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Facility Based Newborn Care Operational Guide

Guidelines for Planning and Implementation

2011

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Ministry of Health and Family Welfare
Government of India, 2011

Acknowledgements

The Facility Based Newborn Care Operational Guide has been produced using wide consultation, and represents the hard work of a large number of individuals. We sincerely acknowledge the contributions from an expert group comprising leading professionals, programme managers and government officers. The expert group was set up by the Government of India involving staff from medical colleges, professional bodies – the National Neonatology Forum (NNF) and Indian Academy of Pediatrics (IAP) –UNICEF, WHO, USAID and NIPI for developing these guidelines.

The expert group submitted its report on Unified Standard Protocols for Special Newborn Care Units, Newborn Stabilization Units and Newborn Care Corners under the chairmanship of Dr Ashok Dutta from Kalawati Saran Children's Hospital. Ms Anuradha Gupta and Dr Ajay Khera from the Ministry of Health and Family Welfare reviewed the draft and coordinated the finalization of this document.

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Foreword

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Reproductive and Child Health (II) Programme of the Ministry of Health and Family Welfare, Government of India, aims to reduce Infant Mortality Rate (IMR) and Under-Five Mortality Rate (U5MR) to 30 and 38 per thousand live births respectively in accordance with the Millennium Development Goals (MDG).

Though IMR has declined from 146 in 1951 to 50 per thousand live births (SRS 2009), reduction in Neonatal Mortality Rate (NMR) is almost static and has reduced from 37 (SRS 2005) to 34 per thousand live births (SRS 2009). Furthermore, NMR contributes to about two-thirds of infant deaths and nearly half of all under - 5 deaths. There is an increasing need to focus on newborn care and survival for significant reduction in IMR and U5MR and strengthen the care of sick, premature, low birth weight newborns at the various levels of facilities right from the moment to birth through the neonatal period.

In this context, facility based new born care in Special Newborn Care Units (SNCU), Newborn Stabilization Units (NBSU) and Newborn Care Corners (NBCC) at various levels of health care system assume significant importance. Facility based newborn care operational guidelines have been developed by an expert group of leading professionals and programme managers to serve as a tool for both technical staff and programme managers in operationalizing SNCU, NBSU and NBCC. I am confident that these operational guidelines will prove to be very useful for the health personnel in planning, implementing and monitoring facility based newborn care. It would also provide assistance to service providers working in the facilities by way of key clinical protocols.

I earnestly hope the guidelines would be fruitfully used at the national, state, district and sub-district levels to strengthen facility based newborn care and bring down neonatal mortality.

(K. Chandramouli)

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Abbreviations

AMC	annual maintenance contract
ANM	Auxiliary Nurse Midwife
ANC	antenatal care
APH	antepartum hemorrhage
BeMOC	basic emergency obstetric care
BA	birth asphyxia
BCG	Bacillus Calmette-Guerin
BP	blood pressure
CFL	compact fluorescent light
CFT	capillary filling time
CME	continual medical education
CSF	cerebrospinal fluid
DL	Deciliter
ECG	electrocardiography
EBM	expressed breast milk
EDD	expected date of delivery
ELBW	extremely low birth weight
EmOC	emergency obstetric care
FBNC	facility based newborn care
F-IMNCI	Facility based Integrated Management of Neonatal and Childhood Illnesses
GIR	glucose infusion rate
GOI	Government of India
HEP B	Hepatitis B
HIE	Hypoxic- Ischemic Encephalopathy
HR	heart rate
IAP	Indian Academy of Pediatrics
IMNCI	Integrated Management of Neonatal and Childhood Illnesses
IMR	infant mortality rate
IANN	Indian Association of Neonatal Nursing
IV	intravenous
IVF	intravenous feeding
IUCD	intrauterine contraceptive device
JSY	*Janani Suraksha Yojana*

KCL	potassium chloride
KG	kilo
LBW	low birth weight
LMP	last menstrual period
MAS	Meconium Aspiration Syndrome
MCH	maternal and child health
MDG	Millennium Development Goals
ML	milliliter
MOHFW	Ministry of Health and Family Welfare
MTP	medical termination of pregnancy
MVA	manual vacuum aspiration
NBCC	newborn care corner
NBSU	newborn stabilization unit
NIBP	non-invasive blood pressure
NMR	neonatal mortality rate
NNF	National Neonatology Forum
NRHM	National Rural Health Mission
NS	normal saline
NSSK	Navjaat Shishu Suraksha Karyakram
OPV	oral polio vaccine
OT	operation theatre
PHC	Primary Health Centre
PIH	pregnancy induced hypertension
PIP	project implementation plan
PROM	premature rupture of membrane
RCH II	Reproductive Child Health Programme II
RDS	Respiratory Distress Syndrome
RL	Ringer's Lactate
RR	respiratory rate
RTI	reproductive tract infection
SNCU	special newborn care unit
SP02	spot oxygen saturation
SRS	sample registration system
STI	sexually transmitted infection
TSB	Total Serum Bilirubin
U5MR	under-5 mortality rate
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
VLBW	very low birth weight
WHO	World Health Organisation

Introduction

Overview

In India, 26 million babies are born every year, and 940,000 babies die before one month of life. The neonatal period is only 28 days; yet, with a neonatal mortality rate (NMR) of 34/1000 live births (SRS 2009), neonatal mortality contributes to about two-thirds of all infant deaths (Infant mortality rate 50/1000 live births, SRS 2009) and about half of all deaths in children younger than 5 years of age (Under 5 mortality rate 69/1000 live births, SRS 2008). Preventable morbidities such as hypothermia, asphyxia, infections, and respiratory distress continue to be the main causes of mortality in the neonatal period.

Infant mortality rate (IMR) in India has steadily declined from 58/1000 live births in 2004 to 50/1000 live births in 2009. However, there is slow progress in reduction of NMR which declined from 37 in 2004 to 34 in 2009. Reduction of deaths in the first week of life has shown the least progress.

