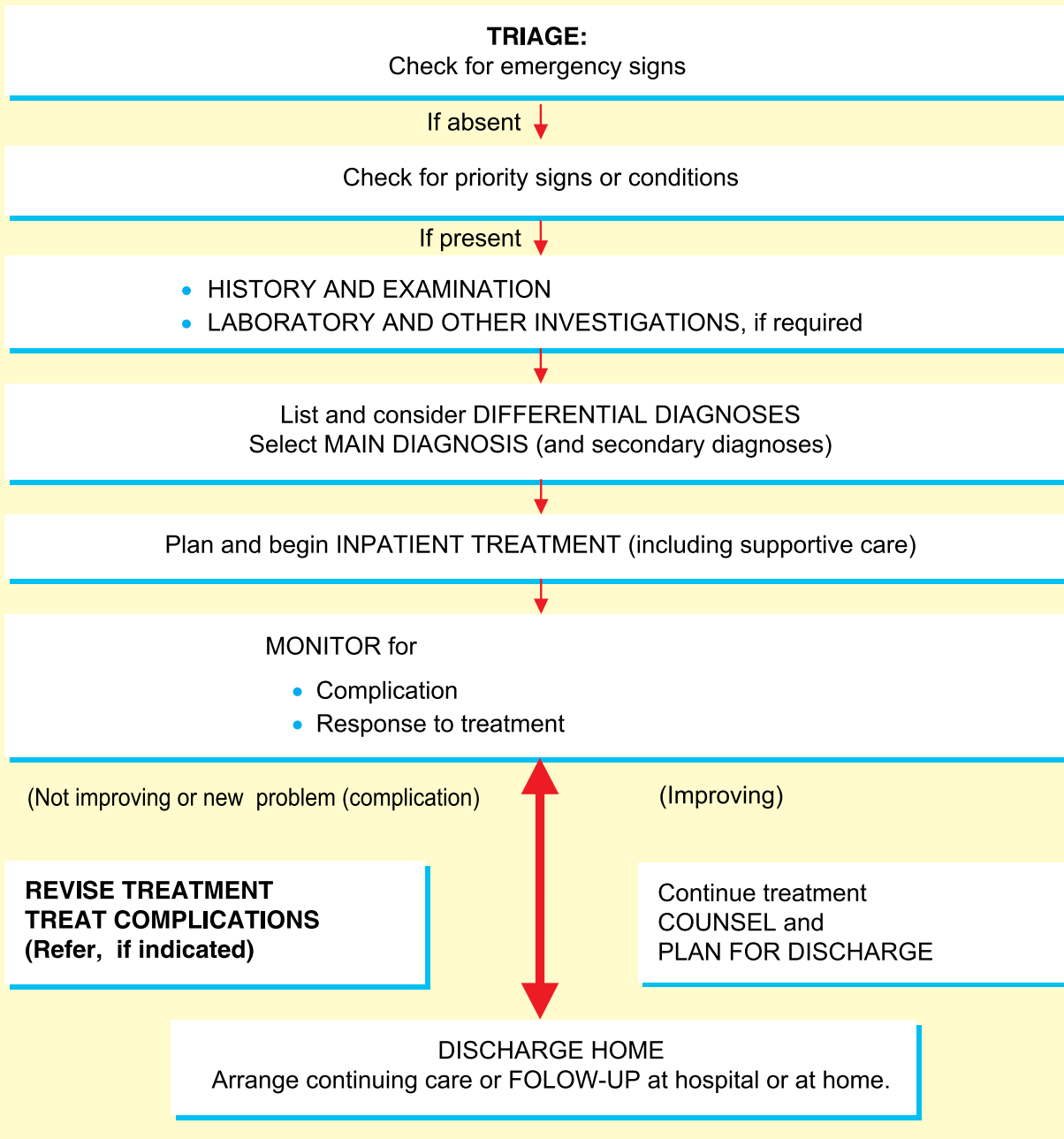
2ASSESSMENT AND TREATMENT OF NEWBORNS DISPLAYING EMERGENCY SIGNS

Signs	Assess for emergency signs (In all cases)	Treat emergency
Temperature	<div>Cold to touch (Abdomen)</div> <div>If Positive</div>	<ul style="list-style-type: none"> Rewarm hypothermic babies Rapidly rewarm if there is severe hypothermia (<32°C) upto 35°C and then gradually rewarming Make sure neonate is warm
Airway And Breathing	<ul style="list-style-type: none"> Not Breathing or gasping or Central cyanosis or Severe respiratory distress <ul style="list-style-type: none"> Respiratory rate > 70/min Severe lower chest indrawing Apneic spells Grunting Unable to feed <div>Any Sign Positive</div>	<ul style="list-style-type: none"> Manage airway Provide tactile stimulation, if apneic If still apneic or gasping-Provide PPV Give oxygen Make sure neonate is warm.
Circulation	<ul style="list-style-type: none"> Capillary Refill Time longer than 3 seconds, and Weak and fast pulse (>160) <div>If Positive</div>	<ul style="list-style-type: none"> Give oxygen Insert IV line and give 20 ml/kg Normal Saline over 20 min Proceed immediately to full assessment and treatment Make sure neonate is warm.
Convulsion	<ul style="list-style-type: none"> Convulsions <div>If Convulsing</div>	<ul style="list-style-type: none"> Manage airway Give oxygen Check & Correct hypoglycemia Give anticonvulsant Give IV Calcium Make sure neonate is warm
Dehydration (Severe)	<div>Any of the two signs</div> <ul style="list-style-type: none"> Lethargy Sunken eyes Very slow skin pinch <div>If two signs positive</div>	<ul style="list-style-type: none"> Treat according to PLAN C

