



CHILD HEALTH DIVISION

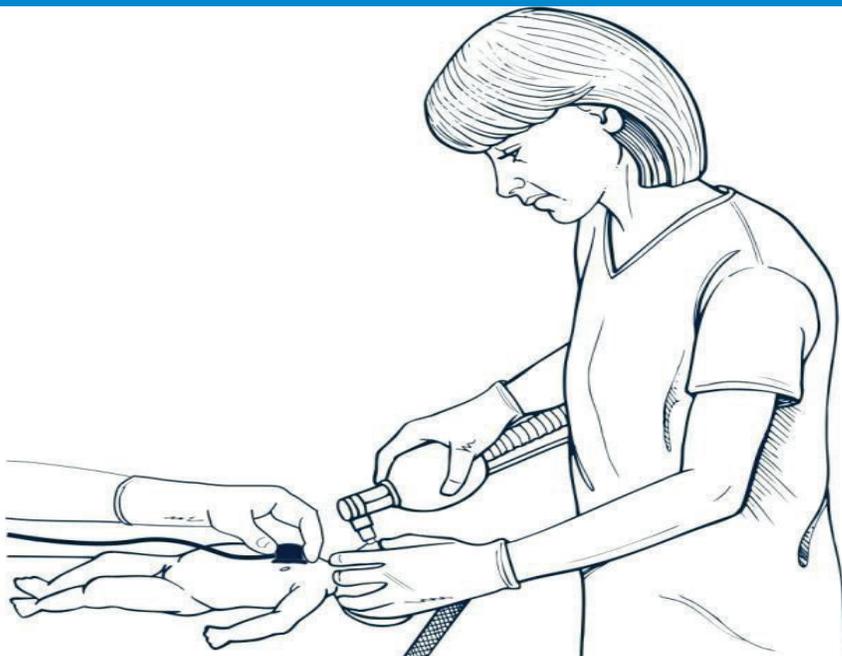
Ministry of Health and Family Welfare

Government of India



NAVJAAT SHISHU SURAKSHA KARYAKRAM

2020



**RESUSCITATION AND
ESSENTIAL NEWBORN CARE
RESOURCE MANUAL**



सबका साथ, सबका विकास, सबका विश्वास
Sabka Saath, Sabka Vikas, Sabka Vishwas



डॉ हर्ष वर्धन
Dr Harsh Vardhan

स्वास्थ्य एवं परिवार कल्याण, विज्ञान और प्रौद्योगिकी
व पृथ्वी विज्ञान मंत्री, भारत सरकार

Union Minister for Health & Family Welfare,
Science & Technology and Earth Sciences
Government of India



MESSAGE

I am pleased to note that the Ministry of Health and Family Welfare has revised the training module for “Navjaat Shishu Suraksha Karyakaram (NSSK)” which is being launched during the “National Newborn Week” during 15th to 21st November, 2020.

National Health Policy, 2017 provides a framework to strengthen healthcare system for attaining Universal Health Coverage (UHC) and work on Government’s philosophy of ‘Sabka Sath Sabka Vikas’. Our flagship programme ‘Ayushman Bharat’ is working towards attainment of UHC as one of the key targets under Sustainable Development Goals.

Under this UHC, we are committed to provide appropriate healthcare to children including newborns across the country. We are targeting to bring down the Neonatal Mortality Rate to single digit by 2030 which is more ambitious than targets set under Sustainable Development Goals.

I am sure that these revised training modules will help doctors and nurses in acquiring essential knowledge and skills for providing optimal care to neonates in the health facilities, thereby helping in improving health status of newborns.

I extend all my best wishes for the occasion.

(Dr. Harsh Vardhan)

कार्यालय: 348, ए-स्कंध, निर्माण भवन, नई दिल्ली - 110011 • Office: 348, A-Wing, Nirman Bhawan, New Delhi - 110011

Tele.: (0): +91-11-23061661, 23063513 • Telefax: 23062358 • E-mail: hfwminister@gov.in, hfm@gov.in

निवास: 8, तीस जनवरी मार्ग, नई दिल्ली - 110011 • Residence: 8, Tees January Marg, New Delhi -110011

Tele.: (R): +91-11-23794649 • Telefax. 23794640



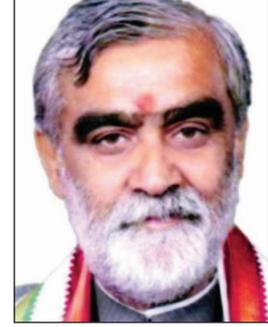
अश्विनी कुमार चौबे
Ashwini Kumar Choubey



सर्वेसन्तु निरामया



स्वास्थ्य एवं परिवार कल्याण राज्य मंत्री
भारत सरकार
MINISTER OF STATE FOR
HEALTH & FAMILY WELFARE
GOVERNMENT OF INDIA



MESSAGE

The Ministry of Health and Family Welfare, Government of India has implemented a number of policies and programmes aimed at ensuring universal access to health coverage and reducing child and neonatal mortality.

In 2014, the Government of India launched the India Newborn Action Plan (INAP) in order to intensify the efforts towards improving newborn health. INAP has successfully brought a sharper focus on implementation of the existing and new initiatives for the newborns-both for their survival and subsequent growth and development.

To fulfill the role of providing quality service for newborn care in the health facilities, Ministry of Health and Family Welfare, Government of India has developed training package for Navjaat Sishu Suraksha Karyakaram (NSSK). Capacity building of the service providers are of utmost importance as newborn care and survival necessitate knowledge and skills of high order in the providers.

I would like to express my heartfelt appreciation to all those who contributed to the preparation of these documents. I am sure that these packages will help in delivering newborn health services with quality care, all across the country.

(Ashwini Kumar Choubey)

Office : 250, 'A' Wing,
Nirman Bhawan, New Delhi-110 011
Tel. : 011-23061016, 011-23061551
Telefax : 011-23062828
E-mail : moshealth.akc@gov.in

Residence :
30, Dr. APJ Abdul Kalam Road,
New Delhi – 110003
Tel. : 011-23794971, 23017049



राजेश भूषण, आईएएस
सचिव
RAJESH BHUSHAN, IAS
SECRETARY



भारत सरकार
स्वास्थ्य एवं परिवार कल्याण विभाग
स्वास्थ्य एवं परिवार कल्याण मंत्रालय
Government of India
Department of Health and Family Welfare
Ministry of Health and Family Welfare



MESSAGE

India has made remarkable progress in the field of women, children and adolescents' health during the recent years. Childhood and infant mortality in India has shown steady decline during the last decade however the rate of neonatal mortality continues to be high. Nearly two-thirds infant deaths occur within the first four weeks of life and about two-thirds of those occur within the first week. Thus, the first days and weeks of life are critical for new born survival and health of a child. Most of the neonatal deaths are preventable with simple, evidence based and cost-effective solutions. Hence continued focus on neonatal care is essential.

India Newborn Action Plan (2014) has clearly spelt out India's ambition to improve this scenario and the country will make all possible endeavors to reduce newborn mortality rate to single digit by the year 2030. This target is even more ambitious than the corresponding SDG target and therefore calls for concerted actions. Improving the quality of newborn care is a critical challenge faced by every health care setting dealing in maternal and child health. This may be overcome by equipping the Doctors, Nurses and ANMs with appropriate knowledge and skills to improve the quality of service delivery, therein saving more lives.

Government of India has been implementing the Navjaat Shishu Suraksha Karyakram (NSSK) since 2009 to build capacity of the doctors and nurses to provide essential newborn care around birth. With advances in critical care and based on evidence, the package has now been revised with updated algorithm and improved training methodology. I am hopeful that the revised NSSK curriculum and training package will act as an enabling tool and help our healthcare providers improve their clinical skills and practices and contribute to newborn survival and health in the country.

(Rajesh Bhushan)



वन्दना गुरनानी, भा.प्र.से.

Vandana Gurnani, I.A.S.

अपर सचिव एवं मिशन निदेशक (रा.स्वा.मि)

Additional Secretary & Mission Director (NHM)



भारत सरकार

स्वास्थ्य एवं परिवार कल्याण मंत्रालय
निर्माण भवन, नई दिल्ली – 110011

Government of India

Department of Health and Family Welfare
Nirman Bhavan, New Delhi - 110011



PREFACE

The time around the birth is a crucial period in neonatal health which accounts for more than a third of neonatal deaths and still births. Despite significant reduction in child mortality, the contribution of newborn mortality still remains high. Hence, concentrated efforts and strategic focused interventions are the need of the hour to improve neonatal health.

As a part of the Reproductive, Maternal, Newborn, Child and Adolescent Health and Nutrition (RMNCAH+N) strategy of the National Health Mission, newborn health continues to be of highest priority. A well-defined tiered system for newborn care at public health facilities has been scaled up across the country and is supported by strategic community based programmes to ensure the continuum of care. Health system strengthening over the last decade or so brought a considerable improvement in the infrastructure, availability of human resources, drugs and equipment along with supportive services.

With initiatives like LaQshya and SUMAN, the system has geared up towards making childbirth safer at public health facilities where majority of deliveries are taking place. The Newborn Care Corner has always been an integral part of the labour room and maternity OTs for provision of essential newborn care and resuscitation services. The revised package builds upon the Navjaat Shishu Suraksha Karyakram (NSSK), 2009 and incorporates evidence based changes in curriculum and improved pedagogy.

I hope that the revised NSSK 2020 package will be rolled out expeditiously across the States and UTs to ensure essential care to the newborns as a first step towards healthy childhood and adult life.

(Vandana Gurnani)

स्वच्छ भारत—स्वस्थ भारत



Dr. Manohar Agnani, IAS

Additional Secretary

Tele.: 011-23061723

e-mail: jsrch-mohfw@gov.in



भारत सरकार

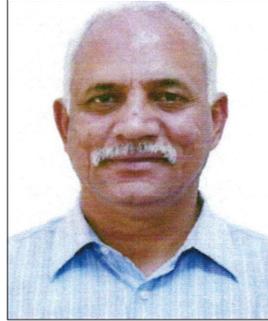
स्वास्थ्य एवं परिवार कल्याण मंत्रालय

निर्माण भवन, नई दिल्ली – 110011

Government of India

Ministry of Health and Family Welfare

Nirman Bhavan, New Delhi - 110011



FOREWORD

The India Newborn Action Plan (2014) and National Health Policy-2017 both have put forward a clear roadmap for India to attain single digit newborn mortality by the year 2030 by accelerating reduction in the newborn deaths. Newborn health is the central pillar in the Reproductive, Maternal, Newborn, Child, Adolescent Health and Nutrition (RMNCAH+N) strategy. Inter-linkages between various RMNCAH+N life cycle stages have a significant impact on the mortality and morbidity of a newborn.

Under the National Health Mission, many new interventions and service delivery platforms have been included in the newborn health programme over the decade. In order to incorporate these new topics and skill sets, based on the new evidences and practices that have emerged over the years, a review of existing training packages has been undertaken. This will build the competencies required for use of technology and improve quality of care at the health facilities.

The Child Health Division of the Ministry, with support from technical experts and development partners, has revised the Navjaat Shishu Suraksha Karyakram (NSSK) Package (2020) and presented it in a pictorial format which also serves as a job-aid. The package emphasizes on the skill imparting techniques by the facilitators and ensures uniform messaging across all the levels. With this revised package, we hope that the training on essential newborn care and resuscitation will be more practical and the entire training experience will be enhanced leading to better learning outcomes.

I am hopeful that by adopting this training package, the trainers along with service providers will feel more confident in carrying on their roles and responsibilities. The essential newborn care will now be provided at all the delivery points with updated skills and efficacy of the health care providers.

(Dr. Manohar Agnani)

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Talking about AIDS is taking care of each other
www.mohfw.nic.in



DR. SUMITA GHOSH

Additional Commissioner

Telefax.: 011-23063178

E-mail: sumita.ghosh@nic.in



GOVERNMENT OF INDIA
MINISTRY OF HEALTH & FAMILY WELFARE
Nirman Bhavan, Maulana Azad Road,
New Delhi - 110108



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The Neonatal Mortality Rate of India has reduced by more than one-third in the last decade with a sustained decline in maternal and child mortality faster as compared to global averages. With the National Health Policy 2017 in place and with a sight on the Sustainable Development Goal agenda, the opportunity to build upon these gains made in the recent years should not be lost.

While scaling up delivery care services in health facilities, the training package “Navjaat Shishu Suraksha Karyakram (NSSK)” was developed in 2009 for providing essential newborn care at the Delivery points. During the last decade, the algorithm for resuscitation of newborn has undergone changes. Revised NSSK 2020 package incorporates these changes along with improved training methodology to make it more skill based and practical.

I sincerely thank my colleagues Dr. Ajay Khara Ex. Commissioner MCH & Dr. P. K . Prabhakar Ex. Joint Commissioner, Child Health for initiating the process. My special acknowledgement goes for the efforts of Dr. Sushma Nangia, National Collaborating Centre for Newborn Health , who has developed the first draft of this package, ably guided and supported by Dr. Siddharth Ramji. I do acknowledge the contribution of Dr. Harish Kumar, Dr. Renu Srivastava, Dr. Deepti Agrawal and Norway India Partnership Initiative (NIPI) team who worked together to refine this package further with the support of academicians, experts, officers and consultants of the Child Health Division and State programme officers.

The Child Health Division will provide all necessary support to the State Programme Managers to roll out this package contributing towards further improvement of newborn health. I look forward to continued support from all concerned as we move together on the mission to improve newborn survival and their quality of life.

