SAFE CARE SAVING LIVES PROJECT

Quality Improvement Kit

ACCESS health international

CIFF CHILDREN'S INVESTMENT FUND FOUNDATION

Institute *for* Healthcare Improvement

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A. Driver Diagram

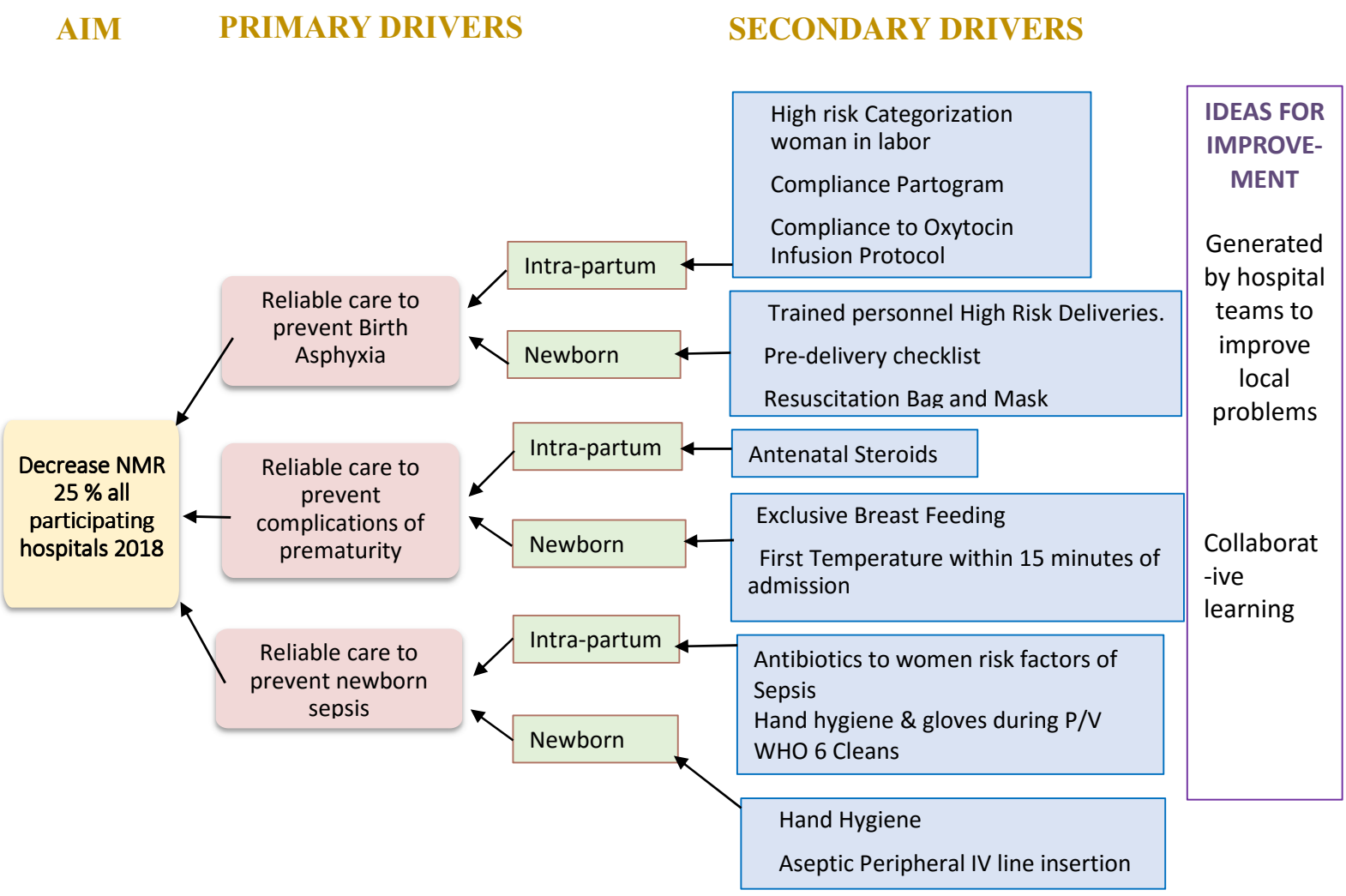


Figure 1: Driver Diagram: Safe Care Saving Lives

B. Measurement Strategy

Sr. No	Potentially better practices	Process Measures	Outcome measures
		BIRTH ASPHYXIA	
1	All women in labor will be categorized as high risk or low risk.	Proportion of labor records audited in which the mother was categorized appropriately as high risk Intermediate Outcome: incidence of cases of Eclampsia, antepartum hemorrhage and post partum hemorrhage	Incidence of moderate to severe perinatal asphyxia
2	Ensure all women in labor will have a Partogram completed appropriately.	Proportion of labor records audited which had the Partogram appropriately completed. Intermediate Outcome: proportion of emergency caesarian cases	Proportion of newborn deaths due to moderate to severe asphyxia
3	Ensure compliance to Oxytocin Infusion Protocol/ Bundle	Proportion of deliveries audited in which there was compliance to all the components of the Oxytocin Infusion Protocol/ Bundle Intermediate Outcome: Proportion of women induced and had hyper-stimulation of uterus	Stillbirth rate
4	All high risk deliveries will be attended by a personnel trained in newborn resuscitation.	Proportion of audited high risk deliveries attended by a personnel trained in newborn resuscitation Intermediate Outcome: No.of babies provided appropriate management of asphyxia in the labor room	
5	A pre-delivery checklist to prepare for all high-risk deliveries.	Proportion of audited high risk deliveries before which the pre-delivery checklist was used to prepare. Intermediate Outcome: No.of babies provided appropriate management of asphyxia in the labor room	
6	All newborns with perinatal depression at 30 seconds of life to be given assissted positive pressure ventilation with bag and mask* ** Unless there is a contraindication to its use.*	The proportion of inborn newborns admitted in the newborn nursery with provisional diagnosis of birth asphyxia and resuscitated by the administration of bag and mask at 30 seconds of life. Intermediate Outcome: a) Decrease in the incidence of the more severe grades of asphyxia b) Decrease in the number of admissions to the NICU with a diagnosis of more severe grades of hypothermia	

SEPSIS			
1	All women in labor with risk factors for sepsis are given antibiotics.	Proportion of women in labor with risk factors for sepsis and were given antibiotics as per the recommended protocol. Intermediate Outcome: a) decrease in incidence of early onset sepsis among newborns born in the hospital b) Decrease in the incidence of puerperal sepsis c) Decreased incidence of delayed wound healing	Incidence of sepsis in neonates
2	Ensure compliance to hand hygiene & use of sterile gloves during every PerVaginal examinations performed in the labor room.	Proportion of per vaginal examination audited in which there was compliance to hand hygiene and use of sterile gloves. Intermediate Outcome: a) decrease in the incidence of early onset sepsis among newborns born in the hospital b) Decrease in the incidence of puerperal sepsis	Proportion of newborn deaths due to sepsis
3	Ensure 6 WHO Cleans are followed during every delivery in the labor room.	Proportion of deliveries audited in which there was compliance to all the 6 WHO Cleans Intermediate Outcome: a) decrease in incidence of puerperal sepsis (among mothers who delivered recently) b) decrease in incidence of sepsis among the newborns born in the hospital	Incidence of Central Line Associated Bloodstream Infection (CLABSI)
4	Ensure compliance with optimal hand hygiene practices among all staff in the NICU/ newborn nursery.	Percentage of healthcare providers compliant to recommendations for hand hygiene including glove use when it is indicated. Intermediate Outcome: a) Decrease in incidence of nosocomial infections b) Average Length of Stay	
5	Ensure compliance to aseptic non touch technique during Peripheral Intravenous line insertion.	Percentage compliance to all steps of the ANTT (Aseptic Non Touch Technique Tool) tool while passing peripheral IV line (PIV). Intermediate Outcome: a) Average time to cannula change b) Incidence of Phlebitis	
COMPLICATIONS OF PREMATURITY			

1	All pregnant women between 24- 34 weeks of gestation at risk of iatrogenic or spontaneous preterm delivery in the next 7 days, will be given a single course of antenatal steroids as per the recommended schedule.	Proportion of women between 24 and 34 weeks of gestation, who are at risk of preterm birth in the next 7 days and have received a single course of antenatal corticosteroids as per the recommended schedule. Intermediate Outcome: a) Decrease in the incidence of RDS among babies born to mothers who received antenatal corticosteroids b) Number of babies given CPAP/Surfactant among those born to mothers who received steroids between 24-34 weeks of gestation c) Babies referred to higher centers for CPAP/Surfactant among those born to mothers who received steroids between 24-34 weeks of gestation	Incidence of RDS (Respiratory Distress Syndrome)
2.	Ensure all mothers are counselled and shown how to express breast milk/ give direct breast feeding **in** order to have all babies on established exclusive direct breast feeding and/ expressed breast milk for at least 48 hours before discharge.	Proportion of babies admitted in the NICU whose mothers have been counselled and shown how to express breast milk/ give direct breast feeding. Intermediate Outcome: Proportion of babies on established exclusive direct breast feeding and/ expressed breast milk for at least 48 hours before discharge. Intermediate Outcomes: a) Decrease in the incidence of Necrotising Entero Colitis (NEC) b) Weight gain by the first follow up visit after discharge from the NICU	Proportion of newborn deaths due to RDS (Respiratory Distress Syndrome)
3.	All babies admitted in the NICU to have a first temperature taken within 15 minutes of NICU admission and the measured temperature is between 36.5°C to 37.4°C degrees centigrade.	Proportion of babies admitted in the NICU and having a first temperature taken within 15 minutes of NICU admission and the temperature was between 36.5°C to 37.4°C degrees centigrade	Proportion of preterm newborn deaths
4.	All preterm neonates born in the hospital and having respiratory distress at birth will be given CPAP in the delivery room (using flow-inflating bag or T-piece resuscitator).	Proportion of preterm neonates born in the hospital, having respiratory distress at birth and given CPAP in the delivery room (using flow-inflating bag or T-piece resuscitator).	

C.Additional key indicators to be measured

1. Total deliveries (including LSCS-Lower Segment Caesarean Section) in a month
2. Total maternal deaths in the hospital in a month
3. Total neonatal admissions in NICU in a month
4. Total out-born admissions to NICU in a month
5. Total newborn deaths in a month
6. Total still births in a month
7. Total LAMA (Leave against medical advice) in NICU
8. Total NICU Referrals
9. Total newborn deaths/100 live births

A. Total newborn deaths/100 NICU admissions

D. Overview

This Quality Improvement Kit is designed to provide your Safe Care Saving Lives quality improvement team with ready made material that you can use to initiate improvement efforts in this Collaborative. This kit's design has been adapted from VON Quality Improvement Kit on preventing nosocomial infection[1].Your team can use these Kits to jump-start their quality initiatives. Thus, these Kits should be thought of as 'Starter Kits.' Over the course of the Safe Care Saving Lives project the teams in the collaborative will be encouraged to refine the kits based on further review of the evidence and their own experiences testing and implementing the changes. There is a plan to review the kit every 6 months and review evidence to include new potentially best practices.

This Quality Improvement Kit is based on a set of clinical practices that have the potential to improve the outcomes of neonatal care, known as **Potentially Better Practices (PBP's).** Some of these PBP's are derived from the work of previous collaborative of Neonatal Intensive Care Unit (NICU) teams and Maternity Safety Programmes from around the world. They have made focused attempts to improve safety and quality using a collaborative approach. Others are derived from a review of the literature and from expert recommendations.

These practices are not recommendations or protocols from the Safe Care Saving Lives project. They are labeled 'potentially better' rather than 'better' or 'best' because until the practices are evaluated, customized, and tested in your own organization (labor room or NICU), you will not know whether are truly 'better' or 'best' (or 'worse'). Depending on the particular circumstances in your unit(s), you may have to implement other practices or modify existing ones in order to successfully deliver safer care to mothers and newborns. In other words, this document will be considered a "live" learning document, collaborative teams will learn together how to close the gap between these PBP's and the care the mother and the neonate receives in order to achieve the goal of improving neonatal outcomes.

The PBP's in this collection are not necessarily the only ones required to achieve the improved outcomes you are targeting. Thus this list of PBP's is not exhaustive, exclusive, or all-inclusive. Changes in practice, guided by these PBPs, will require testing and adaptation to your particular circumstances and context in order to achieve measured improvements in outcomes[2]. As you define your work, it is much better to start small, sustain your improvement over time, and then add additional PBP's as you build your capability and capacity.

As the teams in this collaborative learn together, a focus on unintended consequences will also be important. Appropriate balancing measures need to be identified to ensure that you are obtaining the desired results, that no harm is being done, and that no unanticipated results are seen.

In this collaborative, the teams are recommended to use the Model for Improvement described by Langley and colleagues [3], as a framework for their improvement efforts. The key elements of the Model for Improvement are (1) Aims (2) Measures (3) Changes (4) Plan-Do-Study-Act (PDSA) cycles.

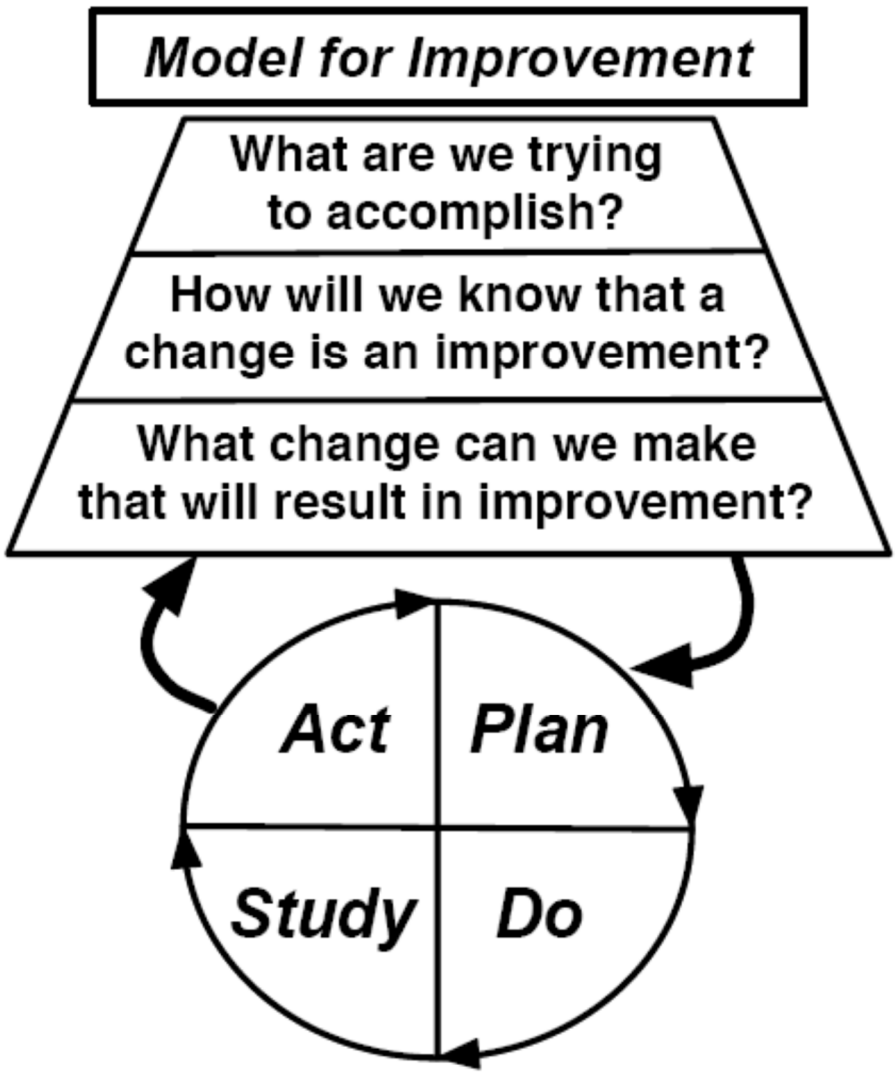


Figure. Model for Improvement

Reference: Langley, GJ, Nolan KM, Nolan TW, Norman CL, and Provost LP. The Improvement Guide. 1996.