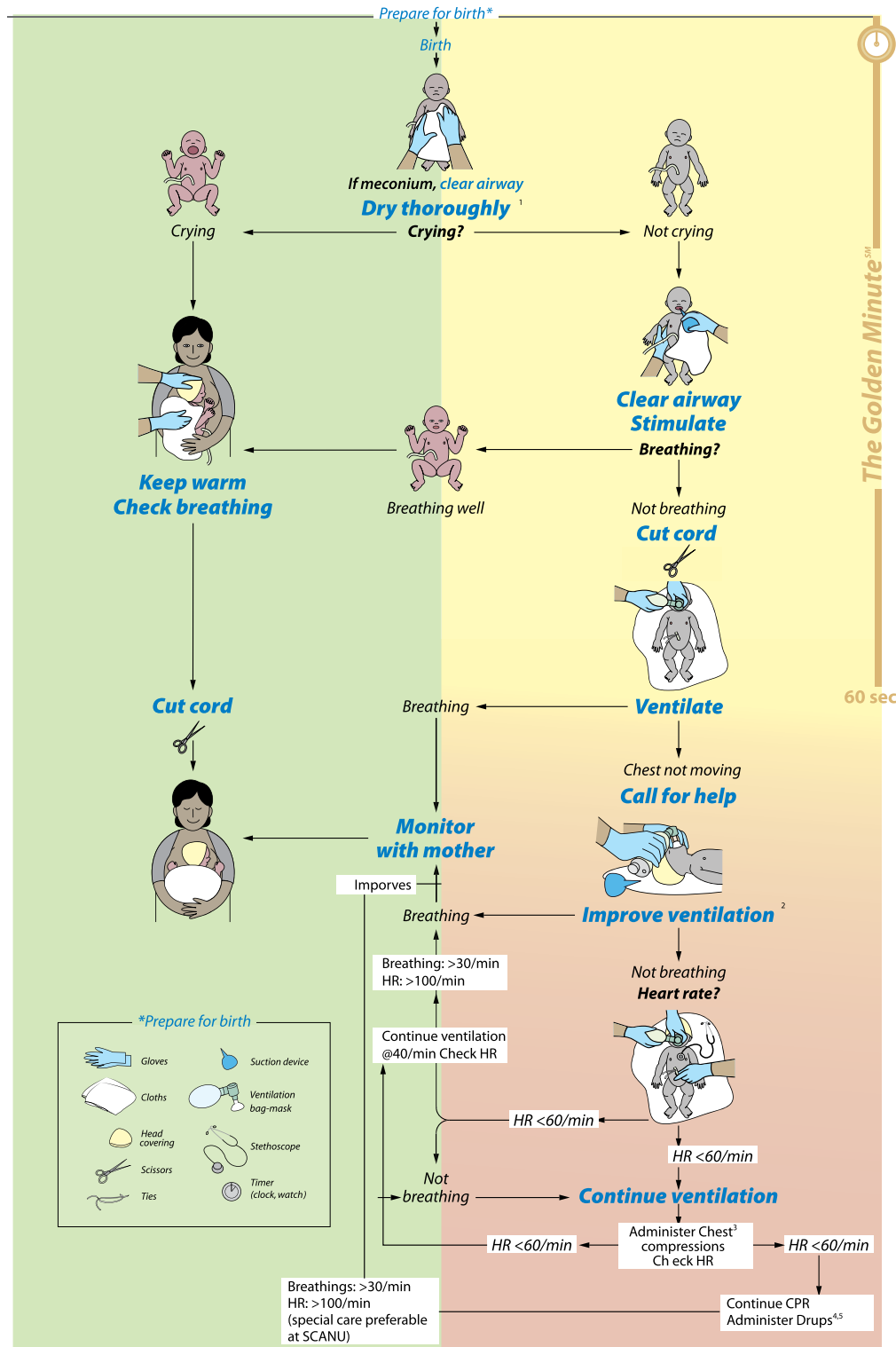
For all newborns displaying emergency signs:

- Manage airway
- Make sure neonate is warm
- Provide the treatment as above
- Draw blood for emergency investigations (Glucose, calcium, sepsis screen)
- Check and correct hypoglycemia.
- Treat cause

³STEPS OF MANAGEMENT OF THE NEONATES WITH PRIORITY SIGNS



ALGORITHM FOR NEONATAL RESUSCITATION



¹If liquor is meconium stained, suction mouth first and then both nostrils, before drying

²Steps to improve ventilation if chest is not moving:

- Check the mouth, the back of the throat, and the nose for secretions, and clear as necessary
- Open the baby's mouth slightly before reapplying the mask
- Reapply the mask to the face to form a better seal
- Reposition the head with the neck slightly extended
- Squeeze the bag harder to give a larger breath

³CPR: One CPR cycle comprises of 3 chest compressions plus 1 ventilation. To give chest compression, hold the baby with the fingers around the torso, thumbs in front, in the midline just below the nipple line, over the lower third of the sternum. Depress the sternum to a depth of approximately one third of the antero-posterior diameter of the chest (about 2/3rd to 1"). Count 'one and'... 'two and'... 'three and'... 'four and'... (give ventilation when counting 'four and'). Continue the cycles for 30 seconds and evaluate color, breathing and heart rate to take the next action on the basis of your findings.

⁴Drugs: Injectable adrenaline 1:1000 solⁿ: Mix 1ml with 9 ml of distilled water to make a 1:10,000 dilution. Give 0.1- 0.3 ml/kg IV.

Additional Drugs:

Injectable dextrose 10%: Give 2-4 ml/kg IV

Injectable naloxone 0.4mg/ml: Give 0.5ml/kg- if labouring mother received opiate within 4 hours of delivery.

⁵Harmful resuscitation practices:

- Slapping the baby on the back
- Hanging upside down by the feet
- Milking the cord
- Routine suction of baby's mouth and nose
- Throwing cold water on the baby's face & body
- Giving glucocorticoid injections
- Blowing into the ears and nose
- Stimulating the anus
- Squeezing the rib cage
- Heating the placenta
- Dipping the baby's cord alternatively in hot and cold water
- Bending the legs on the abdomen
- Keeping the placenta & cord attached for long time, till baby cries.

RECOGNITION AND MANAGEMENT OF SEPSIS^{1,2}

If any one of the DANGER signs present

Not feeding well
Convulsions
Fast breathing (≥ 60 breath/min on second count)
Severe chest indrawing

Low body Temperature (less than 35.5°C or 95.9°F)
Fever (more than 37.5°C or 99.5°F)
Movement only when stimulated or no movement at all

Admit the baby in health facility

Investigation

Septic profile:

- Complete blood count with platelet count
- Blood C/S
- C - Reactive protein (if available)
- CSF study (if available)

Supportive Investigations:

- X-ray chest or abdomen (if respiratory distress or abdominal distention)
- Serum electrolytes,
- Serum glucose and bilirubin

Management

Specific management³

- IV antibiotics : Ampicilin 50mg/kg/dose every 12 hourly if age is less than or equal to 7 days; thrice a day if age is more than 7 days. plus, Gentamicin 5 mg/kg once daily
- Consider to switch to second line of antibiotics (ceftazidime plus amikacin) after 48 hrs if there is no clinical improvement or on clinical deterioration or according to C/S report.

Supportive management

- Thermal care
- Oxygen if required.
- Monitor vital signs, peripheral perfusion and urine out put
- Fluid bolus: if there is poor peripheral perfusion (capillary refill time >3 secs), give normal saline 10 ml/kg I.V bolus. The same vol. can be repeated. Continue maintenance fluids
- Treat convulsions if present, according to guidelines.

Referral

- If admission or lab facilities are not available, refer.
- Give 1st dose of antibiotic(s) and other pre referral management prior to referral
- Send a referral slip with the baby

¹Risk factors for Neonatal Sepsis

1. Low birth weight (<2500 grams) or prematurity
2. Febrile illness of mother with the evidence of bacterial infection during or within 2 weeks prior to delivery.
3. Foul smelling and/or meconium stained liquor.
4. Prolonged rupture of membranes >18 hours.
5. Single or more unclean or > 3 sterile vaginal examination(s) during labor
6. Prolonged labor (sum of 1st and 2nd stage of labor > 24 hrs)
7. Severe perinatal asphyxia (Apgar score <4 at 1 minute)