(Dr. Sumita Ghosh)

Healthy Village, Healthy National



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List of Contributors

NSSK

Ministry of Health and Family Welfare

Ms Vandana Gurnani
Dr Manohar Agnani
Dr Sumita Ghosh
Dr Sheetal Rahi

Editorial Team

Dr Sushma Nangia
Dr Sadhana Mehta
Dr Renu Srivastava
Dr Deepti Agrawal

Technical Experts

Dr Ajay Khera
Dr P K Prabhakar
Dr S. Ramji
Dr Ashok Deorari
Dr Harish Kumar
Dr S Sitaraman
Dr Babu S Madarkar

Child Health Division

Dr Kapil Joshi
Mr Vishal Kataria
Mr Sharad Singh
Mr Vinit Mishra
Ms Sumitra Dhal Samanta

Reviewers

Dr Aditya Mohapatra
Dr Arti Maria
Dr J Kumutha
Dr Lalan Bharti
Dr Mangala Sood
Dr Ramesh Agarwal
Dr Reeta Bora
Dr Ruchi Nanavati
Dr Praveen Kumar
Dr Vivek Singh
Dr Piyush Gupta
Dr Bakul Parikh
Dr Amrita Misra
Dr Ashfaq Bhat
Dr Sachin Gupta
Dr Nimisha Goel
Dr Prasant Kumar Saboth
Mr Rajat Khanna
Mr Pradeep Kumar Choudhry
Dr Anil Nagendra

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1. INTRODUCTION TO THE PACKAGE

Ninety percent of newborn babies make the transition from intrauterine to extra uterine life requiring little or no assistance to begin spontaneous and regular respirations. Approximately 10% of newborns require some assistance to begin breathing at birth and only about 1% may need extensive resuscitative measures to survive. Yet, birth asphyxia is a leading cause of mortality and morbidity in newborns and in India it contributes towards one fifth of all neonatal deaths. These deaths can be averted by proper antenatal and intrapartum care along with correct technique and steps of neonatal resuscitation.

To reduce perinatal asphyxia related morbidity and mortality, Government of India launched a training programme - Navjaat Shishu Suraksha Karyakram (NSSK) - essential newborn care and resuscitation in 2009-10. The course was aimed to impart the basic skills required to manage common neonatal problems related to birth asphyxia, infections, hypothermia and breastfeeding. The programme was rolled out across most states of India and more than one and a half lakh health personnel have been trained till now.

An evaluation of this training programme revealed that knowledge to skill transfer of the trainees in the states ranged from good to average. It was recommended that the trainee selection criteria, prioritization, practical exposure and a quality training at the district level will ensure faster knowledge to skill transfer. Ensuring adequate number of trainers and dedicated training sites equipped with the required infrastructure and equipment/all training aids at the training site further add to the quality of training. Regular updates, refreshers, functional radiant warmers and self-inflating bags at the delivery points will enable the trainees in retaining the skills learnt in the training.

Based on the above information the NSSK training package has been revised in the year 2020 using a training methodology, keeping adult learning principles in mind. A flip chart promoting participatory interactions with notes for the facilitator will be used during training. Better facilitator to participant ratio will also add to improving the quality of training. Emphasis for hands on practice of the skills is an effort to enable each participant to acquire the same skill set at the end of the training. The training duration remains as two days.

2. GUIDANCE NOTE FOR THE TRAINING COORDINATORS AND FACILITATORS

Introduction

The success of any training package depends on the ease with which it gets percolated down to the end-user (service provider) and that the knowledge and skills get converted into actions desired at that level. The revised NSSK package is using a different methodology than the existing one and therefore requires new checklists and logistics.

The resource manual has been developed to assist the facilitators in organizing the NSSK trainings using the revised package and the participants to use as a reference manual after the training.

Checklist for organizing the training

To begin with each state should organize state level Training of Trainers to train/reorient the trainer/develop a resource pool for NSSK, Daksh & Dakshata programme. It is reiterated that to organize a quality training it is mandatory to provide appropriate venue with required logistics and optimal boarding & lodging to all the participants.

Logistics:

1. Room with a seating capacity of at least 30-35 people or two separate rooms with a seating capacity of 15-20 people, each
2. The number of tables should be 2 in each room with seats for 2 facilitators and 12 to 14 participants (6 to 7 participants on each table)
3. Each room should have two wall charts of the 'resuscitation' algorithm
4. List of items for Participant's Folder (Note Pad, Pen, Name Tag)
5. Flipchart, marker or blackboard and chalk

Resources:

1. Flip Chart
2. Wall chart
3. Resource manual
4. Well-equipped skill stations

Logistics for each group of participants

S. No.	Items	Quantity
1.	Mannequin (Neonatalie)	4
2.	Stethoscope (desirable neonatal)	4
3.	Self-inflating Bag 250/500ml	4 each
4.	Masks size 0 and 1	4 each
5.	Wall clock with seconds hand	4
6.	Baby tray	4
7.	Contents of each baby tray: Gloves 1pair Sheets/towels-2 Cord tie/Clamp 1 Inj. Vitamin K1 ampoule, 1ml syringe Disposable needle 26 gauge Shoulder roll Dee Lee's/Mucus Extractor Bowls containing cotton swabs	4 trays for 4 groups
8.	Scissors/Sterile Blade	4
9.	Digital thermometers	4
10.	Cloth for wrapping the mannequin	4
11.	Baby/infant weighing machine (digital or mechanical)	4 (desirable)
12.	Identification bands for newborn (state specific)	4 (desirable)

It is important to collect the supplies needed, at least one/two days prior to initiation of training, as per the activities detailed in the flip chart so that the training can be conducted smoothly and all participants can practice hands on using the equipment. Prepare folders for learners with all the materials ready for distribution including the registration and attendance sheets.

Methodology of Training

Revised NSSK package is a customized 2-days clinical update cum skill standardization training at identified training sites. (Preferably near SNCU/Newborn Care unit where the participants can be easily transferred for equipment demonstration)

Facilitators: Trained paediatricians, medical officers and nurse tutors who have undergone master training can facilitate this training. For a batch of 24-28 participants, 4 facilitators shall be required.

Eligibility of participants: All service providers working in the labour room, and involved with care of mother and the baby at time of birth are eligible for this training. Even SBA trained providers will be eligible for this training.

Batch Size: Each batch will be of 24-28 participants. The batch of the trainees is to be divided into group of 6-7 with one facilitator for the complete training.

Sites of training: In each district, either the district hospital (DH) or/and a high case load sub district hospital should be the training site. One or more than one (depending on the size/need of the state), state level TOTs should be organized to develop a resource pool of trainers to continue trainings at the district level. The trainings should ideally be followed by mentoring visits.

Training approach and role of trainers: The trainers will use participatory training methods based on adult learning principles to make the sessions interesting and at the same time ensure quality of training. To ensure clinical knowledge update, the trainers will present the information through interactive discussions and activities. To build competency, the trainers will demonstrate skills on anatomic models (humanistic approach) and facilitate learners to practice them using the relevant skills.

Agenda for NSSK Training

Day 1			
9.00-9.30 am	Registration		
9.30-9.45 am	Welcome & Introduction	15 minutes	
9.45-10.00	Objectives & expectations	15 minutes	
10.00-11.15	Flip chart 1-6	75 minutes	Discussions
11.15-11.30 am	Tea Break		
11.30-13.30	Flip chart 7-11	120 minutes	Discussion and skill practice
13.30-14.30 pm	Lunch		
14.30-17.30 pm	Flip chart 12-15	180 minutes with tea break for 15 minutes	Discussion and skill practice, role plays
Day 2			
9.00-9.15 am	Recap of day 1		Use of Algorithm (summarize all critical steps)
9.15-11.00 am	Flip chart 16-20	100 minutes	
11.00-11.30 am	Tea break		
11.30-13.00 pm	Flip chart 20-24	90 minutes	Discussion and skill practice, role plays
13.00-14.30 pm	Lunch		
14.00-15.00 pm	Equipment demonstration sessions (half an hour for each group at each station) (Station 1 & 3 – Radiant warmer), Station 2 & 4 (Bag & mask). Rotation between 1 & 2 AND between 3 & 4.	60 minutes	Four groups by rotation at 4 stations – 2 at Radiant warmer station-(daily operations, asepsis protocols) and 2 at Bag and mask station (disassembling & assembling, cleaning protocols)

Suggested plan for training

Each batch of 24 participants will be divided into 4 groups with one facilitator assigned to each group. Each facilitator shall be provided with a flip chart. The discussions using flip charts shall be done for each group separately. There will be four sets of mannequins with relevant equipment for each group.

Note for the facilitator

A facilitator helps the participants learn the skills presented in the course. The batch size for NSSK has been revised to a ratio of one facilitator to 6-7 participants so as to give sufficient attention to each participant. As a facilitator, familiarity with the material being taught is essential and one should make all efforts to give explanations, do demonstrations and answer questions. The facilitator should also give feedback to the participants on their answers to exercises and conduct role plays, lead group discussions, organize and supervise clinical practice at the skill stations; in short, provide any help needed by the participants to successfully complete the course.

Begin the training by self-introduction and ask the participants to introduce themselves to the group. After the round of introduction, the facilitator should explain that this training will teach them basic newborn care and resuscitation of newborns. Besides this, administrative tasks or announcements pertaining to the training, arrangements for lunches, the daily transportation of participants from their lodging to the course etc. will also be addressed during trainings.

As a facilitator, try to identify the reason(s) for an incorrect answer and help the participant correct the problem accordingly. Always summarize, or ask the participant to summarize, at the end of the exercise. Do appreciate the participant's hard work. Whenever leading a group discussion ensure all participants are involved, remember the purpose of discussion, major points to stress and keep it on track.

Watch the participants and offer individual help if you see a participant looking troubled. Encourage participants to ask questions whenever they have a doubt or need some help. Make note of important issues or questions to be discussed later with the entire group. Before giving individual feedback, refer to the appropriate notes in this resource manual/Flip Chart. Each discussion point is further detailed to assist the facilitator so that uniform key messages are disseminated at the end of each theme on the flip chart.

While conducting role play, ensure the purpose of the role-play, assign roles, provide background information and make a note of major points to address in the group discussion afterwards. Interrupt if the players are having tremendous difficulty or have strayed from the purpose of the role-play. Thank the players and praise them for their participation once the role-play is finished. Ensure that feedback offered by the rest of the group is supportive. First discuss things done well, then discuss things that could be improved.

3. SKILLED ATTENDANT AT BIRTH MAKES A DIFFERENCE

The revised NSSK package has been developed to orient and build capacity of skilled birth attendants involved in care of newborn babies. It is expected that at the end of this two days' training, participants should be able to:

1. Assess a newborn baby at birth
2. Perform resuscitation of a newborn baby, if needed, using standard equipment
3. Provide after care to a baby who required help with breathing at the time of birth

Every birth attendant should be skilled in newborn resuscitation, and have access to clean and functional equipment and supplies.

Basic resuscitation if performed correctly, will help most infants to survive even in resource limited settings.

Key to successful Resuscitation

1. Anticipation
2. Preparation
3. Call for help when needed
4. Be able to work quickly in coordination (with the helper or team)
5. Communicate effectively
6. Be gentle, but quick
7. Provide warmth, maintain hygiene, document/record

Anticipation:

Most newborn babies are vigorous at birth. Only about 10% require some resuscitative assistance. Though babies who will need resuscitation at birth, can be identified by the presence of ante-partum or intra-partum risk factors as mentioned in the table below, but it is always best to be prepared for resuscitation at every birth.

Antepartum Risk Factors	
Maternal Risk Factors <ul style="list-style-type: none"> • Mother's age <16/ >32 years • Inadequate antenatal care • Significant ante-partum hemorrhage (Abruptio placentae, placenta previa) • Preeclampsia or eclampsia • Maternal Hypertension • Maternal medical problems (cardiac, pulmonary, renal, thyroid, anaemia, etc) • Maternal pyrexia, infection, chorioamnionitis • Poly-hydramnios • Oligo-hydramnios 	Foetal Risk Factors <ul style="list-style-type: none"> • Preterm/Post term • Previous foetal or neonatal deaths • Intra-uterine growth restriction • Significant malformations or anomalies in foetus • Intrauterine infection • Reduced foetal movements before onset of labour
Intrapartum Risk Factors	
<ul style="list-style-type: none"> • Meconium stained amniotic fluid • Reduced foetal movements • Precipitate labour, Prolonged labour • Breach or other non vertex presentations, Forceps/vacuum deliveries • Cord prolapse 	<ul style="list-style-type: none"> • Chorioamnionitis • Narcotics administered to mother within 4 hrs of delivery • Maternal general anesthesia/sedation

4. PREPARATION OF THE DELIVERY ROOM

Preparation for birth is the most important step to begin with and is based on the resources available at the facility, for any emergency that may arise e.g.; requirement for neonatal resuscitation. Preparedness of labor room for safe care during delivery includes conducive ambience, cleanliness, availability of equipment and supplies, readiness at newborn care area and infection prevention practices with biomedical waste management.

The providers must communicate with the mother and her attendant, take informed consent and empower birth companion. Arrangements for calling a doctor or another skilled person for resuscitation in case of emergency or for shifting the baby to the nearest referral unit should also be ensured. If possible, birth attendant and a helper (qualified nursing staff, another untrained hospital staff or relative of mother) may be identified and their role explained.

Preparation in the delivery room includes:

1. Close all the doors and windows and draw the curtains to ensure privacy
2. Providing warmth: Switch off the fans to avoid direct draught of air over the baby. A well-lit, room with temperature in the range of 26-28°C is ideal for delivery room.
3. Switch on the radiant warmer, twenty minutes before the delivery and place two baby sheets before delivery to ensure that the baby is received in a pre-warmed sheet to maintain warm chain. Use heating/cooling devices depending on local conditions.
4. Newborn care corner is the designated place to perform resuscitation. It has a set of equipment and supplies which should be ensured and checked before delivery.