There is a growing recognition that to meet national goals and the Millennium Development Goals (MDGs), a substantial reduction in NMR is needed, and reducing deaths in the first week of life is essential to make progress. A rapidly increasing number of newborns are being delivered in hospitals after the launch of the *Janani Suraksha Yojana* (JSY) scheme. The roll out of the Integrated Management of Neonatal and Childhood Illnesses (IMNCI) programme has also led to increased contact with newborns at their households and improved detection and referral of sick newborns to health facilities. Bringing these two together has resulted in an increased number of sick newborns presenting to referral hospitals. Provision and delivery of services for both essential newborn care and care of sick newborns in the existing health facilities at the district and sub-district level has, however, been found lacking. Facility-based newborn care (FBNC) has a significant potential for improving newborn survival. It has been estimated that health-facility based interventions can reduce neonatal mortality by as much as 25-30% (Lancet 365:977-88).

To accelerate the achievement of national goals and MDGs to bring down childhood mortality, the Government of India (GoI) is committed to improving the availability of quality newborn care services in addition to renewing efforts in providing quality health care for women, infants and young children under the National Rural Health Mission (NRHM) and its Reproductive and Child Health Programme (RCH II). One of the key steps in this direction is the setting up of newborn care facilities at various levels of public health services. Provision of newborn care facilities at various levels of health facilities will not only increase the confidence of the community in the health delivery system but also increase the coverage of services at the time of greatest risk – birth and the first days of life – and thus address the challenge of bringing down neonatal mortality in the country.

Purpose

This operational guide on FBNC has been developed to facilitate planning, establishment, operationalisation and monitoring of newborn care facilities at various levels of public health facilities. The guidelines given here will assist programme managers and service providers at national, state and district level in planning and delivering FBNC. The first section of the guide focuses on specifications and processes related to establishment of new facilities, while the second section provides technical guidance (key clinical protocols) to service providers working in newborn care facilities for managing sick newborns. The guidelines have been put together based on recommendations of an expert group that was set up by the GoI and included experts from medical colleges, professional bodies – National Neonatology Forum (NNF) and Indian Academy of Paediatrics (IAP) – and from UNICEF, WHO, USAID and NIPI.

Structure of the operational guide

The operational guide includes information on various aspects that need to be addressed for ensuring quality newborn care services and is organised in two sections.

Section I: Setting up, costing and operational steps

Section II: Key clinical protocols and other technical documents

Section I

Setting up, Costing and Operational Steps

1.1 Newborn care at different levels

In the overall planning of facility based care it is important to understand the level of care that can be provided at the various facility levels. Table 1 summarizes the required newborn care facilities at different levels.

Table 1: Newborn care facilities at different levels

Health Facility	All Newborns at Birth	Sick Newborns
Primary health centre (PHC)/ Sub-centre (SC) identified as MCH Level I	Newborn care corner in labor rooms	Prompt referral
Community health centre (CHC) / First referral unit (FRU) identified as MCH Level II	Newborn care corner in labor rooms and in operation theatre (OT)	Newborn stabilization unit
District hospital identified as MCH Level III	Newborn care corner in labor room and in operation theater	Special newborn care unit (SNCU)

Terminology

Newborn Care Corner (NBCC)

NBCC is a space within the delivery room in any health facility where immediate care is provided to all newborns at birth. This area is MANDATORY for all health facilities where deliveries are conducted.

Newborn Stabilization Unit (NBSU)

NBSU is a facility within or in close proximity of the maternity ward where sick and low birth weight newborns can be cared for during short periods. All FRUs/CHCs[1] need to have a neonatal stabilization unit, in addition to the newborn care corner.

Special Newborn Care Unit (SNCU)

SNCU is a neonatal unit in the vicinity of the labor room which will provide special care (all care except assisted ventilation and major surgery) for sick newborns. Any facility with more than 3,000 deliveries per year should have an SNCU (most district hospitals and some sub-district hospitals would fulfil this criteria).

[1] *As per the IPHS*

Table 2: Expected services to be provided at newborn care facilities

Newborn Care Corner	Stabilization Unit	Special Newborn Care Unit
Care at birth	**Care at birth**	**Care at birth**
• Prevention of infection • Provision of warmth • Resuscitation • Early initiation of breastfeeding • Weighing the newborn	• Prevention of infection • Provision of warmth • Resuscitation • Early initiation of breastfeeding • Weighing the newborn	• Prevention of infection • Provision of warmth • Resuscitation • Early initiation of breastfeeding • Weighing the newborn
Care of normal newborn	**Care of normal newborn**	**Care of normal newborn**
• Breastfeeding/feeding support	• Breast feeding/feeding support	• Breast feeding/feeding support
Care of sick newborn	**Care of sick newborn**	**Care of sick newborn**
• Identification and prompt referral of 'at risk' and 'sick' newborn	• Management of low birth weight infants ≥1800 grams gwith no other complication • Phototherapy for newborns with hyper-bilirubinemia* • Management of newborn sepsis • Stabilization and referral of sick newborns and those with very low birth weight(rooming in) • Referral services	• Managing of low birth weight infants <1800grams g • Managing all sick newborns (except those requiring mechanical ventilation and majorsurgical interventions) • Follow-up of all babies discharged from the unit and high risk newborns • Immunization services • Referral services
Immunization services	Immunization services	Immunization services

** Availability of laboratory facilities to estimate bilirubin levels is a prerequisite*

Steps in setting up newborn care facilities

Newborn Care Corner

1. Earmark an area about 20-30 sqft in size within the labor rooms of all health facilities for establishing a newborn corner. For FRUs and district hospitals, also set up newborn corners in operation theatres where caesarean sections are conducted.
2. Equip the corner with a radiant warmer and resuscitation kits (Annexure 1.1, A).

Newborn Stabilization Unit

1. For setting up a 4-bedded stabilization unit, at least 200 sqft of floor space is required. The unit should be located within or in close proximity to the maternity ward.
2. In addition, two beds in the postnatal ward should be dedicated for rooming in.
3. Civil work. Basic civil work required to set up a stabilization unit are:
    - Power supply: The unit should have 24 hr uninterrupted stabilized power supply.

- Water supply: The unit should have 24 hr uninterrupted running water supply.
- Lighting: The unit should be well lit, preferably with compact fluorescent light (CFL) panels.
- Floor surfaces: The floor surfaces should be easily cleanable thus minimizing the growth of micro-organisms.
- Walls: As with floors, the ease of cleaning, durability, and acoustical properties of wall surfaces needs to be considered.

4. Equipment: The equipment for maintaining temperature and conducting resuscitation are required (See Annexure 1.1, B : List of Equipment).

