

Toolkit for Setting Up Special Care Newborn Units, Stabilisation Units and Newborn Care Corners

Functional Description ■ Equipments ■ Renewable Resources

Toolkit for Setting Up Special Care Newborn Units, Stabilisation Units and Newborn Care Corners

Functional Description ■ Equipments ■ Renewable Resources



Acknowledgements

This toolkit is a result of significant contribution by large number of agencies and professionals. National Neonatology Forum (NNF) led the initiative supported by UNICEF and the WHO Collaborative Center for Training and Research in Newborn Care, All India Institute of Medical Sciences, New Delhi. Dr Anil Narang led the NNF accreditation committee that set standards for level II newborn care in India. The toolkit draws heavily from these standards. We acknowledge that the idea as well as the initial draft was inspired by the work done by Society for Applied Studies in collaboration with UNICEF field office for West Bengal.

We sincerely acknowledge the contributions made by Dr Harish Chellani, Dr Sidharth Ramji, Dr Neelam Kler, Dr Arvind Saili, Dr Sushma Nangia, Dr Satish Saluja, Dr VK Paul and Dr Ashok Deorari in drafting and revising the draft. Dr Kaninika Mitra, Dr Pavitra Mohan, Dr Gagan Gupta, Dr Ajay Trakroo and Dr Harish Kumar provided useful inputs and field insights. Special thanks to James Patterson who led the initiative to firm up the specifications of equipments and Dr Anju Puri who very patiently reviewed, revised and finalised the draft. Dr Marzio Babilio believed that quality healthcare is possible for newborns in India, and engaged partners to translate the belief into reality. This toolkit is a step in that direction.

The preparation of the toolkit was funded by UNICEF from a contribution by Norway India Partnership Initiative.

Contents

	Page No.
Abbreviations	vi
Introduction.....	1
Description of newborn care facilities at different health setting levels	2
Section – I: Special Care Newborn Unit.....	3
Part A: Setting up of a special care newborn unit in a district hospital.....	4
A.1 Services at the unit	4
A.2 Location and size of the unit.....	4
A.3 Minimum space requirement	5
A.4 Configuration of the unit	5
A.5 Electrical and mechanical needs	7
A.6 Lighting	7
A.7 Ambient temperature and ventilation	8
A.8 Acoustic environment.....	8
Part B: Guide for equipment and renewable resources	11
B.1 Equipments for individual care.....	13
B.2 Equipment for disinfection	14
B.3 Laboratory equipment	14
B.4 General equipment.....	14
B.5 Renewable and consumables	15
Part C: Technical specifications of equipments.....	17
Part D: Asepsis and Housekeeping Protocols	18
Part E: Annual Maintenance Contract (AMC), specific coverage and requirements for critical equipments	19
Part F: Human resources	20
Part G: Cost	21
Section – II: Stabilisation Unit.....	22
2.1 Setting up of stabilisation unit at first referral units	23
2.2 Services at a stabilisation unit.....	23
2.3 Configuration of a stabilisation unit.....	23
2.4 Equipment and renewables required for a stabilisation unit.....	23
2.5 Human resources	24
2.6 Referral services.....	24
2.7 Cost of setting up a stabilisation unit	24
Section – III: Newborn Care Corner.....	25
3.1 Designation of newborn care corner in labour room.....	26
3.2 Services at the corner	26
3.3 Configuration of the corner.....	26

3.4 Equipment and renewables required for the corner	26
3.5 Human resources	26
3.6 Cost of setting up newborn care corner.....	27
Summary	27

Annexures.....	28
Annexure 1: Estimating number of beds required for SCNU	29
Annexure 2: Generic specifications for the equipments	30
Annexure 3: Asepsis and housekeeping protocols	59
Annexure 4: Instructions for equipment and equipment use	63

Abbreviations

AMC	Annual Maintenance Contract
CFL	Compact fluorescent lighting
CRT	Capillary refill time
ET	Endo-tracheal tube
FRU	First Referral Unit
IUGR	Intrauterine Growth Retardation
LED	Light-Emitting Diodes
OT	Operation Theatre
PVC	Poly Vinyl Chloride
ROP	Retinopathy of Prematurity
SCNU	Special Care Newborn Unit
USG	Ultra Sonography

Introduction

India accounts for 30 per cent of the neonatal deaths globally. In India, the neonatal mortality rate is 37/1,000 live births. Most of these deaths occur within the first days of life: 46.2 per cent occurring in the first two days of life and 73.3 per cent taking place within the first week of life.¹

Thus, serious, concerted efforts have to be made to address the needs of a newborn in its first days in order to reduce neonatal mortality in India.

While simple, known, preventive and promotive interventions within the home environment – such as exclusive breastfeeding or keeping the baby warm – remain the corner-stone in tackling newborn mortality, an effective link between healthcare facilities and community based newborn care is needed. Provision and delivery of services for both essential newborn care and the care of sick newborns in the existing health facilities at the district and sub-district levels is lacking.

The purpose of this toolkit is to support the efforts of state and district health administrators, health care entrepreneurs and others involved in planning and managing Facility Based Care for Newborns at various levels. It provides recommendations on setting up Special Care Newborn Units (SCNUs), Stabilisation Units and Newborn Care Corners at different levels of healthcare organisation. It does not, however, provide guidelines on organising level III newborn care units.

The recommendations relate to the services, design, infrastructure, equipments, supplies and human resource requirements for providing newborn care at these levels. The document also provides detailed specifications of the equipments and tips for maintenance and use of the equipments.

It is hoped the toolkit will serve as a ready-reference and a one-stop guide for the establishment of newborn care units. However, defining the exact scale and design of these units in a given situation is complex, and would often require drawing in expertise from other sources and institutions. Upon request, National Neonatology Forum (NNF) provides handholding support to individuals and agencies in this process.

We hope that this kit will contribute to expansion of newborn care in India and ensure that the economic and technological advances of the country are adequately harnessed to ensure best possible start in lives for all children. In the future, we hope to update this toolkit on a regular basis, incorporating new research findings, experiences and suggestions. Your suggestions are welcome.

1. *Multi-centric Home based Intervention project of the Indian Council of Medical Research [ICMR annual report 2005-06]*

Description of newborn care facilities at different levels

Special Care Newborn Unit (SCNU): The Special Care Newborn Unit (SCNU) 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 *Section-I*

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

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 *Section-III*

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

Table 1: Newborn care facilities at different health care levels

Health Facility	All Newborns at Birth	Sick Newborns
Primary Health Centre	Newborn care corner in labour rooms	Prompt referral
Community Health Center/ First Referral Unit	Newborn care corner in labour rooms and in operation theatres (OT)	Neonatal Stabilisation Unit
District Hospital	Newborn care corner in labour room and in operation theatre (OT)	Special Care Newborn Unit

Section – I

Special Care Newborn Unit



Part A: Setting up of a Special Care Newborn Unit in a District Hospital

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

A.1 Services at the unit

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

1. Care at birth, including resuscitation of asphyxiated newborns
2. Managing sick newborns (except those requiring mechanical ventilation and major surgical interventions)
3. Post-natal care
4. Follow-up of high risk newborns
5. Referral services
6. Immunisation services

In addition, the unit should also provide training to medical officers and nurses in 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 area of the hospital where births occur. The unit should preferably be situated close to the labour room
- If obstetric and neonatal services are on separate floors of the hospital, provision for

quick access like a ramp or an elevator should be provided for service between the birthing unit and the care unit.

- Units receiving infants from other facilities should have ready access to the hospital’s transport receiving area.
- Transport of newborns within the hospital should be possible without using public corridors. It should provide effective circulation for staff, family, and equipment. Passage for accessing other services should not be through the unit.

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 district hospital). Additionally, for newborns delivered outside the hospital (extramural) and being brought to the hospital for special care, an extra allowance of 30 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: $30\% \times 9 = 3$ beds
- Total beds required = 12

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 becomes unviable 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 (Annexure 1). For an optimum size, one has to consider economic realities and sustainability.

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

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.

This 100 sq ft per bed of space should be utilised as follows:

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

A.4 Configuration of the unit

The SCNU design should be driven by a systematic plan of space utilisation, 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. The ideal design should provide constant surveillance of each bed area from the nurses' 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 (50 sq ft per bed) 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 SCNU. 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 medications
- Mother's area for expression of breast milk, breastfeeding and learning mother crafts
- Side 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 metres). Hand washing stations should be no closer than three feet (0.9 metres) from a newborn bed or clean supply storage. Protocols for asepsis and hand washing are in Annexure 2.

- 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 x 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 within the unit to allow mothers to breastfeed comfortably. This area should have communication aides so that families can learn about 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): Such areas should be there for storage of supplies frequently used in the care of newborns. Routinely used supplies such as diapers, linen, cover gowns, 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 holding 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/holding 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 soiled utility/holding room should be so situated that it enables 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 SCNU should be located near the entrance to the unit. This will also enable personnel to 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 introduction does not significantly disrupt functions of the unit or impinge on the space designed for other purposes.

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. Placement of an automatic washing machine with dryer 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 SCNU.

A.4.5 Step down area (rooming in 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 SCNU to some extent.

The additional space requirement should be about 40-50 sq ft per bed: the space can be in the SCNU 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 organised keeping in mind safety, easy access and maintenance.

A.5.1 Electrical needs

- Power supply – The unit should have a 24-hour uninterrupted stabilised power supply. Back up power supply is a must, with one or two outlets. To ensure this, a generator with 25-50 KVA capacity and a servo stabiliser (3 phase) of the same rating is needed. Monitors must have UPS.
- Electrical outlet for individual beds - To handle equipment, 6-8 central voltage stabilised outlets are required per bed: 4 of them should be of 5 amperes and another 4 of 15 amperes. Two 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 minimise 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. Other flooring that may be used includes Kota Stone or chip flooring; however, such flooring needs to be well-polished.

- Walls - As with floors, the ease of cleaning, durability, and acoustical properties of wall surfaces must be considered. Although commonly used, vinyl wall covering contains PVC which degrades indoor air quality, and thus should be avoided. Walls should be glazed-tiled up to a height of at least seven feet.
- 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 litres.

A.6 Lighting

A.6.1 Ambient lighting

Perception of skin tones is critical in a SCNU; 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 space; this does not exclude direct procedure lighting, as described below.

Any lighting used outside the baby area shall be located so as to prevent any newborn's direct line of sight to the fixture.

Lighting fixtures 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 SCNU, including the charting areas, medication preparation area, reception desk, and hand washing areas 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 should 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 minimise 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 minimise 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 and to minimise drafts on or near the newborn beds. General ventilation can be provided in two ways: exhaust-only and supply-and-exhaust. Exhaust fans pull stale air out of the unit while drawing fresh air in through cracks, windows or fresh air intakes. Exhaust-only ventilation is a good choice for units that do not have existing ductwork to distribute heated or cooled air. Supply-and-exhaust ventilation is a good choice for units with heating or cooling ducts, as it is an inexpensive way of providing fresh air.

A.8 Acoustic environment

The acoustic conditions of the unit should favour speech 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.