A birth companion is someone who will be by the side of the woman in labour during and immediately after delivery. She can be an important partner in care provision, if properly empowered through knowledge related to the delivery process.

Respectful maternity care (as envisaged in SUMAN Guidelines):

Ensuring respectful maternity care includes:

Privacy, confidentiality, provision of birth companion, choice of birthing position, cordial, congenial and supportive environment etc.)

1. To ensure privacy have screens between the labour tables, prevent direct entry to the labor room, curtains or screens should be drawn on doors and windows.
2. Ensure that the patient is not exposed.
3. Ensure confidentiality (No one should share the patient's personal information).

All the pregnant women who are going to deliver in the facility must be treated with dignity and respect, have freedom from discrimination and receive equitable and empathetic care.

With an increase in the number of pregnant women coming to deliver at public health facilities, it becomes crucial that the labor rooms are well equipped for safe care at all times. Ensuring the availability of all essential (functional) supplies, at the point of use in the labor room, will help to undertake these safe care practices in a timely manner and avoid delays in providing essential services to the pregnant woman and her baby. A woman who is in labor or who has given birth to a baby should receive adequate medical attention, and should be managed immediately in case any life threatening situation arises. It is equally important to take the woman's consent and permission before conducting procedures like-surgery/cesarean section, episiotomy, per-vaginal examination and blood transfusion.

5. PREPAREDNESS FOR BIRTH – EQUIPMENT

These are summarized in the box below:

Important points about the equipment used for resuscitation:

1. Before every delivery ensure that all essential equipment is in place and in working condition.
2. Equipment of the appropriate size should be always available. The volume of the ambu bag should not be more than 500 ml.
3. If an electrical suction machine is used, the pressure should not exceed a negative pressure of 100 mmHg.
4. Mucus extractor and suction catheter should be discarded after single use and must be replaced with new ones.
5. Bag and mask, neonatal stethoscope, radiant warmer and suction machine should be disinfected prior to each use.
6. Broken equipment is dangerous and should be replaced.

PREPARING FOR BIRTH

Equipment and supplies:

1. Baby tray with two clean, warm towels/sheets, mucous extractor (Dee Lee's), gloves, cord clamp/tie, cotton swabs, Needle (26 gauge) and syringe (1ml.), Inj. Vitamin K-1
2. Clean cord cutting equipment (sterile or boiled scissors and if not available then new blade).
3. Wall clock with seconds hand
4. Functional self- inflating bag (250 & 500 mL); infant masks in two sizes: size '1' for normal weight baby and '0' for small baby
5. A functional radiant warmer
6. Oxygen source
7. Stethoscope
8. Suction machine (electrical/foot operated) (suction pressure 80- 100 mmHg) and suction catheters 10 and 12 F.
9. A folded piece of cloth to be used as shoulder roll during resuscitation (1/2 to 3/4th inches thick)

The service providers who are designated for the delivery room need to understand that team building is a part of preparation where, before the delivery, each member is aware of his/her task during resuscitation. A person skilled in bag and mask ventilation and use of oxygen should be available and in case further intervention such as intubation, chest compressions and drugs are to be used then a person trained in these skills should be available on call. The support staff must be aware of the contact details of the referral transport and the driver. One of them should be designated to do the record keeping, communicate with the family and call for additional help. A working telephone is always useful in contacting the team.

6. INFECTION PREVENTION

World Health Organization (WHO) promotes “six cleans”(Figure1) - hand washing of birth attendant before birth, clean perineum, clean birth surface, cutting of the umbilical cord using a clean instrument, clean cord tie, and a clean cloth for drying. Clean practices at birth and in the postnatal period could prevent many deaths, especially in settings with high baseline neonatal mortality.

Figure 1: WHO six cleans



1. Clean hands – vigilant handwashing and sterile gloves are essential for vaginal exams or when handling the baby
2. Clean perineum (mother) – faeces should be wiped away and the perineum washed prior to the birth (mother can shower or bathe)
3. Clean delivery surface at facilities, the delivery surface should be cleaned and then wiped with a 0.5% solution of chlorine after each use
4. Clean cord cutting instrument –autoclaved scissors or a new blade
5. Clean cord tie – the cord should be tied with a clean tie or clamp
6. Clean cord care – nothing should be applied on the cord, and it should be kept clean and dry at all times. Clean towels/sheets to dry the baby and then wrap the baby are equally important for infection prevention.

Handwashing is the simplest and the most effective means of preventing infection in healthcare settings. The following steps of hand washing should be followed. All steps should be completed in 40-60 seconds before entering the birthing area.

Steps of effective handwashing

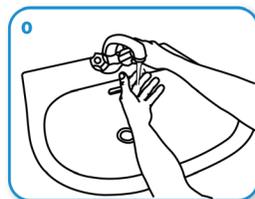
Figure 2: Steps of handwashing

How to handwash?

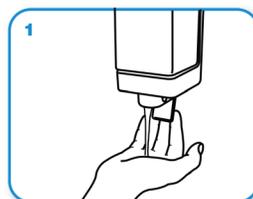
WASH HANDS ONLY WHEN VISIBLY SOILED! OTHERWISE, USE HANDRUB!



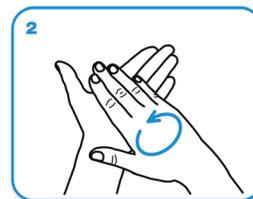
Duration of the entire procedure: **40-60 sec.**



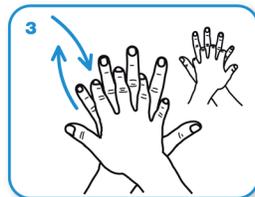
Wet hands with water



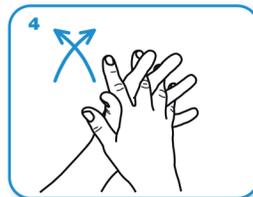
apply enough soap to cover all hand surfaces.



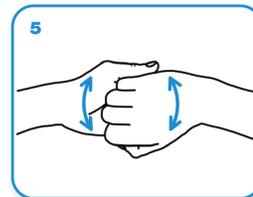
Rub hands palm to palm



right palm over left dorsum with interlaced fingers and vice versa



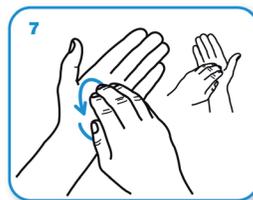
palm to palm with fingers interlaced



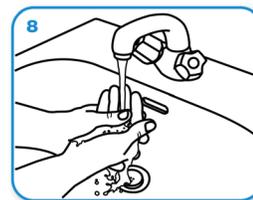
backs of fingers to opposing palms with fingers interlocked



rotational rubbing of left thumb clasped in right palm and vice versa



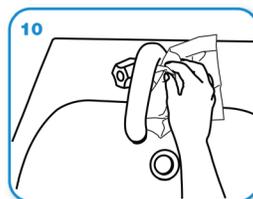
rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa.



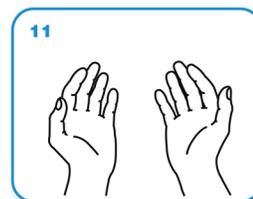
Rinse hands with water



dry thoroughly with a single use towel



use towel to turn off faucet



...and your hands are safe.

Source: Hand Hygiene WHO 2009

Before starting the process of handwashing, ensure nails are clipped and not polished, sleeves are rolled up above elbow and wrist watch, bangles, rings etc. are taken off. Using plain water and soap, wash parts of the hands in the following sequence:

1. Palms and fingers and web spaces
2. Back of hands
3. Fingers and knuckles
4. Thumbs
5. Fingertips
6. Wrists and forearm upto elbow

Remember to keep elbows always dependent, i.e. lower than your hands, close the tap with elbow.

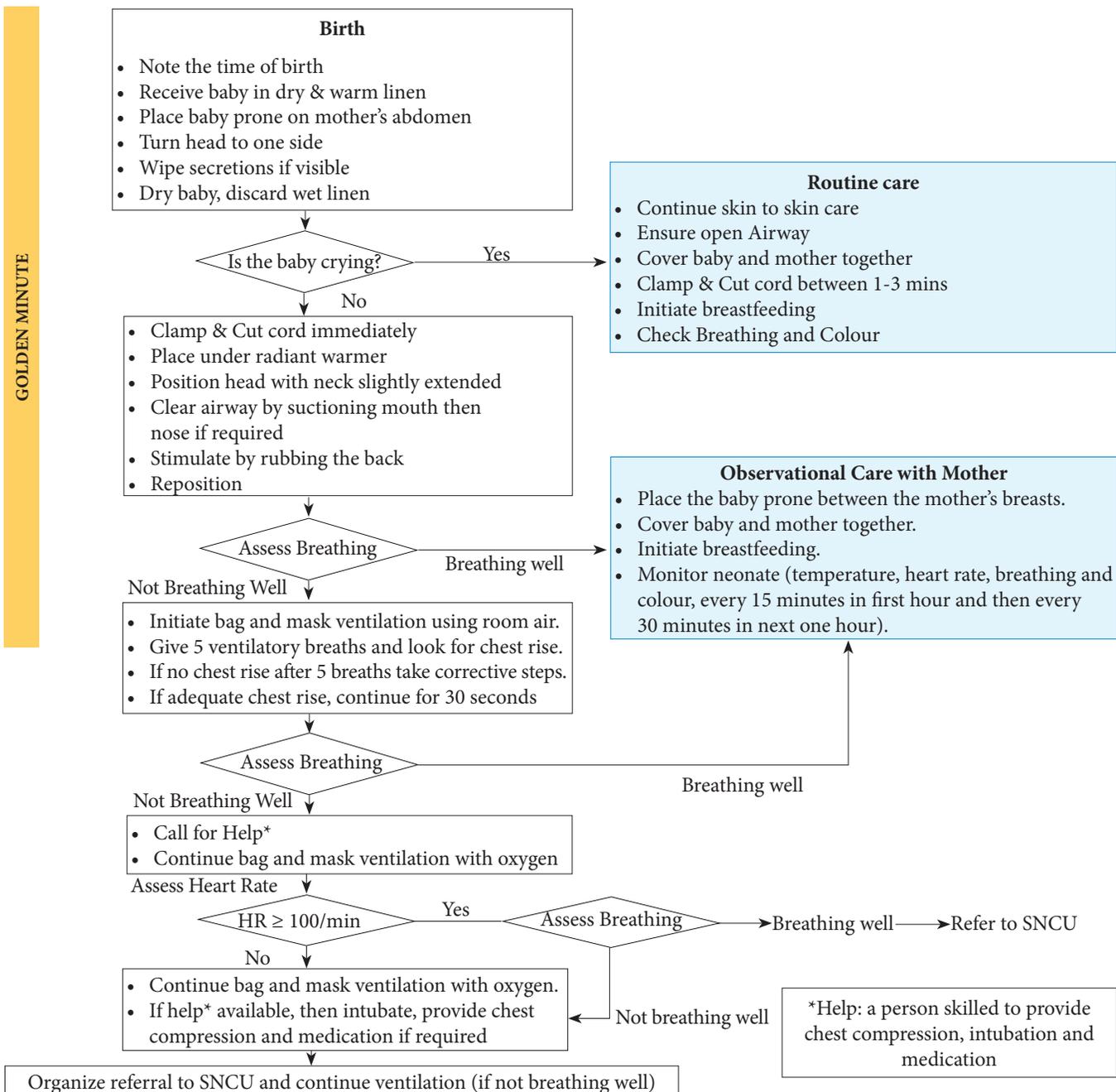
Dry hands using single-use, sterile napkin or autoclaved paper napkins. Discard napkin in the bin kept for the purpose.

Do not touch anything once you have washed your hands e.g. hair, pen or any other article before receiving the baby.

Remember - Use of alcohol handrub is NOT A SUBSTITUTE for hand washing.

Hand washing is essential prior to wearing the gloves. Gloves are not a substitute for hand washing.

7. ALGORITHM FOR NEONATAL RESUSCITATION



8. ACTIONS AT BIRTH

Birth

- Note the time of birth
- Receive baby in dry & warm linen
- Place baby prone on mother's abdomen
- Turn head to one side
- Wipe secretions, if visible
- Dry baby, discard wet linen

It is important that the actions by the service provider ensure providing routine care and resuscitation, if needed. **Golden Minute** is the first minute after birth within which a baby who does not breathe is supported so that the baby starts breathing well or is receiving effective ventilation.

Drying baby on the mother

As soon as the baby is born, the time of birth is noted and is called aloud so that it can be documented correctly and it tells everyone about the start of the golden minute. Receive baby in clean dry, warm, sheet/towel and place prone on mother's abdomen (skin to skin contact) to provide warmth. Turn the head of the baby to one side and secretions, if any, may be wiped clean from mouth and nose.

Drying helps keep a baby warm and also stimulates breathing. Drying thoroughly, involves gently patting dry the body, arms, legs and head. Wet linen can lead to hypothermia and hence it should be replaced with clean, dry and warm linen. A wet baby can easily become cold. A cold baby can have difficulty in breathing.

Breathing is observed by watching the baby's chest. A baby is breathing well if he or she is crying vigorously or has good rhythmic chest movements. One should not be misled by a baby who is gasping, which is a series of deep, single and irregular inspirations. Such breathing occurs when the baby is hypoxic/ischaemic and is indicative of severe neurologic and respiratory depression.