Special Newborn Care Unit

1. Project the bed demand.

   The minimum recommended number of beds for an SNCU at the district hospital is 12. However, if the district hospital conducts more than 3,000 deliveries per year, 4 beds should be added for each 1,000 additional deliveries.

2. Estimate the required space and identify the space.

   a. An average floor area of 50 sqft per bed should be available for a patient care area with an additional 50 sqft to be utilized as ancillary area. Therefore, on an average, a total area of 100 sqft per patient is required. For example, for a 12-bedded SNCU, 1,200 sqft floor area is required.

   b. Additional space will be required for the step-down area which will have beds for babies rooming-in with the mothers after the acute phase of illness is over. The number of beds (adult beds would be required for rooming-in babies with mothers) is 30% of the SNCU beds. For example, a 12-bedded unit will require 4 additional adult beds for the step down.

3. Design the unit.

   The unit should be so designed as to have the following areas:

   a. Patient care area: For a unit of 12 beds, the patient care area would be 600 sqft (50 sqft per bed). The patient care area can be designed to have two interconnected rooms separated by transparent observation windows from the nurses' working place in between. While one room can be used for intramural newborns (those born within the health facility), another room can be used for extramural newborns (those born outside the health facility).

   b. Ancillary area: 600 sqft ancillary area should include separate areas for hand washing and gowning area at the entrance, nurses' work station, clean area for mixing intravenous fluids and medications, doctors duty room, computer terminal, mother's area for expression of breast milk and learning mother crafts, unit store and side lab. It is desirable to have areas for portable x- ray, boiling and autoclaving and laundry room.

   c. Step-down area: In addition to the patient care area and ancillary space, the SNCU design should include the step-down unit. The step-down could be within the premises or in close proximity.

4. Identify and provide for civil, electrical and mechanical requirements.

Civil, electrical and mechanical works are essential for effective functioning of SNCU.

a. Power supply: The unit requires 24 hr uninterrupted stabilized power supply, sufficient to take the load of equipment. Stabilized power is critical to prevent any electrical damage to the equipment. Ensuring stabilized power inputs will require careful planning at the design stage. Power generator of appropriate wattage is needed to provide uninterrupted power supply.

b. Floor surfaces: The floor surfaces should be easily cleanable and minimize the growth of micro-organisms.

c. Walls: As with floors, the ease of cleaning, durability, and acoustical properties of wall surfaces must be considered.

d. Water supply: The unit should have 24 hr uninterrupted running water supply. An overhead tank of appropriate size should be provided for.

e. Lighting: Light sources should be as free as possible of glare or veiling reflections. No direct view of the electric light source or sun should be permitted in the newborn space.

f. Temperature: The unit should be designed to provide an air temperature of 78.8°F to 82.4°F (28 ± 2°C).

5. Procure and install equipment.

SNCU equipment include equipment for resuscitation, phototherapy and thermoregulation such as radiant warmers and phototherapy units. It is imperative to ensure adherence to the standards. As mentioned above, it is critical to ensure uninterrupted and stabilized power supply before installation (Annexure1.1, C).

Cost of setting up newborn care facilities

Table 3: Indicative costs for setting up newborn care facilities (in Indian rupees –₹)

	NBCC	NBSU	SNCU
One time establishment cost (in ₹; does not include the cost of training)			
Renovation & civil works (average)	10,000	3,00,000	16,00,000
Equipment & furniture	75,000	2,75,000	25,00,000
SubTotal	85,000	5,75,000	41,00,000
Recurring or running cost (does not include staff salaries)			
Consumables	5,000	25,000	3,50,000
Maintenance cost	15,000	1,50,000	6,50,000
SubTotal	20,000	1,75,000	10,00,000
Total	**1,05,000**	**7,50,000**	**51,00,000**

Human resources for newborn care service

- **NBCC:** One doctor and one staff nurse should be designated to NBCC to ensure appropriate functioning of the corner. All doctors and nurses who are likely to attend deliveries must be trained in *Navjaat Shishu Suraksha Karyakram* (NSSK). If NBCC is established at the sub-centre, then the auxillary nurse midwife (ANM) must also receive NSSK training.
- **NBSU:** One trained doctor is required for the stabilization unit. At least one full-time staff nurse trained in newborn care per shift should be available. This would require at least 4 fulltime staff nurses per unit. The staff at NBSU must be trained in facility based IMNCI (F-IMNCI).
- **SNCU:** A 12-bedded unit (plus 4 beds for the step-down area) requires at least one pediatrician or a trained doctor round-the-clock. Assuming that one doctor provides back-up of 8 hours, at least three to four trained doctors should be available at the facility. It is proposed that one paediatrician trained in neonatology should be posted at the unit, supported by two or three medical officers trained in FBNC.

  Such a unit will also require three nurses in each shift, round-the-clock. In addition, there should be sufficient nurses recruited to provide for leave vacancy and contingency.

  In addition to doctors and paramedics, dedicated support staff should be available to clean the nursery at least once during every shift and more often depending on the need. In addition, a part-time lab technician and a data operator will be required for the unit.

Note: It is important that doctors and nurses trained in newborn care are retained in SNCU/NBSU/NBCC and are not rotated to duties outside the newborn care facilities.

Training of staff on newborn care

To ensure that the staff has the necessary skills to provide the appropriate level of care, the staff should, at a minimum, undergo training in the following programme areas:

- **NBCC:** Doctors, staff nurses and ANMs working at newborn corners should be trained in NSSK
- **NBSU:** Doctors and nurses at facilities with stabilization units should be trained in F-IMNCI
- **SNCU:** The staff posted at the SNCU need to further undergo training in FBNC

Given below is a brief on each of the trainings proposed for staff at newborn care facilities:

Navjaat Shishu Suraksha Karyakram (NSSK)

Birth asphyxia is among the major direct causes of neonatal deaths, along with preterm birth and severe infections. NSSK is a new programme in basic newborn care and resuscitation that has been rolled out with support from the IAP and NNF. NSSK addresses important interventions of care at birth, that is basic newborn resuscitation, prevention of hypothermia, prevention of infection, early initiation of breast feeding, and equips the staff with appropriate knowledge and skill to provide essential newborn care in primary health care settings.

A two-day training module for medical officers, staff nurses and ANMs at primary health facilities (24x7 PHCs, sub-centres identified at MCH centres) has been developed.