²Sepsis screen

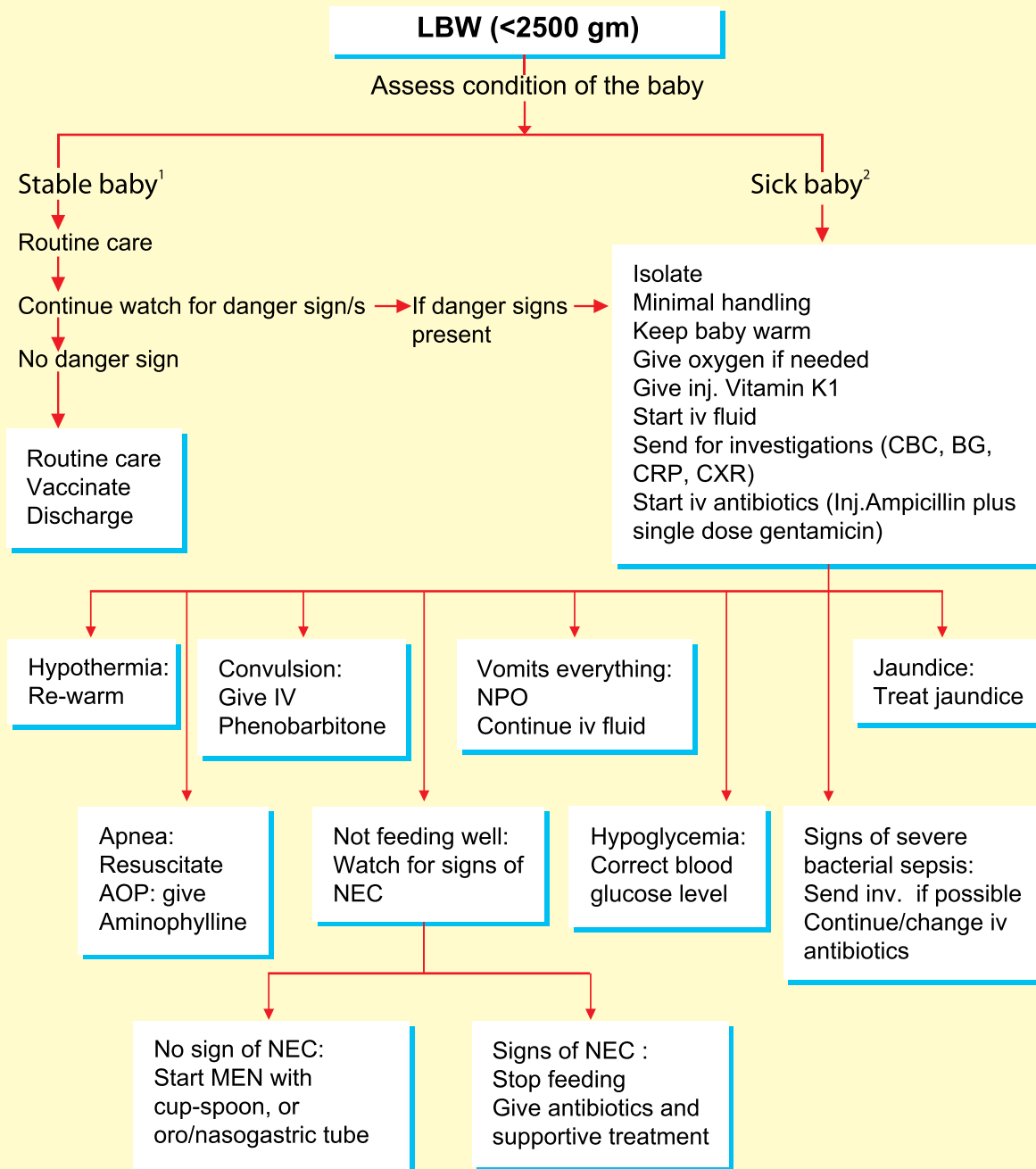
Components	Abnormal value
Total leukocyte count	<5000/mm ³
Absolute neutrophil count	Low counts
Immature/total neutrophil	> 0.2
Micro-ESR	>15 mm in 1st hour
C-reactive protein (C-RP)	>10 mg/dl

³Duration of antibiotic therapy

Diagnosis	Duration
Meningitis (with or without positive blood/CSF culture)	21 days
Blood culture positive but no meningitis	14 days
Culture negative , sepsis screen positive and clinical course consistent with sepsis	7-10 days
Culture and sepsis screen negative , but clinical course compatible with sepsis	5-7 days
Culture and sepsis screen negative , but clinical course not compatible with sepsis . Only risk factors present	3 days

FLOW CHART: MANAGEMENT OF LBW

Wash hands before touching each baby



AOP: Apnoea of Prematurity, NEC: Necrotizing Enterocolitis, MEN: Minimal Enteral Nutrition

¹ Stable baby

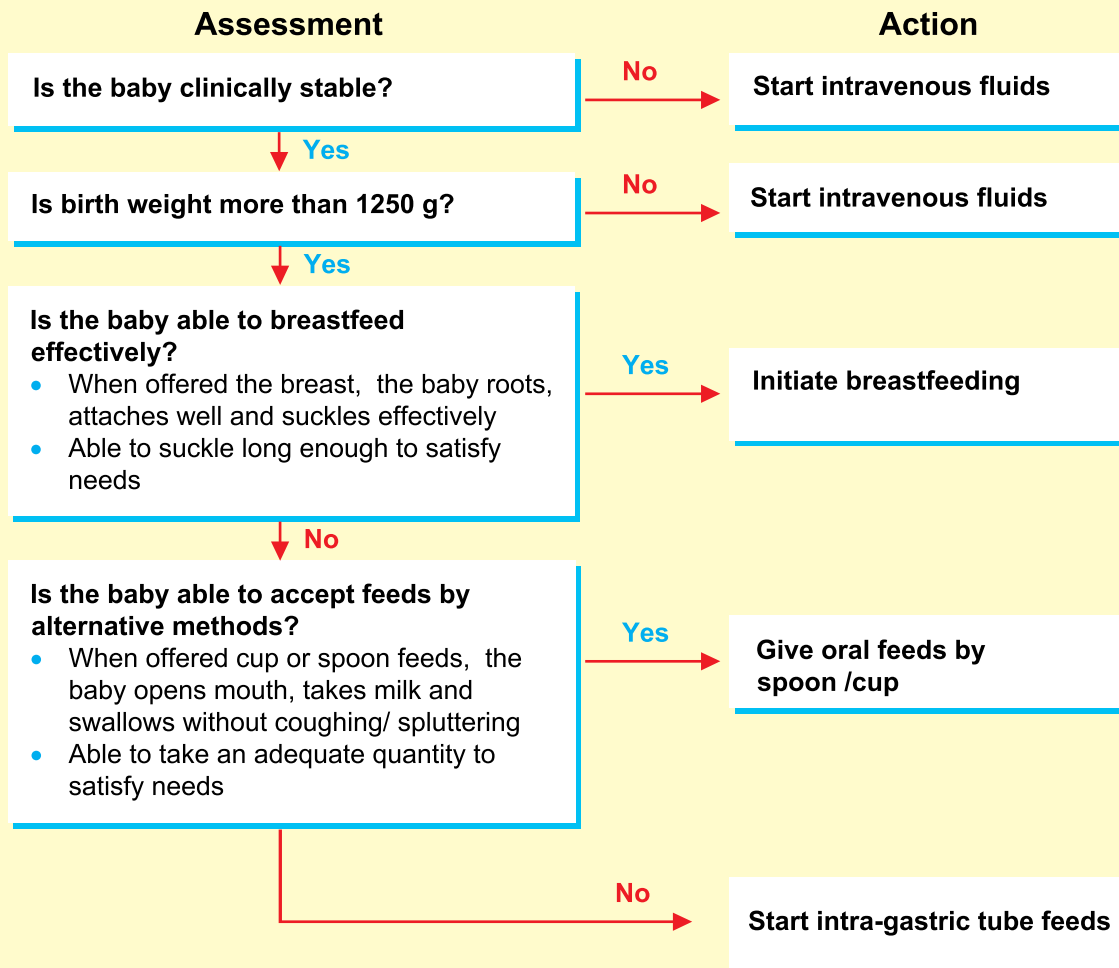
- Baby has no breathing problems
- Sucks well and stays warm
- Active