Meconium (baby's stool passed in utero) in the amniotic fluid may be a sign that a baby has experienced stress before birth. Meconium inhaled into the lungs can cause breathing difficulty. Baby born through

meconium stained amniotic fluid also needs to be cared for on the mother's chest and abdomen if s/he is breathing/crying. Such a baby may require suction, if secretions are copious.

See if the baby is crying/breathing:

Assessment	Decision
Baby is crying	No need for resuscitation or suctioning. Provide routine care.
Baby is not crying, but is breathing regularly between 40 to 60 times in a minute	No need for resuscitation or suctioning. Provide routine care.
Baby is gasping/not breathing	Resuscitate immediately.

9. ROUTINE CARE FOR BABIES WHO CRY AT BIRTH

In case the baby is breathing well and crying

Routine care

- Continue skin to skin care
- Ensure open Airway
- Cover baby and mother together
- Clamp & Cut cord between 1-3 mins
- Initiate breastfeeding
- Check Breathing and Colour

Ensure that skin to skin care is provided uninterrupted for one hour. Place the baby in between the breasts of the mother and cover the baby and mother together. Also remember to cover the baby's head and initiate breast feeding.

Between 1-3 minutes, place sterile cord clamps and cut the cord between the clamps using a sterile instrument and placing a sterile gauze to avoid splash of blood.

The provider needs to observe ongoing breathing and colour of the baby on the mother's chest. Although this baby did not require any assistance but it is mandatory to monitor such a baby's breathing and colour so that prompt resuscitation can be started in case there is a need.

10. BABY WHO DOES NOT CRY/BREATHE

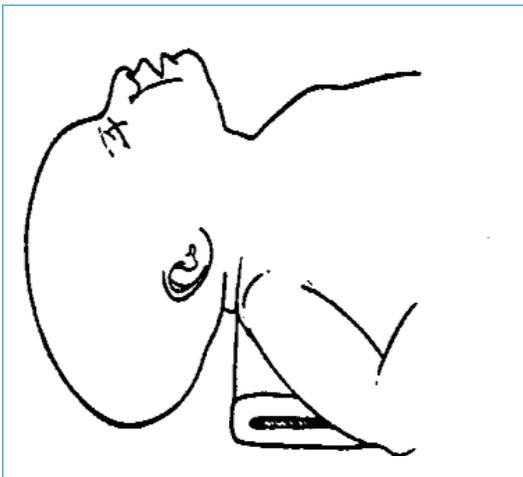
- Clamp & cut cord immediately
- Place under radiant warmer
- Position head with neck slightly extended
- Clear airway by suctioning mouth & then nose, if required
- Stimulate by rubbing the back
- Reposition

In case the baby is not breathing/crying, clamp and cut the cord immediately and place the baby under radiant warmer.

Provide initial steps under radiant warmer

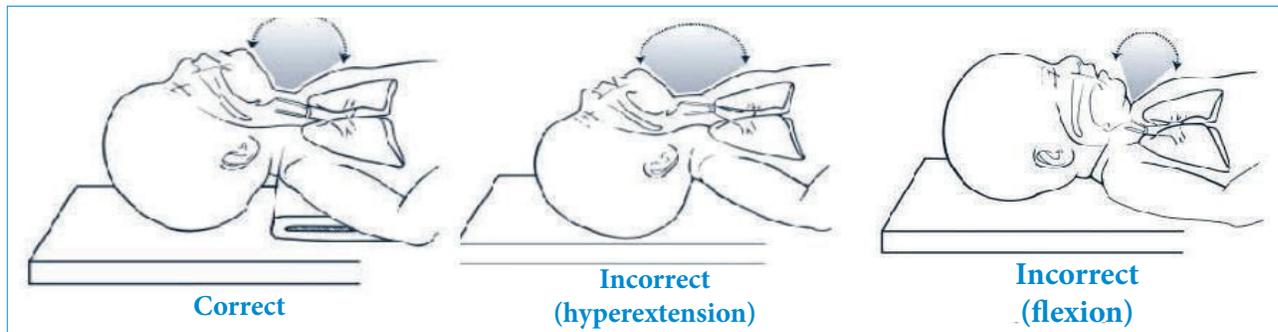
- The warmer should be pre-warmed prior to the delivery for at least 20 minutes in the manual mode. Place the baby supine under the radiant warmer, with the head positioned towards the side opposite to the display panel. This helps in full visualization of the baby, prevents the baby from getting hypothermic and gives enough space to work and move around the baby.
- **Position** the head so that the neck is slightly extended (to open the airway). The baby should be positioned on the back with the neck slightly extended in the “sniffing” position. The goal is to move the nose of the baby as far anterior, as possible. Care should be taken to prevent hyperextension or flexion of the neck, since either may restrict air entry.

Figure 3: Positioning of the baby with shoulder roll in place



- To attain the correct posture, a rolled piece of cloth/ gauze piece (shoulder roll) may be placed under the shoulder of the baby (Figure 3). This is particularly useful when there is a large occiput (back of head) resulting from moulding, oedema or prematurity.
- An appropriate position as described facilitates an unrestricted air entry, by bringing the pharynx, larynx and trachea in line. This alignment in the supine position is also the best position for bag and mask ventilation. Figure 4 illustrates the correct and incorrect head positions.

Figure 4: Correct and incorrect head positions for resuscitation



- **Clearing the airway**, if required should immediately follow once the newborn has been positioned. After the baby is positioned well, the presence of secretions may prevent air entry into the lungs. First suction mouth using mucous extractor or suction catheter. Size of catheter should be 10F for clear amniotic fluid and 12F in case of meconium. Insertion depth should not exceed 5 cms beyond the lip. Apply the suction while withdrawing the tube, then insert the catheter 1-2 cm into each nostril and apply suction while withdrawing the tube. Always suction first the mouth and then the nose (Figure 5).

Figure 5: Suctioning of mouth followed by nose



Do not do deep or prolonged suction (no more than 5 cm in mouth and 2 cm in nose and for not more than 3-5 seconds), as it can produce a vagal response, causing the heart rate to slow down or breathing to stop.

Suctioning also stimulates many babies to breathe and initiate respiration. If a baby does not have vigorous breathing, additional tactile stimulation may be provided briefly.

Figure 6: Rubbing the back



Stimulation may be useful not only to induce and begin breathing during the initial steps of resuscitation but also may be used to stimulate continued breathing after positive pressure ventilation (PPV). The only safe and appropriate method of providing tactile stimulation is gently rubbing the back of the baby once or twice (Figure 6).

Inappropriate and vigorous stimulation is not helpful and can cause serious injury. Shaking the baby should be strictly avoided.

There is a possibility that after performing these actions, the position of the head will need a relook. **Reposition** the baby by adjusting the neck in the position of slight extension.

The entire process of resuscitation up to this point, should not take more than 30 seconds. The next step is to evaluate the baby to assess if further resuscitation is needed. The baby is assessed for breathing and if there are good chest movements and the rate and depth of respirations increases after few seconds of tactile stimulation, then the baby has good respiration. Labored breathing in some babies, especially the preterm may require additional respiratory support and monitoring.

Baby who breathes after initial steps of resuscitation requires ongoing observation to ensure smooth transition and also most of these babies do not need to be admitted to newborn unit. The baby is nursed with the mother by keeping the newborn in skin-to-skin contact/close to the mother. Observe breathing and assess temperature, every 15 minutes in first hour and then every 30 minutes in next one hour. Initiate breastfeeding, if well. Watch for complications (apnoea, gasping or breathing difficulty, hypothermia, lethargy, convulsions etc.) and refer immediately if any of these are noted.

Observational Care with Mother

- Place the baby prone between the mother's breast.
- Cover baby and mother together.
- Initiate breastfeeding.
- Monitor neonate (temperature, heart rate, breathing and colour, every 15 minutes in first hour and then every 30 minutes in next one hour).

If a baby is breathing well with a heart rate above 100/min and is centrally cyanosed, free flow oxygen may be given by placing the oxygen tube over the baby's mouth and nose. Persistent cyanosis or low oxygen saturation (less than 85%) despite free flow oxygen suggests significant lung disease, such a baby needs to be referred to a higher centre for evaluation and management.

If a baby is still not breathing well/apnoeic, positive pressure ventilation should be immediately initiated.

Continuing to provide tactile stimulation or administering free –flow oxygen to a non-breathing baby is deleterious and delays appropriate management.

11. USING BAG AND MASK

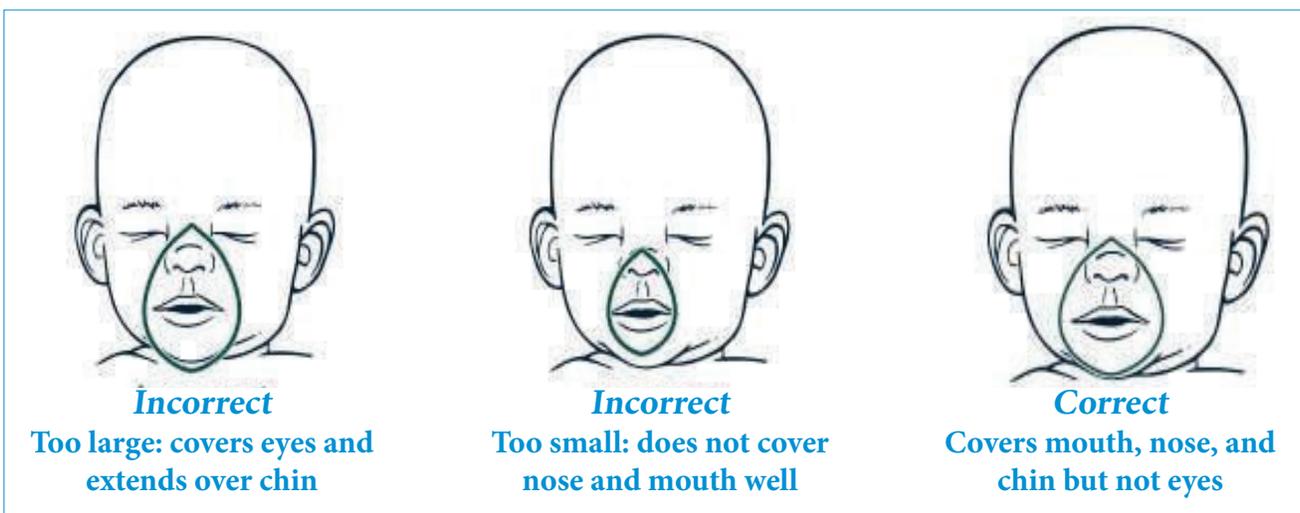
- Initiate bag and mask ventilation using room air.
- Give 5 ventilatory breaths and look for chest rise.
- If no chest rise after 5 breaths take corrective steps.
- If adequate chest rise, continue for 30 seconds.

Ventilation of the lungs is the single most important step in resuscitation of a newborn. If the baby is not breathing or breathing is abnormal at the end of initial steps of resuscitation, start ventilation with bag and mask. The baby is already placed under the radiant warmer which ensures firm, flat and clean surface and the head of the baby should also be in neutral position to ensure open airway. Use of shoulder roll may be required in presence of large caput or in preterm infants. While providing initial steps, ensure that the newborn's head remains in the correct position during and after initial steps.

It is reiterated that the functionality of the bag and mask should be always be checked before any delivery so that one is well prepared, if needed. The service providers should position themselves at the side or head end of the baby to allow them to hold the mask on the baby's face comfortably and have an unobstructed view of the abdomen and chest.

Selection of the correct size of mask

Figure 7: Correct and incorrect mask sizes

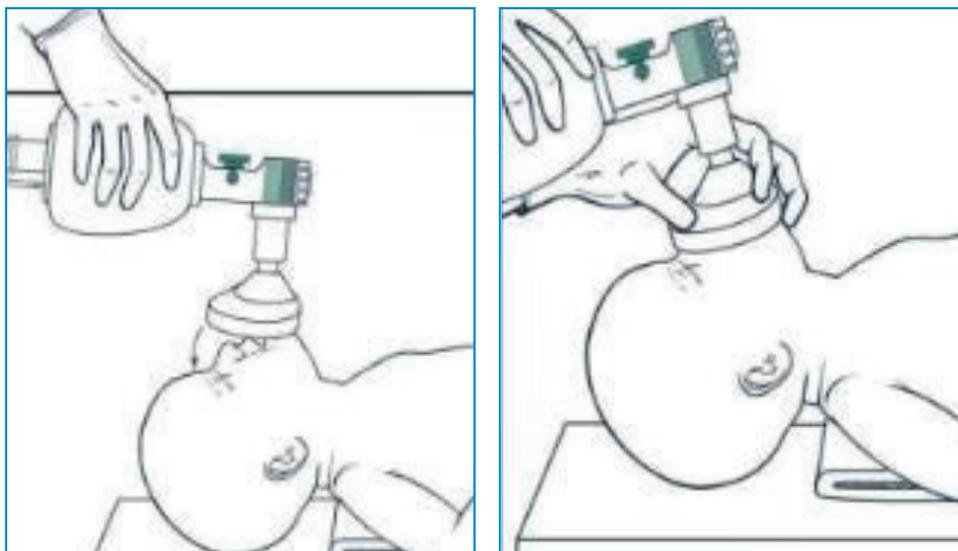


For the mask to be well fitting, it should be of correct size. If the mask is too large, it may cause eye damage and will not seal well. If the mask is too small, it will not cover the mouth and nose and may occlude the nose (Figure 7).

The mask should be placed on the face, so that it covers the nose and mouth & chin, so that the **tip** of the chin rests within the rim of the mask and it covers over the mouth till the **base** of the nose. Always begin by cupping the chin in the mask and then covering the nose.