NSSK is recommended as an essential training for all health workers conducting deliveries at 24x7 PHCs and sub-centres identified as MCH centres.

The specific details are as follows:

Training	Navjaat Shishu Suraksha Karyakram (NSSK)
Venue	District hospital or medical colleges
Trainers	Paediatricians from medical colleges and district hospitals
Trainees	Medical officers, staff nurses and ANMs
Batch Size	32 per batch
Duration	2 days

Facility based IMNCI (F-IMNCI)

Capacity building of service providers at NBSUs is essential to ensure quality care for normal and sick newborns. Keeping in view the non-availability of specialists (paediatricians) at many FRUs, it becomes important to build skills of medical officers and staff nurses at these facilities. It is recommended that all NBSU staff at FRUs is trained in F-IMNCI, which includes the package on 'facility based care of sick newborns and children'. F-IMNCI is skill-based training, based on a participatory approach combining classroom sessions with hands-on clinical sessions.

Medical officers and nurses not trained in IMNCI and working at health facilities should receive the full package of training with duration of training being 11 days.

Medical officers and nurses already trained in IMNCI will receive a training of the facility based care (FBC) portion of 5 days duration only.

The operational guidelines for F-IMNCI (already available) must be followed in this regard. Specific details include:

Training	F-IMNCI
Trainees	Medical officers and staff nurses at 24x7 PHCs, FRUs, district hospitals, MCH Level I, II and III.
Trainers	Senior paediatricians in district hospitals; faculty members of departments of paediatrics and community medicine of the medical colleges.
Venue	Medical college hospital, district hospital or private health facility with adequate number of deliveries and admitted cases of sick newborns and children under 5 years of age (at least 5 each).
Duration	11 days for medical officers and staff nurses who have not been trained in IMNCI and 5 days for those already trained in IMNCI.
Batch size	16 participants per batch.

Facility based newborn care training programme

All doctors and nurses posted in SNCUs need to undergo a more intensive training programme, including an observership at a recognized centre. The training programme includes skill-based training on essential and special care. Besides skills on clinical management, additional training is provided on housekeeping and maintenance of the equipment. The box on page 11 summarises the programme.

Training	Facility Based Newborn Care (FBNC).
Trainees	Medical officers and staff nurses posted in SNCU.
Trainers	National facilitators from National Neonatology Forum (NNF) and Indian Association of Neonatal Nurses (IANN), Faculty members, Department of Neonatology of National & Regional SNCU Collaborative Centres.
Venue	Training in a district hospital (SNCU) followed by obsevership in an SNCU collaborative centre or a medical college hospital with level-3 neonatology unit.
Duration	4 days of training followed by 2 weeks of observership.
Batch size	20-24 participants per batch of training and 4 participants per batch of observership.

1.2 Operational steps for planning and rolling out facility based newborn care in the state and districts

A National Collaborative Centre for FBNC will be engaged at the national level. This centre will provide technical expertise and overall support to the government for effective implementation and monitoring of the progress in the states. The National Collaborative Centre will work in close association with regional and state collaborative centres (see section 1.3) to build capacity of the service providers located at the newborn care facilities as well as extend mentoring support to the SNCU teams and state/district programme managers.

State orientation and planning meeting

- State planning meeting of at least one day should be organized for key state/district programme managers to plan for all components, phasing and budgeting of newborn care units. A detailed plan with budgets should be available with the state and concerned districts. The operational guideline should be disseminated to all the concerned programme managers and experts in the state and a one-day orientation can be carried out, if required
- If the plan and budgets have been approved in the state project implementation plan (PIP), a 'roll out' plan should be developed by involving the state and district programme managers. This includes physical establishment as well as recruitment and training of requisite human resources

Prioritisation of districts

The aim is to have an SNCU in each district hospital and at those sub-district hospitals where more than 3,000 deliveries are conducted per year. However, prioritisation of districts has to be done in setting up newborn care facilities and this can be guided by the following criteria:

- Prioritise the high focus districts (those districts which are performing poorly on RCH indicators). Within these districts, focus on districts with high infant mortality and those with high levels of institutional deliveries. High mortality districts are those with IMR higher than the state average
- Within the districts, prioritise facilities having high institutional delivery rates
- In the identified districts, newborn care facilities must be planned as follows:
    - Newborn care corners: In OT and labor room of district hospitals, sub-district hospitals, FRU/CHCs and at all 24x7 PHCs and MCH level 1 centres, that is at all delivery points.
    - Newborn stabilization unit: At all FRUs and CHCs with less than 3,000 deliveries per year

- SNCU at district hospitals and sub-district hospitals conducting more than 3,000 deliveries per year. If a newborn care unit exists in the medical college hospital, then it should be ensured that it fulfils the requirements of an SNCU as specified here.

Setting up a multi-disciplinary team

State should set up a multi-disciplinary team composed of doctors, civil works team (from the public works department) and biomedical engineers to oversee the overall assessment, civil work and refurbishment plans at the district and state level.

Procurement, supply and maintenance of the equipment

Based on a facility assessment, efforts should be made to mobilize unused essential newborn care equipment in peripheral units. Acquisition of new equipment should be as per RCH-II or state suggested mechanisms. It should be ensured that the equipment is of appropriate quality and comply with the specifications laid down in this regard. It is preferred that indigenously manufactured equipment be procured. Equipment is critical for optimal performance of SNCUs. Inadequate functioning or non-use of equipment will lead to ineffective services. Very often reasons for poor functioning of the equipment are non-stabilized power input, limited skills in use of equipment, lack of preventive maintenance and troubleshooting, absence of an annual maintenance contract (AMC) and non-honouring of AMC.

State should ensure some of the following steps for the maintenance and adequate functioning of the equipment:

- Build multiyear AMC into procurement contracts
- Provide designated automatic power back-up of adequate power
- Carry out power audit of the units, ensuring stabilized power input
- Train SNCU staff in use, preventive maintenance, and troubleshooting of equipment before installation
- Create network of trained technicians and biomedical engineers for optimum functioning of the equipment
- Earmark funds for local repair, and place funds with the unit in order to avoid inordinate delays in sanctioning of funds
- Conduct regular audit for functionality of equipment
- Outsource some selected maintenance services (e.g. medical and laboratory equipment maintenance)

Recruitment and training of staff

The quality of services offered at a facility depends on the availability of clinical expertise round-the-clock, backed by monitoring devices and equipment.