² Sick baby

- Baby has respiratory problem(s) or is lethargic
- Unable to suck/feed or to maintain normal temperature
- Vomits every time

FEEDING OF LOW BIRTH WEIGHT AND SICK NEONATES

1. Deciding initial feeding method



2. Progression to oral feeds^{1,2,3}

Infants on IV fluids

↓ If hemodynamically stable

Start Minimal Enteral Nutrition (MEN) by OG/NG tube & Monitor for feed intolerance

↓ If accepting well

Gradually increase the feed volume,
Simultaneously taper to stop IV fluids

Infants on OG/NG tube feeds

↓ If accepting feeds well

Try spoon feeds once or twice a day
Also, put on mothers' breast

↓ If accepting well

Gradually increase the frequency
and amount of spoon feeds, and simultaneously
reduce OG feeds

Infants on Spoon/cup feed

Put them on mothers' breast before
each feed Observe for good
attachment & effective sucking

↓ If able to breastfeed
effectively

Direct breastfeeding
Taper and stop spoon feeds once
mother is confident

¹Feed with expressed breast milk

²Box 1: Steps of Spoon/Cup feeding

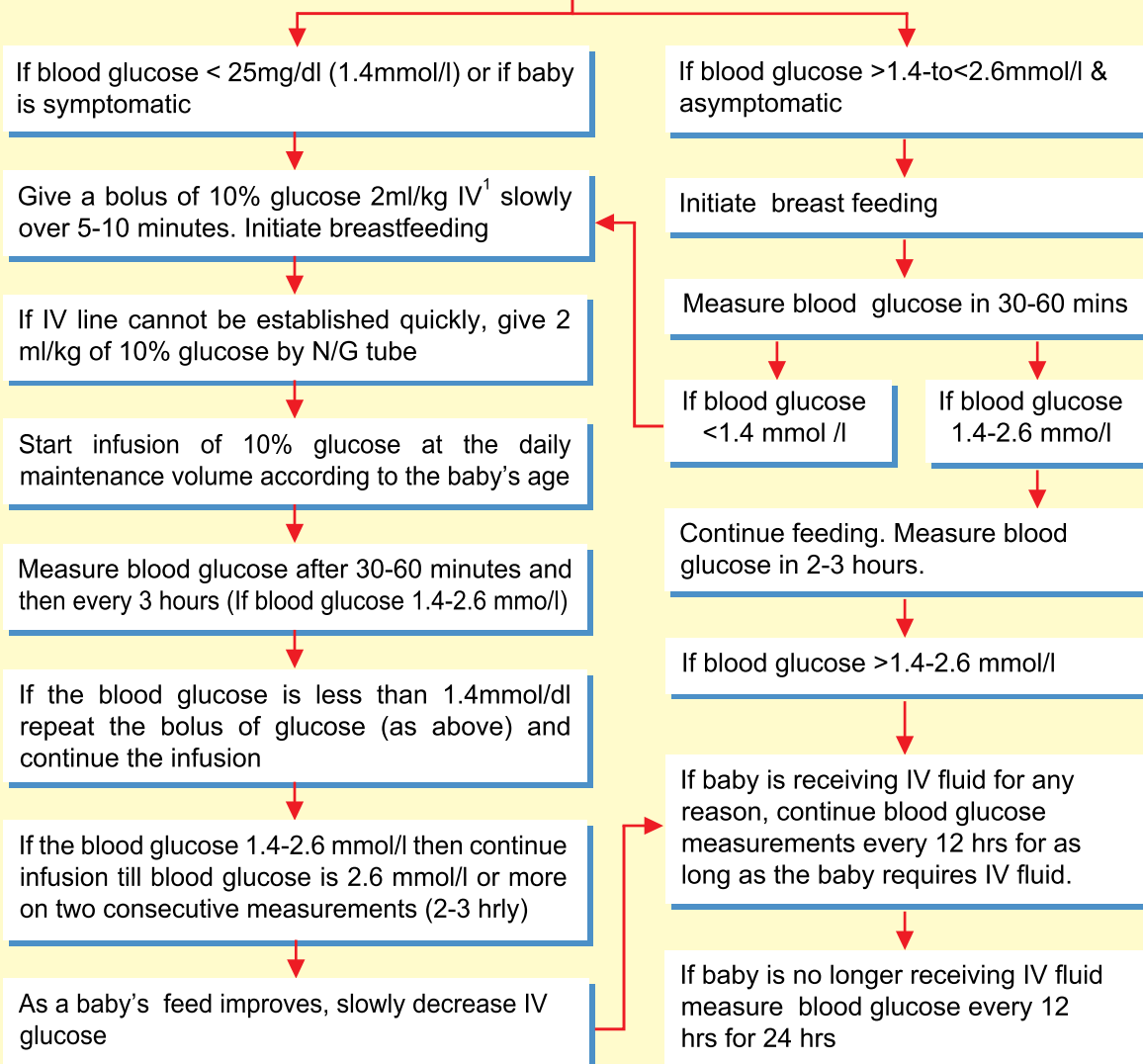
Steps
<ol style="list-style-type: none">1. Infant should be awake and held sitting semi-upright on caregiver's lap; put a small cloth on his or her front to catch drips of milk2. Take a measured amount of milk in the cup3. Hold the cup so that the tip rests lightly on the infant's lower lip4. Tip the cup to pour a small amount of milk into the infant's mouth5. Feed the infant slowly6. Make sure that the infant has swallowed the milk already taken before giving any more7. When the infant has had enough, he or she will close his or her mouth and will not take any more. Do not force-feed the infant.8. Wash the cup with soap and water and then put in boiling water for 20 minutes to sterilize before next feed.

³Box: 2 Steps of Intra-gastric tube feeding

Steps
<ol style="list-style-type: none">1. Before starting a feed, check the position of the tube2. Take a fresh syringe (ideally a sterile syringe should be used) and remove the plunger3. Connect the syringe to the inflow end of the gastric tube4. Pinch the tube and fill the barrel of the syringe with the required volume of milk5. Hold the tube with one hand, release the pinch and elevate the syringe6. Let the milk run from the syringe through the gastric tube by gravity;7. DO NOT force milk through the gastric tube by using the plunger8. Control the flow by altering the height of the syringe. Lowering the syringe slows the milk flow, raising the syringe causes the milk flow faster9. It may take about 10-15 minutes for the milk to flow into the infant's stomach10. Stop tube feed if the infant shows any of the following signs during feeding: breathing difficulty, change in colour-looks blue, becomes floppy, or vomits11. Cap the end of the gastric tube between feeds; if the infant is on CPAP, the tube is preferably left open after about half an hour12. DO NOT flush the tube with water or saline after giving feeds.