Two sample designs of the SCNUs are depicted as follows:

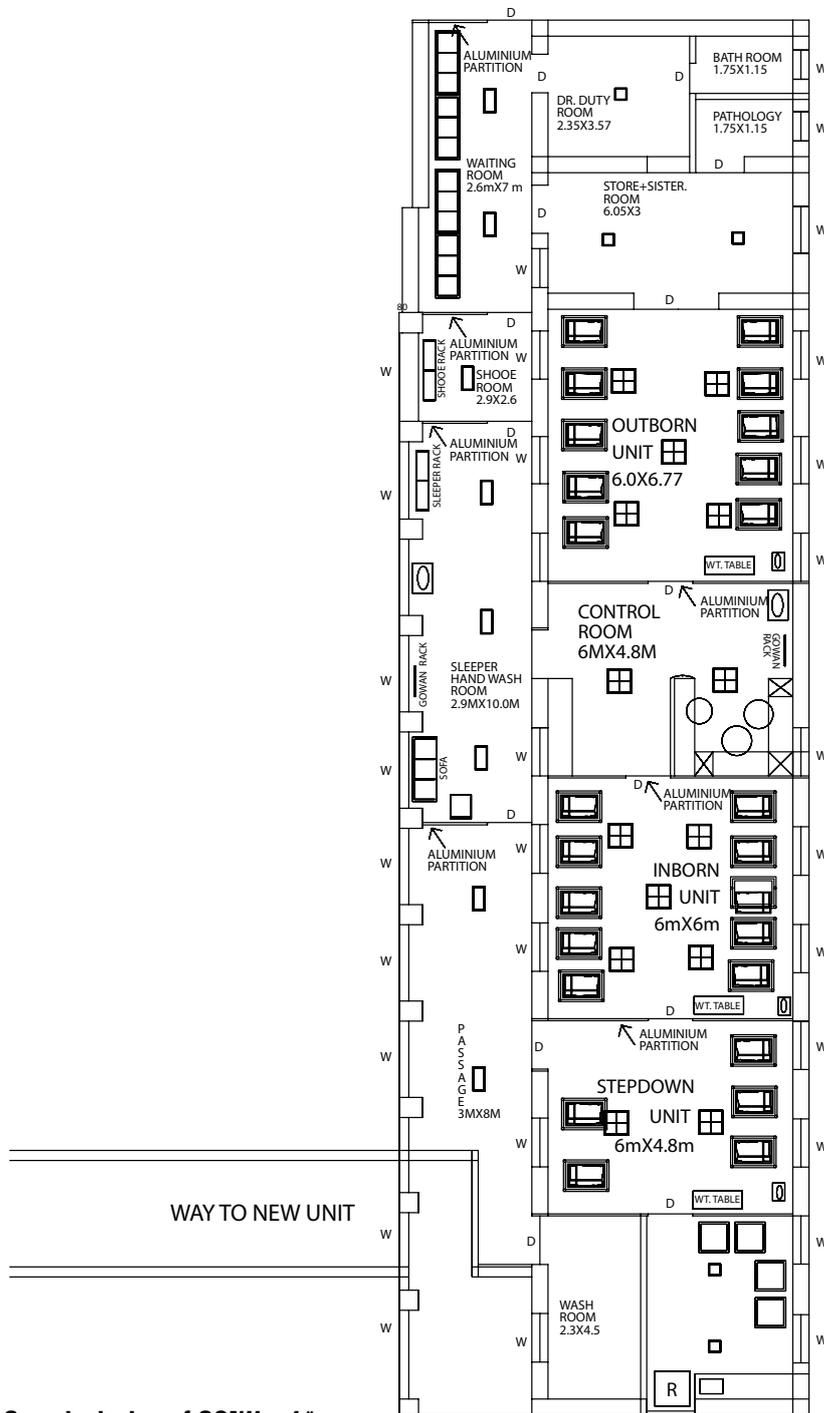


Figure – 1: Sample design of SCNU – 1*

* Adapted from design of SCNU at Satna District Hospital, M.P.

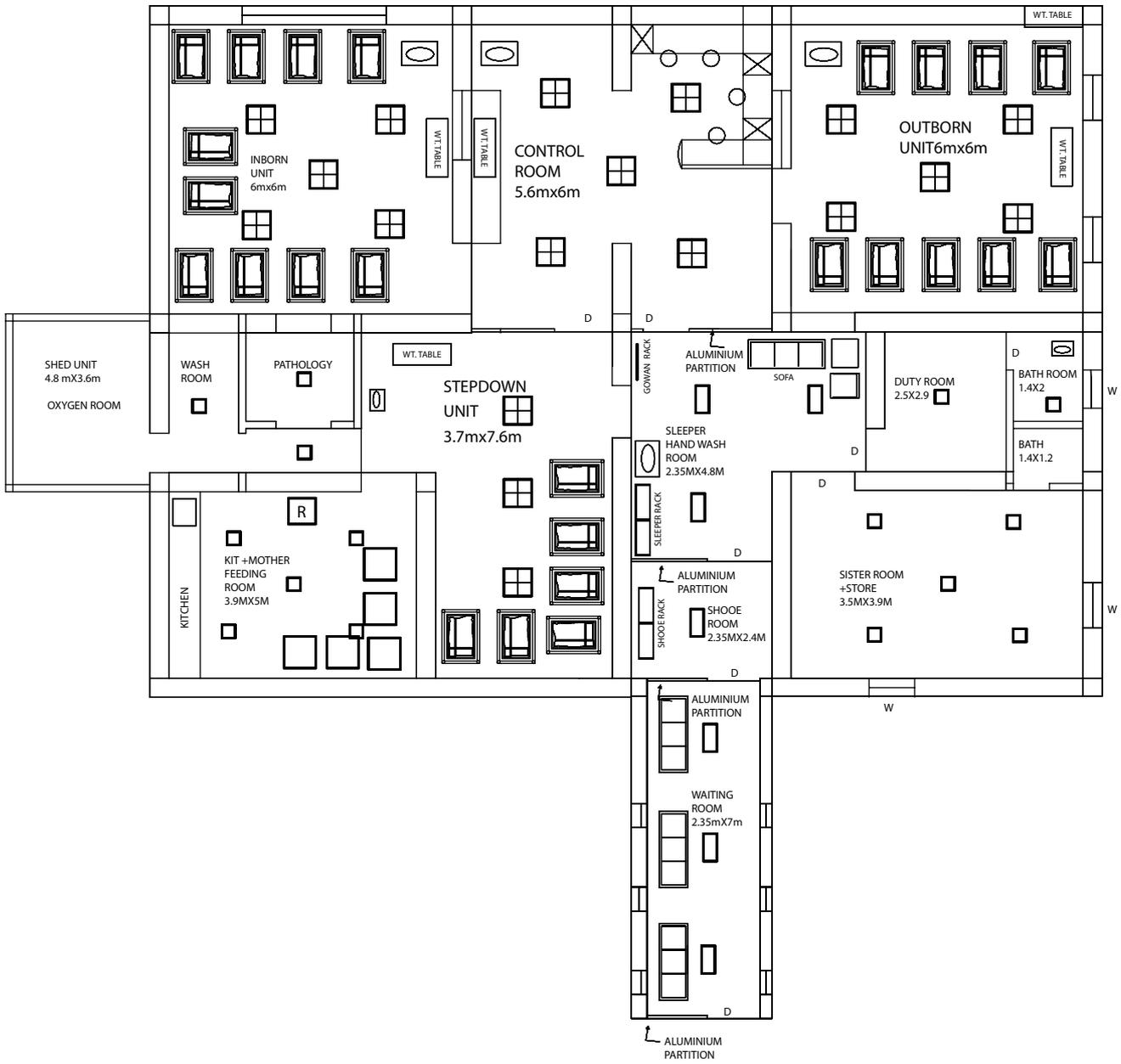


Figure – 2: Sample design of SCNU – 2*

* Adapted from design of SCNU at Bhind District Hospital, M.P.

Part B: Guide for Equipment and Renewable Resources

Medical devices and renewable resources should be planned on the basis of the functional services to be provided by the unit. There must be access to equipment for:

- Providing radiant heat
- Monitoring of vital signs, including blood pressure and blood gases
- Fluid and drug treatment
- Providing venous access
- Portable X-ray facilities

Some of the questions that the planners need answers on, with respect to newborn care equipments are:

1. What are the equipments required for Special Care Newborn Unit?
2. What quantities are required for a 12 bedded unit? These recommendations can be suitably modified to estimate requirements for units with larger number of beds
3. Whether these equipments are Essential or Desirable?



4. Whether pre-installation assessment and installation by the supplier is recommended?
5. Does the installation of the equipment have implications for civil, mechanical or electrical systems of the unit?

Tables B.1 to B.4 provide answers to the above questions in a tabular form. Before proceeding to read the tables, read the following comments and instructions:

Box-1: Instructions on reading Tables B.1 to B.4

1. Equipments listed in these tables are classified as those required for **individual care**, equipments required for **disinfection, laboratory equipments** and **general** equipments.
2. To accommodate differences in development and availability of supporting services, such as laboratory, central sterile supply and diagnostics, the listed items are classified as "**essential**" (these should be available) and "**desirable**" items (these could be available or could be drawn from shared resources within the hospital).
3. For each of the items, it has been identified whether **installation by a supplier is recommended** and if pre-installation assessment & training is necessary.
4. Many equipments have **potential implications on civil, mechanical and electrical systems** of the unit and should be taken into consideration while setting

up the unit. In the following tables, the potential implication on the equipments on Civil (C), mechanical (M) and Electrical (E) systems are depicted. This information should be carefully considered when planning the unit:

Civil Implications: Equipment that have implications on the construction of the building (for example, items that are wall or ceiling mounted).

Mechanical Implications: Items that have implications for the mechanical engineering infrastructure (for example, items requiring hot and/or cold water supply or/and sewage).

Electrical Implications: Items that have implications for electrical installation of the hospital (in general, it concerns high voltage requirements, but can also be for low voltage equipment, such as for computers).

Example on reading Tables B.1 to B.4

Item No.	Item Description	Essential	Desirable	Quantity for 12 bed unit	Installation	Training	Civil/Mechanical	Mechanical	Electrical
1	Open care system: radiant warmer, fixed height, with trolley, drawers, O2-bottles	E		12	√	√	√	√	√

The table above depicts that 12 numbers of open care radiant warmers are essential for a 12-bedded unit. It is recommended that installation is conducted by the supplier, and that the staff is trained in its use. The installation will have implications for civil, mechanical and electrical systems of the unit.