In this Kit, each PBP is placed within the framework of the Model for Improvement and has associated with it an aim, a measure, a list of suggested changes, and tips and tools for implementing changes (that include potential barriers to implementation).

Your team can implement as many of the PBP's in this Kit as you wish, based on an assessment of your unit's priorities, and based on availability of resources, time, and individuals with quality improvement skills. Your team can modify the tools provided in this Kit as desired. For example, if your team feels that the wording of a specific aim is not suitable for your unit, you should feel free to modify the aim based on your local discussions and decisions. Similarly, your team is free to modify the exact methods of obtaining measurements in your project, the data collection tools, and the exact change ideas you

implement as this project progresses. **The core set of Outcome Measures however need to be collected keeping a uniform definition across all centers.**

As mentioned above, this is a Starter Kit. As you work in the Safe Care Saving Lives Collaborative to make improvements, you will collaborate and share your progress, challenges and breakthroughs with members of the Safe Care Saving Lives collaborative. An expected byproduct of this improvement work will be a set of improvement case studies, tools and resources to support others' improvement, but the initial focus and emphasis for your team should preferably be on testing, adapting and implementing practices provided in this Kit. Furthermore, it is expected that as a result of working with these initial PBP's your Topic Group will refine and perhaps add to the this set of practices.

E. Overall Goal

The overall goal of the Safe Care Saving Lives Project is to reduce neonatal deaths by providing reliable intrapartum and newborn care. It aims to prevent neonatal deaths due to perinatal asphyxia, sepsis and complications of prematurity by improving process reliability and standardization.

The best source of data for this overall aim is the data you collect for submission to the Safe Care Saving Lives Project. Effort has been made to prevent duplication and confusion by keeping the outcome data definitions aligned to the measures reported by public hospitals to the Government of India. This includes the measures reported as per the FBNC (Facility Based Newborn Care) program. However some intermediate outcome measures and many of the process measures are specific to the Safe Care Saving Lives Project and this toolkit contains detailed information on their definitions and collection tools.

SECTION 1

Reliable Intrapartum Care and newborn resuscitation

OUTCOME MEASURES: Reliable intra-partum care and newborn resuscitation

1. **Incidence of moderate to severe perinatal asphyxia in babies born in the hospital**
2. **Proportion of newborn deaths due to moderate to severe perinatal asphyxia.**
3. **Stillbirth rate in the hospital**

1. **Incidence of moderate to severe perinatal asphyxia in babies born in the hospital:**

$$\frac{\text{No of newborns babies born in the hospital and diagnosed with moderate to severe perinatal asphyxia in the month}}{\text{Total No of Newborns born in the month}} \times 100$$

2. **Proportion of newborn deaths due to moderate to severe perinatal asphyxia:**

$$\frac{\text{No of newborns deaths due to moderate to severe perinatal asphyxia in the month}}{\text{Total No of Newborn deaths in the month}} \times 100$$

3. **Stillbirth rate in the hospital**

$$\frac{\text{Number of still births during the year}}{\text{Number of live births and still births during the year}} \times 1000$$

OR

$$\frac{\text{Number of still births in the hospital during the month}}{\text{Number of live births and still births in the hospital during the month}} \times 1000$$

Note: Operational Definitions[4]

1. Moderate to severe perinatal asphyxia/ Hypxic Ischaemic Encephalopathy (HIE):
Moderate to severe perinatal asphyxia is diagnosed if baby with birth asphyxia has encephalopathy i.e. if any 1 factor listed in (a) and any 1 factor listed in (b) are present:

a) Birth Asphyia: Presence of any one of the following:

- Delayed Cry
- Need for assisted ventilation at birth or
- Apgar < 3 at 1 minute
- Apgar < 5 at 5 minutes

b) Signs suggestive of encephalopathy: Presence of any one of the following:

- Altered sensorium
- Inability to feed
- Convulsions

2. **Still birth**[5]: A baby born in the hospital with no signs of life at or after 28 weeks' gestation and/ or weighing 1000gms or more[a].

[a] Definition recommended by WHO for international comparison.

POTENTIALLY BETTER PRACTICES (PBP's): reliable intra-partum care and newborn resuscitation

The key concept is to understand and manage variation in clinical practice by developing standardised processes and protocols. The initial PBP's included for creating reliable intra partum care and newborn resuscitation are the following:

PBP 1.	**All women in labor will be categorized as high risk or low risk.**
PBP 2.	**All women in labor will have a Partogram completed appropriately**
PBP 3.	**The Oxytocin Infusion Protocol/ Bundle will be used for every women receiving oxytocin in labor.**
PBP 4.	**All high risk deliveries in the hospital will be attended by a personnel trained in newborn resuscitation.**
PBP 5.	**A pre-delivery checklist will be used to prepare for all high-risk deliveries**
PBP 6.	**All newborns with perinatal depression at 30 seconds of life, will be given assissted positive pressure ventilation with bag and mask*** *** Unless there is a contraindication to its use.**

Monthly reporting of collected data and the knowledge gathered will inform how the PBPs can be implemented reliably and also the development of additional PBPs. After every 6 months, the list of potentially better practice (PBPs) will be reviewed for inclusion of new or exclusion of existing PBPs.

PBP 1. All women in labor will be categorized as high risk or low risk [6].

1.a. AIM

Ensure all women in labor are categorized as high risk or low risk* in order to be able to determine the frequency of monitoring and to identify risk to mother and neonate throughout all stages of labor.

The rationale is that pregnant women at high risk of complications require additional care led by an obstetrician[7] ,[8] ,[9].

* Note: The category can change during labor and whenever a woman's status changes she should be re-assessed.

1.b. PROCESS MEASURE

Proportion of labor records audited in which the mother was categorized appropriately as high risk

Denominator: Number of labor records audited and mother found to be high risk

Numerator: Number of labor records audited and mother found to be high risk and mother was also appropriately categorized as high riskby treating healthcare provider.

Operational Definition:

Categorization as High Risk: Refer to PBP4 Tool 1, for questions to categorize women.

1.c. RISK CATEGORIZATION OF WOMEN IN LABOUR[10]:

Questions to ask for risk categorization of women in labour :

A. **Does she have any medical disorders, any preexisting co-morbidities**

1. Hypertension (Chronic HTN, pre-eclampsia, eclampsia)
2. Diabetes
3. Cardiac disease
4. Hemoglobinopathy
5. Severe anemia
6. Hyperthyroidism
7. Collagen vascular disease
8. Obesity (BMI>35 kg/m^2)
9. Renal disease

B. Does she have any pregnancy retaled risk factors – Maternal and Fetal?

1. Hypertension disorders
2. Gestational diabetes
3. Pyrexia
4. Vaginal bleeding
5. Epidural analgesia
6. Hemodynamic instability due to any reason
7. Oxytocin augmentation

C. Fetal risk factors

1. Fetal growth restriction
2. Meconium stained amniotic fluid (MSAF)
3. Multiple pregnancy
4. Post dated pregnancy
5. Oligohydramnios
6. Doppler compromised fetus
7. Breech presentation
8. Induced labour
9. Oxytocin augmented labour
10. Previous suspicious cardiotocogram (CTG)
11. Excessive bleeding per vaginum in labour

1.d. DATA COLLECTION TOOL:

Following audit tool to be used on a random sample of case records once in 1-2 weeks to determine if women in labor are being appropriately categorized as high risk or low risk.

Sr No.	Patient ID No	Did the mother have any condition as per high risk classification Yes/ No	If Yes, what was the condition?	Was the mother classified as high risk Yes / No	Was the delivery actually attended by a person trained in newborn resuscitation Yes/ No/ NA	Did the baby require assisted mechanical ventilation? Yes/ No/ NA	Did the baby develop moderate to severe asphyxia Yes/ No/ NA
1							
2							
3							
4							
5							
6							

PBP 2. Ensure all women in labor have a Partogram filled and that its filled appropriately[11], [12], [13]

2.a. AIM

All women in labor will have a Partogram completed appropriately (in order to differentiate between normal and abnormal labor).

The rationale is that there is evidence that the partogram clearly differentiates normal from abnormal progress in labour and identifies those women likely to require intervention. Hence, its use in all labour wards is recommended[14], [15], [16]. 'Evidence from low income settings show that the use of pictorial representations of progress in labour (partograms), that have an action line, increases vaginal birth and reduces maternal morbidity. A 4 hour action line is associated with fewer intrapartum interventions than a 2 hour action line with the same outcomes. There is no current evidence on the efficacy or otherwise of partograms without action or alert lines'. [17].

2.b. PROCESS MEASURE

Proportion of labor records audited which had the partogram appropriately filled.

Denominator: Number of labor records audited

Numerator: Number of audited labor records in which the partogram was appropriately filled.

2.c. KEY FEATURES ON USE OF PARTOGRAM[9, 18, 19]

Every mother in labour is monitored and the findings are documented on a partogram. Partogram should be started when the patient is taken into labour and delivery room, usually at 4 cm dilatation. The alert line is started at 4 cm cervical dilatation as a 1cm/hour line. The action line is a drawn 4 hours parallel to the right of the alert line, which signifies the need for consultant opinion, assessment for the delayed progress and an appropriate intervention.

Plotting of Partogram

1. Patient details: Name, age, MR No., any risk factors, membrane status, time and date.
2. Fetal monitoring
a. Fetal Heart Rate (FHR) : baseline FHR is represented as a cross – (X)
b. Deceleration is represented a line from the base FHR to the lowest heard. Deceleration can be
represented by the abphabets; E for early, L for late and V for variable.
d. CTG findings are documenting as Normal, Suspicious and Pathological by N, S and P respectively.
e. Moulding is assessed at every vaginal examination at two sites; at parietal parietal suture, at
parietal occipital suture and quantified as grades. The Stewarts score is used to combine both the grades and predict cephalopelvic disproportion.
i. I degree : scalp bones touching each other (score 1)

ii. II degree: overlapping but can be separated by finger (score 2)
iii. III degree : overlapping and cannot be separated (score 3)
Stewarts score is calculated by adding up the graded scrores at both the sutures. A score of 4 or more is suggestive of cephalopelvic disproportion along with other findings.
f. Caput is documented if present with a "+"

Progress of labour
a. Cervical dilatation is marked as a cross on the graph
b. Vaginal examination is done every 4 hours
c. Alert and action lines are drawn 4 hours apart (at 1 cm/hour) from 4 cm cervical dilatation as shown in figure on the next page.
d. Descent of the fetal head is marked as a small circle
e. Uterine contractions are counted per 10 minutes and the duration of a single contraction is assessed in seconds. Example of 2 contractions in 10 minutes each lasting for 30 seconds is shown in figure on the next page.
i. Less than 20 seconds is represented by dots
ii. 20 to 40 seconds is represented with cross hatched lines
iii. More than 40 seconds is represented by complete dark boxes

Maternal monitoring
a. Pulse rate is represented by a cross
b. Blood pressure recordings are recorded as a line connecting the systolic reading to diastolic reading with arrow head at each end.
c. Urine output has to be documented every 4 hours. Every mother in labour should have urine albumin checked at admission.

Management of Labour Form:
The interpretation of findings at every vaginal examination have to be entered by the person doing a vaginal examination. Only the interpretation has to be written and care must be taken not repeat the observation findings.
a. Maternal condition: Satisfactory, pyrexia, exhausted, haemodynamically unstable, etc.
b. Fetal condition: Satisfactory, Suggestive of fetal compromise, fetal death.
c. Progress of labour: Satisfactory or good, delayed or arrest of labour.
d. Management plan: A plan written for the next 4 hours along with time of next review.

2.d. DATA COLLECTION TOOL

Following audit tool to be used on a random sample of case records once in 1-2 weeks to determine if women in labor are having the partogram completed appropriately, whether appropriate decisions are being taken based on partogram and the corresponding outcome of the pregnancy.

Sr. No.	***IP No.***	*Does partogram show maternal pulse, uterine contractions, fetal heart rate and amniotic fluid color recorded every 30 minutes Yes/ No (No includes not documented)*	*Does partogram show temperature, blood pressure, cervical dilatation and descent of presenting part recorded every 4 hours Yes/ No (No includes not documented)*	*Did partogram cross the action line Yes/ No* (No includes not documented)*	*If partogram crossed action line, was re-assessment done to determine cause of delay and decision taken on how to overcome it? Yes/ No* (No includes not documented)*	*If decision was taken, please write what it was.*	*Date and time of birth*	*Was it a still birth (SB) or live birth (LB)*	*Did baby develop moderate to severe perinatal asphyxia Yes/ No* (No includes not documented)*
1									
2									
3									
4									
5									
6									

PBP 3. The Oxytocin Infusion Protocol/ Bundle will be used for every women receiving oxytocin in labor[20]

3.a. AIM

Ensure compliance to the Oxytocin Infusion Protocol/ Bundle in every woman started on oxytocin in order to standardise and ensure reliable care to women in labor receiving a high risk medication[21], [22], [23].

3.b. PROCESS MEASURE

Proportion of deliveries audited in which there was compliance to all the components of the Oxytocin Infusion Protocol/ Bundle

Denominator: Number of deliveries audited**.**

Numerator: Number of deliveries audited in which there was compliance to all the components of the Oxytocin Infusion Protocol/ Bundle.

Note: The components of the Oxytocin Infusion Protocol/ Bundle[9] are as follows:

a) Appropriate **indication** for starting Oxytocin

b) Compliance to **low dose regime** for oxytocin use & step up

c) Observe for **Contraction every 30 minute**s: If 4 contractions in 10 minutes, maintain Oxytocin rate and don't increase any further.

d) **Tachysystole**: If 5 contractions or more in 10 minutes, diagnosis & appropriate management of tachysystole.