MANAGEMENT OF HYPOGLYCEMIA

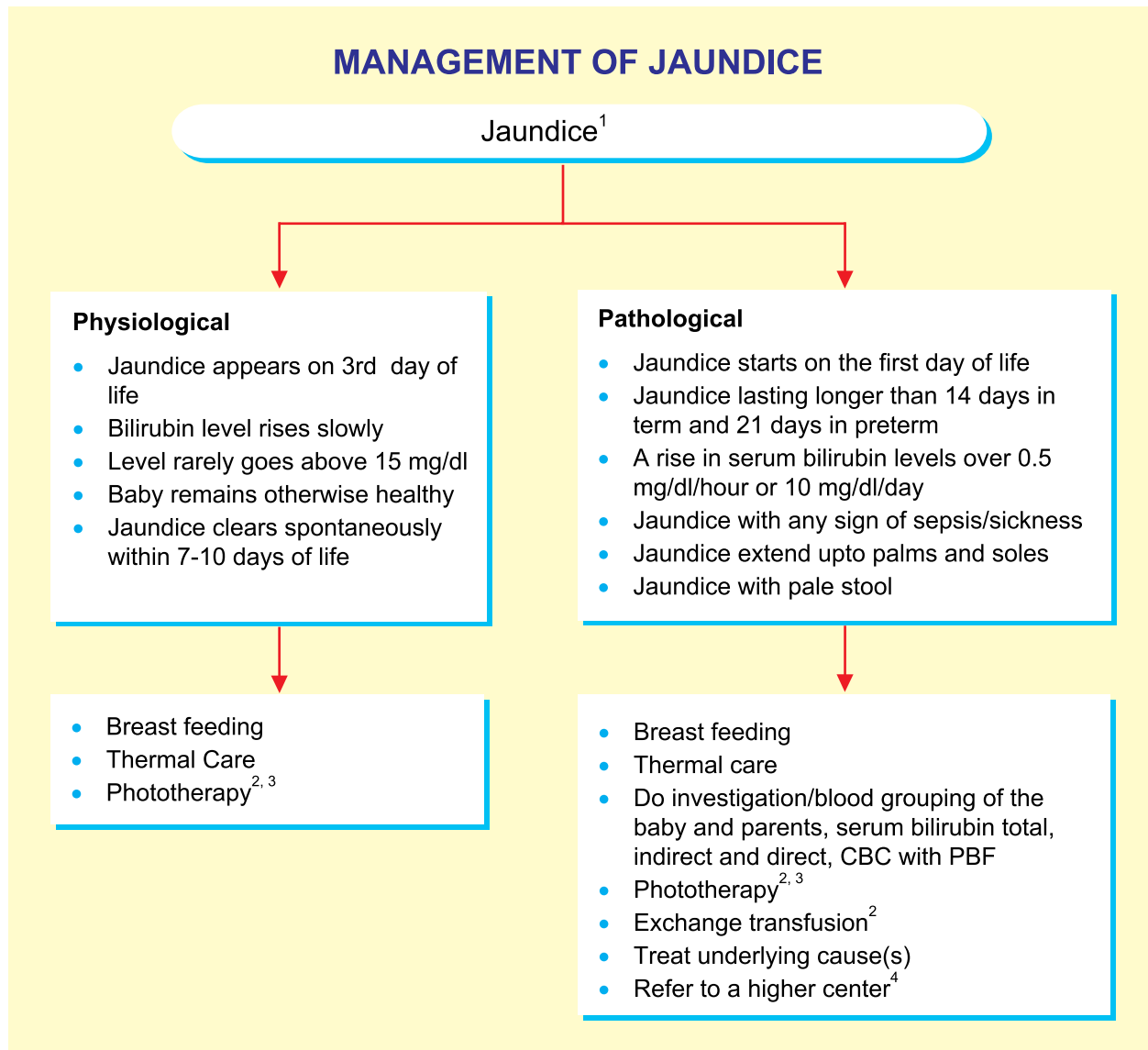
Blood glucose <45mg/dl (2.6mmol/l)



¹Indications of IV glucose in Hypoglycaemia:

- Inability to tolerate oral feeds
- Symptomatic Hypoglycemia
- Oral feeding can not maintain normal glucose level
- Glucose level < 25mg/dl (1.4 mmol/L)

MANAGEMENT OF JAUNDICE



¹Visual Inspection of neonates with jaundice:

Baby should be examined under good day light.

Jaundice visible up to:

1. Face – approximate bilirubin level : 5mg/dl
2. Umbilicus - approximate bilirubin level: 10-15mg/dl
3. Palms and soles - approximate bilirubin level: 20 mg/dl

²Total serum bilirubin cut offs for phototherapy or exchange transfusion

	Phototherapy		Exchange transfusion*	
	Healthy babies	Babies with risk factor(s)**	Healthy babies	Babies with risk factors**
Day 1	Any visible jaundice		15 mg/dL(260)	10 mg/dL(220)
Day 2	15 mg/dL(260)	10 mg/dL(170)	20 mg/dL(425)	15 mg/dL(260)
Day ≥ 3	18 mg/dL(310)	15 mg/dL(250)	25 mg/dL(425)	20 mg/dL(340)

The values are expressed in mg/dL ($\mu\text{mol/L}$)

* indicated immediately if baby exhibits any sign(s) of acute bilirubin encephalopathy or kernicterus: hypertonia, abnormal posturing such as arching, retrocollis, opisthotonus; or convulsion, fever or high pitched cry)

** Risk factors: gestation <35 wks or weight <2 kg, hemolysis, sepsis, asphyxia (5 minute apgar score of 3 or less), Temperature instability, acidosis, hypo albuminemia(<2.5gm/dl), any sick baby.

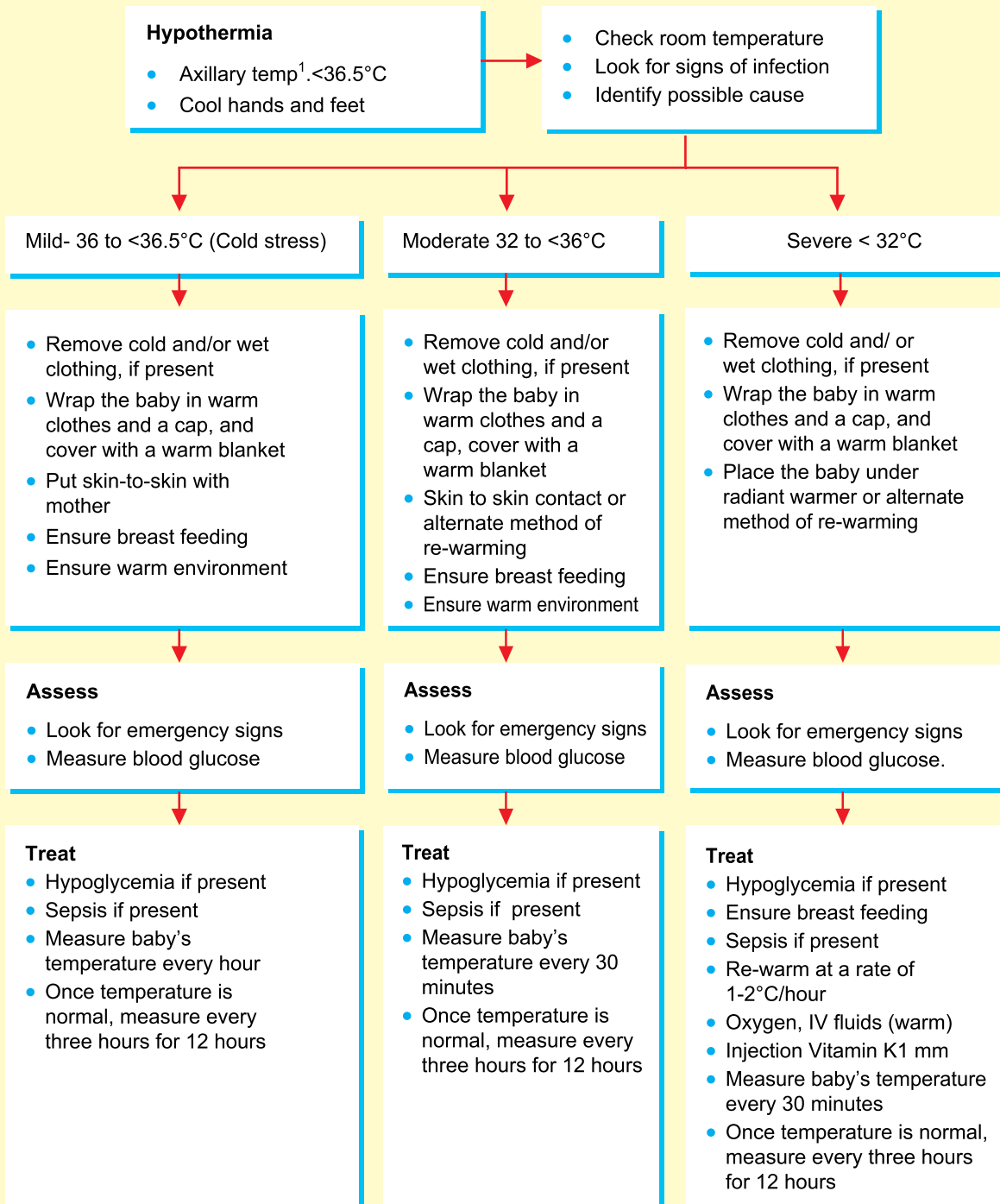
³Tips for delivering safe and effective phototherapy