Table B.1: Equipments for individual care

Item No.	Item Description	Essential	Desirable	Quantity for 12 bed unit	Installation	Training	Civil/Mechanical	Mechanical	Electrical
1.	Open care system: radiant warmer, fixed height, with trolley, drawers, O2-bottles	E		12	√	√	√	√	√
2.	Phototherapy unit, single head, high intensity	E		6	√	√			√
3.	Resuscitator, hand-operated, neonate, 250 ml	E		2		√			
4.	Resuscitator, hand-operated, neonate, 500ml	E		4		√			
5.	Laryngoscope set, neonate	E		6		√			
6.	Pump, suction, portable, 220V, w/access	E		2	√	√			√
7.	Pump, suction, foot-operated	E		2		√			
8.	Surgical instrument. suture/SET	E		2					
9.	Syringe pump, 10,20,50 ml, single phase	E		3	√	√			√
10.	Oxygen hood, S and M, set of 3 each, including connecting tubes	E		6					
11.	Oxygen concentrator	E		4	√	√			√
12.	Thermometer,clinical,digital,32-43°C	E		12					
13.	Scale, baby, electronic, 10 kg <5g >	E		4	√	√			√
14.	Pulse oxymeter, bedside, neonatal	E		6	√	√			√
15.	Stethoscope, binaural, neonate	E		12					
16.	Sphygmomanometer, neonate, electronic	E		6		√			√
17.	Light,examination, mobile,220-12V	E		6	√				√
18.	Hub cutter, syringe	E		2		√			
19.	Tape, measure, vinyl-coated, 1.5m.	E		2					
20.	Basin, kidney, stainless steel, 825ml	E		4					
21.	Tray,dressing,ss,300x200x30mm	E		4					
22.	Stand, infusion, double hook, on castors	E		1					
23.	Indicator, TST control spot/PAC-300		D	1					
24.	Irradiance meter for phototherapy units		D	2		√			√
25.	Monitor, vital sign, NIBP, HR,SpO2, ECG, RR,Temp		D	1	√	√			√
26.	ECG unit, 3 channel, portable/SET		D	2		√			√
27.	Infantometer, plexi, 3 ½ ft/105cm	E		1		√			√
28.	X-Ray, mobile		D	1	√	√	√		√
29.	Transport incubator, basic, with battery and O2, w/o ventilator		D	1	√	√		√	√
30.	Autoclave, steam, bench top, 20L, electrical		D	1	√	√		√	√
31.	Laundry washer dryer, combo, 5kg		D		√	√	√	√	√

Table B.2: Equipment for disinfection

Item No.	Item Description	Essential	Desirable	Quantity for 12 bed unit	Installation	Training	Civil/Mechanical	Mechanical	Electrical
1.	Drum,sterilising,165mm diameter		D	4	√				
2.	Electric Steriliser		D	1		√			√
3.	Washing machine with dryer	E		1	√				√
4.	Gowns for staff and mothers	E		Adequate		√			
5.	Washable slippers	E		Adequate		√			

Table B.3 Laboratory equipment

Item No.	Item Description	Essential	Desirable	Quantity for 12 bed unit	Installation	Training	Civil/Mechanical	Mechanical	Electrical
1.	Centrifuge, hematocrite, benchtop, up to 12000 rpm, including rotor	E		1	√	√			√
2.	Microscope, binocular, with illuminator		D	1	√				√
3.	Bilirubinometer, total bilirubin, capillary based		D	1	√	√			√
4.	Glucometer with Dextrostix	E		3		√			

Table B.4: General equipment

Item No.	Item Description	Essential	Desirable	Quantity for 12 bed unit	Installation	Training	Civil/Mechanical	Mechanical	Electrical
1.	AC (1.5 Tonne)	E		1	X	X	X	X	X
2.	Generator set 25-50 KVA	E		1	X				X
3.	Refrigerator, hot zone, 110L	E		1	X				X
4.	Voltage Servo-Stabiliser (three phase): 25-50 KVA	E		1					X
5.	Room Heater(Oil)		D	4					X
6.	Computer with printer		D	1	X	X			X
7.	Spot Lamps	E		2					X
8.	Wall Clock with second hand	E		2				X	

Table B.5 Renewable and consumables

Item No.	Item Description	Essential/Desirable
1	Adaptor, Meconium aspirator, disposable (for suction pump)	E
2	Line, infusion pump, sterile, disposable	E
3	Multistix, urine, 5 parameter, Glu, Prot, Eryt, Spc Grav, pH	E
4	Cuvettes, Glu, box of 200	E
5	Cuvettes, Hb, box of 200	E
6	Vacuum tube, EDTA, 3ml, set of 100	E
7	Vacuum tube, EDTA, 6ml, set of 100	E
8	Vacuum tube, serum, 3ml, set of 100	E
9	Vacuum tube, holder, set of 100	E
10	Vacuum tube, needle, 22G set of 100	E
11	Lancet,safety,sterile,single-use/PAC-200 (1.8mm)	E
12	Capillary tubes, box 1000	E
13	Sealing compound, capillary tubes, pck 500g	E
14	Mask, surgical, disposable, box 100	E
15	Cap, surgical, disposable, box 100	E
16	Cord clamp, disposable, set of 10	E
17	Extractor, mucus, 20ml, ster, disp Dee Lee	E
18	Tube,suction,CH10,L50cm,ster,disp	E
19	Tube,suction,CH12,L50cm,ster,disp	E
20	Tube,feeding,CH05,L40cm,ster,disp	E
21	Tube,feeding,CH06,L40cm,ster,disp	E
22	Tube,feeding,CH07,L40cm,ster,disp	E
23	Syringe,dispos,1ml,ster/BOX-100	E
24	Syringe,dispos,2ml,ster/BOX-100	E
25	Syringe,dispos,5ml,ster/BOX-100	E
26	Syringe,dispos,10ml,ster/BOX-100	E
27	Syringe,dispos,20ml,sterile/BOX-80	E
28	Needle,disp,22G,ster/BOX-100	E
29	Needle,disp,24G,ster/BOX-100	E
30	Needle,disp,26G,ster/BOX-100	E
31	Needle, scalp vein,21G,ster,disp	E
32	Needle, scalp vein,25G,ster,disp	E
33	Gloves,exam,latex,medium,disp/BOX-100	E
34	Gloves,surg,7,ster,disp,pair	E
35	Infusion set, pediatric, with chamber 150ml, ster, disp, with 22G needle	E
36	Cotton wool,500g,roll,non-ster	E
37	Compress,gauze,10x10cm,n/ster/PAC-100	E
38	Compress,gauze,10x10cm,ster/PAC-5	E

Table B.5 Cont...

Item No.	Item Description	Essential/Desirable
39	Tube, connection, 2.2mm, length, box of 100	E
40	Connector, 3-way, stop cock valve, ster, disp	E
41	Disinfectant, chlorhexidine, 20%	E
42	Disinfectant, bleach percentage	E
43	Disinfectant, handsoap	E
44	Antiseptic, betadine	E
45	Tape, adhesive, Z.O., 2.5cmx5m	E
46	Scalpel blade, ster, disp, no.22 box of 100	E
47	Umbilical Venous catheter No 5, 6	E
48	Disinfectant Bacilloid	D
49	Blood transfusion, set	D
50	Nasal prongs, disposable, set of 3	D
51	Endotracheal tubes	D
52	Electrodes, neonatal, box of 200 sets of 3 electrodes for ECG-recorder and monitoring	D
53	Sterilization indicator TST control spots	D
54	Paper sheets, crepe, for sterilization pack	D
55	Tape adhesive, for sterilization pack	D
56	Slide, microscope, 76x26mm/BOX-100(2x50)	D
57	Cover glass, microscope slides/BOX-100	D
58	Jar, staining	D
59	Counting chamber, glass, Neubauer, WBCs	D
60	Solution, stain, Gram, 100ml	D

Part C: Technical Specifications of the Equipments

Knowing the correct generic specifications of the medical devices supporting technical integrity and quality for equipment are critical to ensure that appropriate equipments of appropriate quality and safety are procured. Detailed specifications of the newborn care equipments are provided in Annexure-2.

Part D. Asepsis and Housekeeping Protocols

Maintenance of asepsis is extremely critical in newborn care units. It requires laying down of clean housekeeping protocols of following them stringently . Details of asepsis and housekeeping protocols are mentioned in Annexure-3

Part E. Annual Maintenance Contract (AMC), Specific Coverage and Requirements for Critical Equipments

After-sales technical services in the context of maintenance start right from the time of installation of the equipment. The 'training and installation' offered by suppliers ought to include (i) user training, (ii) technical training and (iii) basics of the clinical application of the device.

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

Annual maintenance contract proposal ought to cover 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:

1. Exchange of information with the end-user and technical staff about the status of the device.
2. Function and performance check-up of the device.
3. Technical check-up of device based on the manufacturer's technical checklist.
4. Assessment of wear and tear of the device with notification if incorrect use of the device is noted.
5. Cleaning parts beyond reach, or capability, of the end-user.

6. Adjustment and calibration of the device.
7. All necessary materials to complete the preventive maintenance.
8. Repetition of user and technical training for current and new hospital staff.
9. All parts to be replaced; those which are most likely to break down within the next 6 months.
10. It includes working hours, travel cost, boarding and lodging, if applicable, of the service engineer(s).

On-call corrective intervention

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

1. On-site visit of service engineer(s) with necessary spare parts, within a specified period of notification of the malfunction.
2. All necessary materials and spare parts to complete the repair.
3. Availability of spare parts for the technical lifetime of the device, approximately seven years.
4. 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.
5. It includes working hours, travel cost, boarding and lodging, if applicable, of the service engineer(s).

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 3.

Part F: Human Resources

Staffing:

Successful provision of quality services by an SCNU depends not on the equipped unit but on the availability of round-the-clock clinical expertise, backed up by monitoring devices and equipment.

Well-trained nurses and medical staff form the backbone of the service. Thus, the unit should have the required number of appropriately trained and qualified nurses. There should be a designated consultant pediatrician responsible for the clinical standards of the care of newborn babies.

While the available manpower for SCNU will differ from state to state, the basic principles are;

- At least two dedicated staff nurses per shift are necessary for a 12-bedded unit. Thirty per cent extra staffing is recommended to account for nights off and leave vacancies.
- There should be an adequate number of doctors to be able to take a round of the newborns once in each shift (every eight hours) and to be on call round-the-clock.

- Dedicated support staff should be there to clean the nursery at least once every shift and more often, depending on the need.

For a 12-bed unit, the recommended staffing is:

- Staff Nurses: 10
- Physicians: 3
- Support Staff: 4

Training:

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

- An initial training program for 4-5 days and,
- An observer ship at medical college or an equivalent facility for at least two weeks (12 working days):

National Neonatology Forum (www.nnfi.org) and WHO Collaborative Center for Training and Research in Newborn Care (www.newbornwhocc.org) supports training programs for physicians and nurses and could be contacted.

Part G: Cost

Cost can be broken down into capital cost and recurrent cost. While the cost will vary widely due to various factors, indicative costs for a 12-bed unit is summarised below:

One-time establishment cost (does not include the cost of training)	
Renovations and civil works <i>(average of 16 lakhs)</i>	Rs. 12,00,000 – 20,00,000
<i>(Highly variable depending on the state of the health facility)</i>	
Equipment and furniture	Rs. 25,00,000
Sub Total	Rs. 41,00,000*

Recurring or running cost per year (does not include the salaries of staff)	
Consumables	Rs. 3,50,000
Maintenance cost	Rs. 6,50,000
Sub Total	Rs. 10,00,000

Section – II

Stabilisation Unit



2.1 Setting up of stabilisation units in first referral units

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.