3.c. KEY FEATURES OF OXYTOCIN INFUSION PROTOCOL/ BUNDLE [9]

a) **INDICATIONS FOR STARTING OXYTOCIN OR INDUCTION OF LABOR (IOL):** Atleast 1 of the following indication needs to be present before induction of labor:

- Prolonged pregnancy, 41 weeks
- Preterm prelabour rupture of membranes – women with PPROM after 34 wks offer IOL
- Prelabour rupture of membranes – offer IOL after 24 hrs of PROM

 Fetal growth restriction : 37 – 38 weeks

 Diabetes mellitus:
- GDM on diet, with well controlled sugars at 41 weeks
- GDM on insulin, with good control of sugars at 39 weeks
- GDM, uncontrolled sugars, consider delivery at 38 weeks

 Hypertensive disorders in pregnancy
- Gestational HTN or mild preeclampsia or Chronic HTN : deliver at 37 - 38 weeks
- Severe Pre eclamspsia : deliver at 34 weeks

 SLE, APA Syndrome deliver at 37 – 38 weeks

 IHCP – offer induction of labour at 37 weeks

 Previous IUFD, individualize management plans; deliver at 37 – 38 weeks

 Maternal indication for delivery: where delivery would improve maternal condition.

b) **COMPLIANCE TO LOW DOSE REGIME FOR OXYTOCIN USE & STEP UP** : Is given in the table below:

OXYTOCIN INFUSION REGIME

		INFUSION PUMP OR DIAL FLOW	MICRODRIP SET	ORDINARY SET
TIME	mu / mt	ml per hour	microdrops per minute	drops per minute
0 hrs	1	5	6	1
0.5 hrs	2	10	12	3
1 hrs	4	25	24	6
1.5 hrs	6	35	36	9
2 hrs	8	50	48	12
2.5 hrs	10	60	60	15
3 hrs	12	70	72	18
		WAIT FOR ONE HOUR BEFORE INCREASING		
4 hrs	14	85	84	21
4.5 hrs	16	95	96	24
5 hrs	18	110	96	24
5.5 hrs	20	120	120	30

c) **OBSERVE FOR CONTRACTION EVERY 30 MINUTES**: If 4 contractions in 10 minutes, maintain Oxytocin rate and don't increase any further.

d) **TACHYSYSTOLE**: **DETECTION & MANAGEMENT OF TACHYSYSTOLE**

If more than 5-6 contractions in 10 minutes, diagnose tachysystole.
If no FHR changes: reduce Oxytocin rate and go 1 step behind.
With FHR changes: Stop Oxytocin, reposition the women, give Ringer Lactate, & Tocolytic - GTN (Nitroglycerine) spray: one puff of 400 mics buccal spray / terbutaline 0.25 mg SC

Second dose of terbutaline is given after 15 mins and for GTN, the second dose is given after 5 minutes. If no response to the second dose, it is an indication for Caesarean delivery.

3.d. DATA COLLECTION TOOL

Following audit tool to be used on a random sample of case records once in 1-2 weeks to determine compliance to oxytocin infusion protocol/ bundle and corresponding fetal outcome.

S. No.		1	2	3	4	5	6	7	8
1	Patient ID								
2	Was women started on Oxytocin Yes/ No								
3	Was indication for starting oxytocin documented Yes/ No								
4	Was the indication appropriate Yes/ No								
5	If indication was not appropriate, Please Specify								
6	Was correct Low Dose regime used Yes/ No/ Not documented								
7	Was patient observed for contractions every 15-30 minutes? Yes/ No								
8	If contractions documented in 10 minutes, was Oxytocin rate not increased any further Yes/ No/ NA								
9	If tachysystole detected and documented, was it appropriately managed? Yes/ No/ NA								
10	*Date and time of birth*								
11	*Was it a still birth (SB) or live birth (LB)*								
12	*Did baby develop moderate to severe perinatal asphyxia* *Yes/ No** *(No includes not documented)*								

PBP 4. All high risk deliveries in the hospital will be attended by a personnel trained in newborn resuscitation.

4.a. AIM

To ensure all deliveries at high risk of complications are attended by a personnel trained in newborn resuscitation since often a delay is noted before a person trained in neonatal resuscitation is available when required. National guidelines in the United States and Canada recommend that a team or persons trained in neonatal resuscitation be promptly available for every birth[24], [25], [26]. The ultimate goal of the Safe Care Saving Lives program is to have a team or persons trained in neonatal resuscitation be promptly available to provide resuscitation for every birth. Since this may not be feasible currently in all centers due to constrained resources, its recommended that to begin with at least deliveries of women at higher risk of complications are attended by a personnel trained in newborn resuscitation.

4.b. PROCESS MEASURE

Proportion of audited high risk deliveries in the hospital which are attended by a personnel trained in newborn resuscitation.

Denominator:
Total No of high risk deliveries audited in the hospital during the month.

Numerator:
No. of high risk deliveries audited in the hospital and which were attended by a personnel trained in newborn resuscitation during the month.

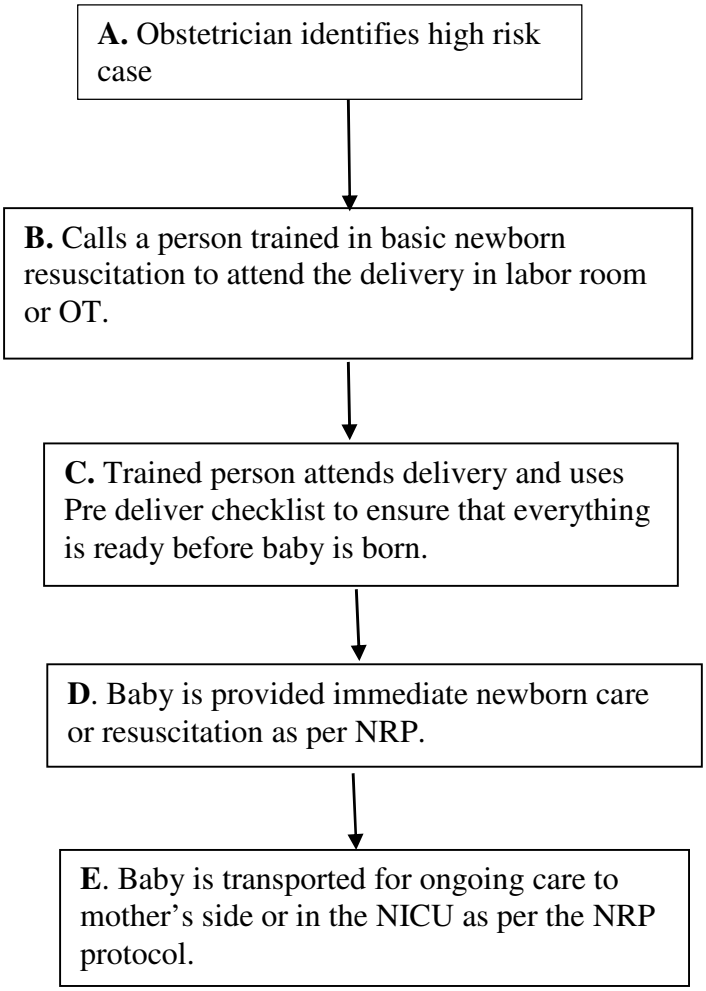
Operational Definition:

Personnel trained in newborn resuscitation: The person is trained in the Newborn Resuscitation Program (NRP) of the Indian Academy of Pediatrics & the National Neonatology Forum, India or the NSSK (Navjaat Shishu Suraksha Karyakram) conducted by the Ministry of Health and Family Welfare, Government of India.

High Risk: Is defined and listed above in **1.c. RISK CATEGORIZATION OF WOMEN IN LABOUR [9]:**

4.c. KEY FEATURES OF PROPOSED PROTOCOL:

Initially only the first 3 steps have been included in the potentially best practices. The Safe Care Saving Lives project aims to initiate QI work on the additional steps also with the ultimate goal of ensuring that a person trained in newborn resuscitation is available promptly for every birth and also receives appropriate resuscitation as per NRP (neonatal resuscitation protocol).



4.d. DATA COLLECTION TOOL

The audit tool for determining whether high risk deliveries are attended by a person trained in newborn resuscitation, use the **1.d. DATA COLLECTION TOOL** which is follows:

Following audit tool to be used on a random sample of case records once in 1-2 weeks to determine if women in labor are being appropriately categorized as high risk or low risk and a person trained in newborn resuscitation is called to attend the high risk delivery.

Sr No.	Patient ID No	Did the mother have any condition as per high risk classification Yes/ No	If Yes, what was the condition?	Was the mother classified as high risk Yes / No	Was the delivery actually attended by a person trained in newborn resuscitation Yes/ No/ NA	Did the baby require assisted mechanical ventilation? Yes/ No/ NA	Did the baby develop moderate to severe asphyxia Yes/ No/ NA
1							
2							
3							
4							
5							
6							

PBP 5. A pre-delivery checklist will be used to prepare for all high-risk deliveries

5.a. AIM

To ensure that a pre-delivery checklist is used to prepare before high-risk deliveries with the ultimate goal of scaling its use for all deliveries. Preparing and planning before a delivery to ensure the availability of essential equipment and personnel is a very important component of effective neonatal resuscitation [25], [27], [28] . To achieve this objective timely and accurate communication between the obstetric and neonatal resuscitation team is required. Healthcare providers giving obstetric care need to be aware of maternal-fetal risk factors [26] and should also be able assess before the delivery whether the neonate will require resuscitation after birth [29]. Once the person (ideally a team) arrives to attend a delivery, they need to obtain the relevent maternal history and check that all equipment is available and functional[26]. In addition, the room temperature is optimized to receive the infant by turning on the radiant heat warmer.

5.b. PROCESS MEASURE

Proportion of audited high-risk deliveries before which the pre-delivery checklist was used.

Denominator: The sample of high-risk deliveries audited in the hospital during the month.

Numerator: The number of high-risk deliveries audited in which there was documented evidence that a pre-delivery checklist was used.

5.c. SAMPLE PRE-DELIVERY CHECKLIST

Suggested method of obtaining this measure: A paper-based checklist can be provided in the delivery room, or it can be carried by the person/ team trained in newborn resuscitation. The checklist should have a designated space for documenting the names of the mother and baby. A box can be provided in the NICU, or in the delivery room (if all high-risk resuscitations occur in a dedicated delivery room) into which the resuscitation checklist can be dropped by the team after the checklist is used. Alternatively it can be attached where the neonate's resuscitation notes are documented (choose 1 of the 2 options).

Note: For sampling, all high risk resuscitations are eligible to be sampled.

Equipment Check (available and functional)

❒ Radiant warmer on, on manual mode. Full power, have servo temperature probe available
❒ Warm blankets present, plastic wrap present if ELBW - Extremely Low Birth Weight (less than 1000gms baby)
❒ Suction working and set to 80-100mmHg
❒ Suction catheter present
❒ Bulb suction present
❒ Face masks of different sizes present, especially for ELBW infant size
❒ Meconium aspirator
❒ Laryngoscope present and working and appropriate blade sizes
❒ ET tube present and right sizes
❒ Oro-gastric tube available and right size
❒ Medications available (Injection adrenaline)
❒ Normal saline available
❒ 10% Dextrose available

Medical Information

❒ Gestational Age
❒ Estimated fetal weight
❒ Meconium stained amniotic fluid
❒ Maternal narcotic within four hours
❒ Singleton or multiple gestation
❒ Why was the mother categorized as high risk?
❒ Specific medical or surgical conditions that might affect resuscitation:
    ❒ Congenital anomalies
    ❒ Polyhydramnios
    ❒ Oligohydramnios
    ❒ Hydrops fetalis

5.d. DATA COLLECTION TOOL

Following audit tool to be used on a random sample of deliveries categorized as high risk. Case records of high risk deliveries to be audited once in 1-2 weeks to determine if a pre-delivery checklist was used.

High Risk Delivery No.	Patient ID No.	Checklist Used? Yes or No	Percentage of checklist components ticked as present	Please write checklist components not ticked since equipment not present/ not functional/ medical information not obtained.
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				

NOTE: (i) SOME CHANGE IDEAS TO TEST

- Modify the sample pre-delivery neonatal resuscitation checklist provided in this kit after a discussion among your NICU resuscitation team members.
- Educate NICU and Obstetric staff about the need for a checklist and the method of documenting its use
- Provide multiple copies of the checklist in all locations that deliveries occur. Ensure a laminated copy is attached to every newborn care corner and is part of the equipment checklist for the person in charge of preparing the newborn care corner after it is cleaned.
- If individual checklists for each resuscitation are not preferred by the resuscitation team, provide a static checklist that is posted in the delivery room or rooms that the staff can refer to. This will require a modification of the data collection method (the pre-delivery checklist should be soon as a tool, not just a data collection form.)
- The pre-delivery checklist can also be provided as a laminated card to be carried by the resuscitation team members on their person.
- Audit the availability of equipment listed in the checklist at the place of newborn resuscitation.

(ii) POTENTIAL BARRIERS TO CHANGE

- NICU staff with a lot of experience may be used to relying on their memory and feel confident that they can prepare for a delivery without help (Human Factors).
- Having to use a checklist may be perceived as being burdensome to the staff, and as creating more work (Have staff develop where and how it is to be used and kept)
- Staff may not use the checklist as intended – they may run through the checklist casually, or skip over items.

PBP 6. All newborns with perinatal depression at 30 seconds of life, will be given assissted positive pressure ventilation with bag and mask *.

*** Unless there is a contraindication to its use.**

6.a. AIM

Ensure all newborns with perinatal depression at 30 seconds of life are given assissted positive pressure ventilation with bag and mask *

*Unless there is a contraindication to its use.

Neonate with respiratory depression at the time of birth is kept under the radiant heat warmer, with his head in the "sniffing" position to open the airway, the airway is cleared (if necessary), and the neonate is dried. Breathing is stimulated by gently rubbing the infant's back and the wet cloth beneath the infant is changed[30]. Thirty seconds after birth (after provision of initial warmth, ensuring an open airway and drying/ stimulation), the neonate's respiratory efforts and heart rate are assessed. If the neonate has apnea or gasping respiration[31], or if the heart rate is less than 100 bpm, its recommended that positive pressure ventilation (PPV) via bag and mask be initiated with room air (21 percent oxygen) or oxygen [25, 29], [32], [33].
The ultimate goal is that all neonates receive bag and mask ventilation from a person who has received a certified training in newborn resuscitation*. In the interim while this capacity is being built, the resuscitation in some centers may be delivered by personnel who have received in house training in newborn resuscitation.

After ensuring compliance to the above listed PBP, there is a plan to initiate QI activities to improve compliance to the other steps of NRP as well.

* NRP (Newborn Resuscitation Program) of the Indian Academy of Pediatrics & the National Neonatology Forum of India or the NSSK (Navjaat Shishu Suraksha Karyakram) conducted by the Ministry of Health and Family Welfare, Government of India.

6.b. PROCESS MEASURE

The proportion of inborn newborns admitted in the newborn nursery with provisional diagnosis of birth asphyxia and resuscitated by the administration of bag and mask at 30 seconds of life.

Denominator: The number of inborn newborns admitted in the newborn nursery with provisional diagnosis of birth asphyxia and having no contraindication to bag and mask ventilation.