The mask usually is held on the face with the thumb and encircling the rim of the mask in shape of letter C while the middle, ring and little fingers bring the chin forward to maintain a patent airway. Once the mask is positioned, using light downward pressure on the rim of the mask helps to achieve an air tight seal (Figure 8).

Figure 8: Positioning the baby and mask



Following precautions are to be observed:

- Do not “jam” the mask down on the face. Too much pressure can injure the baby.
- Be careful not to rest your fingers or hand on the baby’s eyes and throat/neck.
- Make sure that there is adequate seal between mask and face, to prevent air leak and provide effective ventilation.

12. STEPS FOR POSITIVE PRESSURE VENTILATION (PPV)

- Initiate bag and mask ventilation using room air.
- Give 5 ventilatory breaths and look for chest rise.
- If no chest rise after 5 breaths, take corrective steps.
- If adequate chest rise, continue for 30 seconds.

Initiation of ventilation

Start ventilation by squeezing the bag to deliver a breath using room air. Remember, the lungs of a foetus are filled with fluid, so the first few breaths will often require higher pressures. Adequate pressure required to squeeze the bag should be just enough to produce an easy chest rise as seen during normal breathing. If the baby appears to be taking deep breaths, then the lungs are being overinflated, possibly using too much pressure.

Ensure chest rise

Start ventilation with bag and mask, look for chest movement with each breath to ensure adequacy of ventilation. If the chest movement is absent or inadequate during the initial **5 breaths**, then you should immediately take “steps to ensure chest rise and improve ventilation”.

13. NO CHEST RISE AFTER 5 BREATHS

- Initiate bag and mask ventilation using room air.
- Give 5 ventilatory breaths and look for chest rise.
- If no chest rise after 5 breaths, take corrective steps.
- If adequate chest rise, continue for 30 seconds.

Reasons for inadequate or absent chest movements are

- The seal is inadequate
- The airway is not open/blocked
- Not enough pressure is being given

“Steps to ensure chest rise and improve the ventilation”

If no chest rise after initial 5 breaths, take the following two corrective steps:

- Reapply the **mask** to the face and try to form a better seal. The most common place for a leak to occur is between the cheek and bridge of the nose.
- Check the baby’s **position** and ensure that there is slight neck extension.

Give five ventilatory breaths again and look for chest rise, if still there is no chest rise take the following additional corrective steps and look for chest rise:

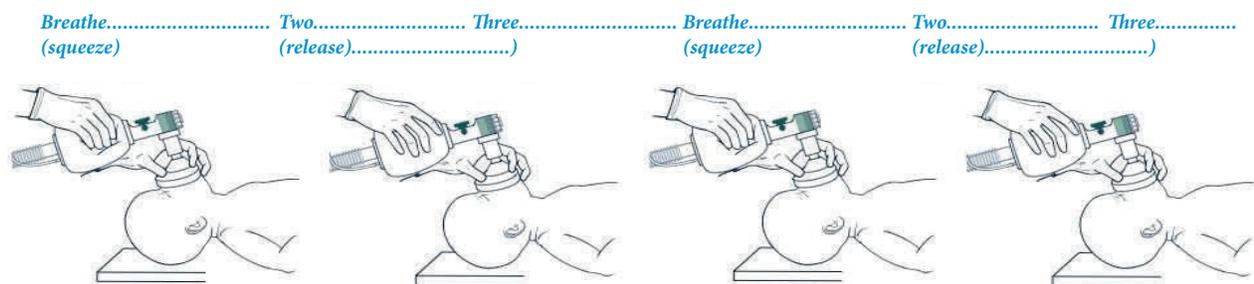
- Check the mouth for secretions, **suction** the mouth and nose, if necessary.
- Use a little more pressure on the rim of the mask and lift the jaw a little more forward. Do not press down hard on the baby’s face. Increase the **pressure** by squeezing the bag with more force, until there is visible movement of chest.

14. HOW TO CONTINUE PPV

- Initiate bag and mask ventilation using room air.
- Give 5 ventilatory breaths and look for chest rise.
- If no chest rise after 5 breaths, take corrective steps.
- If adequate chest rise, continue for 30 seconds.

During the initial stages of neonatal resuscitation, breaths should be delivered at a rate of **40 to 60 breaths per minute**, or slightly less than once a second (Figure 9). To help maintain a rate of 40 to 60 breaths per minute, try saying: “**Breathe–Two–Three, Breathe–Two–Three**” as one ventilates the newborn.

Figure 9: Counting out loud to maintain a rate of 40 to 60 breaths per minute



Evaluate the baby after 30 seconds of adequate ventilation. Evaluate heart rate using a stethoscope and counting the same for 6 seconds and multiplying by 10 to get the actual rate per minute. Some babies improve quickly and begin breathing well after 30 seconds of adequate ventilation. Some others require prolonged ventilation with bag and mask.

Although adequacy of ventilation is usually indicated by either a rapidly increasing heart rate or a heart rate that is maintained faster than 100 beats per minute, but ventilatory support should be continued until the baby has established normal, regular breathing.

If the baby is breathing adequately and has a heart rate of more than 100 bpm, then gradually, reduce the rate and volume of ventilatory support and watch for the baby's breathing. If the baby is breathing well (breathing at a rate of 40 to 60 breaths per minute, regular and with no retractions) then stop positive pressure ventilation while continuing to gently stimulate the baby to take deeper breaths. Provide observational care to babies who have received bag and mask ventilation for less than a minute.

15. OBSERVATIONAL CARE WITH MOTHER

Observational Care with Mother

- Place the baby prone between the mother's breasts.
- Cover baby and mother together.
- Initiate breastfeeding.
- Monitor neonate (temperature, heart rate, breathing and colour, every 15 minutes in first hour and then every 30 minutes in next one hour).

Points to remember during observational care:

- Keep the mother and baby together in skin-to-skin contact to keep the baby warm.
- NEVER leave the mother and newborn alone. Monitor the duo every 15 minutes during the first hour.
- Check breathing, temperature and colour. Watch for complications & refer immediately, if present.
- Encourage the mother to breastfeed her baby as soon as she is ready. This will help prevent hypoglycemia (low blood sugar).
- Assess the baby's attachment at the breast, help the mother breastfeed if needed. Good suckling is a sign of recovery. If the baby is unable to suck effectively, help the mother to express colostrum.
- Record the sequence of events during resuscitation and explain them to the mother and family. Keeping records of events which occur at the time of delivery and in the immediate period afterwards can be vital. The information is important if a baby needs to be referred or becomes sick in the next few days.

Post resuscitation care: Babies who require positive pressure ventilation for more than one minute or need further resuscitation with chest compressions and/or drugs are at risk of deterioration and at high risk for developing subsequent complications. These babies should be referred to a higher centre for supervised medical care.

16. ACTIONS IF NOT BREATHING WELL EVEN AFTER VENTILATING FOR 30 SECONDS

Assess breathing and if not breathing well:

- Call for help*
- Continue bag and mask ventilation

Call for help

A person skilled in bag and mask ventilation and use of oxygen should be available for all deliveries. In case further interventions, such as chest compression, intubation and drugs are to be used then such a trained person should be available on call. The support staff must be aware of the contact details of the referral transport team and the driver. One of the service providers' should be designated to do the record keeping and establish effective communication with the transport team as well as the family.

Babies requiring chest compressions, intubation and medications will need presence of skilled healthcare provider (e.g., a Doctor or nurse trained in Neonatal Resuscitation Program).

Continue bag & mask ventilation

In term infants receiving respiratory support at birth with positive pressure ventilation (PPV), it is best to begin with air (21% Oxygen) as opposed to 100% oxygen. If, despite effective ventilation, there is no increase in heart rate or oxygenation (guided by oximetry wherever possible) remains unacceptable, use higher concentration of oxygen by attaching oxygen to the bag without reservoir. It should be noted that high concentrations of oxygen are associated with an increased mortality and delay in time of onset of spontaneous breathing. Therefore, if increased oxygen concentrations are used, they should be weaned off as soon as possible.

In preterm infants, 32 weeks and below at birth, resuscitation should be initiated with room air or low concentration of oxygen (21–30%). Most babies needing respiratory support at birth will respond with a rapid increase in heart rate within 30 seconds of bag and mask ventilation. In case oxygen is to be given for a longer time, then the oxygen should be heated and humidified. Avoid flow rates that are more than 5 liters per minutes, as these may cause significant convective heat losses.

Adequate ventilation is more important than additional oxygen. Quick action with the bag and mask is more important than intubation. Therefore, resuscitation can and should be initiated even at places where oxygen is not available. The most common causes of failed resuscitation are failure to recognize the problem promptly, delay in initiating ventilation and ineffective ventilation.

Assess heart rate

1. The heart rate may be assessed by using a stethoscope and counting it for 6 seconds and multiplying by 10 to get the actual rate per minute.
2. If the heart rate increases but the baby is not breathing adequately, ventilate at a rate of about 40-60 breaths per minute until there is adequate spontaneous breathing.
3. If heart rate is more than 100/minute and baby is breathing well, the baby may be shifted with the mother for observational care.
4. In case heart rate is less than 100/minute and baby is not breathing well, then:
 - a. Take corrective steps and continue providing effective bag and mask ventilation with oxygen.
 - b. If heart rate is < 60/minute and trained help is available, then provide chest compression, intubation and medication.
5. If the heart rate is slow, make sure that all the steps to improve ventilation have been taken. The chest should move gently with each breath. Continue to provide bag and mask ventilation and reassess heart rate after every 30 seconds. In the meantime a more skilled healthcare provider (doctor) should provide advanced care, if possible. The baby may need more advanced support such as endotracheal intubation, chest compressions and medications.

Arrange for referral if advanced care is not available. Correct technique and assessment of the effectiveness of ventilation are critical. Advanced procedures (chest compression, intubation, use of drugs) are needed only in a very small proportion of cases. These procedures have specific indications and are beneficial only in specific circumstances and if carried out by an experienced person. These babies require to be cared for at the Special Newborn Care Unit (SNCU) or a similar unit equipped to handle such cases and baby should be transferred to such a unit. Ventilation should continue uninterrupted during the transport process.

When to stop ventilation?

Bag and mask ventilation should be continued until the baby establishes spontaneous breathing; however, if there are no signs of life to begin with (no breathing, no heart sounds and no movement) and remain so even after 10 minutes of birth, ventilation may be stopped (NRP 2015). If there are any signs of life during resuscitation, then the resuscitative efforts must continue for 30 minutes before terminating the same. When withdrawing or withholding resuscitation, care should be focused on the comfort and dignity of the baby and family.

Communication with the parents

It is important that the team caring for the newborn baby informs the parents of the baby's progress. After delivery, if the baby does not require resuscitation, keep the baby in skin to skin contact with the mother. If resuscitation was required, inform the parents of the procedures undertaken and why they were required. Record carefully all discussions and decisions in the mother's notes prior to delivery and in the baby's records after birth. Babies who have required only brief ventilation (<1 minute) should receive observational care.

17. CARE AFTER BIRTH

Aims of neonatal care after Birth are:

1. Prevention of hypothermia
2. Establishment of respiration and ensuring adequacy of respiration
3. Initiation and continuation of breastfeeding
4. Prevention of infection
5. Others - care of eyes, care of cord and administration of injection Vitamin K
6. Detection of danger signs

The care at birth is same irrespective of birthing place or person attending the birth (medical or paramedical personnel). The attending personnel should document the baby details such as time of birth, weight, gender and any other relevant information in all cases. Actions i.e. weighing the baby and administration of vitamin K should be performed only after one hour of birth during which the baby has already received skin to skin care and breast feeding has been initiated.

Initial weight recording

All infants should be weighed after stabilization on an infant weighing scale (preferably digital). A single- use paper towel or a sterile cloth towel should be placed on the weighing scale beneath the infant. The weighing scale should be cleaned with soap and water and wiped with spirit swab between patient use. Zero error, if any, should be recorded and accounted for, if it cannot be corrected. The weighing scale must be periodically (at least weekly) calibrated.

Adopt the following procedure for weighing:

- Wipe and clean the weighing pan
- Check for and adjust zero error
- Calibrate using a known weight
- Place baby with sheet
- Note weight (a)
- Remove baby
- Weigh the sheet above (b)
- Subtract b from a (a-b)
- Record weight

Never use weighing scale for stacking linen or any other objects, when not in use.

Always place the weighing scale on a flat firm surface, look for and adjust zero error, calibrate using a known weight & record weight only when the display is steady and ensure that the room is warm.

Injection Vitamin K1: Injection Vitamin K1 (phytomenadione) should be administered intramuscularly on the anterolateral aspect of the thigh using a 26-gauge needle and one ml syringe. Dose to be used is 0.5 mg for babies weighing less than 1000 g and 1.0 mg for those weighing above 1000 g at birth.

Care of umbilical cord: Umbilical cord should be clamped between 1 and 3 minutes of birth. The cord should be clamped/tied using a sterile commercial clamp or thread. Cord should be cut with a sterile scissor between 3 and 5 cm (approx. 3 fingers from umbilicus), so that the umbilical stump is away from the genitalia. The cord should be inspected frequently during the initial few hours after birth for early detection of any oozing. Nothing should be applied on the cord stump. Ensure that the cord stump remains dry at all times.

Care of the eyes: There is no need for any regular eye care unless there are signs of infection. Some neonates may develop persistent epiphora (watering) due to blockage of nasolacrimal duct by epithelial debris. The mother should be advised to massage on either side of the nose adjacent to the medial canthus 5 to 8 times daily, each time before she feeds the baby. Avoid the use of kajal, as it may transmit infections, cause injury or even cause lead poisoning.