2.2 Services at a stabilisation unit

A Stabilisation Unit at an FRU or an equivalent facility provides the following services:

- Care at birth
- Provision of warmth
- 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

2.3 Configuration of a stabilisation unit

- The stabilisation unit should be located within or in close proximity of the maternity ward
- Space of approximately 40-50 sq ft per bed is needed, where four radiant warmers can be kept.
- Provision of hand washing and containment of infection control should be there, if it is not a part of the delivery room

2.4 Equipment and renewables required for a stabilisation unit

Item No.	Item Description	Quantity
1.	Open care system: radiant warmer, fixed height, with trolley, drawers, O2-bottles	4
2.	Resuscitator, hand-operated, neonate, 500ml	2
3.	Laryngoscope set, neonate	2
4.	Scale, baby, electronic, 10 kg <5kg >	1
5.	Pump suction, foot operated	1
6.	Thermometer, clinical, digital, 32-34C	4
7.	Light examination, mobile, 220-12 V	4
8.	Hub Cutter, syringe	1
Renewable Resources		
9.	I/V Cannula 24 G, 26 G	
10.	Extractor, mucus, 20ml, ster, disp Dee Lee	
11.	Tube, feeding, CH07, L40cm, ster, disp	
12.	Oxygen cylinder 8 F	
13.	Sterile Gloves	
14.	Tube, suction, CH 10, L50 cm, ster, disp	
15.	Cotton wool, 500g, roll, non-ster	
16.	Disinfectant, chlorhexidine, 20%	

2.5 Human resources

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 paediatrician is required for clinical care and oversight

Training:

Doctors and nurses posted in the stabilisation unit must undergo skill-based training for 3-4 days.

2.6 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.

2.7 Cost of setting up a stabilisation unit

The costs mentioned below are indicative and could vary widely:

One time establishment cost	
Renovations and civil works	Rs. 3,00,000 – 7,50,000
<i>(Highly variable depending on the state of the health facility)</i>	
Equipment and furniture	Rs. 2,75,000
Capacity building	Rs. 25,000
Sub Total	Rs. 6,00,000*

* Civil and electrical work has been taken at an average of Rs 3 Lakh

Recurring or running cost per year (does not include the salaries of staff)	
Consumables	Rs. 25,000
Maintenance cost	Rs. 1,50,000
Sub Total	Rs. 1,75,000

Section – III

Newborn Care Corner

3.1 Designation of newborn care corner in labour room

Labour rooms¹ 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. Newborn care corner in this document refers to the space within the labour room for providing immediate newborn care to all newborns.

3.2 Services at the corner

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

- Essential Care at birth
- Resuscitation
- Provision of warmth
- Early initiation of breastfeeding
- Weighing the neonate

3.3 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.

3.4 Equipment and renewables required for the corner

Item No.	Item Description	Essential/Desirable	Quantity
1.	Open care system: radiant warmer, fixed height, with trolley, drawers, O2-bottles	E	1
2.	Resuscitator, hand-operated, neonate, 500ml	E	1
3.	Weighing Scale, spring	E	1
4.	Pump suction, foot operated	D	1
5.	Room Thermometer	E	1
6.	Light examination, mobile, 220-12 V	D	1
7.	I/V Cannula 24 G, 26 G	E	
8.	Extractor, mucus, 20ml, ster, disp Dee Lee	E	
9.	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	

3.5 Human resources:

Staffing:

One staff nurse or ANM is desirable in addition to the one conducting the delivery for providing appropriate care at birth

Training:

All staff posted at the labour rooms should be trained in providing essential care at birth and basic resuscitation.

1. Including Operation Theatres in facilities where Cesarean Sections are conducted.

3.6 Cost of setting up newborn care corner

The following costs are indicative

One time establishment cost	
Equipment and furniture	Rs. 75,000
Capacity building	Rs. 5,000
Sub Total	Rs. 80,000

Recurring or running cost per year	
Consumables	Rs. 5,000
Maintenance cost	Rs. 15,000
Sub Total	Rs. 20,000

Summary

- This document provides specific guidance for setting up newborn care services for different level of health services
 - 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)
- There should be agreed procedures for transport of sick newborns from one level of facilities to another.
- SCNU within the district hospitals must have continuous availability of qualified medical and nursing staff, and resources to meet the needs of all sick babies.
- Technical specification standards 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.
- 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 newborns.

Annexures

Annexure 1: Estimating number of beds required for SCNU

The number of beds that would be required for a particular hospital can be estimated based on factual information as below.

Average number of live births in last 2 years	A
No. of live births requiring special care	$B = (15\% \times A)$
No. of bed days required (assuming an average stay of 7 days)	$C = (B \times 7^{**})$
No. of special care beds required	$D = C/365$
An extra allowance of 30 per cent beds for extramural births	$E = D \times 30\%$

Annexure 2: Generic specifications for the equipments

1. Open care system on trolley with drawers, with radiant warmer, O₂-provision

Technical Specifications:

- Mobile newborn resuscitation table with fixed-height radiant warmer
- Antistatic castors, 2 with breaks
- Table surface with mattress with infant head/shoulder support
- Mattress-padding: foam density approx. 21 - 25 kg/m³
- Mattress cover: removable with zipper, waterproof, washable, resistant to cleaning with chlorine based solution and flame retardant
- Side boards transparent acryl, drop down and lockable
- Under table 2 storage drawers
- Side rails allow for mounting of accessories
- Hood suspended above the table integrates heating element and overhead light
- Overhead light: 2 x 50W halogen spot, with dimming function
- Integrated support for two 10 L oxygen bottles
- Control unit has flow meter and displays pressure
- 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, further details see "Technical Provisions")
- Device is safety certified according CE 93/42, FDA 510k or equivalent

Supplied with:

- 1 x mattress
- 1 x skin temperature probe (including connection cable)
- 1 x spare skin temperature probe (including connection cable)
- 1 x spare heating element
- 2 x empty 10 L oxygen cylinders
- 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
- List with name and address of technical service providers in India
- Training and installation at end-user site
- Proposal for full service AMC, year 1 to 5, covering (i) 2 preventive maintenances per year, (ii) on-call technical interventions, spare parts and travel.

2. Phototherapy unit, single head, high intensity

Technical Specifications:

- Heavy sturdy mobile stand phototherapy unit
- Antistatic castors, 2 with breaks
- Single head, surface size, approx: 0.50 x 0.75 m
- Head height adjustable, approx: 1.40 to 1.75 m
- Blue light, 4 Compact Fluorescence Tubes (CFL), approx: 20 W
- White light, 2 Compact Fluorescence Tubes (CFL), approx: 20 W
- Tubes are protected by grill
- Irradiance at skin level, up to: 40 $\mu\text{W}/\text{cm}^2/\text{nm}$
- Wavelength: 420 to 500 nm, with highest intensity at 470 nm
- Integrated cumulative hour timer
- Power requirement: 220 V/50 Hz
- Power consumption: 250 W
- Device is produced by ISO 9001 certified manufacturer (Certificate to be submitted, further details see "Technical Provisions")
- Device is safety certified according CE 93/42, FDA 510k or equivalent

Supplied with:

- 2 x spare blue CFL tubes
- 1 x spare white CFL tube
- 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
- List with name and address of technical service providers in India
- Training and installation at end-user site
- Proposal for full service AMC, year 1 to 5, covering (i) 2 preventive maintenances per year, (ii) on-call technical interventions, spare parts and travel

3. Resuscitator, hand-operated, neonate, 500ml; 250ml

- Resuscitator for manual ventilation of neonates
- Ventilation can be done with ambient air or with oxygen
- Resuscitator can be totally disassembled, is easy to clean, disinfect and sterilize
- All parts can be autoclaved at 121°C (except O2 reserve bag)
- Manufactured from durable high-strength synthetic not requiring special maintenance or storage
- Resuscitator is supplied as a complete set in a box
- Compressible self-refilling ventilation bag, capacity, approx. 500 ml and 250 ml
- With non-rebreathing patient valve with pressure limitation
- Intake valve with nipple for O2 tubing
- O2 reserve bag complete, capacity approx.: 2000 ml
- Set of 3 cushioned neonate size masks, translucent (Size "0", approx: 50 mm)
- Device is produced by ISO 9001 certified manufacturer
- Device is safety certified according CE 93/42, FDA 510k or equivalent

Supplied with:

- 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
- List with name and address of technical service providers in India

4. Laryngoscope set, neonate

- Laryngoscope set with neonate blades
- Constituted of large hollow, cylindrical, slightly ribbed handle and a set of depressors in stainless steel
- Handle is made of either chromium-plated or stainless steel and can be opened at an extremity to insert two alkaline batteries (LR14, size C, 1.5 Volts). The other end has a stud contact which fits the various sizes and types of depressors.
- 2 x curved depressors, Macintosh type No. 1, approx 68 mm length with halogen bulb
- 2 x straight depressors, Miller type No. 0, approx 53 mm length with halogen bulb
- Presented in suitable protective plastic box
- Device is produced by ISO 9001 certified manufacturer (Certificate to be submitted, further details see "Technical Provisions")
- Device is safety certified according CE 93/42, FDA 510k or equivalent

Supplied with:

- 2 x spare halogen bulbs (1 for each depressor)
- 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
- List with name and address of technical service providers in India

5. Pump, suction, portable, 220V, w/access

Technical Specifications:

- Portable suction pump with 1 litre plastic jar
- Dismantable for easy cleaning, jar autoclavable
- Shock resistance protects from dropping
- Light, easy to carry and keep clean
- Jar with plastic cover, gasket and overflow valve
- With suction regulator, vacuum gauge
- Size, approx: 260 x 180 x 220 (H) mm
- Suction power: 17 L/min
- Vacuum, max: 800 mmHg
- Power requirement: 220 V/50 Hz
- Power consumption: 100 W
- Device is produced by ISO 9001 certified manufacturer
- Device is safety certified according CE 93/42, FDA 510k or equivalent

Supplied with:

- 1x set of silicone rubber suction tubing, approx: diam. 10 mm, length 1.5 m
- 1 x spare jar with cover
- 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
- List with name and address of technical service providers in India
- Training and installation at end-user site
- Proposal for full service AMC, year 1 to 5, covering (i) 2 preventive maintenances per year, (ii) on-call technical interventions, spare parts and travel.