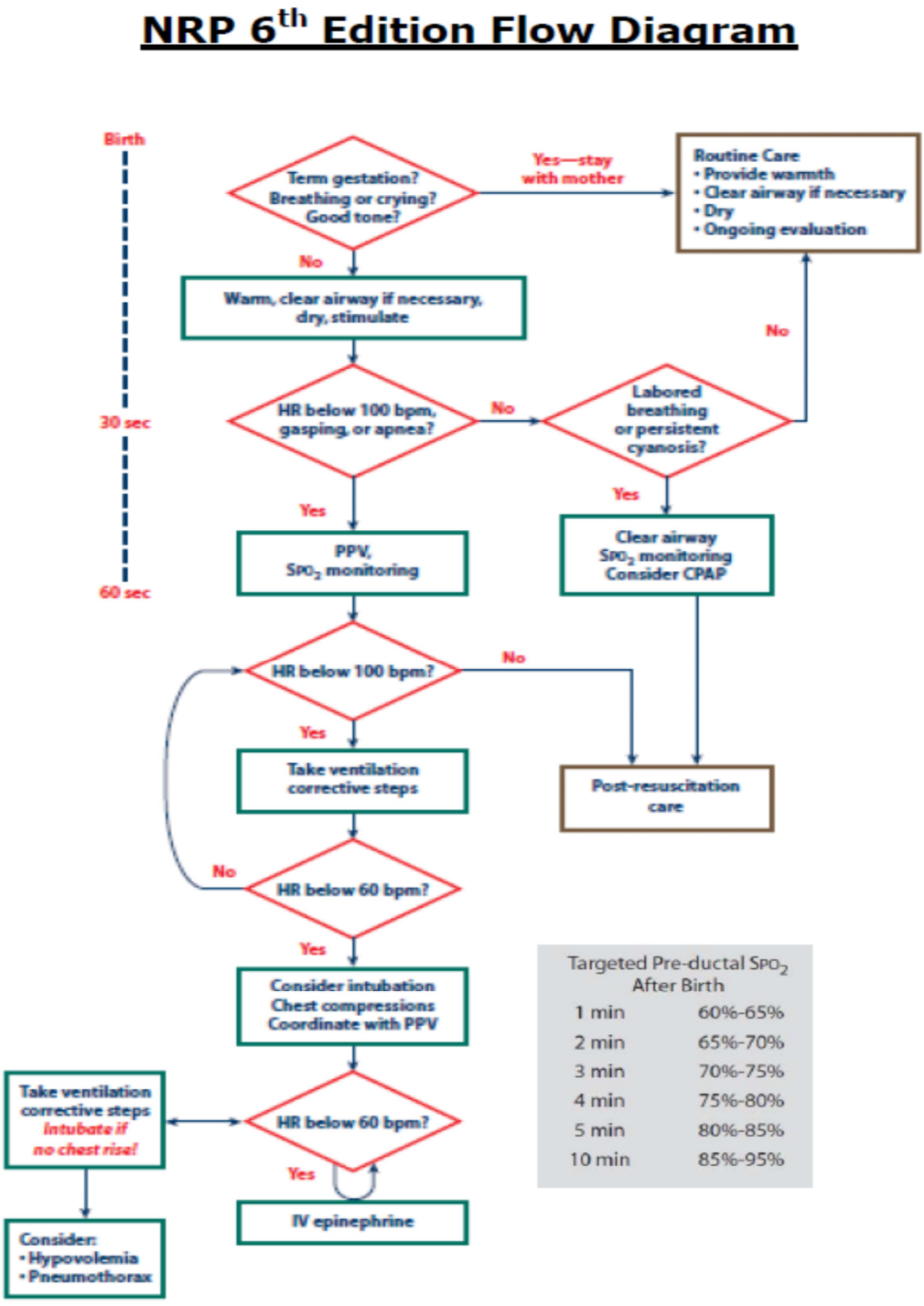
Numerator: The number of newborns in the denominator resuscitated by the administration of bag and mask at 30 seconds of life (after receiving initial warmth, ensuring open airway and drying/ stimulation).

Operational Definition:

Contraindication to bag & mask: Diaphragmatic Hernia, Non -vigorous baby born through meconium stained liquor. If any other, please specify ----------

(If tracheal intubation is unsuccessful or if there is severe bradycardia, to proceed to PPV irrespective of meconium stained liquor).

6.c. NRP 2011: RAISING THE BAR FOR PROVIDERS AND INSTRUCTORS[34]



6.d. DATA COLLECTION TOOL

Following audit tool to be used on sample/ all case records of newborns admitted in the NICU with provisional diagnosis of birth asphyxia. Case records to be audited once in 1-2 weeks.

Sr, No	*IP No.*	*Gender of Baby*	*Date and time of Birth*	*Birth Weight*	*Period of Gestation*	*Inborn*	*Neonate admitted with provisional diagnosis of birth asphyxia*	*Did baby have any contraindication for bag and mask ventilation*	*Did baby receive bag and mask ventilation at 30 seconds of life*
		M / F	*DD/MM/YY HH:MM*	*in grams*	*in weeks*	*Yes/ No*	*Yes/ No*	*Yes/ No*	*Yes/ No*
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

Additional PBP's to Consider Implementing

1. **If Oxytocin is started for delayed first stage or delayed second stage, at least 1 CTG (Cardiotocography) to be done before starting Oxytocin & CTG to be repeated at least once in 2-3 hours. (Intermittent auscultation to be done every 15-30 minutes in the first stage of labor, and every 5 minutes in the second stage of labor.)**

2. **Use a standardized algorithm to manage the interpretation of fetal heart rate patterns noted on CTG (Cardiotocography).**

3. **Ensure all healthcare providers score of 80 % or more on the knowledge assessment tool for newborn resuscitation.**

4. **Ensure all healthcare providers score of 80 % or more on the skill assessment tool for newborn resuscitation.**

5. **Ensure obstetric and pediatric team score high on a teamwork assessment scale during deliveries.**

SECTION 2

Reliable Intrapartum and Newborn care to Prevent Newborn Sepsis

OUTCOME MEASURES: reliable intra-partum and newborn care to prevent newborn sepsis

1. **Incidence of Sepsis in neonates. This is a composite measure containing patients with (a) Clinical Bloodstream Infection (C-BSI) or (b) Microbiologically Confirmed Bloodstream Infection (M-BSI).**

2. **No. of deaths attributable to Sepsis in neonates. This is a composite measure of deaths attributable to (a) Clinical Bloodstream Infection (C-BSI) or (b) Microbiologically Confirmed Bloodstream Infection (M-BSI).**

3. **Incidence of Central Line Associated Bloodstream Infection (CLABSI)**

1. a) Incidence of Clinical Bloodstream Infection (C-BSI):

$$\frac{\text{No of admitted newborns diagnosed with a Clinical Bloodstream Infection (C-BSI) during the month}}{\text{Total No of Patient Days in the month}} \times 1000$$

b) Incidence of Microbiologically confirmed Bloodstream Infection (M-BSI):

$$\frac{\text{No of admitted newborns diagnosed with a Microbiologically confirmed Bloodstream Infection (M-BSI) during the month}}{\text{Total No of Patient Days in the month}} \times 1000$$

2. a) No. of newborn deaths attributable to Clinical Bloodstream Infection (C-BSI):

$$\frac{\text{No of newborn deaths attributable to Clinical Bloodstream Infection (C-BSI) during the month}}{\text{Total No of Newborn deaths in the month}} \times 100$$

b) No. of newborn deaths attributable to Microbiologically confirmed Bloodstream Infection (M-BSI):

$$\frac{\text{No of newborns deaths attributable to Microbiologically Confirmed Bloodstream Infection (M-BSI) during the month}}{\text{Total No of newborn deaths in the month}} \times 100$$

Note: Any death in a baby diagnosed with clinical or microbiologically confirmed sepsis is to be considered as death attributable to sepsis unless proven otherwise.

3. Incidence of Central Line Associated Bloodstream Infection (CLABSI)[35]

$$\frac{\text{No of admitted newborns diagnosed with a M-BSI* during the month and having a central line in place at the time of, or within 48 hours before, onset of the event.}}{\text{Total No of Central Line Days in the month}} \times 1000$$

* Not secondary to a nosocomial infection at another body site or a community-associated infection.

OPERATIONAL DEFINITION: Modified German NEO-KISS definitions[36] have been used for defining clinical and blood stream infection. NEO-KISS is the Nosocomial infection surveillance system used for infants admitted in a NICU.

CLINICAL BLOODSTREAM INFECTION (C-BSI): Presence of A + B + C.

A. **Primary Blood Stream Infection : Presence of any 2 or more of the following symptoms suggestive of sepsis**

1. Temperature instability {Fever (>38 °C) or temperature instability (frequent incubator adjustment) or hypothermia (<36.5 °C)}
2. Tachy or bradycardia {tachycardia (> 200/min) or new/more frequent bradycardia (<80/min)}
3. New or more frequent apnea (>20 seconds)
4. Prolonged recapillarization time (>2 seconds)
5. Unexplained metabolic acidosis {BE < -10 mEq/l}
6. New onset hyperglycemia (>140mg/dl)
7. Any other symptom suggestive of sepsis*, please specify …….

*Note: Examples of other symptoms suggestive of bloodstream infection are skin color (only when recapillarization time is not used), increased oxygen requirement, apathy etc.

B. **Physician already instituted treatment for sepsis for at least 5 days based on clinical condition**

OR

Positivity of 2 out of 5 parameters in the sepsis screen as enumerated below:

1. CRP >10 mg/L or > 1 mg/dl
2. I/T ratio >0.2
3. ANC < 1800
4. TLC < 5000 per mm
5. Micro ESR > 10mm in the first hour

C. **Blood and CSF culture Not Done or Negative**

MICROBIOLOGICALLY CONFIRMED BSI (M-BSI): Presence of A + B + C.

(M-BSI):

A. **Primary Blood Stream Infection : Presence of any 2 of the following symptoms suggestive of sepsis:**

1. Temperature instability {Fever (>38 °C) or temperature instability (frequent incubator adjustment) or hypothermia (<36.5 °C)}
2. Tachy or bradycardia {tachycardia (> 200/min) or new/more frequent bradycardia (<80/min)}
3. New or more frequent apnea (>20 seconds)
4. Prolonged recapillarization time (>2 seconds)
5. Unexplained metabolic acidosis {BE < -10 mEq/l}
6. New onset hyperglycemia (>140mg/dl)
7. Any other symptom suggestive of sepsis*, please specify …….

*Note: Examples of other symptoms suggestive of bloodstream infection are skin color (only when recapillarization time is not used), increased oxygen requirement, apathy etc.

B. **Physician instituted treatment for sepsis for at least 5 days.**

C. **Blood or CSF culture Positive**

DATA COLLECTION TOOL: (DENOMINATOR DATA):

The denominator data is collected at the same time every day and provides information on the total number of babies admitted in the NICU, the number of babies in each weight category, the number of babies receiving invasive ventilator support and the number of babies having central catheter/s in situ.

Date	Birth Weight (grams)	No. of babies admitted in the neonatal unit (daily census)	No. of babies with Central Catheters in situ (Venous and/or Arterial)	No. of babies on Invasive Ventilator Support
	<750 g			
	750-999 g			
	1000-1499			
	1500-2499 g			
	≥2500			
	Total			
	<750 g			
	750-999 g			
	1000-1499 g			
	1500-2499 g			
	≥2500			
	Total			
	<750 g			
	750-999 g			
	1000-1499 g			
	1500-2499 g			
	≥2500			
	Total			
	<750 g			
	750-999 g			
	1000-1499 g			
	1500-2499 g			
	≥2500			
	Total			

Note: If the neonate has more than 1 central catheter in situ, its still counted as 1.

DATA COLLECTION TOOL: INFECTION EPISODE DESCRIPTRION [35] (NUMERATOR DATA)

Name: IP No: Gender:
Birth Weight: Gestation: Inborn/ Outborn:
Date & Time of Birth:
Date & Time of Admission:
Date & Time of Sepsis suspected (onset of symptoms suggestive of sepsis)

1) Primary Blood Stream Infection: Clinical Symptoms (Tick all that apply)

a) Temperature instability {Fever (>38 °C) or temperature instability (frequent incubator adjustment) or hypothermia (<36.5 °C)}	**b) Tachy or bradycardia** {tachycardia (> 200/min) or new/more frequent bradycardia (<80/min)}	**c) New or more frequent apnea (>20 seconds)**	**d) Prolonged recapillarization time (>2 seconds)**
e) **New onset hyperglycemia**(>140mg/dl)	**f) Unexplained Metabolic Acidosis** {BE < -10 mEq/l}	**g) Any other sign of sepsis**, please specify ……	

2) Positive Sepsis screen (Tick all that apply)

a) CRP >10 mg/L/ or > 1/dl	b) I/T ratio >0.2	c) ANC < 1800
d) TLC < 5000 per cmm	e) Micro ESR > 10mm in the first hour	

3) Physician already instituted treatment for sepsis for at least 5 days based on either clinical course OR positivity of 2 out of 5 parameters in the sepsis screen as enumerated below:

Yes No

4) Risk factors present/ removed < or = 48 hours of onset of Primary Blood stream Infection symptoms (Tick below as many as applicable)

Invasive Ventilator Support	Yes/ No	**Central Catheters in situ (Venous and Arterial) [35]**	Yes/ No

5) Cultures (Blood, CSF)

	Date when sample taken	**Report***
Blood		
CSF		

*Mention complete name and species, including for fungi. If it is a preliminary report, final report should be collected.

6) Culture sensitivity (In case of multiple organisms, write the name & sensitivity of different organisms with different color inks)

Drug	**Sensitive**	**Resistant**	**Intermediate**	**Not Tested**
Cefotaxime				
Ceftazidime				
Cefetriaxone				
Ceftizoxime				
Cefoperazone				
Cefepime				
Cefotaximesulbactum				
Ceftriaxone sulbactum				
Cefoperazonesulbactum				
Gentamycin				
Amikacin				
Netilmycin				
Ciprofloxacin				
Imipenam				
Meropenem				
Vancomycin				
Methicillin				
Erythromycin				
Piperacillin				
Piperacillintazobactum				
Ticarcillinclavulanic acid				
Aztreonam				
Amoxycillin				
Chloramphenicol				
Fluconazole				

Amphotericin B				
Other (Please Specify)				

7) Outcome: Died/Recovered/LAMA

If Died, was death attributable to Sepsis. Yes No

If not, please specify cause of death. **----------**

Date of Discharge/Death **Signature**

8) Final Diagnostic Label (To be completed by Senior Resident responsible for sepsis data). Is it sepsis? Yes/No. If Yes, diagnostic labels:

Clinical Blood stream Infection (Clinical Sepsis)	
Microbiologically Confirmed Blood stream Infection (Microbiologically Confirmed Sepsis)	

POTENTIALLY BETTER PRACTICES (PBP's): reliable intra-partum and newborn care to prevent newborn sepsis.