Infection Prevention: Babies are protected from infections in-utero. Extrauterine life exposes them to a potentially contaminated environment. Clean delivery practices reduce the risk of infection for the mother and baby. Hand washing is the single most important step, to be emphasized, to both family members and health care workers.

Prevention of Hypothermia: Provision of warmth to prevent hypothermia is one of the cardinal principles of newborn care. Hypothermia can lead to hypoglycemia, bleeding diathesis, pulmonary haemorrhage, acidosis, apnoea, respiratory failure, shock and eventually death. Neonatal hypothermia continues to be a very important cause of neonatal deaths due to lack of attention by health care providers.

Concept of warm chain

The 'warm chain' is a set of ten interlinked interventions carried out at birth and later, which will minimize the likelihood of hypothermia in all newborns.

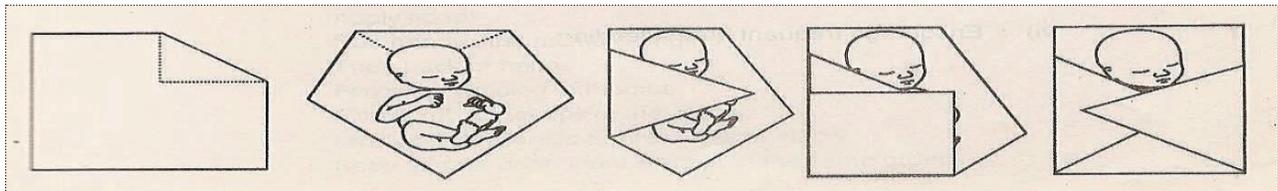
1. Warm delivery room (26-28°C)
2. Warm resuscitation
3. Immediate drying

4. Skin-to-skin contact between baby and the mother
5. Breastfeeding
6. Postpone bathing and weighing
7. Appropriate clothing and bedding
8. Keep mother and baby together
9. Warm transportation
10. Awareness-raising of healthcare provider

Use a wall-mounted thermometer to ensure room temperature at 26-28°C

Wrapping and covering a baby soon after birth and thereafter is important for maintaining the baby's temperature.

Figure 10: Steps for wrapping and covering the baby



Wrap the baby using a sheet, spread the sheet. Fold one corner on itself- place the baby's head on the infolded corner so as to cover the head till the hairline on forehead. Cover over the right shoulder and tuck on left side. Fold from the foot end and tuck beneath the chin. Finally cover the left shoulder and tuck on the right side.

Common situations where temperature maintenance is to be ensured:

- At birth/immediately after giving bath
- During changing of nappy/clothes
- Malfunctioning heat source or removing the baby from heat source
- While transporting a sick baby
- During the stay at post-natal ward

Keeping the baby between the mother's breasts ensures that the baby's temperature remains in the normal range, as long as the skin contact continues. This first skin-to-skin contact should last uninterrupted for at least one hour after birth or until after the first breastfeed. The mother and baby should be covered with a warm and dry cover. Temperature maintenance should be an ongoing process starting from the time of delivery and continued till the baby is discharged from the hospital.

18. MONITORING BREATHING AND TEMPERATURE

During the first hour after delivery, two most important parameters-breathing and temperature of the baby should be monitored. Both baby and the mother should remain in the delivery room for the first hour to facilitate monitoring. The health personnel should monitor these parameters every 30 minutes after birth of the baby, till first two hours of life. The signs to be looked for are given in the table below:

Table 1: Monitoring the baby in the first hour after birth

Parameter	What to look for?
Breathing	Look for fast breathing (>60/min) or No breathing Check for breathing difficulty
Warmth	Normal temperature of a newborn is 36.5-37.5°C. Check to see if baby's feet are cold to touch. Baby's temperature can be assessed, with reasonable precision by touching his/her abdomen, hands and, feet with the dorsum of your hand. In newborns, abdominal temperature is representative of the core temperature. When an accurate temperature record is needed, one should always use a thermometer.

Breathing: Count the breathing rate in the same manner as you would in an older infant. Always count the breaths in one minute. Newborns usually breathe faster than older infants. The breathing rate of a neonate is 40-60 breaths per minute. Therefore, 60 breaths per minute is the cut-off used to identify fast breathing in a neonate.

If the first count is 60 breaths or more, repeat the count. This is important because the breathing rate of a neonate is often irregular. The neonate will occasionally stop breathing for a few seconds, followed by a period of faster breathing. If the second count is also 60 breaths or more, the neonate has fast breathing.

Similarly, look for chest indrawing in the same manner as you would in an older infant. However, mild chest indrawing is normal in a newborn because the chest wall is soft. Severe chest indrawing is very deep, easy to see and is a danger sign.

Steps of axillary temperature recording:

Precautions:

- Wash your hands before recording a baby's temperature.
- Keep the baby warm throughout the procedure.

Steps:

1. Make sure that the thermometer is clean.
2. Ensure that the armpit of baby is clean and dry
3. Switch on the digital thermometer
4. Wait till the display shows "LO"
5. Place the bulb end of the thermometer under the baby's arm, in the centre of the arm pit.
6. Gently hold the baby's arm against the body.
7. Keep the thermometer in place, till the beep is heard.
8. Remove the thermometer and note the reading. DO NOT add to/subtract from this reading.
9. Keep thermometer in a sterile container after cleaning.

Tactile Method: Temperature can also be assessed by the tactile method by placing the dorsum of the hand on the feet and then abdomen. When feet are cold and abdomen is warm, it indicates that the baby is in cold stress. In hypothermia, both feet and abdomen are cold to touch.

In summer months, hyperthermia may occur due to raised environmental temperature. This may be treated by shifting the baby to a colder environment and ensuring loose light clothes for the baby. Move the baby from the source of heat (heater, radiant warmer).

19. BREASTFEEDING

Breast milk is the best milk for all newborns. All babies must be exclusively fed breast milk till the age of 6 months. It is therefore essential to help the mothers of newborn babies to establish breastfeeding, as soon as possible after delivery. **A baby should be fed at least 8-10 times during the day and night also.**

A healthy newborn baby can be breastfed ON DEMAND i.e. whenever the baby cries for feeds. The usual time interval between each feed is about 2 to 3 hours. Mothers should be advised that they should feed their babies at least 8-10 times in 24 hours and importantly they should not omit any night feeds. The mother should be advised to be relaxed and calm and to give night feeds to improve breast milk secretion.

Benefits to the baby:	Complete food <ul style="list-style-type: none">• Easily digested and well absorbed• Readily available, at the right temperature• Protects from infection• Promotes better brain growth• Promotes emotional bonding
Benefits to the mother:	<ul style="list-style-type: none">• Promotes bonding• Delays pregnancy• Lowers risk of breast and ovarian cancer• Decreases mother's workload
Benefits to the family & society:	<ul style="list-style-type: none">• Saves money• Promotes family planning• Decreases need for hospitalization• Contributes to child survival

Helping a Mother to Breastfeed

Breastfeeding is natural and most mothers can feed without any problem. However, few mothers shall need some assistance in positioning and attaching the baby to the breast. Hence, it is important for the health care providers to know how to help and support mothers to breastfeed their babies. The steps are summarized below:-

Step 1: Preparing the infant and the mother

Ensure that the infant is clinically stable and alert. Make sure that the mother is in a comfortable position and relaxed.

Step 2: Demonstrate various positions for breastfeeding a baby

A mother can feed the infant in various positions as shown in figure 11. Whatever the position, it is important to remember that the baby has to be supported well.

Figure 11: Various positions for breastfeeding a baby



Step 3: Demonstrate the four key points in positioning the infant

- The baby's head and body should be straight;
- The baby's face should face mother's breast;
- The baby's body should be close to her body;
- She should support the baby's whole body

Correct positioning will ensure effective sucking and prevents sore nipples and breast engorgement

Step 4. Demonstrate the four points of good attachment (Figure 12)

1. Chin touching the breast
2. Mouth wide open
3. Lower lip turned outwards
4. More areola visible above than below

Figure 12: Attachment of the baby at the breast (Good attachment and poor attachment)



Good attachment



Poor attachment

The causes of poor attachment include:

- Use of feeding bottles.
- Inexperienced mother.
- Lack of skilled support.
- Inverted nipples.

Poor attachment usually leads to problems such as:

- Pain or damage to nipple, or sore nipple.
- Breastmilk not removed effectively, thus causing breast engorgement.
- Poor milk supply, hence baby is not satisfied after feeding.
- Breast produces less milk resulting in a frustrated baby and refusal to suck. This leads to poor weight gain.

For an infant who shows signs of good attachment, the next step would be to assess if he/she suckles and swallows effectively:

Step 5 Assess if the infant is suckling and swallowing effectively

Effective sucking: Infant takes several slow deep sucks followed by swallowing, and then pauses.

Ineffective sucking: Infant suckles for a short time, but tires out and is unable to continue for longer periods.

If an infant is not able to attach and suckle effectively at the breast, show the mother how to support her breast with the other hand. Explain the mother that she should:

- Put her fingers below her breast
- Use her first finger to support the breast
- Put her thumb above the areola, helping to shape the breast
- Not keep her fingers near the nipple

Show the mother how to help the baby to attach by asking her to:

- Express a little milk on to her nipple
- Touch the baby's lips with her nipple
- Wait until the baby's mouth is opening wide, and the tongue is down and forward
- Move the baby quickly onto her breast, aiming the nipple towards the baby's palate and his lower lip well below the nipple.

Despite the above intervention, if still the infant is not able to suckle for long enough to complete a feed, he or she will need to be fed with a spoon or paladai until effective feeding ability develops.

Assessing the adequacy of Breastfeeding

After the mother has been counseled and helped in establishing breastfeeding successfully, ensure that the infant is getting enough breastmilk. Often, mothers worry about the amount of milk secreted and whether it is sufficient for their babies. It is the duty of health personnel to assess and then reassure them regarding the adequacy of breastfeeding.

Breastfeeding is considered adequate if the baby:

- i. Passes urine 6-8 times in 24 hours.
- ii. Goes to sleep for 2-3 hours after the feeds.
- iii. Gains weight @20- 30 gm/day (term neonates)
- iv. Crosses birth weight by 7-10 days (term babies).

Breastfeeding is considered adequate if the infant passes urine 6-8 times in 24 hours, sleeps for 2-3 hours after feeds and gains weight adequately.

Promoting Exclusive Breastfeeding

Key messages to promote exclusive breastfeeding:

1. Put baby to feed at breast, as soon as possible after birth preferably in the delivery room.
2. DO NOT DISCARD COLOSTRUM. Feeding this milk provides nutrition and prevents infections.
3. Keep the baby and mother close to feed during day and at night at least eight to ten times and whenever baby cries with hunger.
4. Mother may lie down, sit on a bed, chair or floor to breastfeed her baby.
5. Allow baby to feed at one breast until he releases the nipple on his own. Then offer him the other breast. He will feed if he is still hungry. The next feeding session should always begin with the breast offered later.
6. Give baby only breast milk and no ghutti, water, tea, gripe water, honey, animal or formula milk for first six months of life .
7. NEVER use bottles or pacifier.

Issues in Breastfeeding

Condition	Description	Treatment
Inverted/flat or retracted nipples	Inverted or flat nipples usually protract well (become prominent or pull out easily) and do not cause difficulty in breastfeeding. However, retracted nipples may not protract well and make attachment to the breast difficult.	Diagnose this entity in the antenatal period. Advise mother to manually stretch or roll out the nipple several times a day after birth of the baby. Syringe method can be taught to the mother
Sore nipples	Sore nipples are caused by: a) Incorrect attachment at the breast causing the baby to suck only at the nipple, resulting in not getting enough milk and sucking more vigorously. b) Frequent washing of the breast with soap and water, c) Fungal infection d) Pulling the baby off the breast, while s/he is still sucking.	Correct positioning and attachment of the baby to the breast. Hind milk should be applied to the nipple after a feed and the nipples should be allowed to air dry in between feeds. If fungal infection is present, apply antifungal medication on the nipple; clean the same before feeding the baby.

Condition	Description	Treatment
Breast engorgement	If feeding is delayed or infrequent or the baby is not well attached at the breast, amount of milk in the breast exceeds the capacity of the alveoli to store it comfortably. Such a breast becomes swollen, hard, warm, and painful and is termed as an engorged breast.	Providing local warmth, paracetamol to relieve pain and gentle expression of the milk to soften the breast. Subsequently the mother should be helped to properly attach and position the baby at the breast.
Breast abscess	If conditions like engorged breast, cracked nipple, blocked duct or mastitis are not treated early, then breast abscess may form. The mother may have high grade fever and pain in breast.	Mother should be treated with analgesics and antibiotics. The abscess must be incised and drained. Breastfeeding must be continued from the other breast.

Back massages are especially useful for stimulating lactation.

20. KANGAROO MOTHER CARE

Kangaroo Mother Care (KMC) is a special way of caring for low birth weight (LBW) babies. It improves their health and wellbeing by promoting effective thermal control, breastfeeding, infection prevention and bonding. In KMC, the baby is continuously kept in skin-to-skin contact by the mother and breastfed exclusively. KMC is initiated in the hospital and can be continued at home.

Benefits of KMC

1. Temperature maintenance with a reduced risk of hypothermia
2. Increased breastfeeding rates
3. Less morbidities such as apnoea and infections
4. Better weight gain
5. Early discharge from the health facility
6. Less stress (for both baby and mother)
7. Better mother infant bonding.