6. Pump, suction, foot-operated (refer to material S0760640)

Technical Specifications:

- Foot-operated suction pump
- High performance suction pump for pharyngeal and tracheal suction
- Double acting piston pump provides a combination of large airflow and high vacuum
- See-saw movement of pedal generates suction every time one side of the pedal is depressed
- Pump chassis complete with valve diaphragms, manifold pipe, bottom cover, cylinder with draw link and valve diaphragm, piston O-ring, pedal with retaining springs, aspirating tube with angle connector and combination suction tip
- Pump can be totally disassembled, is easy to clean and disinfect
- All parts can be autoclaved at 121°C
- Vacuum, max: 600 mmHg
- Free airflow at two pumping strokes per second, approx: 30 to 40 L/min
- All parts made of high-strength, long-life materials, not requiring specific maintenance or storage
- Transparent polycarbonate collection container capacity, approx: 1 L
- Bottom cover: thermoplastic rubber
- Manifold pipe: polypropylene
- Gasket, O-rings and valve diaphragm: silicone rubber
- Piston rings: teflon
- Foot pedal: aluminium
- Device is produced by ISO 9001 certified manufacturer (Certificate to be submitted, further details see "Technical Provisions")
- Device is safety certified according CE 93/42, FDA 510k or equivalent (Certificate to be submitted, further details see "Technical Provisions")

Supplied with:

- 1x set of silicone rubber suction tubing, approx: diam. 10 mm, length 1.5 m
- 1 x angle connector and combination acetal suction tip
- 1 x spare valve diaphragms
- 1 x spare piston O-ring
- 1 x spare retaining springs,
- 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
- List with name and address of technical service providers in India
- Assembly and installation at end-user site

7. Surgical instrument, suture/SET

- Suture instruments set consisting of:
- 1 x Scissors, Deaver, 140 mm, curved, sharp/blunt
 - Surgical operating scissors, model according Deaver
 - Curved, with one pointed and one blunt end blade
 - Martensitic steel, quenched, magnetic steel
 - (stand mat S0773550)
- 1 x Needle holder, Mayo-Hegar, 180 mm, straight
 - Ratchet enables needle to be gripped with varying tightness, model according Mayo-Hegar
 - Defined longitudinal groove to prevent deterioration of the needle
 - Jaws with pronounced ridges
 - Martensitic steel, quenched, magnetic steel
 - (stand mat S0743600)
- 1 x Forceps, artery, Kocher, 140 mm, straight
 - Haemostatic forceps, model according Kocher
 - Slightly springy, flexible arms
 - Variable setting of the ratchet
 - Adjustment of the jaws
 - Martensitic steel, quenched, magnetic steel
 - (stand mat S0726000)
- 1 x Scalpel handle, no.4
 - Bistoury handle for interchangeable blade
 - The number indicates the characteristic of the distal end and therefore the choice of the blade
 - Length: approx. 14 cm
 - Austenitic steel, non-quenched, non-magnetic
 - (stand mat S0745500)
- 1 x Forceps, tissue, 145 mm, straight
 - Straight tissue dissecting forceps
 - Slightly springy, flexible arms
 - With 1 x 2 teeth
 - Good adjustment of the teeth
 - Good gripping of the jaws
 - Martensitic steel, quenched, magnetic steel
 - (stand mat S0737000)
- 1 x Probe, double-ended, 145 mm
 - Double-ended probe/dilator
 - Bulbous shape at both ends
 - Diameter: 2 mm
 - Austenitic steel, non-quenched, non-magnetic
 - (stand mat S0759820)
- Device is produced by ISO 9001 certified manufacturer
- Device is safety certified according CE 93/42, FDA 510k or equivalent

Supplied with:

- Technical manual with maintenance and first line technical intervention instructions, in English
- List of priced accessories
- List of priced spare parts
- List with name and address of technical service providers in India

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

- Digital and self regulating volume controlled portable syringe pump
- Can be mounted on 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
- Device is safety certified according CE 93/42, FDA 510k or equivalent

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
- List with name and address of technical service providers in India
- Training and installation at end-user site
- Proposal for full service AMC, year 1 to 5, covering (i) 2 preventive maintenances per year, (ii) on-call technical interventions, spare parts and travel.

9. Oxygen hood, S and M, set of 3 each, including connecting tubes

- Round shape
- 3 x size small, approx: height 22 cm, diam 25 cm
- 3 x size medium, approx: height 18 cm, diam 20 cm
- Made of autoclavable polycarbonate
- Trauma free silicone neck, with adjustment flap
- With bilateral oxygen nozzle
- Oxygen tube of 2 m length must be provided with
- Device is produced by ISO 9001 certified manufacturer
- Device is safety certified according CE 93/42, FDA 510k or equivalent

Supplied with:

- 1 x spare set of tubing
- 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
- List with name and address of technical service providers in India

10. Oxygen concentrator, elec 220V (refer to material S0002047)

Technical Specifications:

- Oxygen concentrator to provide oxygen from ambient air
- Oxygen concentration measured at the flow meter by oxygen sensing device (OSD)
- Sound level < 15 dB
- Superior grade of molecular sieve
- Maintenance free rotary proppet valve.
- Oxygen purity, approx: 90%
- Oxygen output, approx: 0 - 5 LPM
- Pressure, approx: 8 psi
- Double outlet or flowsplitter for oxygen Delivery
- Oxygen tube of 2 m length must be provided with
- Facility for nebulization with tube & mask
- With two humidifier bottles and two cabinet filters
- Power requirements: 220 V/50 Hz
- Power consumption: 450 W
- Device is produced by ISO 9001 certified manufacturer
- Device is safety certified according CE 93/42, FDA 510k or equivalent

Supplied with:

- 1 x spare set of tubing
- 1 x spare set of internal and external filters (baterial)
- 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
- List with name and address of technical service providers in India
- Training and installation at end-user site
- Proposal for full service AMC, year 1 to 5, covering (i) 2 preventive maintenances per year, (ii) on-call technical interventions, spare parts and travel.

11. Thermometer, clinical, digital, 32-43°C (refer to material S0481053)

- Digital thermometer Celsius scale with switch to Fahrenheit
- Safe to use, atraumatic, no glass, no mercury
- Measurement range: 32°C to 43°C
- Accurate measurement: +/- 0.1°C between 35°C to 41°C
- Liquid crystal display, easy to read
- Beep sound and switch off
- Water proof for ease of cleaning
- Battery powered
- Low battery indicator
- Power requirements: 220 V/50 Hz
- Power consumption: 450 W
- Device is produced by ISO 9001 certified manufacturer
- Device is safety certified according CE 93/42, FDA 510k or equivalent

Supplied with:

- 1 x NiCad battery
- User manual with trouble shooting guidance, in English
- Technical manual with maintenance and first line technical intervention instructions, in English

12. Scale, baby, electronic, 10 kg < 5g >

- Electronic scale for weighing babies
- Measuring range 0 to approx 10 kg
- Minimum graduation: 5 g
- With tare function
- On switch and auto-off
- Auto-calibration with each switch-on
- Large LED display readable in low light working situations, display cover durable plastic
- Display in kg and lbs, easy switch between kg and lbs
- Reading time max 5 seconds
- Zero weighing adjustment
- Freeze reading feature
- Smooth surface/finishing allows for easy cleaning/disinfection.
- All vital parts made of rust proof materials
- Horizontal levelling with height adjustable feet
- Splash proof and shock resistant light-weight body
- Power requirements: 220 V/50 Hz
- Power consumption: 150 W
- Device is produced by ISO 9001 certified manufacturer
- Device is safety certified according CE 93/42, FDA 510k or equivalent

Supplied with:

- 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
- List with name and address of technical service providers in India
- Training and installation at end-user site

13. Pulse oximeter, bedside, neonatal

- Compact portable bedside pulse oximeter with LCD display
- Continuous monitoring of SpO₂ (arterial blood oxygen saturation), pulse rate and signal strength
- Measuring range:
 - SpO₂: 30 to 100 %, minimal graduation 1 %
 - Pulse rate: 20 to 250 bpm, minimal graduation 1 bpm
- Accuracy SpO₂: 50 to 69% ($\pm 3\%$), 70 to 100% ($\pm 2\%$)
- Display shows SpO₂(%), HR(bpm) and signal strength bar
- Large display readable from distance, display cover durable plastic
- User preset of high/low alarms on SpO₂ and pulse rate monitoring
- Audio visual alarm for SpO₂ and pulse rate in case measurements are outside preset range
- Silencing feature for audio alarm
- Display reports system errors, probe failure and built-in battery status
- Automatic switch from mains to batteries in case of power failure
- Power requirements: 220 V/50 Hz and internal re-chargeable battery (autonomy approx 6 hrs, automatic recharge)
- Power consumption: 50 W
- Device is produced by ISO 9001 certified manufacturer
- Device is safety certified according CE 93/42, FDA 510k or equivalent

Supplied with:

- 2 x reusable SpO₂ sensors neonate, clip-on type (including connection cable)
- 10 x reusable SpO₂ sensors neonate, wrap around type (including connection cable)
- 1 x spare rechargeable 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
- List with name and address of technical service providers in India
- Training and installation at end-user site
- Proposal for full service AMC, year 1 to 5, covering (i) 2 preventive maintenances per year, (ii) on-call technical interventions, spare parts and travel

14. Stethoscope, binaural, neonate

- Double cup neonatal stethoscope
- Chest piece in stainless steel with non-chill plastic rim
- Diaphragm approx: 20 mm
- Sensitivity approx 3.0 dB from 50 to 500 Hz (cardio)
- Sensitivity approx 8.0 dB from 600 Hz to 1500 Hz (pneumo)
- Y tube: treated rubber with large diameter
- Arms: stainless steel or chrome brass, with treated spring for lasting elasticity and comfort
- Removable plastic ear-pieces
- Device is produced by ISO 9001 certified manufacturer

Supplied with:

- 1 x spare set of earpiece
- 1 x spare diaphragm
- 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
- List with name and address of technical service providers in India

15. Sphygmomanometer, neonate, electronic

- Digital electronic sphygmomanometer suitable for neonate
- Composed of cloth cuff with inflatable bag quick-connected via tube to main unit
- Cloth is washable, strong and reinforced at both ends
- Tube length approx 60 cm
- Strip of Velcro fastening; length can be adjusted to fit around neonate upper arm
- Measuring range: up to 300 mmHg
- Minimum graduation: 1 mmHg
- Accuracy: +/- 5%
- Large LCD display readable in low light working situations, display cover durable plastic
- Displays reports: systolic, diastolic and mean pressure and heart rate
- Power requirements: 220 V/50 Hz (with adapter), internal re-chargeable batteries or replaceable batteries (autonomy approx 6 hrs, automatic recharge)
- Power consumption: 30 W
- Device is produced by ISO 9001 certified manufacturer
- Device is safety certified according CE 93/42, FDA 510k or equivalent

Supplied with:

- 1x storage case
- 2 x spare cuffs
- 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
- List with name and address of technical service providers in India
- Training and installation at end-user site

16. Refrigerator, hot zone, 110L

See WHO minimal performance specifications for refrigerators.