The key concept is to understand and manage variation in clinical practice by developing standardised processes and protocols. The initial PBP's included for creating reliable intra partum care and newborn care to prevent newborn sepsis resuscitation are the following:

PBP 1.	**All women in labor with risk factors for sepsis are given antibiotics**.
PBP 2.	**Ensure compliance to hand hygiene & use of sterile gloves during every Per Vaginal examinations performed in the labor room.**
PBP 3.	**Ensure 6 WHO Cleans are followed during every delivery in the labor room.**
PBP 4.	**Ensure compliance with optimal hand hygiene practices among all staff in the NICU/ newborn nursery**.
PBP 5.	**Ensure compliance to aseptic non touch technique during Peripheral Intravenous line insertion.**

Monthly reporting of collected data and the knowledge gathered will inform how the PBPs can be implemented reliably and also the development of additional PBPs. After every 6 months, the list of potentially better practice (PBPs) will be reviewed for inclusion of new or exclusion of existing PBPs

PBP 1: All women in labor with risk factors for sepsis are given antibiotics.

1.a. AIM

Ensure all women in labor are given antibiotics if risk factors for sepsis are present. 'Maternal and infant clinical characteristics, as well as infant laboratory values, have been used to identify newborns at risk, and to administer empiric antibiotic therapy to prevent progression to more severe illness'[37]. The modified WHO Safe Birth Checklist implemented under the National Health Mission of Government of India provides clear indications for antibiotic administration during labor[38]. NICE guidelines provide further evidence on the value of intra-partum antibiotics in preventing early onset neonatal sepsis[39].

Administration of antibiotics in newborns born to mothers with risk factors of sepsis is another potentially best practice and there is a plan to initiate QI activity in improving compliance to this practice also as the Safe Care Saving Life project progresses.

1.b. PROCESS MEASURE

Proportion of women in labor with risk factors for sepsis who were given antibiotics*.

Denominator: Number of women in labor with risk factors for sepsis

Numerator: Number of of women in labor with risk factors for sepsis and were given antibiotics*.

* choice of antibiotic as per the unit protocol based on local antibiogram.

1.c. RISK FACTORS FOR SEPSIS:

Presence of atleast 1 of the following risk factors for sepsis in women in labor is an indication for administration of antibiotics * [37, 38].

* choice of antibiotic as per the unit protocol based on local antibiogram.

- Mother's temperature >38°C (>100.5°F)
- History of Foul-smelling vaginal discharge
- Rupture of membranes >12 hours without labor or >18 hours with labor
- Labor >24 hours or obstructed labor
- Preterm rupture of membranes (<37weeks gestation).
- Chorioamnionitis

Note: Women given antibiotics just before, during or just after their cesarean section operation, are much less likely to have infection of their womb (uterus) and wound[40].

Antibiotics may be given for other sepsis risk factors not listed above, as considered appropriate by the clinician. However, please document the rationale for antibiotic administration in the patient's case record.

1.d. DATA COLLECTION TOOL:

Following audit tool to be used on a random sample of case records of atleast 10 women identified during the audit/ case review to have risk factors for sepsis during labor. Then determine if these women received antibiotics. Audit to be performed once in 1-2 weeks.

Sr. No. of patient with risk factors for sepsis	Patient ID No.	Please specify risk factor/s for sepsis present	Did patient receive antibiotics? Yes or No	If patient received antibiotic, write name of antibiotic/s (Write NA if antibiotic not given)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

PBP 2. Compliance to hand hygiene & use of clean/ sterile gloves during per vaginal examinations performed in the labor room.

2.a. AIM

Ensure hand hygiene & use of clean/ sterile gloves during every per vaginal examination performed in the labor room since hospital born babies in developing countries are at increased risk of neonatal infections because of poor intrapartum and postnatal infection control practices.[41] Its recommended that vaginal examination be carried out under strict aseptic conditions to prevent intrapartum infection. Hands need to be washed with soap and water before and after each examination and clean/ sterile gloves are recommended to be worn while performing vaginal examination[42]. NICE guidance also recommends 'routine hygiene measures taken by staff caring for women in labour, including standard hand hygiene and single-use non-sterile gloves, are appropriate to reduce cross-contamination between women, babies and healthcare professionals'[43].

2.b. PROCESS MEASURE

Proportion of per vaginal (P/V) examination audited in which there was compliance to hand hygiene and use of clean/ sterile gloves.

Denominator: Number of per vaginal examination audited**.**

Numerator: Number of per vaginal examination audited in which there was compliance to hand hygiene and use of clean/ sterile gloves.

2.c. STEPS FOR DOING A P/V EXAMINATION [42]

_ Do not shave the perineal area.
_ Explain to the woman what is being done and always ask for her consent before doing a vaginal examination.
_ Ask the woman to pass urine.
_ Wash your hands with soap and water before and aft er each examination. Carry out the vaginal examination under strict aseptic conditions.
_ Place the woman in the supine position with her legs fl exed and apart.
_ Perform the vaginal examination very gently, wearing clean/sterile gloves.
_ Clean the vulva and perineal area with a mild antiseptic solution. Wipe the vulva fi rst, then labia majora and lastly labia minora with cotton swabs from the anterior to the posterior direction. Use a swab only once. Use separate swabs for each side.
_ Separate the labia with the thumb and forefi nger of the left hand and clean the area once again.
_ Use two fingers of the right hand (index and middle fingers) and insert them gently into the vaginal orifice without hurting the woman.

Note:

Hygiene measures [43]

- Tap water may be used if cleansing is required before vaginal examination.
- Selection of protective equipment must be based on an assessment of the risk of transmission of microorganisms to the woman, and the risk of contamination of the healthcare worker's clothing and skin by women's blood, body fluids, secretions or excretions
- Alcohol based handrub/ soap and water, gloves and gel should be made readily available for use wherever the likelihood of a vaginal examination can arise.

2.d. DATA COLLECTION TOOL:

Following tool to be used to audit per vaginal examinations carried out in the labor room. Audit tool to be used once in 1-2 weeks to determine if hand hygiene & clean/ sterile gloves are being used during every per vaginal examination.

Sr. No.	Type of Healthcare worker	Hand Hygiene Before Yes/ No	Gloves Used Yes/ No	Hand Hygiene After Yes/ No	Overall Adherance Yes/ No
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
% Overall Adherance = %					

PBP 3. Ensure 6 WHO Cleans are followed during every delivery in the labor room.

3.a. AIM

Ensure all the 6 WHO Cleans are followed during every delivery in the labor room. The use of clean delivery kits and the Six Cleans have been associated with a reduction in both maternal and newborn infection[44], [45], [46]. A study in Tanzania, concluded that the use of a Clean Delivery Kit, when coupled with an educational intervention about the 'six cleans', was strongly associated with lower incidences of umbilical cord infection and puerperal sepsis[47].

3.b. PROCESS MEASURE

Proportion of deliveries audited in which there was compliance to all the six cleans.

Denominator: Number of deliveries audited**.**

Numerator: Number of deliveries audited in which there was compliance to all the six cleans.

3.c. WHO SIX CLEANS [46, 48]

The World Health Organization promotes the practice of 'six cleans' during delivery:

(1) **clean hands** of the birth attendant: handwashing and gloves are essential for vaginal exams or when handling the baby.

(2) **clean delivery surface**: the delivery surface should be cleaned and then wiped with a 0.05% solution of chlorine after each use. A clean cloth/ linen and/ or clean plastic sheet to be used to drape the delivery surface.

(3) **clean perineum of the mother**: feces should be wiped away and the perineum washed prior to the birth (mother can shower or bathe).

(4) **clean cord cutting instrument**: a sterile blade or scissor to be used.

(5) **clean cord tying instrument**: the cord to be tied with a sterile cord clamp/ tie.

(6) **clean cord care**: nothing should be put on the cord, and it should be kept clean and dry at all times.

Note: nothing unclean introduced into the vagina.

2.d. DATA COLLECTION TOOL:

Following tool to be used to audit compliance to the WHO 6 cleans during labor. The Audit

Sr. No.	Type of Healthcare worker	clean hands Yes/ No	clean delivery surface Yes/ No	clean perineum Yes/ No	clean cord cutting instrument Yes/ No	clean cord tying instrument Yes/ No	clean cord care Yes/ No	Overall Adherance Yes/ No
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
% Overall Adherance = %								

tool to be used once in 1-2 weeks.

PBP 4: Ensure compliance with optimal hand hygiene practices among all staff in the NICU/ newborn nursery.

(Note: staff refers to all providers including front desk, house keeping and all healthcare providers).

4.a. AIM

To improve compliance to optimal hand hygiene practices among all staff providing care to a neonate in the NICU/ newborn nursery.

Transmission of health-care-associated pathogens occur most frequently via the contaminated hands of health care workers. Hence, hand hygiene (i.e., handwashing with soap and water or use of a waterless, alcohol-based hand rub) has been considered for a long time to be one of the most important infection control measures for prevention of health-care-associated infections [49], [50], [51], [52], [53].

'Hand hygiene is considered to be the primary measure necessary for reducing Healthcare Associated Infections. Although the action of hand hygiene is simple, the lack of compliance among health-care workers continues to be a problem throughout the world and a multimodal strategy has been advised by WHO to improve compliance to hand hygiene [54].

4.b. PROCESS MEASURE

Percentage of healthcare providers compliant to recommendations on hand hygiene including glove use when it is indicated.

Denominator:
No of opportunities for hand hygiene noted during an audit in the newborn care unit.

Numerator:
No. of times the healthcare provider appropriately performed hand hygiene including glove use as per the recommendations.

4.c. OPTIMAL PRACTICE

(i) WHEN TO PERFORM HAND HYGIENE[54] ?

Reference: WHO My 5 Moments of Hand Hygiene:

(ii) HOW TO PERFORM HAND WASH OR HAND HYGIENE WITH HAND RUB?

Steps of how to use alcohol based hand rub are given below: (Duration of the entire procedure is 20-30 seconds).

Step 1- Apply a palm full of the product in a cupped hand, covering all surfaces;
Step 2- Rub hands palm to palm;
Step 3-Right palm over left dorsum with interlaced fingers and vice versa;
Step 4-Palm to palm with fingers interlaced;

Step 5-Backs of fingers to opposing palms with fingers interlocked;
Step 6-Rotational rubbing of left thumb clasped in right palm and vice versa;
Step 7-Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;
Once dry, your hands are safe.

Steps of how to wash hands when visibly soiled! Otherwise, use hand rub. Duration of the entire procedure: 40-60 seconds.

Step 0- Wet hands with water;
Step 1-Apply enough soap to cover all hand surfaces;
Step 2-Rub hands palm to palm;
Step 3-Right palm over left dorsum with interlaced fingers and vice versa;
Step 4-Palm to palm with fingers interlaced;
Step 5-Backs of fingers to opposing palms with fingers interlocked;
Step 6-Rotational rubbing of left thumb clasped in right palm and vice versa;
Step 7-Rotational rubbing, backwards and forwards with clasped fingers of right hand in left palm and vice versa;
Step 8-Rinse hands with water;
Step 9- Dry hands thoroughly with a single use towel;
Step 10-Use towel to turn off faucet; your hands are now safe.

4.d. DATA COLLECTION TOOL:

Following audit tool to be used once in 1-2 weeks to determine compliance to optimal hand hygiene practices among all staff providing care to a neonate in the NICU/ newborn nursery.

Sr. No.	Type of Healthcare worker	Type Of Contact	Hand Hygiene Before	Gloves Required	Gloves Used	Hand Hygiene After	Hand Hygiene Adherance	Glove Use Adherance	Overall Adherance
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
Total	Total Overall Adherance Y = , N=								

Instructions to fill the form:

Type of Healthcare Worker: **D** = Doctor, **N** = Nurse, **XR** = Radiology technician; **ES** = Environmental services; **TR** = Transporter; **OT** = Other.
Type of Contact: **P**=Patient Contact, **E**= Environmental Contact.
Hand hygiene before/after: **Alc** = Alcohol-based hand rub; **HW** = Handwashing with soap and water; **N** = None
Gloves Required: **Y** if isolation requiring gloves or contact involves an invasive procedure or contact with blood, body fluids, secretions/excretions, mucous membranes, or non-intact skin; **N** if not
Adherence: **Hand hygiene** - **Y** if patient contact and hand hygiene before and after are both Y or if environmental contact only and hand hygiene after is Y; **N** = if not
Glove use -- **Y** if Gloves Required and Used are both Y; **N** if Gloves Required is Y and Used is N; **NA** if Gloves Required is N
Overall adherence --Y if Hand hygiene is Y and glove use is Y or NA; **N** if not

Type of Contact/ Opportunities of Hand Hygiene.

Type of contact	Hand hygiene before	Hand hygiene After	Use of gloves
Patient contact that involves an invasive procedure (i.e.,	Yes	Yes	Yes
Insertion of an intravascular catheter, urinary catheter, or other invasive device)	Yes	Yes	Yes
Patient contact that involves direct contact or potential contact with blood, body fluids, secretions (except sweat), excretions, mucous membranes, and non intact skin (i.e., wounds, ulcers)	Yes	Yes	Yes
Patient contact not involving those noted above (i.e., taking vital signs, examination, repositioning, etc.)	Yes	Yes	*
Contact with the patient Environment	--	Yes	*

NOTE: SOME CHANGE IDEAS TO TEST[55]

The **World Health Organization** (WHO) **Multimodal Hand Hygiene Improvement Strategy**[56] to be utilized for improving hand hygiene compliance in the hospital. It includes the following:

a) **System change**: Ensuring that the necessary infrastructure is in place to allow health-care workers to practice hand hygiene. This includes two essential elements:

- Access to a safe, continuous water supply as well as to soap and towels;
- Readily accessible alcohol-based hand rubs at the point of care.

  - Provide alcohol gel at convenient locations that are easy to access with the dispensers easily visible, easy to use, and operational, with delivery of the correct amount of agent. [57], [58], [59]

  - Have staff walk through usual work procedures to determine where to place the dispensers and ensure that they are conveniently located and ergonomic.

  - Select alcohol gel brand based on staff's preferences for skin protection, fragrance and user experience.

  - Offer staff personal alcohol gel dispensers if they wish to use them.

- Provide gloves of all three sizes at convenient locations that are easy to access and use, with easily visible dispensers.

- Ensure timely replenishment of gel dispensers and gloves

b) Training / Education: Providing regular training on the importance of hand hygiene, based on the "My 5 Moments for Hand Hygiene" approach[60], and the correct procedures for hand rubbing and hand washing, to all health-care workers. Some training resources are as follows:

- Use hand hygiene video from CDC (www.cdc.gov) for staff education[61]
- Use material from WHO hand hygiene kit, including posters for 'My five moments for hand hygiene.'
- Use material from the Institute for Healthcare Improvement (www.ihi.org) for staff education.[62]

Emphasize staff accountability for compliance with hand hygiene[63]

c) **Evaluation and feedback**: monitoring hand hygiene practices and infrastructure, along with related perceptions and knowledge among health-care workers, while providing performance and results feedback to staff. Check staff competency in performance of hand hygiene[64].

d) **Reminders in the workplace**: Posters prompting and reminding health-care workers about the importance of hand hygiene and about the appropriate indications and procedures for performing it. Can post cartoons depicting proper hand-washing technique on the wall above each sink[65].

e) **Institutional safety climate**: creating an environment and the perceptions that facilitate awareness-raising about patient safety issues while guaranteeing consideration of hand hygiene improvement as a high priority at all levels, including
   - Active participation at both the institutional and individual levels;
   - Awareness of individual and institutional capacity to change and improve (self-efficacy); and
   - Partnership with patients and patient organizations.