- Identify staffing requirements (see the section on human resources) and take steps to get the staff into position.
- Assess training needs and training load, and develop a training plan for the state and district. Trainings should be timed as close as possible to the operationalisation of the newborn care unit.

Record keeping

Each unit will record information on each admitted newborn in the standard case-recording sheet (Annexure 2.2). Standard case definitions would be used for recording the clinical conditions among admitted newborn babies (Annexure 2.1). Use of standard definitions would ensure that the data is valid, reliable and comparable across the units. Ideally, all units should have a computerised data entry system.

Based on the case records, the units will generate the report, using the standard reporting format (Annexure 1.3), and submit to the districts. The districts will send the collated reports to the relevant state health authorities and to the state collaborative centre.

Review and feedback

At each level, the reports will be analysed and performance reviewed on standard indicators (Annexure 1.2). At the unit level, review of cases and feedback to staff is a continuous process, and the medical officer in-charge/medical superintendent will be responsible for the review. The monthly reports should be compiled and sent to the district. At the district level, monthly reports should be compiled from all health facilities providing newborn care and forwarded to the state.

At the state (or divisional level), state or regional collaborative centres should provide a quarterly feedback to the districts and newborn care units.

The data compiled from all the districts will be forwarded by the state to the RCH division at the central level.

Supervision and monitoring

Periodic review by the state and district officials and by the faculty of the collaborative centres would be conducted to assess implementation and suggest mid-course correction.

Each SNCU must be assigned a mentoring team of two experts from the state, at least for the initial one to two years till the functioning of the units is well established. These can be the experts designated by NNF, IAP or the Indian Association of Neonatal Nursing (IANN) who will be required to undertake regular monitoring visits and provide mentoring support to the local teams. They should also assist the teams in analysing the data (case records, death audits, facility assessment, etc) and to accordingly plan and implement steps for quality improvement. Provision for mentoring visits can be built in the PIPs.

Ensuring quality of care

Adherence to standard operating procedures for housekeeping and for clinical care of admitted newborns is critical for ensuring quality care at the facilities. Refer to Section II for the details on housekeeping and clinical protocols.

Planning for newborn care facilities at district level

A district will have newborn care facilities established as a three-tiered system. While MCH centres and 24x7 PHCs will have NBCCs, the FRU/CHC will have NBSUs (in addition to NBCCs attached to the labor room and OT). SNCUs will be established at the district or sub-district hospital (wherever 3,000 or more deliveries are being conducted in a year).

Illustration 1: Assume a district that has one district hospital with more than 3,000 deliveries per year, five FRUs, and twenty 24x7 PHCs[4]. In one such district, the facilities required for newborn care are listed in Table 3.

Table 3: Facilities for newborn care in a district having one district hospital with more than 3,000 deliveries per year, five FRUs, and twenty 24x7 PHCs

Health Facility	Services	Nos.
Primary health centre/MCH Level I	Newborn care corners in labor rooms	20
First referral unit/ Community health centre/ MCH Level II	Newborn care corners in labor rooms	5
	Newborn care corners in OT	5
	Newborn stabilization unit	5
District hospital/ MCH Level III	Newborn care corners in labor rooms	1
	Newborn care corners in OT	1
	Special newborn care unit	1

1.3 Collaborative centres

Institutions fulfilling the following criteria will be identified, designated and supported to be collaborative centres:

- Have a functional Level II or Level III nursery (certified by NNF).
- Express interest in supporting FBNC in rural India.
- Have adequate and motivated faculty to support the units, who are willing to travel to the remote districts for about 1-2 weeks per year for training and mentoring visits.
- Follow rational practices of clinical newborn care and of housekeeping in their own units.
- Involved in operational research activities related to evidence based newborn care.

National Collaborative Centre

An apex institute or medical college will provide clear leadership and technical guidance for ensuring uniform, high quality implementation of FBNC.The designated National Collaborative Centre will be responsible for coordinating the activities of the regional and state collaborative centres.

The National Collaborative Centre will:

- Prepare technical guidelines, norms and protocols, and update them from time-to-time
- Monitor the progress and quality
- Review and analyse reports
- Mentor and support some regional/state collaborative centres
- Provide recommendations to the Ministry of Health and Family Welfare (MOHFW) to improve the implementation and make course corrections
- Build capacity of the regional and state collaborative centres

[4]*Population norm for PHC/FRU, CHC/DH*

Regional and state collaborative centres

Existing Centres of Excellence in newborn care will be identified and designated as regional collaborative centres. These will provide technical support in operationalisation of newborn care facilities, establishing a monitoring system, and conducting quality assessment. King Edward Memorial Hospital (Mumbai), PGIMER (Chandigarh), Institute of Child Health (Chennai), and Kalawati Saran Children's Hospital (New Delhi) have already been identified as collaborative centres.

In consultation with the state, one medical college will be identified as the state collaborative centre. As far as possible, these centres will be the ones identified already as state resource centres for skilled birth attendance.

The regional collaborative centre will ensure that in the state collaborative centre

- appropriate perinatal practices are followed;
- capacity of the faculty and staff is built so that they can play the role of local trainers and mentors; and
- data is well managed to allow for analysis and feedback.

Regional/State collaborative centres will perform the following tasks:

i. Capacity building of SNCU staff and administrators
   - Establishing the state trainer pool
   - Training of SNCU staff including doctors (medical officers and paediatricians) and nurses equipped with knowledge and skills for efficient management of sick newborns
   - Training of all staff in housekeeping protocols for SNCUs and equipment maintenance
   - Training in administration/managerial issues for in-charge MOs and nurse managers
   - Refresher courses or continuing medical education (CME)

ii. Supporting the establishment of a standard recording and reporting system
   - The regional/state collaborative centre will generate quarterly analysis report on various trends in the SNCUs, for example trends of admissions (inborn vs out-born), gestation, birth weight, causes of deaths, etc

iii. Ongoing support
   - Follow-up observership visits to the collaborative centre for 2 weeks (after the FBNC training).
   - Mentoring visits by the collaborative team to each centre once every three months. The mentoring visits will be made to look into all operational issues, including the quality of care being provided at the units. For a suggested checklist for mentoring visits see Annexure 1.4.
   - Establish a technical helpdesk for queries related to patient care, unit management and case discussions.

iv. Quality assurance
   - The regional/state collaborative centre will ensure that quality assurance systems for SNCUs are developed and bi-annual quality assessment is performed for these SNCUs

v. Operational research

- The national/regional/state collaborative centres will conduct focused operational research on issues where there is identified gap in knowledge or felt need for generating new evidence.

vi. Review meetings

- The regional/state collaborative centre will organise bi-annual review meetings of the in-charges of newborn care units in the states and districts, and also actively participate in the annual review meeting of all the collaborative centres.