- Protect the eyes with eye bandages
- Keep the baby naked with a small nappy to cover the external genitalia
- Place the baby as close to the lights as the manufacturers' instructions allow. Use white cloth or aluminum foil to reflect light back onto the baby, making sure not to impede the airflow that cools the bulbs
- Do not place anything over the top of the phototherapy unit. This may block air vents or light and items may fall on the baby.
- Encourage frequent breastfeeding. Unless there is evidence of dehydration, supplementing breastfeeding with IV fluid is unnecessary
- Change position supine to prone after each feed to expose the maximum surface area of baby to phototherapy
- Keep diaper area dry and clean
- Phototherapy does not have to be continuous and can be interrupted for feeding, clinical procedures, and to allow maternal bonding.
- Monitor temperature every 4 hours and weight every 24 hours. Giving frequent feeding will prevent excessive weight loss and temperature from rising
- Measure serum bilirubin frequently, about every 12 hours. Visual assessment of jaundice during phototherapy is unreliable.
- Change tube lights every 6 months (or usage time >1200 hrs) whichever is earlier; or if tube ends blacken or if tubes flicker.

⁴Criteria for referral to a higher center:

- Jaundice appearing within 24 hours
- Rapidly rising serum bilirubin level - > 0.5 mg/hour or >10 mg/day
- Indirect serum bilirubin level more than 20 mg/dl in term baby and more than 15-18 mg/dl in preterm baby.
- Prolonged neonatal jaundice i.e. jaundice persisting after 2nd week of life
- Jaundice with pale stool.

MANAGEMENT OF HYPOTHERMIA



¹Temperature measured by keeping the bulb of the thermometer in the axilla for 3-5 minutes

FLUID THERAPY IN NEONATES¹

Preterm (<32 weeks) or in whom full enteral feeds cannot be started (START on Minimal Enteral Nutrition (MEN) 10-15mL/kg); Except Severe hemodynamic instability, suspected or confirmed NEC, perforation or ileus

Increase 20- 30mL/kg daily. STOP if aspirate is >3mL or bilious/ blood stained; GRV>25%²

Deduct the same amount from the total daily fluid requirement

Preterm

Term

60mL/kg

60mL/kg

Day - 1

Daily increment³
10-15 mL/kg

Daily increment³
15-20 mL/kg

90mL/kg
Potassium:
2mmol/kg

100mL/kg
Potassium:
2mmol/kg

Day - 3

150mL/kg
Potassium:
2mmol/kg

150mL/kg
Potassium:
2mmol/kg

Day - 7

¹Composition of IV fluid:

Day 1-2: 5-10% Dextrose in aqua

Day 2 onwards: 5 -10% Dextrose in 0.225% sodium chloride

Day 3 onwards: Potassium: 2mmol/kg/day (Inj. potassium, 1 ml \equiv 2 mmol). Addition of potassium to IV fluid is required when a baby cannot be fed for a prolonged period of time. This must be done with extreme caution because a small overdose can have serious consequences.

²Measure gastric residual volume (GRV) only if abdominal girth >2 cm above baseline

³Do not increase fluid volume if:

- ✓ Weight gain
- ✓ Tachycardia
- ✓ Edema in lower limbs
- ✓ Puffy eyes
- ✓ Urine output < 1mL/kg/hr (oliguria)

SHOCK IN NEWBORN^{1,2}

- Pale, mottled
- Cold extremities
- Disturbed sensorium, lethargy, unconsciousness



Manage airway; optimize breathing, circulation and temperature;
start oxygen if low SpO₂ (<90%)

Assess

- Heart rate, B.P., Oxygen saturation
- Capillary refill time (CRT)
- Urine output
- Level of sensorium



- Fluid bolus (Normal saline/Ringer's Lactate) 10 ml/kg over 20 min
- Vasopressors

Reassess

- If does not improve and no signs of fluid overload, repeat the same bolus
- If unresponsive to fluid bolus/persistent shock; refer

¹Table I: Diagnosis and treatment of shock based on history and clinical examination