17. Light, examination, mobile, 220V/12V

- Mobile light for medical examination
- Stand with 5 anti-static swivel castors
- Articulated arm 105 cm, spring loaded, with on/off switch and integrated transformer
- Halogen bulb: 12V/20W
- Light intensity approx: 20.000 Lux at 40 cm
- Natural white light: colour temperature 4000 K
- Reflector adjustable for positioning
- Power cord: length approx 3 m
- Power requirements: 220 V/50 Hz
- Power consumption: 50 W
- Device is produced by ISO 9001 certified manufacturer
- Device is safety certified according CE 93/42, FDA 510k or equivalent

Supplied with:

- 1 x spare halogen bulb
- 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
- List with name and address of technical service providers in India
- Assembly and installation at end-user site

18. Centrifuge, hematocrite, bench top, up to 12000 rpm, including rotor

Technical Specifications

- Benchtop centrifuge for quick assessment of hematocrit
- Rotation upto 12000 rpm, adjustable in increments of 100
- Timer settable in minutes, maximum preset 99 minutes
- Safety lid-lock feature and emergency lid release
- Motor overheating protection and imbalance shut-off
- Digital display shows rpm and time
- Angle rotor, 24 positions, maximum approx 16000 rcf
- Power requirements: 220 V/50 Hz
- Power consumption: 200 W
- Device is produced by ISO 9001 certified manufacturer
- Device is safety certified according CE 93/42, FDA 510k or equivalent

Supplied with:

- 1 x box of micro capillary tubes, inner diam 1mm, length 7mm, heparinized,
- 1 x pack of sealing compound for micro capillary tubes
- 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
- List with name and address of technical service providers in India
- Training and installation at end-user site
- Proposal for full service AMC, year 1 to 5, covering (i) 2 preventive maintenances per year, (ii) on-call technical interventions, spare parts and travel

19. Photometer, glucose (refer to material S0010110)

Technical Specifications:

- Bench top point-of-care blood glucose meter
- Direct reading photometry determining total amount of glucose in whole blood
- On switch and auto-off
- Automatic zero setting between measurements
- Dual wavelength measurement, 660 and 840 nm
- Sample size: 5 ul of whole blood on disposable cuvette
- Measuring time, approx: 30 to 120 seconds
- Measuring range, approx: 0 to 20 mmol/l or 0 to 400 mg/dl
- Accuracy equivalent to laboratory spectrophotometer
- Large LED display readable in low light working situations, display cover durable plastic
- Display in mmol/l and mg/dl, easy switch between both
- Results printable via external printer connected on RS232 or equivalent

- Power requirements: 220 V/50 Hz (with adapter) and internal re-chargeable batteries (autonomy approx 6 hrs, automatic recharge)
- Power consumption: 30 W
- Device is produced by ISO 9001 certified manufacturer
- Device is safety certified according CE 93/42, FDA 510k or equivalent

Supplied with:

- 1 x box of 100 cuvettes
- 1 x box of 100 sterile lancets
- 1 x cleaning set
- 1 x calibration set
- 1 x dust cover
- 1 x storing case
- 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
- List with name and address of technical service providers in India
- Training and installation at end-user site
- Proposal for full service AMC, year 1 to 5, covering (i) 2 preventive maintenances per year, (ii) on-call technical interventions, spare parts and travel

20. Photometer, Hb (refer to material S0010112)

Technical Specifications:

- Bench top point-of-care blood haemoglobin meter
- Direct reading photometry determining total amount of haemoglobin in whole blood
- On switch and auto-off
- Automatic zero setting between measurements
- Dual wavelength measurement, 570 and 880 nm
- Sample size: 5 ul of whole blood on disposable cuvette
- Measuring time, approx: 30 to 120 seconds
- Measuring range, approx: 0 to 20 mmol/l or 0 to 250 mg/dl
- Accuracy equivalent to laboratory spectrophotometer
- Large LED display readable in low light working situations, display cover durable plastic
- Display in mmol/l and mg/dl, easy switch between both
- Results printable via external printer connected on RS232 or equivalent
- Power requirements: 220 V/50 Hz (with adapter) and internal re-chargeable batteries (autonomy approx 6 hrs, automatic recharge)
- Power consumption: 30 W
- Device is produced by ISO 9001 certified manufacturer
- Device is safety certified according CE 93/42, FDA 510k or equivalent

Supplied with:

- 1 x box of 100 cuvettes
- 1 x box of 100 sterile lancets
- 1 x cleaning set
- 1 x calibration set
- 1 x dust cover
- 1 x storing case
- 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
- List with name and address of technical service providers in India
- Training and installation at end-user site
- Proposal for full service AMC, year 1 to 5, covering (i) 2 preventive maintenances per year, (ii) on-call technical interventions, spare parts and travel

21. Hub cutter, syringe

1. Material used will have

- The cutting blade of the cutter will be made of stainless steel (IS 6911 of 1992).
 - The thickness of the blade will not be less than 0.5 mm with one side sharpen to cut minimum of 10,000 cuts.
 - All other metal if used in the hub cutter will be made of galvanized carbon steel which will withstand rusting even in rough weather with high humidity coastal region for a minimum of five year (IS 277 of 2003 – galvanized steel sheet specification).
 - The spring if used in the hub cutter will be made of steel wire for mechanical spring (oil harden and tempered steel wire) ISI-4454 of 2001 revision part
 - The sharp container should be made of Polypropylene (PP) of not less than 4 mm thick and should be white/translucent. The material should be autoclavable plastics, puncture resistant, high drop impact strength, material should be non-toxic and pyrogen free, the material will not wear out with normal usage.
2. **Shape:** The shape of the container will be such that the lid is tightened with the body with a twist and cannot be opened by pulling the lid and the body in the opposite direction. The container containing the cut hub along with needle of various size will be $\frac{3}{4}$ full when filled with 500 cut hub with needles.
3. **Capacity range:** Able to destroy from hub of AD syringe with needles from 18-28 gauge diameter and from 10-25 mm length and fitted with all types of needle fittings, eg, fixed luer lock, luer ship of snap-on
4. **Resistance to piecing:** Container shall accept 500 cut needles along with the hub when it is $\frac{3}{4}$ th full (filling line). Needles shall not penetrate container walls when filled up to the filling line. The average of forces needed to penetrate samples shall be not less than 15 N.

5. **Tamper-proofing:** When contaminated needles are being dropped into the containers, it shall remain sufficiently sealed so as to prevent a hand from entering. Needle should not protrude from the container when the box contains 500 needles with hub.
6. **Capacity of the container:** have sufficient capacity to hold 500, 18-28-gauge, 10-25 mm long needles with hub.
7. **Colour:** The container shall be translucent white in color and will allow visual inspection from outer surface to determine when the container is full
8. **Technique:** The device shall be designed to facilitate the location and entry of the needles so that the AD syringe is cut from hub by having:
 - a non-critical angle of the needle relative to the entry point.
 - an entry target area which is recessed, concave and diameter is such that it allows all type of AD syringe available in the market to cut from hub
9. **Handling:** Able to be carried in one hand and portable.
10. **Instructions:** Pictorial instructions in major Indian languages to be printed on the surfaces of the container to clearly describe:
 - use of the hub cutter.
 - Biohazard symbol as stipulated in schedule III of the Bio-Medical Waste Management and Handling rules;
 - Govt. supply not for sale.
11. **Packaging:** Carton containing 20 hub cutters. A separate sheet is to be provided with pictorial instructions on how to use. Each carton will contain at least twenty sheets of instruction. Each lot will have 1000 units and the lot number and manufacturer details outside the unit.
12. **Biodegradable Polythene Bag (Red/Blue/Black/Yellow):**

The container should comprise of an inner plastic bag of varied color depending on the type of waste according to the Schedule-II and labeled according to Schedule-III of Bio-Medical Waste (Management & Handling) Rules 1998. It should be of a minimum gauge of 55 micron (if of low density) or 25 micron (if of high density), leak proof, and should match the chosen outer container. The outer container is a plastic bin with handles & lids, and of a size which will depend on the amount of waste generated. The inner polythene bag should fit into the container with one-fourth of the polythene bag turned over the rim. The capacity of the bag should vary according to the quantity waste generated.
13. **Durability:** The performance and safety of the device shall not be compromised by Exposure to ambient conditions of +43C, 90% relative humidity for one week.

Supplied with

1. Necessary tools for maintenance.
2. Biodegradable Polythene Bag (Red/Blue/Black/Yellow as applicable) - 100 per unit.

22. Tape, measure, vinyl-coated, 1.5m.

- Vinyl-coated fibreglass measuring tape
- Metal tip finishing at both ends
- Reads both in cm and inch
- Length, 1.5 m/5 ft
- Minimal graduation: 0.5 cm/0.2 inch
- Width, approx: 1.3 cm
- Thickness, approx: 0.36 mm
- Device is produced by ISO 9001 certified manufacturer

23. Basin, kidney, stainless steel, 825ml (refer to material S0211000)

- Stainless steel kidney basin
- Capacity, approx: 825 ml
- Austenitic stainless steel, composition: 8 to 10% nickel, 18 to 20% chromium
- Thickness steel: 0.8 mm
- Length, approx: 250 mm
- Width, approx: 140 mm
- Height, approx: 40 mm
- Device is produced by ISO 9001 certified manufacturer

24. Tray, dressing, ss, 300x200x30mm (refer to material S0279000)

- Stainless steel dressing tray
- Rectangular with rounded corners
- Austenitic stainless steel, composition: 8 to 10% nickel, 18 to 20% chromium
- Thickness steel: 0.8 mm
- Length, approx: 300 mm
- Width, approx: 200 mm
- Height, approx: 30 mm
- Device is produced by ISO 9001 certified manufacturer

25. Drum, sterilizing, 165mm diameter (refer to material S0106000)

- Stainless steel cylindrical sterilising drum
- Austenitic stainless steel, composition: 8 to 10% nickel, 18 to 20% chromium
- Lateral air vents, manually closed after sterilisation
- Thickness steel: 0.8 mm
- Diameter, approx: 165 mm
- Height, approx: 100 mm
- Device is produced by ISO 9001 certified manufacturer (Certificate to be submitted, further details see “Technical Provisions”)

26. Stand, infusion, double hook, on castors (refer to material S0150000)

Technical Specifications:

- Infusion stand on castors, variable height, support column with telescoping upper pole
- Safety double hook welded to the upper pole
- Support column with solid mechanism to fix upper pole at required height
- Heavy base on castors with 5 anti-static swivel wheels
- Knock-down construction
- Must be resistant to corrosion and decontamination (chlorine solution)
- Frame: stainless steel 18/10, bright polished or satin finishing
- Adjustable height, approx: 140 to 200 cm
- Tubes, approx: diam. 25/30 x 1.5 mm
- Swivel castors, approx: diam. 50 mm
- To clean and disinfect
- Device is produced by ISO 9001 certified manufacturer (Certificate to be submitted, further details see “Technical Provisions”)

Supplied with:

- 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
- List with name and address of technical service providers in India
- Assembly and installation at end-user site

27. Indicator, TST control spot/PAC-300

- TST (temperature steam time) control indicator
- Self-adhesive coloured spot attachable to steam sterilizing containers
- Operational range: 121 C/15 minutes
- Colour change irreversible when sterilised corrected from yellow to blue
- Packed in box of 300 TST control spot, plus 1 record sheet
- Device is produced by ISO 9001 certified manufacturer