   Senior staff to demonstrate ideal behavior to serve as role models [66], [67] and opinion leaders.
   Celebrate when high hand hygiene rates are achieved in your NICU

POTENTIAL BARRIERS TO CHANGE

- Lack of support from wider organization to change staff mental model.
- Lack of role modeling by senior leaders and other opinion leaders in the unit.
- Excessive exposure of staff to infection prevention messages can cause desensitzation to the message and reduce impact.
- Staff may take offense and become resistant to change if it is implied or stated that they caused the infection and are being blamed.
- Lack of good systems to procure and replenish hand hygiene resources (resulting in NICU professionals encountering empty dispensers when they try to perform hand hygiene)

PBP 5. Ensure Compliance to Aseptic Non Touch Technique during Peripheral Intravenous Canula Insertion.

5.a. AIM

Ensure in all (100%) episodes of insertion of peripheral vascular catheters, compliance to aseptic non touch technique. 'Peripheral venous catheters are the devices most frequently used for vascular access. Although the incidence of local or bloodstream infections (BSIs) associated with peripheral venous catheters is usually low, serious infectious complications produce considerable annual morbidity because of the frequency with which such catheters are used.'[68]

Peripheral venous catheters in pediatric patients might be complicated by phlebitis, and catheter infection.[69] Good hand hygiene before catheter insertion or maintenance, combined with proper aseptic technique during catheter manipulation, provides protection against infection[70]. Good hand hygiene can be achieved by using an alcohol-based product[71]or an antibacterial soap and water with adequate rinsing[72]. Appropriate aseptic technique does not necessarily require sterile gloves; a new pair of disposable nonsterile gloves can be used in conjunction with a "no-touch" technique for the insertion of peripheral venous catheters. However, gloves are required by as standard precautions for the prevention of bloodborne pathogen exposure. [68]

Note: The majority of serious catheter-related infections are associated with central venous catheters (CVCs), especially those that are placed in patients in ICUs. Moreover, some catheters can be inserted in urgent situations, during which optimal attention to aseptic technique might not be feasible. There is a plan to initiate QI activity towards improving aseptic insertion and handling of central lines as the project progresses.

5.b. PROCESS MEASURE

Proportion of peripheral IV line (PIV) insertions where there was adherance to all steps of ANTT (Aseptic Non Touch Technique Tool).

Denominator: Number of PIV insertions audited.

Numerator: Number of PIV insertion audited in which there was adherance to all the steps of ANTT

5.c. PROCESS OF PIV INSERTION[73], [74], [75]

a. Two persons should do peripheral intravenous cannulation (person doing the actual procedure is N1 and the helper is N2). N1 calls N2 for help.

b. Both of them together gather the necessary things for cannulation and keep them ready. Creation of PIV kits on crash carts with all the required supplies available in one place will prevent healthcare providers from searching for supplies. In addition sterile trays

with sterile cotton balls can be introduced to ease PIV insertion. The tray will provide a sterile surface to place the canula in case a second attempt is required with same canula after a counter puncture.

i. The trolley
ii. Chlorhexidine
iii. Appropriate size cannulae
iv. Cannulation tray
v. Normal Saline flush
vi. 2cc syringe and needle
vii. Extension line
viii. Two broad plasters cut in between (not through and through)
ix. One thin plaster
x. Tegaderm or micropore plaster
xi. Splint
xii. Gloves
xiii. Required blood collection bottles if blood s to be collected

c. The trolley is first cleaned thoroughly with chlorhexidine and left for 30 sec. The things that are gathered are arranged on the table / trolley.

d. N1 performs hand wash according to the 6 steps and N2 performs hand hygiene.

e. N1 selects at least 2 or 3 veins on the baby that are suitable for cannulation.

f. Then Clean/ sterile gloves are worn by N1.

g. N2 opens the top layer of the cannulation tray cover (green cloth) and the rest of it is opened by N1. Carefully, the cover of the cannulation tray is used to spread on the cleaned trolley.

h. N2 then carefully opens the necessary things without touching the inner aspects of the cannula, syringe, needle, extension sets etc and drops them carefully on the green sheet that is covered on the trolley.

i. N1 takes the syringe and needle and N2 opens the Normal saline and holds it upside down and N1 puts the sterile needle attached to the syringe in it and takes the saline needed for flush and keeps it on the green towel. N1 will then flush the extension line with the syringe and then takes more saline if needed and keeps it ready

Note: If sterile gloves are used, the inner covers of the gloves can be used as sterile sheets which are carefully placed under the area selected e.g.; the hands or the feet.

j. A couple of gauze pieces / cotton balls are soaked with few drops of chlorhexidine and kept ready for use (N2 puts the chlorhexidine from the top without touching the gauze pieces).

k. Cleaning should be done in a circumscribed manner starting with the area to be cannulated first and then proceeded to the periphery till the proximal joint.

l. If required, N2 helps N1 in stabilising the cannulating part without touching the cleaned part.

m. N1 cannulates the selected vein and holds it securely in place with one hand.

n. N1 then does the blood collection (blood culture first and then the rest of the bloods)……she/he then hands over the samples to N2 to be capped off.

Note: If Blood culture is being collected it's with a new sterile 2cc syringe and needle.

o. After the blood collection, to secure the cannula N1 puts a small horizontal tape across the hub at the site of entrance into the skin.

p. N1 clears off the blood in the hub with the help of a small wisp of cotton or a gauze so that there is no blood visible in the hub.

q. N1 then takes the extension which had been already flushed and attaches it to the hub of the cannula.

r. N1 flushes the cannula along with the extension set.

s. Disposal of wastes in the appropriate bins: Disposable of the sharps and other things to be done both by N1 and N2.

t. Hand wash of N1 after the procedure and hand hygiene for N2 is a must.

5.d. DATA COLLECTION TOOL:

Following tool to be used while auditing compliance to all the steps of Aseptic Non Touch Technique (ANTT) during PIV insertion. The audit is performed once every two weeks using the ANTT checklist tools.

	STEPS OF ANTT	1	2	3	4	5	6	7	8	9	10
1	Two persons doing the procedure										
2	Hand hygiene before the procedure for the person performing procedure										
3	Hand hygiene for the assistant										
4	Cleaning the trolley/Surface where equipment kept										
5	Assistant opening the equipment appropriately										
6	Appropriate glove use for the person during the procedure										
7	Preparation of a sterile field for the procedure: Cleaning of the site of procedure with 70% Alcohol or Chlorhexidine gluconate with 70% alcohol (wait for 30 seconds)										
8	Sterile field maintained during procedure (protection of the key parts all the time)										
9	Hand Hygiene after the procedure										
	Complete Compliance to all 9 steps										

Day of Week: ----------Date: ----/----/------

Time: ------:------AM/PM to------:----------AM/PM Initials----------

Instructions:
Y=Yes, **N=**No

Complete Compliance = Y, if compliance to all steps; It is N, if non compliance to any 1 or more steps.

NOTE: SOME CHANGE IDEAS TO TEST

i. Unit policy for indications for insertion of PIV

- Any baby who is admitted to the NICU and is in need of IV fluids
- Any baby in need of IV antibiotics
- Sick baby may have one or more PIVs.

ii. Personnel who can do PIV

- Nurse or a doctor trained in doing PIVs
- If a bedside nurse is doing it for the first time, she / he has to be supervised by the shift incharge / nurse incharge / doctor for atleast 3 times before she can do it independently.
- Any lines in the axillae and peripheral lines on the scalp should be done by the senior registrar or experienced doctor only.

iii. Train all staff who insert catheters and check competency. [63] **(Training by simulation if possible). Includes training on selection of sites for PIV insertion which is advised in the following order**

- Peripheral lines on the dorsum of hands
- Dorsum of feet
- Flexor aspect of the arms
- Large peripheral veins like the saphenous and the antecubital veins should be avoided for routine PIVs especially in the preterm babies
- If no veins visible in the above mentioned sites, senior doctor has to be consulted before using the big peripheral veins.

iv. Unit policy for Number of attempts allowed

- A nurse or a doctor can attempt maximum two times and then it has be handed over to a senior person
- In case of difficult cannulation, senior doctor can attempt three times
- If a cannula cannot be secured, the consultant has to be contacted for alternate access and to re think about the need for access.

v. Empower nurse to stop procedure if mistakes are made (“matron’s charter”) by anyone in the unit while passing PIV [63]

POTENTIAL BARRIERS TO CHANGE

- Long-standing individual habit, or unit practice of PIV inserters
- Lack of availability of an assistant to use the checklist
- Emergency PIV insertions are at risk of precautions being skipped and of short-cuts being taken

Additional PBP's to Consider Implementing

1. **Ensure high compliance to aseptic non touch technique during Intravenous fluid preparation and medication preparation.**
2. **Maintenance of PIV and removal of vascular catheters in a timely manner.**
3. **Antibiotics to neonates born to mother with risk factors for sepsis (decrease deaths due to early onset sepsis).**
4. **Avoid Understaffing and Overcrowding of babies**
5. **Ensure Optimal Environmental Hygiene**
6. **Use of breast milk for enteral feeding**
7. **Ensure rational use of antibiotic by promoting compliance to antibiotic stewardship.**
8. **Develop and implement protocols for Insertion & Maintenance of central vascular catheter.**
9. **Change intravenous tubing and infusions (including parenteral nutrition) according to CDC guidelines**
10. **Develop a plan for investigation and response to a nosocomial infection outbreak.**
11. **Encourage all visitors and families to follow handwashing procedures.**

SECTION 3

Reliable Intrapartum and Newborn care to Prevent Complications of Prematurity

OUTCOME MEASURES: reliable intra-partum and newborn care to prevent complications of prematurity

1. **Incidence of RDS (Respiratory Distress Syndrome) in babies born in the hospital**
2. **Proportion of newborn deaths due to RDS (Respiratory Distress Syndrome)**
3. **Proportion of preterm newborn deaths**

1. **Incidence of RDS (Respiratory Distress Syndrome) in babies born in the hospital:**

$$\frac{\text{No of newborn babies born in the hospital and diagnosed with RDS in the month}}{\text{Total No of preterm births in the month}} \times 100$$

2. **Proportion of deaths due to RDS (Respiratory Distress Syndrome)/ HMD (Hyaline Membrane Disease):**

$$\frac{\text{No of newborns deaths due to RDS (Respiratory Distress Syndrome) in the month}}{\text{Total No of Newborn deaths in the month}} \times 100$$

3. **Proportion of preterm newborn deaths:**

$$\frac{\text{No of newborn deaths in preterm babies in the month}}{\text{Total No of Newborn deaths in the month}} \times 100$$

OPERATIONAL DEFINITION [4]:

1. RDS (Respiratory Distress Syndrome)/ HMD (Hyaline Membrane Disease)

A. **Presence of the following criteria**

1. Pre term neonate
2. Respiratory distress having onset within 6 hours of birth

B. **Supportive Evidence (Desirable)**

1. Skiagram of chest showing poor expansion with air bronchogram/ reticulogranular pattern/ ground glass opacity

2. Preterm Babies

Babies born at gestational age less than 37 completed weeks

POTENTIALLY BETTER PRACTICES (PBP's): reliable intra-partum and newborn care to prevent complications of prematurity.

The initial PBP's included in this kit are the following:

PBP 1.	**All pregnant women between 24- 34 weeks of gestation at risk of iatrogenic or spontaneous preterm delivery in the next 7 days, will be given a single course of antenatal steroids as per the recommended schedule.**
PBP 2.	**Ensure all mothers are counselled and shown how to express breast milk/ give direct breast feeds in order to have all babies on established exclusive direct breast feeding and/ expressed breast milk for at least 48 hours before discharge.**
PBP 3.	**All babies admitted in the NICU will have a first temperature taken within 15 minutes of NICU admission and the measured temperature is between 36.5°C to 37.4°C degrees centigrade.**
PBP 4.	**All preterm neonates born in the hospital and having respiratory distress at birth will be given CPAP in the delivery room (using flow-inflating bag or T-piece resuscitator).**

Monthly reporting of collected data and the knowledge gathered will inform how the PBPs can be implemented reliably and also the development of additional PBPs. After every 6 months, the list of potentially better practice (PBPs) will be reviewed for inclusion of new or exclusion of existing PBPs.

PBP 1. All pregnant women between 24- 34 weeks of gestation at risk of iatrogenic or spontaneous preterm delivery in the next 7 days, to be given a single course of antenatal steroids as per the recommended schedule.

1.a. AIM

Ensure all pregnant women between 24- 34 weeks of gestation at risk of iatrogenic or spontaneous preterm delivery in the next 7 days, to be given a single course of antenatal steroids as per the recommended schedule[76].

Antenatal steroids are associated with a significant reduction in rates of neonatal death, RDS and intraventricular haemorrhage and are safe for the mother.[77], [78].