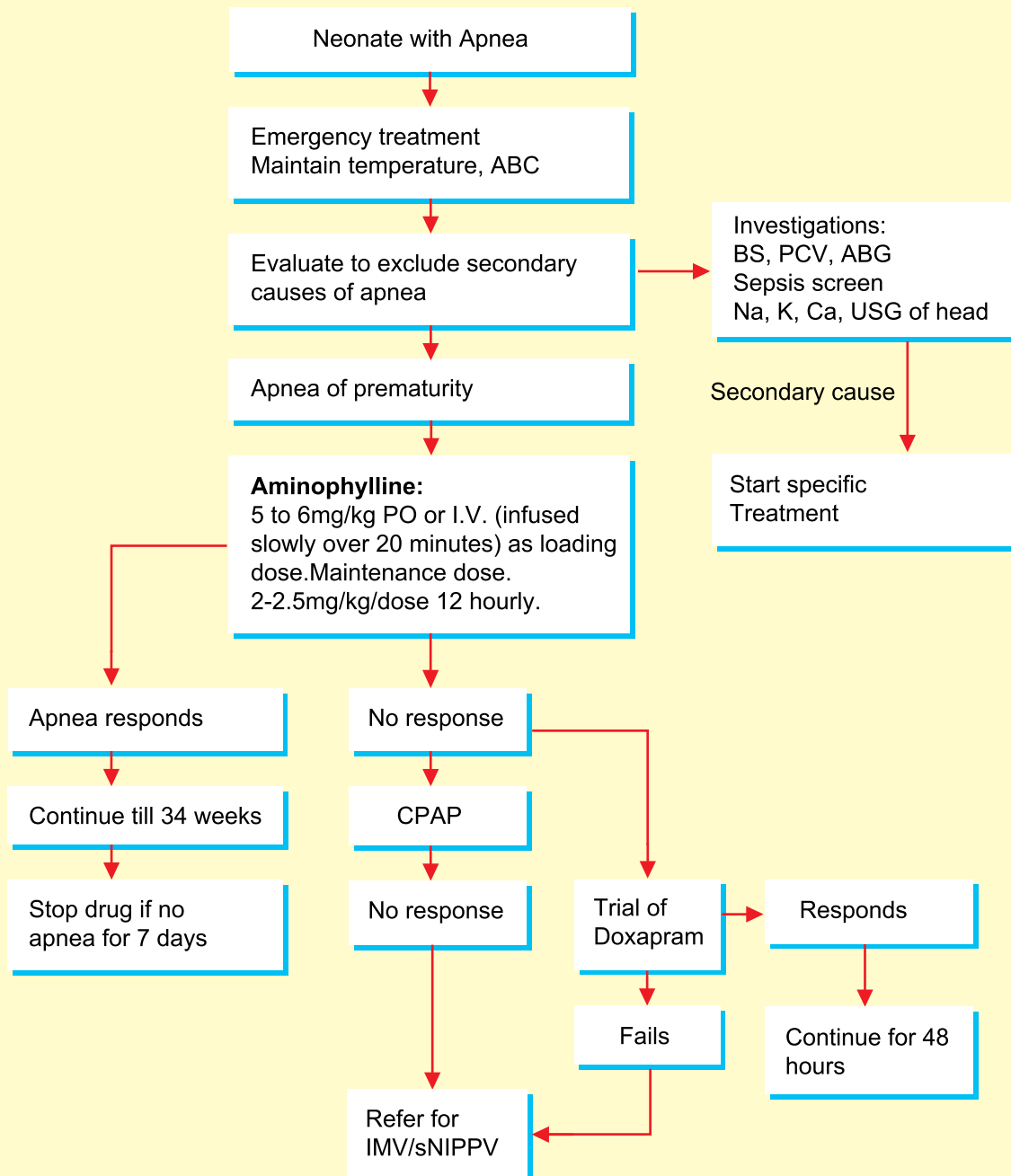
Cause	History / Examination	Specific treatment
Blood loss	Ante partum Hemorrhage Blood loss internal/external Age Day 1	Fluid bolus Blood transfusion
Asphyxia	Need for Resuscitation for poor respiratory effort at birth HIE signs (refer post asphyxia)	Fluid boluses Vasopressor
Sepsis	Predisposing factors for infection Age Day 3 or >	Fluid bolus Antibiotics Vasopressor
Severe dehydration	Loose stool, vomiting, failure to feed	Fluid bolus IV fluids Antibiotics
Cardiac	Term baby; Normal at birth Age Day 3-4 Look for delayed femoral pulse, murmur	May need PGI ₂ Arrange referral
PPHN	Meconium stained term baby Age Day 1-3	Fluid bolus Oxygen Arrange referral

* In all sick babies maintain glucose level, oxygen saturation, temperature, electrolytes (Ca, Na, K, Mg)

²Table II: Monitoring of baby with shock

Signs		At admission	1 hr	2 hr	3 hr	4 hr
HR/mt						
CFT sec						
Urine output						
Sensorium						
Temperature	Core					
	extremities					

ALGORITHM FOR MANAGEMENT OF NEONATAL APEA



(ABC: airway, breathing, circulation, BS: blood sugar, PCV: packed cell vol, ABG: arterial blood gas, CPAP: continuous positive airway pressure, IMV: intermittent mandatory ventilation, sNIPPV: synchronized intermittent positive pressure ventilation)