Supplied with:

- User manual with trouble shooting guidance, in English
- List with name and address of technical service providers in India

28. Irradiance meter for phototherapy units

- Handheld irradiance meter (spectro-radiometer) for measurement the output of conventional phototherapy devices
- Bandpass filter, max transmission: 425 to 475 nm
- Light detector, range: 0 to 2000 uW/cm² (full bandwidth), 0 to 40 uW/cm²/nm
- Minimal graduation: 1 uW/cm²/nm
- Accuracy: (± 10%)
- Total block for IR and UV
- Large LED/LCD or needle/dial reports measurement
- On switch and auto-off
- Automatic zero setting between measurements
- Measuring time, approx: 5 seconds
- Power requirements: 220 V/50 Hz (with adapter) or internal re-chargeable batteries (autonomy approx 6 hrs, automatic recharge)
- Power consumption: 30 W
- Device is produced by ISO 9001 certified manufacturer
- Device is safety certified according CE 93/42, FDA 510k or equivalent

Supplied with:

- 1 x storing case
- 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
- List with name and address of technical service providers in India
- Training and installation at end-user site

29. Monitor, vital sign, NIBP, HR, SpO2, ECG, RR, Temp

- Compact portable, suitable for all patient categories, i.e. neonates and infants
- Parameters monitored: ECG, HR, Respiration rate, SpO2, NIBP and temperature
- Display: colour TFT, approx 7 inch, 4-channel
- Soft touch keys, durable and easy to clean
- Measurements, ranges:
 - ECG: I, II, III
 - HR: approx 30 to 250 bpm < 3 bpm >
 - NIBP: approx 20 to 290 mmHg (systolic) < 1 mmHg >
 - SpO2: approx 40 to 100 % < 1% >
 - ECG div. respiration: approx 6 to 180 bpm < 1 bpm >
 - Temperature: approx 10 to 45 degree Celsius < 0.1 degree Celsius >
- NIBP oscillometric step deflation, manual/automatic, initial inflation pressure user selectable
- Sweep, adjustable: 12.5, 25 or 50 mm/s
- Sensitivity (amplitude) of all signals user adjustable
- Voltage marker, 1 mV
- User preset of high/low alarms on all monitored parameters
- Audio visual alarm in case measurements are outside preset range
- Silencing feature for audio alarms
- Trend display from 2 to 24 hours
- RS232 serial data output provision (peripheral printer or network), analogue output for ECG
- Defibrillator sync and protection
- Pacemaker detection/rejection
- Display reports system errors, leads and sensors failure and built-in battery status
- Unit can be mounted on bed/wall rail or mobile pole/stand
- Automatic switch from mains to batteries in case of power failure
- Monitor: constructed of durable shock proof plastic
- Power requirements: 220 V/50 Hz (with adapter) or internal re-chargeable batteries (autonomy approx 3 hrs, automatic recharge)
- Power consumption: 350 W
- Device is produced by ISO 9001 certified manufacturer
- Device is safety certified according CE 93/42, FDA 510k or equivalent

Supplied with:

- 3 x cuff hose infant
- 2 x sets of 5 neonate BP cuffs (No 1 (3.1-5.7 cm), No 2 (4.3-8 cm), No 3 (5.8-10.9), No 4 (7.1-13.1cm), No 5 (9.6-14.3 cm))
- 1 x patient cable
- 1 x box neonatal ECG-electrodes (200 sets of 3 electrodes, chest and/or extremities, diameter approx 22mm, ultra soft gel, self adhesive)
- 2 x skin temperature transducers
- 2 x reusable SpO2 sensors neonate, clip-on type (including connection cable)

- 10 x reusable SpO2 sensors neonate, wrap around type (including connection cable)
- 1 x spare rechargeable 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
- List with name and address of technical service providers in India
- Training and installation at end-user site
- Proposal for full service AMC, year 1 to 5, covering (i) 2 preventive maintenances per year, (ii) on-call technical interventions, spare parts and travel

30. ECG unit, 3 channel, portable/SET (refer to material S0002062)

- Digital recorder of rest Electro Cardio Gram (ECG)
- Records 12 leads simultaneous: aVR, aVL and aVF, I, II, III and V1-6 pre-cordials
- Automatic and manual printout mode
- Internal memory for data storage
- Splash-resistant alphanumeric keyboard and direct function keys
- Reset zeroing, auto-base-line correction (0.5 Hz) and 1mV test
- Electrode connection quality check
- Filter setting for line-frequency (50 or 60 Hz) and tremor
- Large back-lit LCD (10x12cm) displays recorded data and failure announcements: ECG-curves, leads, heart rate, patient name and ID, electrode control, clock, leads, speed and filter setting
- Integrated high-resolution 300 dpi thermal printer, width 210 mm
- Print-out, folded thermo-reactive paper, format A4
- Number of channels, selectable: 3, 6 or 12
- combination of channels or manually selectable
- Paper speed, selectable: 5, 25 and 50 mm/sec
- Sensitivity, automatic or selectable: 5, 10 and 20 mm/mV
- Copy function
- Built-in batteries and charging unit
- When fully charged, the battery gives approx. 50 readings
- Power requirements: 220 V/50 Hz (with adapter) or internal re-chargeable batteries (autonomy approx 6 hrs, automatic recharge)
- Power consumption: 30 W
- Device is produced by ISO 9001 certified manufacturer
- Device is safety certified according CE 93/42, FDA 510k or equivalent

Supplied with:

- 1 x patient cable
- 6 x suction ball-type chest electrodes, reusable
- 4 x extremity clamp electrodes, reusable
- 1 x bottle of gel for electrodes
- 1 x box of recording paper
- 1 x box neonatal ECG-electrodes (200 sets of 3 electrodes, chest and/or extremities, diameter approx 22mm, ultra soft gel, self adhesive)
- 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
- List with name and address of technical service providers in India
- Training and installation at end-user site
- Proposal for full service AMC, year 1 to 5, covering (i) 2 preventive maintenances per year, (ii) on-call technical interventions, spare parts and travel

31. Infantometer, plexi, 3½ft/105cm

- Portable baby/infant length-height measuring system
- Measures laying length of neonates and babies
- No need for calibration as all parts have prefixed position
- Reads in centimetres and inches
- Minimum graduation: 1 mm
- Long-lasting hard-wearing ruler/graduation is fully integrated with device
- Measuring slide/wedge glides smoothly and close via ruler, avoiding reading parallax
- Measuring slide/wedge wobbles max 2 mm, over full length
- No sharp edges or corners
- Low stable board, width: ca 30 cm
- Length, measurement range, approx: 100 cm
- Head/footplate, board and slide/wedge made of quality laminated wood or plastic
- Wood parts should be treated and finished/protected with varnish to prevent chipping of edges and allow easy cleaning; all connections should be screwed/nailed plus glued
- Device is produced by ISO 9001 certified manufacturer

Supplied with:

- User manual with trouble shooting guidance, in English
- List of priced accessories
- List of priced spare parts
- List with name and address of technical service providers in India
- Assembly and installation at end-user site

32. X-Ray, mobile

- Mobile x-ray system for low volume setting at NICU department
- Heavy base on castors with 4 anti-static swivel wheels, 2 with breaks
- Rotation of arm, approx: + and - 120 degree
- Output power: 2.5 kW
- kV range: 40 to 100 kV
- Coarse and Finer adjustment of Voltage (kV)
- Output waveform, high frequency, max ripple 5 kV
- mA range: 1.6 to 63 mA
- mAs range: 0.32 to 200 mAs
- Exposure time, adjustable: 20 ms to 5 sec
- X-ray tube: BEL DSA7 stationary anode tube
- Focal spot: 1.4 x 1.4 mm
- Inherent filtration: < 1.5 mm Al
- Unit dimensions - 65 x 142 x 142 cm (width x height x length)
- Adjustable Timer
- Power requirements: 220 V/50 Hz
- Power consumption: 3000 W
- Device is produced by ISO 9001 certified manufacturer
- Device is safety certified according CE 93/42, FDA 510k or equivalent

Supplied with:

- 1 x set of 3 empty cassettes
- 1 x set of matching of films
- 1 x set of 2 aprons, lead protection
- 1 x set of 3 gonad shields neonates, 2 mm lead equivalent
- 1 x set of 10 lead numbers 0 to 9
- 1 x set of lead letters A to Z (5 pcs of each)
- 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
- List with name and address of technical service providers in India
- Training and installation at end-user site
- Proposal for full service AMC, year 1 to 5, covering (i) 2 preventive maintenances per year, (ii) on-call technical interventions, spare parts and travel

33. Transport incubator, basic, with battery and O₂, w/o ventilator

- Double wall transparent canopy with mattress, mount on stretcher
- Front and head access door, slide-out mattress tray
- With baby restraining straps
- Warm air circulation system
- Bacterial filter to remove air born particles
- Incubator air temperature monitoring and servo control: 25 to 38 C, increments 0.1C
- Digital displays outside shows air temperature
- Two 10 L integrated oxygen cylinders, regulator and flow meter
- Audiovisual alarms: high/low air temperature, temperature sensor failure, power failure and low battery
- Construction dismantlable allows frequent washing and disinfection of the incubator
- Battery and AC supported
- Power requirements: 220 V/50 Hz and internal re-chargeable batteries (autonomy approx 3 hrs, automatic recharge)
- Power consumption: 200 W
- Device is produced by ISO 9001 certified manufacturer
- Device is safety certified according CE 93/42, FDA 510k or equivalent

Supplied with:

- 1 x spare air temperature probe
- 1 x spare rechargeable battery
- 2 x empty 10 L oxygen cylinders
- 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
- List with name and address of technical service providers in India
- Training and installation at end-user site
- Proposal for full service AMC, year 1 to 5, covering (i) 2 preventive maintenances per year, (ii) on-call technical interventions, spare parts and travel

34. Bilirubinometer, total bilirubine, capillary based

- Bench top point-of-care bilirubine meter
- Direct reading photometry determining Total Bilirubine in serum/plasma
- On switch and auto-off
- Automatic calibration setting between measurements
- Dual wavelength measurement: 460nm and 550nm
- Correcting for Hb at 550 nm
- Sample size: 1 capillary tube with serum/plasma
- Main light source, 5 W tungsten lamp
- Measuring range: 0 to 700 μ mol/or 0 to 40 mg/100 ml
- Accuraccy equivalent to laboratory spectrophotometer (approx $\pm 5\%$)
- Read-out switchable between mg/100 ml of μ mol/l
- Fast analysis time < 5 sec
- Large LED display readable in low light working situations, display cover durable plastic
- With integrated printer
- Power requirements: 220 V/50 Hz (with adapter)
- Power consumption: 350 W
- Device is produced by ISO 9001 certified manufacturer
- Device is safety certified according CE 93/42, FDA 510k or equivalent

Supplied with:

- 2 x reference solution packages
- 1 x box of micro capillary tubes, inner diam 1mm, length 7mm, heparinzed
- 1 x box of micro capillary tubes, inner diam 1mm, length 7mm, plain
- 1 x pack of sealing compound for micro capillary tubes
- 1 x spare lamp
- 1 x dust cover
- 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
- List with name and address of technical service providers in India
- Training and installation at end-user site
- Proposal for full service AMC, year 1 to 5, covering (i) 2 preventive maintenances per year, (ii) on-call technical interventions, spare parts and travel

35. Microscope, binocular, with illuminator (refer to material S0957105)

- Basic binocular microscope with built-in halogen illumination
- Rotable body (360 degrees), inclined, metal base
- Quadruple revolving nosepiece, with distinct click stop
- Stage approx. 140 x 130 mm, with clamps for mounting object slide.
- With fixed, graduated mechanical stage travelling approx. 50 x75 mm, focusing object slide by moving the stage
- Adjustment system: course and fine adjustment
- Magnification: range 40X to 1600X, binocular observation tube, inclined
- Objectives, minimum achromatic, 4X, 10X, 40X (spring-loaded), 100X (spring-loaded, oil immersion), field numbers
- Eyepieces, pair, Huyguenian or widefield, 10X, 16X, field number, inter-pupillary distance and diopter adjustment
- Magnification optics anti-fungus treated
- Illumination: built-in halogen bulb, at least 6V/20W (2 pieces provided) and detachable mirror
- Condenser, type Abbe, min. 1.25 NA, with centring and adjustment by rack and pinion, including iris diaphragm lever and dark field stop
- Coloured filters (daylight), blue
- Power requirements: 220 V/50 Hz complete with transformer
- Power consumption: 50 W
- Device is produced by ISO 9001 certified manufacturer
- Device is safety certified according CE 93/42, FDA 510k or equivalent

Supplied with:

- 1 x detachable power cord
- 1 x cleaning kit (brush, non-frying cloth, non-hazardous cleaning solution, lens tissue paper)
- 1 x bottle immersion oil
- 2 x eye shades
- 1 x pair of tube caps
- 2 x spare halogen bulbs
- 1 x airtight plastic cover (to protect against dust and changing humidity)
- 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
- List with name and address of technical service providers in India
- Training and installation at end-user site

36. Autoclave, steam, bench top, 20L, electrical

- Stand-alone bench top autoclave 20 L, automatic
- Single door, self sealing with high-quality silicone gasket
- Chamber diameter ca 25 cm, depth ca 45 cm
- Pre-set automatic cycles for unwrapped instruments, wrapped instruments/packs; slow exhaust and drying cycles
- Two automatic programmes, approx: 2,2 bar at 134°C and 1,1 bar at 121°C
- Panel reports temperature, pressure and time, low-water level, as well as system errors (f.e. door)
- Fit with 5 L water reservoir, manual fill, autonomy for at least 10 cycles
- Power shut-off upon completion of cycle
- With 3 removable shelves
- Double safety door locking device
- Safety feature protect against over-pressure and over-temperature
- Audible and visual alert upon cycle interruption or completion
- unwrapped cycle time: cold 30 min, hot 20 min
- Control panel with alpha-numerical display and cycle indicators
- Complete with 3 instruments trays
- Power requirements: 220 V/50 Hz single phase
- Power consumption: 3000 W
- Device is produced by ISO 9001 certified manufacturer
- Device is safety certified according CE 93/42, FDA 510k or equivalent

Supplied with:

- 1 x set of 3 matching instrument baskets
- 1 x set of 3 matching sterilising drums
- 1 x roll of sterilisation indicator TST control spots
- 1 x box paper sheets, crepe, for sterilisation pack
- 1 x roll tape, adhesive, for sterilisation pack
- 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
- List with name and address of technical service providers in India
- Training and installation at end-user site
- Proposal for full service AMC, year 1 to 5, covering (i) 2 preventive maintenances per year, (ii) on-call technical interventions, spare parts and travel

37. Laundry washer/dryer, combo, 5kg

- Stand-alone automatic laundry washer
- Capacity, approx: 5kg
- Selection of five programmed wash cycles
- Temperature selection: 30 to 90C
- Dry spinning, approx: 1200 rpm
- Integrated tumble dryer
- Various degrees of drying out selectable
- Electronic sensor monitors humidity and alarm at pre-selected level
- Safety feature protect against over-temperature
- Support feet are height adjustable levelling the device
- Power requirements: 220 V/50 Hz single phase
- Power consumption: 2000 W
- Device is produced by ISO 9001 certified manufacturer

Supplied with:

- 1 x set of connection tubing water supply
- 1 x set of connection tubing water drainage
- 1 x set of connection tubing water vapour exhaust
- 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
- List with name and address of technical service providers in India
- Training and installation at end-user site

Annexure 3: 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 into the baby care are:

- Remove shoes, socks, woollens, 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.

Policy regarding VISITORS

- Only parents of the babies should be allowed entry into the nursery.
- Mothers are welcome at any time to be involved in care of their newborns
- Parents should be trained on proper hand washing technique.

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 a 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 spirit 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 as 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.

* Accessed from "Essential Newborn Nursing"; newbornwhocc.org/essential_newborn_nursing_training.htm

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 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:
 1. Palms and fingers and web spaces
 2. Back of hands
 3. Fingers and knuckles
 4. Thumbs
 5. Finger 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. A Sample poster used in the Neonatal unit at Department of Pediatric, All India Institute of Medical Science is shown bellow.

HAND WASHING – A SIMPLE AND EFFECTIVE METHOD FOR PREVENTION OF NOSOCOMIAL SEPSIS



STEP 1
Palm and fingers



STEP 2
Back of hands



STEP 3
Finger & knuckles



STEP 4
Thumbs



STEP 5
Finger tips



STEP 6
Wrists and forearms

Wash hands for 2 complete minutes before entering NICU & before any procedure

Wash hands for at least 20 seconds before and after touching baby

Golden rules

- Remove all jewelry and watch before hand washing. Roll the shirt to above elbow level.
- Wet and apply soap on hands and forearm up to elbow level.
- A normal, non-medicated soap is good enough.
- Dry hands either in air or by single-use sterile towel or sterile paper. Multiple-use cloth towels are not recommended
- Alcohol-based hand rub solutions may be used as an alternative. The 5 ml solution should be spread on all parts of the hands; follow Above steps; rub hands to dry.

Division of Neonatology, Department of Pediatrics, All India Institute of Medical Sciences

www.newbornhicc.org

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 and Cefotaxime.
- There is no need for flushing with heparinised saline to keep the IV line patent.
- Use separate IV line of giving antibiotics (do not open the IV fluid line for giving injections).

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 linen, blanket, Blanket Cover	Wash and autoclave	Use autoclaved linen each time
Cotton gauze	Autoclave, as required.	Every time use autoclaved cotton
Feeding utensils (paladai, spoon & katoris, 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 separate swab containers for each baby
Sets for procedures	Autoclave	After each use Every 72 hours if unused
Cheattle forceps	Autoclave	Daily. Put in sterile autoclaved bottle containing dry sterile cotton
Stethoscope, measuring tape, thermometer, swabs BP cuffs, probes of Radiant warmer/Incubator pulse oximeter	Clean with spirit	Daily
Laryngoscope	Clean with spirit swab thoroughly daily and after each use.	If used for an infected baby, wash with soap and water. Put the blade in 2% gluteraldehyde after removing from gluteraldehyde wrap in autoclaved cover and mark date on the cover

Disinfection protocols cont...

Name of equipment	Disinfection method	Other Considerations
Oxygen hood	Wash: soap & water	Daily; dry with clean linen
Face mask	Clean with soap and water, immerse in Gluteraldehyde for 20 min. rinse in distilled/ running water, dry and wrap with autoclaved linen	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 linen 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 in morning shift and when required
Radiant warmer and Incubator	Clean with soap water daily, if occupied. If unoccupied, clean with 2% Bacilloid.	Daily

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, body 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 4: Instructions for equipment and equipment use

Radiant warmer

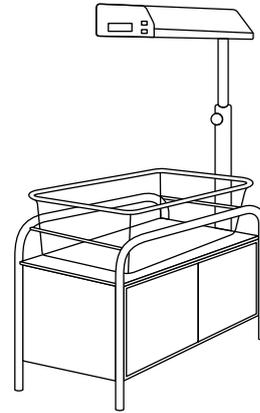
- Ensure that the temperature of the room is 22°C.
- Place the warmer away from air currents.
- Clean the mattress and platform, and cover the mattress with clean linen sheet.
- When it is known beforehand that a baby is to arrive in the newborn unit, turn on the warmer at least 20 minutes prior to pre-warm 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 loin 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 under each radiant warmer.
- Turn the 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 procedures and treatment. If in servo mode the heater output is < 20%, it is 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 rapid 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 and 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 manufacturers 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 stabilisation.

For disinfection

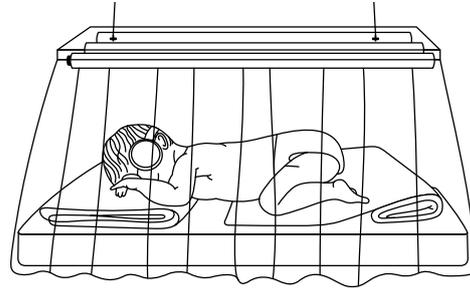
- For daily cleaning of front panel use damp cloth soaked in mild detergent (soap water).
- Don't use spirit or other chemical.
- Bassinet, cot should be disinfected daily using soap/detergent solution or disinfection solution.

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

Alarm	Problem	Response
"Power alarm"	This alarms if the mains power fails.	Find alternative means for heating if power cannot be fixed (KMC). Check the fuse.
"System alarm"	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 alarm High or Low"	This alarm operates in servo mode only. It sounds when the patient temperature differs from the SET temperature by >0.5°C.	Change to manual mode with maximum output if baby is having low temperature and adjust the temperature to try and normalise 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	Indicates 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, from feed.
- Place the baby as close to the lights as the manufacturers' 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 are 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 falls below 6-8 $\mu\text{W}/\text{cm}^2/\text{nm}$.
- Do not 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 to 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/ambu bag/self inflating bag

A. Parts

- a. Valve assembly.
- b. Patient outlet.
- c. Air inlet.
- d. Oxygen inlet.
- e. Safety valve.
- f. Body of the bag.

B. Test function

- Block patient outlet or mask by palm of your hand.
- Squeeze the bag.
 - i) You should feel pressure against your hand.
 - ii) Check opening of inspiratory valve.
 - iii) 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 chest of baby

Observe for improvement in heart rate, colour and chest rise.

- Follow the rhythm "Squeeze two three" to ensure 40 to 60 breaths 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 rinsing** – Disassemble as shown on the reverse.
 - Wash in warm water using a detergent.
 - Rinse in clean water.
- ii) **Disinfection/Sterilisation**

Except reservoir, whole bag can be boiled, autoclaved or soaked in disinfectant solution. After soaking 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 on 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 the 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/sterilisation

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 be 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'ts

- 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 machine (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.

Troubleshooting

- Check fuse.
- Check cord.
- Check earthing.
- Check for leakages in the bottle/tubing.

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 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.