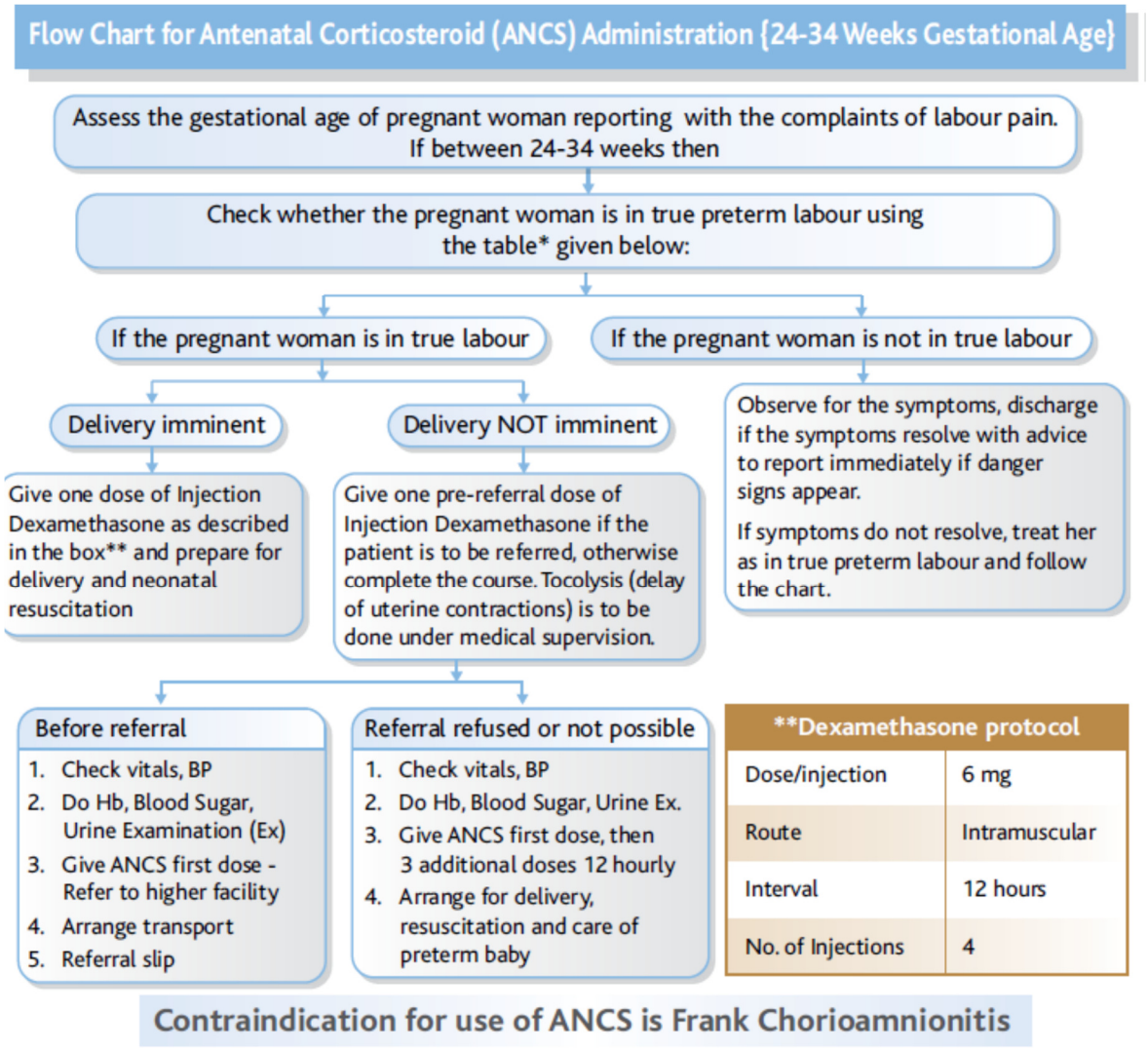
1.b. PROCESS MEASURE

Proportion of women between 24 and 34 weeks of gestation, who are at risk of preterm birth in the next 7 days and have received a single course of antenatal corticosteroids as per the recommended schedule.

Denominator– All women between 24 and 34 weeks of gestation who were admitted in the hospital during the month and had risk of preterm delivery in the next 7 days.

Numerator – the number of women between 24 and 34 weeks of gestation, who were admitted in the hospital during the month and had risk of preterm delivery in the next 7 days and received a single course of antenatal corticosteroids as per the recommended schedule (either before or during admission).

1c. FLOW CHART ANTENATAL CORTICOSTEROID ADMINISTRATION [76]



*Symptoms of True and False Labour Pain	
TRUE Labour Pain	**FALSE Labour Pain**
1. Begins irregularly but becomes regular and predictable 2. Felt first in the lower back and sweeps around to the abdomen in a wave pattern 3. Continues no matter what the woman's level of activity 4. Increases in duration, frequency and intensity with the passage of time 5. Accompanied by 'show' (blood-stained mucus discharge) 6. Associated with cervical effacement and cervical dilatation	1. Begins irregularly and remains irregular 2. Felt first abdominally and remains confined to the abdomen and groin 3. Often disappears with ambulation or sleep 4. Does not increase in duration, frequency or intensity with the passage of time 5. Show absent 6. Does not associate cervical effacement and cervical dilatation

1.d. DATA COLLECTION TOOL:

Following audit tool to be used on a random sample of case records once in 1-2 weeks. The audit determines the proportion of admitted women who were at risk of preterm birth in the next 7 days and had received a single course of antenatal corticosteroids as per the recommended schedule.

Date of Audit: Name & Sign of person conducting audit:
Sr No: 1 Hospital ID: (Please check if patient satisfies the following conditions: ☐>24 weeks gestation ☐<34 weeks gestation ☐At risk of delivery in next 7 days Date of Delivery: Did the mother receive full course of antenatal corticosteroids as recommended ? ☐YES ☐NO Did the mother receive a partial course of antenatal corticosteroids ☐YES ☐NO
Sr No: 2 Hospital ID: Please check if patient satisfies the following conditions: ☐>24 weeks gestation ☐<34 weeks gestation ☐At risk of delivery in next 7 days Date of Delivery: Did the mother receive full course of antenatal corticosteroids as recommended ? ☐YES ☐NO Did the mother receive a partial course of antenatal corticosteroids ☐YES ☐NO
Sr No: 3 Hospital ID: Please check if patient satisfies the following conditions: ☐>24 weeks gestation ☐<34 weeks gestation ☐At risk of delivery in next 7 days Date of Delivery: Did the mother receive full course of antenatal corticosteroids as recommended ? ☐YES ☐NO Did the mother receive a partial course of antenatal corticosteroids ☐YES ☐NO
Sr No: 4 Hospital ID: Please check if patient satisfies the following conditions: ☐>24 weeks gestation ☐<34 weeks gestation ☐At risk of delivery in next 7 days Date of Delivery: Did the mother receive full course of antenatal corticosteroids as recommended ? ☐YES ☐NO Did the mother receive a partial course of antenatal corticosteroids ☐YES ☐NO
Sr No: 5 Hospital ID: Please check if patient satisfies the following conditions: ☐>24 weeks gestation ☐<34 weeks gestation ☐At risk of delivery in next 7 days Date of Delivery: Did the mother receive full course of antenatal corticosteroids as recommended ? ☐YES ☐NO Did the mother receive a partial course of antenatal corticosteroids ☐YES ☐NO

PBP 2: Ensure all mothers are counselled and shown how to express breast milk/ give direct breast feeds in order to have all babies on established exclusive direct breast feeding and/ expressed breast milk for at least 48 hours before discharge.

2.a. AIM

Ensure all mothers are counselled and shown how to express breast milk/ give direct breast feeds[79], [80]in order to have all babies on established exclusive direct breast feeding and/ expressed breast milk for at least 48 hours before discharge.

Human milk has been established as the "optimal form of nutrition"[81] for infants.[82], [83]. For premature or sick infants in a neonatal intensive care unit (NICU), the antiinfective properties of breast milk are considered even more critical than for term infants. Preterm babies fed formula feeds have higher complication like necrotizing enterocolitis[84] and sepsis[85].

In preterm babies successful establishment of breastfeeding is more complex and a high degree of commitment from the institution and the mother is required to ensure successful breastfeeding. Support programs are required to help women who choose to provide breast milk for their high-risk infants.[86], [87]

2.b. PROCESS MEASURE & INTERMEDIATE OUTCOME

PROCESS MEASURE

Proportion of mothers counselled and shown how to express breast milk

Denominator:
The number of mothers interviewed during the audit.

Numerator:
The number of mothers in the denominator who had been counselled and shown how to express breast milk/ give direct breast feeds.

INTERMEDIATE OUTCOME:

Proportion of babies on established exclusive direct breast feeding and/ expressed breast milk for at least 48 hours before discharge.

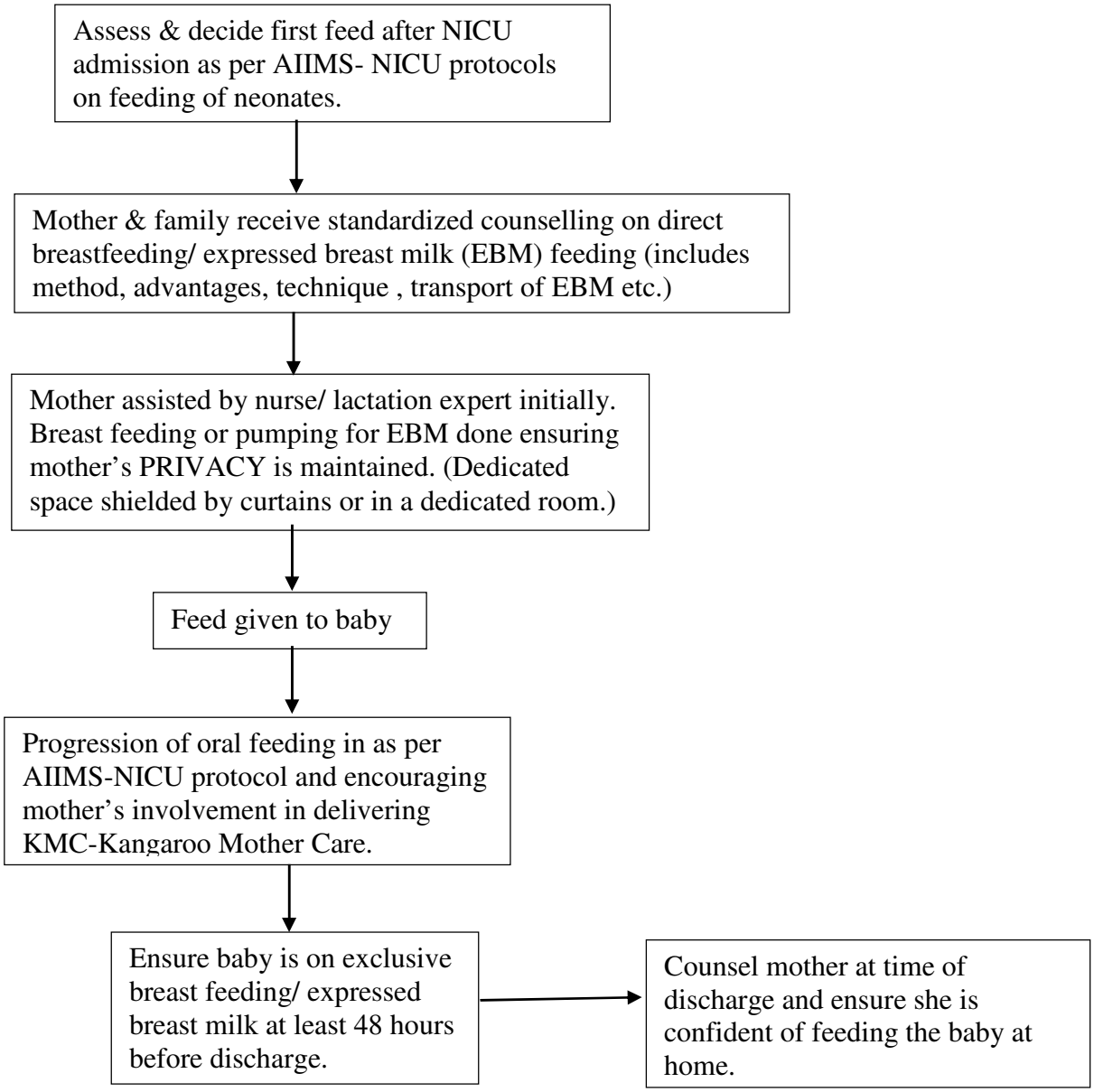
Denominator:
The number of audited case sheets of babies discharged from the NICU of the reporting hospital.

Numerator:

The number of babies in the denominator who were on exclusive breast feeding and/ expressed breast milk for at least 48 hours before discharge (established breast feeding).

2.c. PROCESS FLOW TO ESTABLISH EXCLUSIVE BREASTFEEDING:

Refer to AIIMS NICU protocol for further details on feeding of low birth infants admitted in the NICU [88]



2.d. (i) DATA COLLECTION TOOL: PROCESS DATA

Following audit tool to be used to interview random sample of mothers of babies admitted in the NICU along with their baby's case records. The audit to be done once in 1-2 weeks and determines the proportion of mothers of babies admitted in the NICU who had been counselled and shown how to express breast milk

Sr. No	*1*	*2*	*3*	*4*	*5*	*6*	*7*	8
IP No.								
Gender (M/F)								
Birth Weight (In grams)								
Gestation (in weeks)								
Inborn (I)/ Outborn (O)								
Date of birth								
Day of life on day of audit								
Mother has received standardized counselling on Breastfeeding Yes/ No								
Mother has been shown how to provide direct breast feeding (DBF)/ expressed breast milk (EBM) Yes/ No								
Mother is confident of providing DBF)/ EBM Yes/ No								
Baby has been started on feeds Yes/ No								
Baby has been given EBM/ DBF Yes/ No								
Is baby receiving only EBM/ DBF as feed (No formula feed) Yes/ No								

2.d. DATA COLLECTION TOOL: (ii) INTERMEDIATE OUTCOME DATA

Following tool to be used to audit random sample of case records of babies discharged from the NICU. The audit to be done once in 1-2 weeks and determines the proportion of babies who were on established exclusive direct breast feeding and/ expressed breast milk for at least 48 hours before discharge.

Sr No	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
IP No								
Gender (M/F								
Birth Weight (In grams)								
Gestation in weeks								
Inborn (I)/ Outborn (O)								
Date of Birth								
Date of Admission								
Date of Discharge								
Was baby ever given DBF/ EBM Yes/ No								
Date of Direct Breast Feed /EBM Initiation								
Was baby on exclusive Breast Feed/EBM at time of discharge Yes/ No								
Date since when baby was started on exclusive DBF/ EBM								

NOTE:

STEPS OF EXPRESSION OF BREAST MILK[89]

1. The mother should wash her hands thoroughly.
2. She should hold a clean wide mouthed container near her breast.

3. Ask her to gently massage the breast for 5-10 minutes before expressing the milk (using the pulp of two fingers or with knuckles of the fist in a circular motion towards the nipple as if kneading dough). Massage should not hurt her.
4. Ask her to put her thumb ABOVE the nipple and areola, and her first finger BELOW the areola opposite the thumb. She should support the breast with her other fingers.
5. Ask her to press her thumb and first finger slightly inward towards the chest wall.
6. She should press her breast behind the nipple and areola between her fingers and thumb. She must press on the lactiferous sinuses beneath the areola.
7. Press and release, press and release. This should not hurt-if it hurts, the technique is wrong. It may take some time before milk starts coming.
8. Ask her to press the areola in the same way from the SIDES, to make sure that milk is expressed from all segments of the breast.
9. She should express one breast first till the milk flow slows; then express the other side; and then repeat both sides.
10. Avoid rubbing or sliding her fingers along the skin.
11. Avoid squeezing the nipple itself. Pressing or pulling the nipple cannot express the milk.

STEPS OF PALADAI FEEDING

1. Place the infant in up-right posture on mother's lap
2. Keep a cotton napkin around the neck to mop the spillage.
3. Take the required amount of expressed breast milk by using a clean syringe
4. Fill the *paladai* with milk little short of the brim;
5. Hold the *paladai* from the sides; DO NOT put your finger
6. Place it at the lips of the baby in the corner of the mouth
7. Tip the *paladai* to pour a small amount of milk into the infant's mouth
8. Feed the infant slowly; he/she will actively swallow the milk
9. Repeat the process until the required amount has been fed
10. If the infant does not actively accept and swallow, try to arouse him/her with gentle stimulation
11. While estimating the milk intake, deduct the amount of milk left in the cup and the amount of estimated spillage
12. Wash the *paladai* with soap and water and then put in boiling water for 20 minutes to sterilize before next feed.