MANAGEMENT OF NEONATE WITH SEIZURE

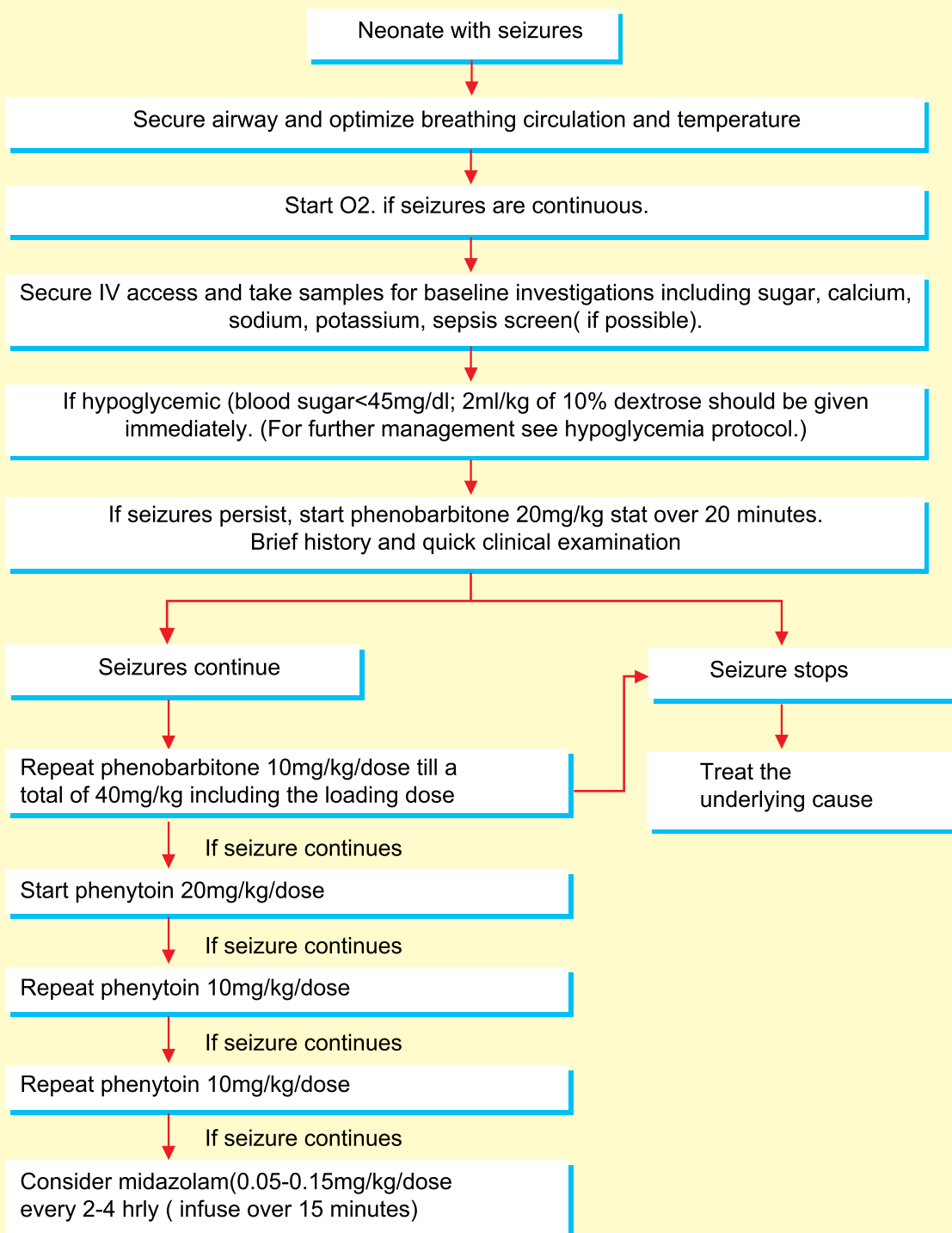
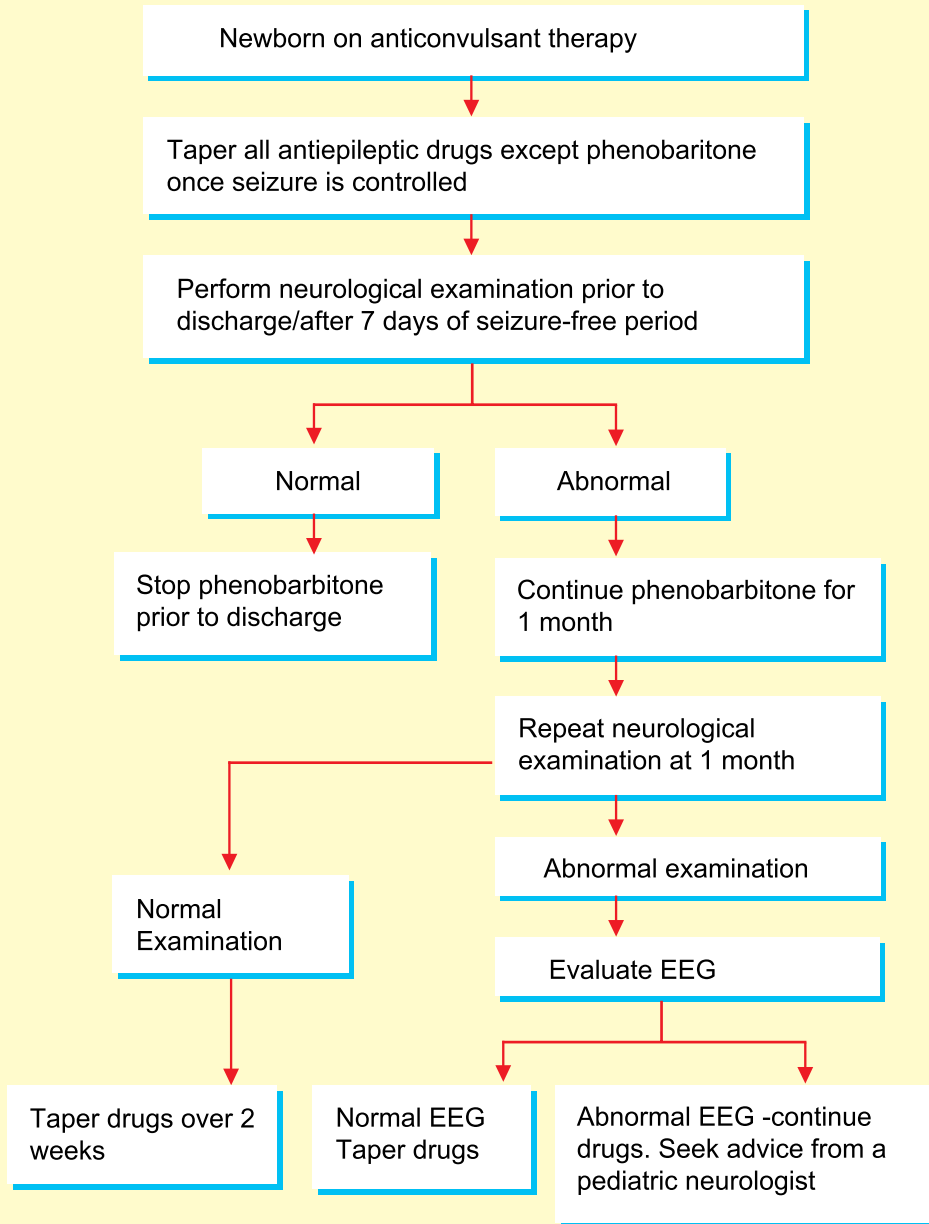


Table 1. Seizures vs. Jitteriness

Seizures	Jitteriness
Have both fast and slow components Slow movements (1-3 jerks per second)	Rhythmic movements (4-6 per second); tremors are of equal amplitude
Often associated with eye movements (tonic deviation or fixed stare) and/or autonomic changes (changes in heart rate)	Not associated with eye movements and/or autonomic changes
Not provoked by stimulation	Provoked by stimulation
Does not stop with restraint	Stops with restraint
Neurological examination - often abnormal	Neurological examination – usually normal

FLOW DIAGRAM ON WEANING AND DURATION OF ANTICONVULSANT THERAPY



Maintenance therapy :

If convulsions recur within two days of initial control give phenobarbital 5 mg/kg body weight once daily until the baby has not had a convulsion for seven days.

If convulsions recur after two days, repeat treatment with phenobarbital as described for initial management of convulsions and follow with phenobarbital maintenance therapy as above.

TRANSPORT OF A SICK BABY

Determine if there is a genuine indication¹ to transport the baby to higher health facility

- Birth weight <1200 gm / gestation <30 wk
- Severe respiratory distress
- Shock not responding to fluid boluses and vasopressors
- Severe jaundice needing exchange transfusion
- Major congenital malformations e.g. meningomyelocele.
- Refractory seizures
- Abdominal distension with bilious vomiting



- Making the baby S.T.A.B.L.E² before transport
- Secure IV line and give necessary treatment before transfer



Prepare for transport

- Counsel the parents and family regarding need for transport
- Communicate with and write a brief note to the referral team
- Arrange a healthcare provider, mother and a relative to accompany
- Assemble supplies and equipment to carry³ and arrange for transport vehicle



Care during transport

- Carry the equipment & supplies
- Monitor frequently (temperature, airway and breathing, circulation, IV cannula and infusions)
- Ensure that the baby receives feeds or fluids
- Stop the vehicle, if necessary, to manage problems



Feedback after transport

Communicate with referral team for:

- condition of the baby at arrival
- outcome of the baby

¹Indications have to be individualized for each facility depending upon capabilities and infrastructure of referring and referral facilities

²S.T.A.B.L.E.

S -Sugar

T - Temperature

A - Airway

B - Blood pressure (circulation/CRT)

L - Lab work / Lines

E – Emotional support to family

³Supplies and equipment to carry

Equipment and supplies		Drugs & fluids*
<ul style="list-style-type: none"> • Source of warmth, blanket • Resuscitation equipment: <ul style="list-style-type: none"> o bag o appropriate sized mask o suction apparatus o oxygen cylinder with flow meter o nasal catheter, or face mask • Stethoscope, thermometer 	<ul style="list-style-type: none"> • Fluids & feeds: <ul style="list-style-type: none"> o milk o gastric tubes o IV infusion set o butterfly set or neoflon • Syringes and needles (various sizes and types) • Adhesive tape • Sterile gloves • Antiseptic solution and cotton-wool balls • Napkins (diapers) • A source of light 	<ul style="list-style-type: none"> • Any drug (e.g. antibiotics) the baby is receiving if a dose is anticipated during the trip • IV fluid

** If the baby is able to feed and the mother is not accompanying the baby, carry expressed breast milk.*

For further information please contact:

IMCI Section
Directorate General of Health Services
EPI Bhoban
Mohakhali, Dhaka
Telephone: 88 02 9887570



Australian Government
AusAID