Section II

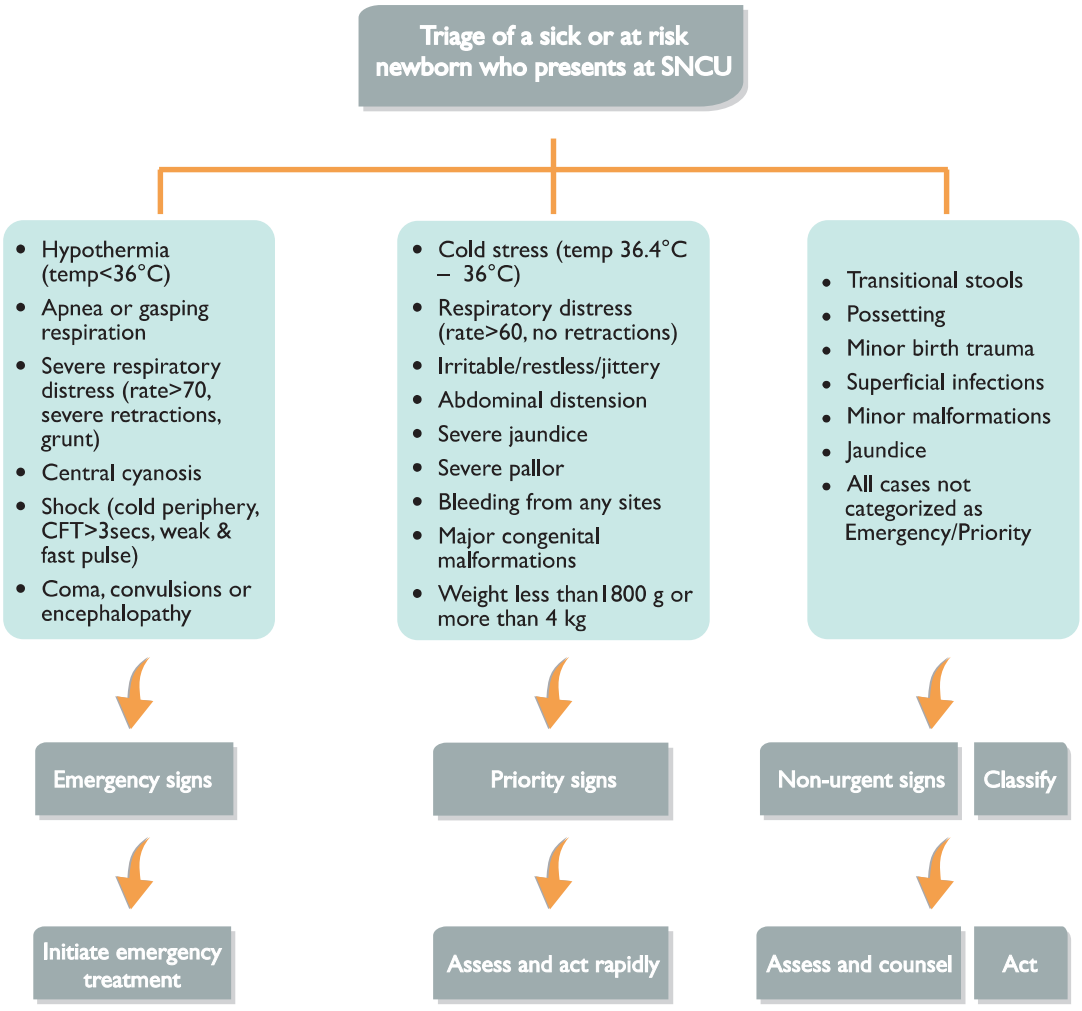
Key Clinical Protocols and Other Technical Documents


NOT FOR SALE
HEALTH EQUIPMENT FOR SNCU
ZEAL MEDICAL PVT. LTD.
36.0
RADIANT HEAT WARMER

Chart 1

Triage of sick newborns

Triaging is sorting of neonates to rapidly screen sick neonates for prioritizing management



*Newborns classified as "Emergency" require urgent intervention and emergency measures. All such newborns will be admitted to SNCU after initial stabilization.

Newborns classified as "Priority" are sick and need rapid assessment and admission to SNCU.

Newborns classified as non–urgent do not require urgent attention but require further assessment and counseling.

Chart 2

Assessment and treatment of newborns displaying emergency signs

	ASSESS FOR EMERGENCY SIGNS (In all cases)		TREAT EMERGENCY SIGNS
TEMPERATURE	• Cold to touch (Abdomen)	IF POSITIVE →	• Re-warm hypothermic babies • Rapidly re-warm if there is severe hypothermia (<32°C) up to 35°C and then gradual re-warming • Make sure young infant is warm

AIRWAY AND BREATHING	• Not breathing or gasping or
	• Central cyanosis or
	• Severe respiratory distress
	  ○ Respiratory rate 70/min
	  ○ Severe lower chest in-drawing
	  ○ Apnoeic spells
	  ○ Grunting
	  ○ Unable to feed
		ANY SIGN POSITIVE →	• Manage airway
			• Provide tactile stimulation if apnoeic
			• If still apnoeic or gasping – Provide PPV
			• Give oxygen
			• Make sure neonate is warm

CIRCULATION	• Capillary refill longer than 3 seconds, and • Weak and fast pulse (>160)	IF POSITIVE →	• Give oxygen • Insert IV line and give 20 ml/kg normal saline over 30 min • Proceed immediately to full assessment and treatment • Make sure neonate is warm
CONVULSIONS	• Convulsions	IF CONVULSING →	• Manage airway • Check & correct hypoglycemia • Give anticonvulsant • Make sure neonate is warm

For all newborns displaying emergency signs:

- Provide the treatment as above
- Call for help
- Draw blood for emergency investigations (Glucose, Calcium, sepsis screening)