Components of Kangaroo Mother Care (KMC)

- Skin to skin contact between mother and baby
- Exclusive breastfeeding

Prerequisites of KMC

- Counselling, support and supervision by health care workers.
- Support to the mother in the hospital and at home.
- Regular follow up post discharge and access to health care providers is mandatory for safe and successful KMC at home.

Requirements for KMC implementation

- Training of nurses, physicians and other staff involved in the care of the mother and baby.
- Educational material, such as handouts, posters, video films on KMC in local language should be available to them, their families and community.
- If possible, reclining chairs in the nursery and postnatal wards, and beds with adjustable backrest should be made available. Mother can provide KMC sitting on an ordinary chair or in a semi reclining posture on a bed with the help of pillows.

All stable LBW babies are eligible for KMC. However, very sick babies needing special care should be cared under radiant warmer initially.

Preparing for KMC

Counselling helps in building a positive attitude of the family and ensuring family support to the mother which is particularly crucial for post-discharge home-based KMC. It is helpful if the mother starting KMC interacts with someone who is already practicing KMC.

Mother's clothing: KMC can be provided using any front-open, light dress as per the local culture. KMC works well with blouse and sari, gown or shawl. A suitable apparel that can retain the baby for extended period of time can be adapted locally.

Baby's clothing: Baby is dressed with cap, socks, jhabala, nappy/diaper.

Monitoring

Babies receiving KMC should be monitored carefully, especially, during the initial stages. Nursing staff should make sure that baby's neck position is neither too flexed nor too extended, airway is clear, breathing is regular, colour is pink and baby is maintaining temperature. Mothers should be involved in monitoring the baby during KMC, so that she can continue monitoring at home.

Ensure that baby's neck is not too flexed or too extended, breathing is normal , feet and hands are warm during KMC

Feeding

Mother should be explained how to breastfeed while the baby is in KMC position. Holding the baby near the breast stimulates milk production. She may express milk while the baby is still in KMC position. The baby could be fed with paladai, spoon or tube, depending on the condition of the baby.

Privacy

KMC does require some amount of exposure of the mother. This can make her nervous and self-conscious. The staff must respect mother's sensitivities in this regard and ensure culturally acceptable privacy, wherever KMC is practiced.

Duration of KMC

- Skin-to-skin contact should start as soon as feasible.
- Sessions that last less than one hour should be avoided because frequent handling may be stressful for the baby.
- The length of skin-to-skin contacts should be gradually increased to as long as possible.

Can the mother continue KMC during sleep and resting?

In the KMC ward or at home, the mother can sleep with the baby in kangaroo position in a reclined or semi-recumbent position. This can be achieved with an adjustable bed or with several pillows on an ordinary bed. It has been observed that this position decreases the risk of apnoea in the baby.

When mother is not available, other willing family member such as grandmother, father or any other relative can provide KMC



Mother providing KMC



Grandmother providing KMC



Father providing KMC

Source: Neonatal Unit, LHMC

21. IMMUNIZATION

The three vaccines a newborn should receive after birth before discharge are:

- BCG
- OPV
- Hepatitis B

BCG is given intradermally in a dose of 0.05 ml. A 1 ml insulin syringe with a 26-gauge needle is used. Under all aseptic precautions the needle is inserted intradermally in the left upper arm and the vaccine is administered. A small bleb is formed on injecting the vaccine intra-dermally. This vaccine should be used within 4 hours of opening the vial and adding the diluent provided and should be protected from sunlight.

The parents/caretaker should be informed about the reaction which will take place after 3 weeks in the form of redness and nodule formation. Sometimes this nodule may rupture and some liquid may come out. Very rarely an abscess may form for which the baby may need referral.

OPV: Two drops of oral polio vaccine should be given orally. Please check the VVM (vaccine vial monitor) before giving the vaccine

Hepatitis B vaccine is given intramuscularly in a dose of 0.5 ml at the anterolateral aspect of the thigh with a half inch needle and 1 ml syringe within 24 hours of birth.

S No.	Vaccine	Protection	Number of doses	Vaccination Schedule*
1.	BCG (Bacillus Calmette Guerin)	Childhood Tuberculosis	1	At birth (up to 1 year if not given earlier)
2.	Hepatitis B	Hepatitis B	1	Birth dose for institutional deliveries within 24 hours. Three primary doses at 6, 10 & 14 week are part of pentavalent vaccine.
3.	OPV (Oral Polio Vaccine)	Polio	5	Birth dose for institutional deliveries. Three primary doses at 6, 10 & 14 week and one booster dose at 16-24 month of age.

* State specific policies should be followed

22. SIGNS OF SICKNESS

Signs of sickness in a newborn may often be subtle and therefore a high index of suspicion is required. Daily monitoring of the baby in the post-natal ward will not only help in prompt detection of the illness, but also in initiating appropriate action.

Danger signs in a baby suggest serious illness requiring immediate medical attention. These, therefore, should be explained to the mother before discharge and she should be advised to bring the baby to the facility, if any of the following danger sign is observed. The signs are elaborated as under:

- **Poor feeding:** May be a sign of sickness, hypothermia, hypoglycemia or respiratory distress.
- **Respiratory difficulty, apnoeic attacks or cyanosis:** May be due to pneumonia, immature lungs, hypoglycemia, hypothermia or any other serious illness
- **Undue lethargy:** May be a sign of sepsis, hypothermia, hypoglycemia or respiratory distress.
- **Sudden rise or fall in body temperature:** Hypothermia needs to be diagnosed and managed according to the actual temperature, to prevent complications and eventual death. Fever may be due to high environmental temperature or at times due to serious infection.
- **Appearance of jaundice within 24 hours of age or yellow staining of palms or soles,** suggests pathological jaundice and needs immediate referral and treatment.
- **Failure to pass meconium within 24 hours/urine within 48 hours/persistent vomiting/drooling of saliva or choking during feeding:** May be due to surgical problem requiring urgent attention.
- **Excessive crying/seizures** (abnormal movements of the body): May be due to some sickness, hypothermia, hypoglycemia or respiratory distress. The baby needs to be seen by a doctor immediately to treat any serious illness, including meningitis.
- **Bleeding from any site:** May suggest serious illness or may be due to Vitamin K deficiency, both need attention at a facility.

Evidence of superficial infections such as conjunctivitis, pustules, umbilical sepsis (redness at base of the stump and discharge), oral thrush, etc. need appropriate treatment to avoid serious bacterial infection.

23. DISCHARGE PLANNING AND ADVICE

Examine the baby before discharge

The baby should be thoroughly examined before s/he is discharged. The parents need to be informed that although the possibility of complications is low, there is still a small probability that the baby may have problems such as apnoea, feeding difficulty, lethargy or convulsions in the first few days.

Instruct them to take the baby to the nearest hospital, if these problems occur. Encourage the mother to maintain skin-to-skin contact, as much as possible, in the next few days.

Checklist before discharge

Neonate should be discharged after 48 hours, once all of the following criteria are fulfilled:

1. Infant is free from any illness, including significant jaundice.
2. The baby has been immunized.
3. Adequacy of breastfeeding has been established. This must be assessed in all babies and the same would be indicated by passage of urine 6 to 8 times/24 hours, onset of transitional stools, baby sleeping well for 2-3 hours after feeding. If there is any concern about adequacy of breastfeeding, the baby can be weighed on the same weighing scale that was used to weigh the baby at birth. Excessive weight loss (normal 8-10% of birth weight by 3-4 days of age) would indicate inadequate breastfeeding.
4. Mother is free from any significant illness and confident of taking care of her baby.
5. Mother has been demonstrated and explained the MCP card.

Follow up

Each baby should be followed up for assessment of growth and development, early diagnosis and prompt management of illnesses, along with health education of parents. MCP card is an important tool for assessing growth, development and early detection of developmental delays, both in the community and the facility. All babies where indicated, should undergo screening for hearing and screening for retinopathy of prematurity. It is desirable that every baby is seen and assessed by a health worker at each immunization visit.

24. NEONATAL TRANSPORT

Appropriate care during transport of sick newborn to newborn care unit improves survival and outcome.

Which babies need transportation

- All babies who require PPV for more than 1 minute
- All sick babies
- All LBW babies < 1800 grams
- All babies requiring orogastric feeds

Components

1. Stabilization prior to transport.
2. Communication with parents, referral unit.
3. Maintenance of “warm chain”.
4. Prevention of hypoglycemia.
5. Maintenance of airway and oxygenation.
6. Instructions to accompanying attendant/family member about danger signs.

Equipment

1. Appropriate clothing for baby (cotton sheets/cap, woolen blanket).
2. Thermometer
3. Cotton swabs
4. Feeding tubes
5. Mucus sucker/suction catheter
6. Oxygen source and nasal prongs
7. Resuscitation bag
8. Pulse oximeter

Procedure

Each component of neonatal transport is described below:

I. Stabilize prior to transport

- Warm the baby till hands and feet are warm to touch.
- Position and clear airway, if required/oxygenate, if needed.
- Give/arrange medications as per attending doctor's advice

II. Communication

- Communicate with the family regarding condition and reasons for transport.
- Communicate with referral unit regarding condition of baby, approximate time of arrival, working diagnosis, what has already been done along with a referral note mentioning reasons for transfer, medications given, along with dose and timings.
- Explain the condition of the baby to the accompanying family members and provide specific instructions to be followed enroute, like-clearing secretions, gentle stimulation, KMC and feeding, as applicable.

III. Prevention of hypothermia:

KMC is the best way to maintain the baby's temperature during transport.

If KMC is not possible:

- Remove soiled nappy and linen
- Warm clothing (dress baby in cotton clothes), cover head with a cap, feet with socks and wrap the baby in a blanket.
 - Skin-to-skin contact with mother/accompanying person
 - DO NOT USE hot water bottles.