Chart 3

Criteria for admissions to SNCU and criteria for transfer to step-down unit and discharge

Any newborn with following criteria should be immediately admitted to the SNCU:

- Birth weight <1800 g or gestation <34 weeks
- Large baby (>4.0 kg)
- Perinatal asphyxia
- Apnea or gasping
- Refusal to feed
- Respiratory distress (Rate >60/min or grunt/retractions)
- Severe jaundice (Appears <24 hrs/stains palms & soles/ lasts>2 weeks)
- Hypothermia <35.4°C, or hyperthermia (>37.5°C)
- Central cyanosis
- Shock (Cold periphery with CFT>3 seconds and weak & fast pulse)
- Coma, convulsions or encephalopathy
- Abdominal distension
- Diarrhea/dysentery
- Bleeding
- Major malformations

Criteria for transfer from SNCU to the Step-Down

- Babies whose respiratory distress is improving and do not require oxygen supplementation to maintain saturation
- Babies on antibiotics for completion of duration of therapy
- Low birth weight babies (less than 1800 g), who are otherwise stable (for adequate weight gain)
- Babies with jaundice requiring phototherapy but otherwise stable
- Babies admitted for any condition but are now thermodynamically and hemodynamically stable

Criteria for discharge from SNCU to home

- Baby is able to maintain temperature without radiant warmer
- Baby is hemodynamically stable (normal CFT, strong peripheral pulses)
- Baby accepting breast feeds well
- Baby has documented weight gain for 3 consecutive days; and the weight is more than 1.5 kg
- Primary illness has resolved

In addition to the above, mother should be confident of taking care of the baby at home.

Chart 4

Indications of admission to newborn stabilization unit (NBSU)

Newborn presenting with any of the following signs to a facility with neonatal stabilization unit requires admission for initial stabilization and transfer to SNCU:

- Apnea or gasping
- Respiratory distress (Rate > 70/min with severe retractions/grunt)
- Hypothermia <35.4°C
- Hyperthermia (>37.5°C)
- Central cyanosis
- Shock (Cold periphery with CFT>3 seconds and weak & fast pulse)
- Significant bleeding that requires blood or component transfusion

Newborns, who after assessment and stabilization, can be managed at stabilization unit*

- Newborns with respiratory distress, having respiratory rate 60-70/min without grunting or retractions (for observation and oxygen therapy)
- Newborns with gestation less than 34 weeks or weight <1800 g (for observation and assisted feeding)
- Newborns with hypothermia and hyperthermia who are hemodynamically stable after initial stabilization
- Newborns with jaundice requiring phototherapy
- Neonates with sepsis who are hemodynamically stable, for observation and antibiotic therapy

* Others would require referral to an SNCU after stabilization, if an SNCU and appropriate referral is available in the district

Chart 5

Grading and management of hypothermia

Baby who is cold to touch both centrally and peripherally or temperature is less than 35.5°C

Grading of hypothermia

- Normal temperature : 37.5–36.5°C
- Cold stress : 36.4–36.0°C
- Moderate hypothermia : 35.9–32°C
- Severe hypothermia : < 32°C

Management of hypothermia

- Record the actual body temperature
- Re-warm a hypothermic baby as quickly as possible:
    - Severe hypothermia – Radiant warmer
    - Mild to moderate hypothermia – Kangaroo mother care or Radiant warmer

If hypothermia still persists despite taking above measures, infection should be suspected

Management of severe hypothermia

1. Keep under radiant warmer
2. Reduce further heat loss
3. Infuse IV 10% Dextrose @ 60ml/kg/day
4. InjectVitamin K 1.0 mg intramuscular
5. Provide oxygen
6. Consider and assess for sepsis

Prevent hypothermia: warm chain
Baby must be kept warm at all times right from birth. The "warm chain" is a set of 10 interlinked procedures carried out at birth and later
1. Warm delivery room (>25°C)
2. Warm resuscitation
3. Immediate drying
4. Skin-to-skin contact between baby and the mother
5. Breast feeding
6. Bathing and weighing postponed
7. Appropriate clothing and bedding
8. Mother and baby together
9. Warm transportation
10. Training/awareness-raising of healthcare provider

Chart 6

Expression of breast milk

Breast milk expression is required for optimal feeding of newborns for preterm, low birth weight and sick newborns that cannot breastfeed but can tolerate assisted feeding.

Expressing breast milk (Figure 1)

Teach the mother to:

- Wash hands with soap and water before expression. Hold, handle or cuddle the baby
- Sit comfortably and hold the clean container near the breast
- Put thumb and index finger on the breast at the rim of the areola opposite each other. Support the breast with other three fingers
- Press thumb and index finger slightly inwards towards the chest wall
- Press the breast between the fore-finger and thumb. Press and release, press and release. This should not hurt
- Press the areola in the same way from the sides, this ensures that milk is expressed from all segments of the breast
- Avoid rubbing or sliding fingers along the skin
- Express one breast for at least 3-5 minutes until the flow slows; then express the other side; and then repeat on both sides
- To express breast milk adequately it may take 20-30 minutes

Storing expressed breast milk (EBM)

- Cover the container of EBM with a clean cloth or a lid
- EBM can be kept at room temperature for 8 hours and in the refrigerator for 24 hours
- EBM stays in good condition longer than animal milk. Do not boil the EBM. For warming, place the container in a bowl of warm water
- Before feeding. gently shake the container or use a stirrer to recombine the separated fat globules with the rest of the milk
- Feed with cup or spoon or paladai, never feed with bottle

Figure 1: Technique of manual expression of breast milk

Chart 7

Assisted feeding of low birth weight neonates

Newborns that require assisted feeding:

- Preterm <34 weeks or birth <1800 g
- Babies having mild respiratory distress
- Babies with inability to feed at breast or by katorispoon/paladai
- Oro-facial defects/malformation (Cleft lip or palate)

Guidelines for the modes of providing fluids and feeding

Birth weight (grams)	<1200	1200-1800	>1800
Gestation (weeks)	<30	30-34	>34
Initial feeding	Intravenous fluids try gavage feeds, if not sick	Gavage, try katori-spoon if not sick	Breastfeeding, if unsatisfactory, give katori-spoon feeds
After 1-3 days	Gavage	Katori-spoon	Breastfeeding
Later (1-3 weeks)	Katori-spoon	Breastfeeding	Breastfeeding
After some more time (4-6 weeks)	Breastfeeding	Breastfeeding	Breastfeeding

Mode for providing fluids and feeds

Breast milk is the ideal feed for low birth weight babies.

Those unable to feed directly on the breast can be fed expressed breast milk (EBM) by gavage OR katori-spoon or paladai.

Techniques of assisted feeding

Gavage feeds

- Place an oro-gastric feeding catheter of size 5-6 Fr after measuring the correct insertion length from ala of nose to tragus and from tragus to midway between xiphisternum and umbilicus
- Check correct placement by pushing in air with 10 ml syringe and listening with stethoscope over upper abdomen
- Attach 10 ml syringe (without plunger) at the outer end of the tube, pour measured amount of milk and allow milk to trickle by gravity. Close outer end of tube after feeding
- Place baby in left lateral position for 15 to 20 minutes to avoid regurgitation
- Leave oro-gastric tube in situ
- Pinch the oro-gastric tube during withdrawal
- Measure pre-feed abdominal girth just above the umbilical stump. Do not attempt pre-feed aspirates
- Evaluate baby for ileus, if abdominal girth increases by >2 cm from baseline

ROUTINE PRE-FEED GASTRIC ASPIRATES ARE NOT RECOMMENDED

Katori-spoon/paladai feeds

- Place the baby in a semi-upright posture
- Place the milk filled spoon at the corner of mouth
- Allow milk flow into baby's mouth slowly, allowing him to actively swallow, avoiding the spill
- Repeat process till required amount has been fed
- Try gentle stimulation if baby does not actively accept and swallow the feed
- If unsuccessful, switch back to gavage feeds

Figure 2: Gavage feeding

Figure 3: Paladai feeding

Chart 8

Intravenous fluid therapy for newborns

Criteria for starting intravenous fluids among newborns

- Neonates with lethargy and refusal to feed
- Moderate to severe breathing difficulty
- Babies with shock
- Babies with severe asphyxia
- Abdominal distension with bilious or blood stained vomiting

Choice of intravenous fluids

- Determine required volume of fluid as per birth weight and age (Table 2)
- Use 10% Dextrose for initial 48 hours of life
- After 48 hours, if baby is passing urine, use commercially available IV fluids such as Isolyte P
- If the premixed solution is not available or baby requires higher GIR (Glucose infusion rate),
    - Take normal saline (NS) 20 ml/kg body weight
    - Add remaining fluid volume as 10% Dextrose
    - Add 1 ml KCl/100ml of prepared fluid

Administration of IV fluid

- Use micro-drip infusion set (where 1 ml = 60 microdrops)
- In this device, ml of fluid per hour is equal to number of micro-drops per minute
  e.g. 6ml/hr = 6 micro-drops/minute
- Calculate rate of administration, monitor to ensure that micro-dropper delivers required rate
- Change the IV infusion set and fluid bag every 24 hours
- Before infusing IV fluid, carefully check:
    - Expiry date of the fluid
    - Seal of the infusion bottle or bag
    - Fluid is clear and free from any visible particles

Monitoring of babies receiving IV fluid

- Inspect infusion site every hour for redness and swelling
- If redness and/or swelling is present, stop infusion, remove cannula, and establish a new IV line in a different vein
- Check the volume of fluid infused, compare to the prescribed volume and record all findings
- Measure blood glucose every nursing shift, i.e. 6–8 hours
- If the blood glucose is less than 45 mg/dl, treat for low blood glucose
- If the blood glucose is more than 150 mg/dl on two consecutive readings: Change to 5% Dextrose solution – measure blood glucose again in three hours
- Weigh the baby daily. If the daily weight loss is more than 5%, increase the total volume of fluid by 10 ml/kg body weight for one day
- If there is no weight loss in the initial 3 days of life, do not give the daily increment
- If there is excessive weight gain (3-5%) decrease the fluid intake by 15-20 ml/kg/day
- Check urine output: Normally a baby passes urine 5–6 times everyday

Fluid requirements of newborns

Day of life	Amount of fluids required (ml/kg/day)	
	Birth weight >1500 g	Birth weight<1500 g
1	60	80
2	75	95
3	90	110
4	105	125
5	120	140
6	135	150
Day 7 onwards	150	150

Chart 9

Management of hypoglycemia

Hypoglycemia in newborns is defined as blood glucose levels less than 45 mg/dl

Management of hypoglycemia

- Establish an IV line. Infuse a bolus of 2 ml/kg body weight of 10% dextrose slowly over 5 min
  - If baby has convulsions, give bolus of 4–5 ml/kg of 10% dextrose
  - If an IV line is not available, administer 2 ml/kg body weight of 10% dextrose by gastric tube
- Start infusion of dextrose at the daily maintenance volume to provide at the rate of 6 mg/kg/min
- Measure blood glucose after 30 min and then every four to 6 hrs
- If blood glucose <25 mg/dl:
  - Repeat bolus of dextrose as above
  - Increase to infusion rate of 8 mg/kg/ min
- If the blood glucose >25 mg/dl but <45 mg/dl:
  - Increase infusion rate by 2 mg/kg/min
  - Measure blood glucose after 30 min
  - Continue the infusion at this rate until 2 consecutive values 6 hrs apart are above 45 mg/dl
- Begin breastfeeding as soon as baby is able to breastfeed
  - If cannot be breastfed, give EBM by spoon or paladai
- As feeding improves, slowly decrease (over 1-2 days) IV dextrose and increase oral feeds

Do not discontinue the glucose infusion abruptly to prevent rebound hypoglycemia

Achieving appropriate glucose infusion rates using a mixture of D10 & D25

Volume of Fluids	Volume Required (ml/kg/d)											
	Glucose Infusion Rate											
	6 mg/kg/min				8 mg/kg/min				10 mg/kg/min			
	D10	D25	NS	DW	D10	D25	NS	DW	D10	D25	NS	DW
60	42	18	-	-	24	36	-	-	5	55	-	-
75	68	7	-	-	49	26	-	-	30	45	-	-
90	60	10	20	-	40	30	20	-	20	50	20	-
105	85	-	20	-	65	20	20	-	45	40	20	-
120	86	-	20	14	88	12	20	-	70	30	20	-
135	86	-	20	29	115	-	20	-	80	25	20	-
150	86	-	20	44	115	-	20	15	120	10	20	-