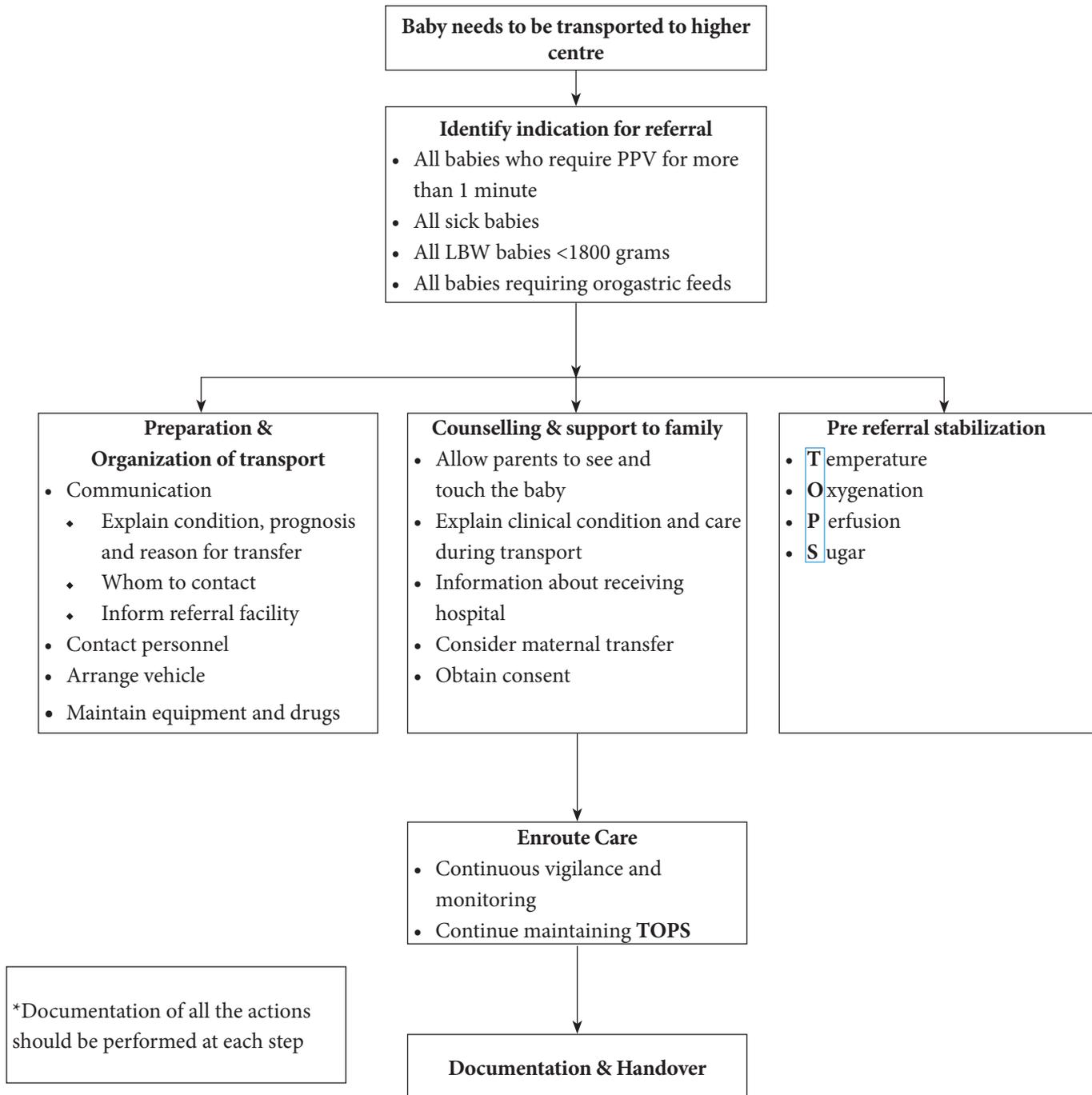
IV. Prevention of hypoglycemia

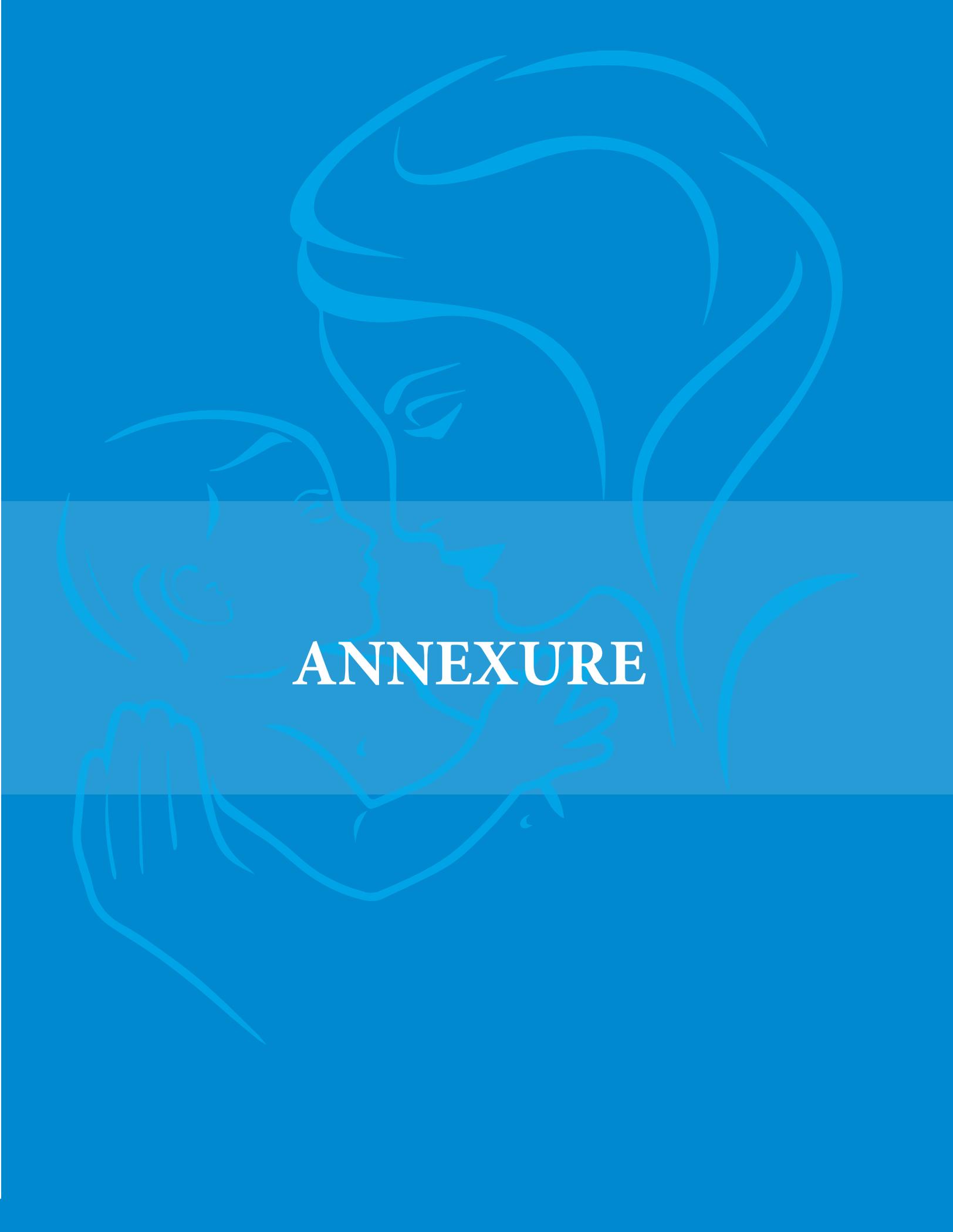
- Give orogastric feed if baby is not able to take breast/kaori spoon feed
- Instruct regarding feeding during transport.
- Ensure 'quick' transport.
- Prevent hypothermia.

V. Prevention of hypoxia

- Instruct caregivers regarding gentle handling.
- Monitor saturation using pulse oximeter. Maintain between 91-95%.
- Position and clear airway, if required.
- Consider use of oxygen with nasal prongs, if required.
- Instruct regarding gentle stimulation, if the baby is apnoeic.

Algorithm for Transport



A stylized, monochromatic blue line-art illustration of a woman with long, wavy hair kissing a young child on the cheek. The woman's face is in profile, looking down at the child. The child is also in profile, looking up at the woman. The illustration is composed of smooth, flowing lines. The background is a solid blue color with a horizontal band of a slightly lighter shade of blue across the middle.

ANNEXURE

RADIANT WARMER – PARTS AND FUNCTIONS

Parts

- Bassinet (for placing the neonate)
- Radiant heat source (Quartz/ceramic or similar heating rod)
- Skin probe (for sensing baby's skin temperature)
- Air probe
- Control panel (displays and control knobs)

Control panel (displays and control knobs)

- Mode selector (selects manual or servo mode)
- Heater output control key/knob(to increase or decrease the heater output manually)
- Heater output display (indicates heater output)
- Temperature selection key/knob (select the desired skin temperature)
- Temperature display (displays temperature of baby's skin, the set temperature and air temperature)
- Alarm display for power failure, system failure, skin probe failure, skin temperature high/low and heater failure.

Working

- Connect to mains and switch on. Select the manual mode and keep heater output to maximum for 15-20 minutes for pre-warming the bassinet and linen.
- Select servo mode and set the desired skin temperature to 36.5°C. Heater output adjusts automatically to keep baby at set temperature.
- Place baby in the bassinet. Cover head with cap, feet with socks and hands with mittens. Baby can be clothed while under a warmer. Connect skin probe to baby's abdomen with a skin friendly tape.
- Do not leave the baby unmonitored, when being cared for, under a warmer

Cleaning and disinfection	
Bassinet	Soap/detergent – Use only mild soap and water wipes daily. Do not use spirit or other chemicals to clean the plastic/acrylic parts Clean using disinfectant, like- 2% Bacillocid or glutaraldehyde, when the bassinet is unoccupied or weekly (move the baby while using disinfectant)
Probe	Clean using isopropyl alcohol swab before and after each use
Do's	Place skin probe on the right upper abdomen in the supine position and in the flanks, if baby is prone Use skin friendly adhesive tape to secure the probe in place. Do not place probe on bony structures. Ensure that the skin is dry or else prepare using alcohol & spirit swab to ensure good adhesion to the skin. Check repeatedly to ensure that the sensor probe is in position. Check temperature manually, at least once per shift. Always respond to alarms promptly and take corrective measures
Don'ts	Do not apply probe to bruised skin. Do not reuse disposable probes.

Trouble Shooting

Problem	Action
Machine does not switch on	Check power supply, check the plug and check fuse, if all the above okay, call engineer.
Power on but heater not working	Call engineer
No skin temperature display	Faulty skin sensor (replace sensor/call engineer)

Side effects and dangers

- Hyperthermia - (especially in the manual mode if temperature is not monitored or in the servo mode when the probe gets displaced). To prevent hyperthermia, ensure probe is properly attached and the temperature of baby is monitored using a thermometer periodically.
- Hypothermia - usually due to equipment failure or when the probe is malfunctioning. Always maintain the radiant warmer in good condition and attend to alarms immediately.
- Increased insensible water loss occurs due to exposed skin surface to radiant heat, more so in preterm neonates, when nursed under the warmer for prolonged period. Take following actions to prevent this:
 - a. Clothe the baby and use caps and socks
 - b. Apply emollients/oil to the skin
 - c. Maintain ambient temperature and humidity.

Maintenance

- Calibration every 4-6 months as per manufacturer's manual
- Comprehensive warranty for 5 years at the time of purchase and thereafter annual maintenance contract

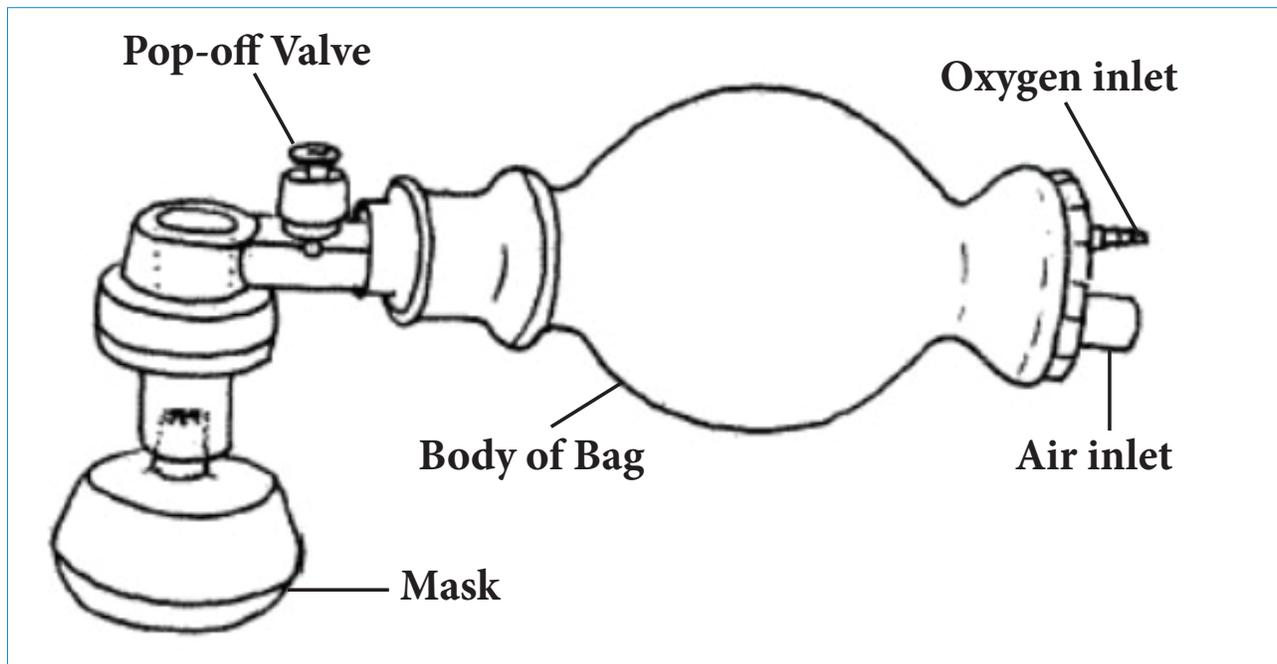
BAG & MASK – PARTS AND FUNCTIONS

Parts of Bag and Mask:

- Bag
- Oxygen inlet
- Air inlet
- Patient outlet
- Valve assembly
- Oxygen reservoir

Resuscitation bags used for newborns are self-inflating bags. A self-inflating bag, inflates automatically without a compressed gas source. It stays inflated at all times, unless squeezed. Bags used for newborns should have a volume ranging from 240 to 500 ml. The bag is made of silicone rubber, which can be easily cleaned and autoclaved.

Figure 12: Parts of bag and mask



Posterior part of bag consists of two inlets. The wider inlet is for air and the other one for oxygen. Oxygen tubing is attached at the oxygen inlet and the oxygen reservoir, if used, is attached to the air inlet.

Pop-off valve is situated on top of the bag. It is a pressure release valve, which opens if excessive pressure is generated, thus limiting the pressure being transmitted to the baby. If you ventilate with high pressure and/or rate, the lungs could become over inflated, causing rupture of the alveoli and a resulting air leak.

Masks come in different sizes and shapes (round and anatomically shaped). Anatomically shaped masks are shaped to fit the contours of the face. They are made to be placed on the face with the pointed part of the mask fitting over the nose. Mask is attached at the anterior end of bag.

Types of mask: Round/anatomical silicone cushioned mask for preterm (size 0) and term (size 1)

Safety feature: There are two safety features: (a) Pressure release valve also called as the pop-off valve, and (b) pressure gauge.

Working: Assemble bag. Check bag by occluding the patient outlet tightly with your palm and then squeezing the bag and looking for the release of the pop-off valve, the pop-off valve goes up along with a hissing sound - this indicates that the bag is functioning normally.

Fix appropriate size mask. Ensure adequate seal & provide PPV. Check for adequate chest rise. Connect to oxygen source/attach the reservoir, if required.

Cleaning and disinfection: Disassemble all parts, wash thoroughly with warm water and soap. Soak in glutaraldehyde 2% for 30 minutes for disinfection and for 4-6 hours for sterilization. After removing from glutaraldehyde, rinse with sterile water, dry with sterile cloth and then reassemble. Disinfect daily and sterilize weekly.

Clean mask with spirit between patient use.

Do's and don'ts

- Check functionality of bag prior to resuscitation
- Choose appropriate sized mask
- Make sure that the airway is patent
- Ensure adequate seal
- Look for adequate chest rise
- Don't perform overzealous PPV

Trouble shooting

Problem	Possible cause	Corrective action
Chest does not rise with bag and mask ventilation	<ol style="list-style-type: none"> 1. Leakage around mask 2. Blocked airways 3. Pop-off valve gives way due to loose spring 4. Needs higher pressure 	<ol style="list-style-type: none"> 1. Provide tight seal 2. Re-suction, reposition 3. Change bag 4. Use higher pressure
Bag doesn't generate pressure when tested on palm	Leakage/cracked bag Leakage at air inlet Pop-off valve defective	Change bag
Baby doesn't improve despite effective bag and mask ventilation	Needs higher level resuscitation Needs oxygen	Based on HR, perform chest compressions, followed by medications. Ensure oxygen supply with attached reservoir.

Maintenance: Replace if damaged or leaking. Do not place/leave it lying under radiant warmer