SOME CHANGE IDEAS TO TEST

- Explaining the frequency and timing of both breastfeeding and spoon/ paladai feeds: Infrequent feeding is one of the commonest causes of inadequate weight gain. Mothers should be properly counseled regarding the frequency and the importance of night feeds. A time-table where mother can fill the timing and amount of feeding is very helpful in ensuring frequent feeding.

- Ensure privacy of mother by creating a dedicated clean and private area for breast feeding. It can be curtained space if a separate room is not possible.

- Giving EBM by spoon/ paladai feeds after breastfeeding also helps in preterm infants who tire out easily while sucking from the breast.

- Proper demonstration of the correct method of expression of milk and paladai feeding: It is important to observe how the mother gives paladai feeds; the technique and amount of spillage should be noted. This should be followed by a practical demonstration of the proper procedure.

- Initiating fortification of breast milk when indicated.

PBP 3: All babies admitted in the NICU will have a first temperature taken within 15 minutes of NICU admission and the measured temperature is between 36.5°C to 37.4°C degrees centigrade.

3.a. AIM

To ensure that all babies admitted in the NICU have a first temperature taken within 15 minutes of NICU admission and the measured temperature is between 36.5°C to 37.4°C degrees centigrade. Hypothermia occurs commonly after birth of preterm low birth weight neonates[90], [91]. Hypothermia has been reported as a risk factor for mortality[92] and morbidity in the preterm neonate. [93],[94].

The CESDI Project 27/28 investigated the standards of care provided to infants who died after birth at 27–28 weeks gestation in England, Wales, and Northern Ireland during 1998–1999, comparing them with controls who survived. Hypothermia on admission to the neonatal unit and deficiencies in early thermal care were observed more frequently amongst babies who died. Particular areas highlighted included allowing the temperature to fall unnecessarily, lack of monitoring and hypothermia consequent to transfer difficulties.
It recommended that simple measures to avoid hypothermia should be routine and might significantly improve outcomes of preterm babies.[95]

"Golden Hour" refers to the first hour of an infant's life following delivery. A study on the impact of implementation of a Golden Hour Protocol in a level III neonatal intensive care unit (NICU) for infants delivered at less than 28 weeks gestation was examined. The protocol included a focus on admission temperature and desired outcome of admission axillary temperature within a range of 36.5°C to 37.4°C. A statistically significant difference was noted in the number of infants with an admission temperature in-range between the preprotocol and postprotocol infants suggesting that quality improvement in the form of implementation of a standardized protocol can significantly improve the stabilization of preterm infants.[96]

The quality indicator for Vermont Oxford Network (US) is “proportion of infants 501 to 1500 grams with first temperature measured within one hour of admission to the neonatal intensive care unit (NICU) below 36 degrees centigrade”.[97] In Indian NICUs however there is often a delay in transport noted (even for inborn babies) to reach the NICU. Hence, there was a consensus among the expert group of the Safe Care Saving Lives project that the first temperature be measured within 15 minutes of NICU admission in order to avoid missing any neonate with long standing hypothermia and for early initiation of appropriate management. There is a plan to utilize this information for improving the warm chain management during transport of neonates to the NICU. QI activity towards improving compliance to appropriate management of hypothermia is also planned subsequently.

3.b. PROCESS MEASURE

Proportion of inborn babies admitted in the NICU who had a first temperature (axillary) taken within 15 minutes of NICU admission and the measured temperature was between 36.5°C to 37.4°C degrees centigrade.

Denominator:
No of inborn babies who had their case records audited.

Numerator:

No. of inborn babies in the denominator who had a first temperature (axillary temperature) taken within 15 minutes of NICU admission and the measured temperature was between 36.5°C to 37.4°C degrees centigrade.

3c.. FLOW DIAGRAM OF STEPS TO PREVENT HYPOTHERMIA during transport of neonates from labor room/ OT to NICU. Its described in the flow chart below.

Before baby is born:
Labor Room Temperature to be maintained: Optimum room temperature for delivery is 25°C and should be free from draughts.

↓

The newborn should be received onto & immediately dried withclean, softpre warmed sheets (2 Pre warm sheets to be kept ready by placing under Open care radiant warmer in labor room/ OT).

↓

Early preterm babies (< 34 weeks gestational age), **physiologically unstable baby of any gestational age**& babies of any gestational age delivered by caesarean section.
To be dried under a clean open care radiant warmer.
Switch on the incubator/ open care radiant warmer 10-15 minutes prior to baby's birth, with temperature maintained at 30^0 Celsius. Prepare a pre warmed space with clean pre warmed sheets while awaiting baby's arrival.
Keep the warming device Embrace warm
Wet sheet replaced with another pre-warmed sheet to wrap the baby in two layers. Ensure head is well covered.
(Note: Open care radiant warmer is part of the Newborn Care Corner, a 20-30 square feet space earmarked for newborn resuscitation. called).

↓

Transport to NICU: while placed inside an incubator or under an open care radiant warmer or inside a warming device like "Embrace". ELBW babies can be wrapped in cling wrap or zip pouch.

↓

Prepare for baby's arrival in NICU: Switch on the incubator/ open care radiant warmer 10-15 minutes prior to baby's birth, with temperature maintained at 30^0 Celsius. Prepare a pre warmed space with clean pre warmed sheets while awaiting baby's arrival.

↓

Measure baby's **Temperature:** Baby's skin temperature recorded within minutes of admission, either by measuring the axillary temperature with a thermometer.

Physiologically stable late preterm (34 0/7 through 36 6/7 weeks of gestational age)**> 1800gms & term** (> or = 37 weeks of gestational age) **babies> 1800gms:**

To be provided immediate, uninterrupted, and extended skin-to-skin contact with the mother until after the first breastfeeding initiated within one hour of birth.

↓

Transport to post-delivery ward – while being provided skin-to-skin contact.

If the infant is not skin to skin it must be dressed in appropriate clothing to maintain a temperature of 36.5 – 37.3°C.

Baby Bath at birth is dangerous and should be avoided.

3.d. DATA COLLECTION TOOL:

Following audit tool to be used on a random sample of case records of inborn babies admitted in the NICU. The audit will demonstrate howm many baies had a first temperature (axillary) taken within 15 minutes of NICU admission and whether the measured temperature was between 36.5°C to 37.4°C degrees centigrade.

Sr. No	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
IP No.								
Birth Weight ***(In grams)***								
Gestation in weeks								
Inborn Baby? ***Yes / No***								
Date of Birth								
Time of Birth								
Date of Admission								
Time of physical admission in the NICU								
Time Temperature was first checked in NICU ***Time in am/pm or NA***								
Temperature of Baby at first record in NICU ***In degrees***								

NOTE. SOME CHANGE IDEAS TO TEST

- Prior to the baby's birth, ensure that the temperature of the delivery room is set as high as possible.
- Ensure that the delivery room has a thermostat that can display the temperature as a digital readout – have a target temperature for the delivery room if possible.
- During the preparation for the resuscitation, ensure that the radiant warmer is turned on and has sufficient time to warm the resuscitation surface. If the radiant warm has a 'pre-warm' setting, using this setting is not adequate. as it usually represents only 25% of the power output

- During the preparation for the resuscitation, ensure that the blankets/ sheets in which the baby is to be received are warm.
- As recommended by the Neonatal Resuscitation Program, dry the baby and remove the wet blankets/ sheets immediately after the baby is born and placed on the resuscitation warmer
- Educate the staff who attend resuscitations about the importance of measuring and maintaining temperature
- Use servo probe as soon as possible and turn warmer to servo mode with appropriate set temperature of 37^{o}C.
- Always stabilize the baby's temperature before transport.
- Record temperature before transport and take remedial measures.
- If temperature cannot be documented, use touch to judge temperature. Hands and feet should be as warm as abdomen.
- Cover head, legs and hands. Avoid undressing the infant for cleaning, weighing or examination. Postpone these until baby is warm.
- Use a transport incubator for shifting babies from OT or delivery room to NICU.

.

POTENTIAL BARRIERS TO CHANGE

- Tendency for delivery room or operating room temperature to be maintained at a temperature that is comfortable for the obstetric, anesthesiology or neonatology health professionals, rather than at the optimal temperature for the baby.

- Lack of practice of routinely measuring temperature within a given time after admission.

PBP 4. All preterm neonates born in the hospital and having respiratory distress at birth will be given CPAP in the delivery room (using flow-inflating bag or T-piece resuscitator)*

*** Unless there is a contraindication to its use.**

4.a. AIM

Ensure all preterm neonates born in the hospital and having respiratory distress at birth will be given CPAP in the delivery room (using flow-inflating bag or T-piece resuscitator)[98]*

*Unless there is a contraindication to its use.

Continuous positive airway pressure (CPAP) has been used to provide respiratory support for preterm infants in the intensive care nursery. "CPAP keeps the lungs slightly inflated and is most helpful for preterm babies whose lungs may be surfactant deficient and whose alveoli tend to collapse at the end of each exhalation."[99]. The NRP 6th Edition states that the use of CPAP may be considered in the delivery room in a term or preterm infant who has spontaneous breathing and a heart rate over 100 beats/minute, but is also demonstrating labored breathing with grunting and/or intercostal retractions or persistent hypoxemia confirmed by oximetry [100], [101].

4.b. PROCESS MEASURE

Proportion of audited preterm neonates born in the hospital, having respiratory distress at birth and given CPAP in the delivery room (using flow-inflating bag or T-piece resuscitator).

Denominator– The number of audited preterm neonates born in the hospital with respiratory distress at birth and no contraindication to CPAP therapy.

Numerator– The number of preterm neonates in the denominator who were given CPAP therapy in the delivery room (Using flow-inflating bag or T-piece resuscitator).

Operational Definition

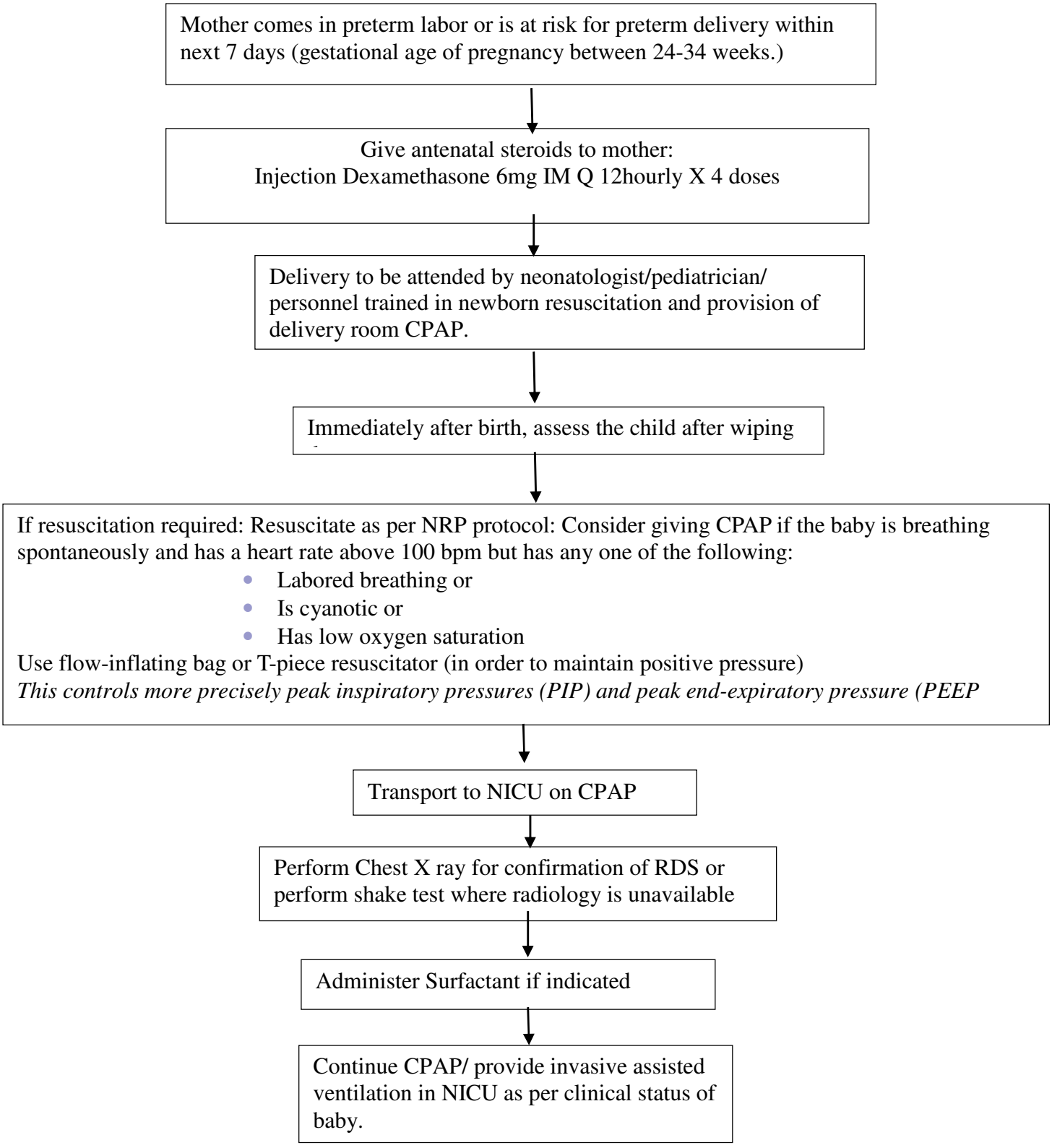
Of preterm: (neonate <37 completed weeks gestation)

Respiratory Distress: baby needs to be breathing spontaneously and having a heart rate above 100 bpm but:

- Labored breathing or
- cyanosis or
- low oxygen saturation (SpO2)

Targeted Pre-ductal SpO2 After Birth
1 min- 60%-65%
2 min- 65%-70%
3 min - 70%-75%
4 min - 75%-80%
5 min - 80%-85%
10 min - 85%-95%

4.c. FLOW DIAGRAM OF STEPS TO PREVENT RDS (RESPIRATORY DISTRESS SYNDROME) IN PRETERM BABIES :



Note: Specific supporting points:

• If the infant requires assisted ventilation, provide such positive pressure with a device with which you are familiar. T piece resuscitators (e.g. Neopuff!) or anesthetic type bags have a lesser tendency to provide pressures above the targeted pressures, and are able to deliver CPAP/PEEP.

• Note that the infant's response to even low pressure breaths may be very effective in helping to establish Functional Residual Capacity, with the infant either exhaling against a positive pressure breath, or inhaling in response to such a breath.

4.d. DATA COLLECTION TOOL:

Following audit tool to be used on a random sample of case records of preterm neonates born in the hospital with respiratory distress at birth. The audit will determine whether the neonate received CPAP in the delivery room (using flow-inflating bag or T-piece resuscitator).

Sr. No.	*1*	*2*	*3*	*4*	*5*	*6*	*7*
IP No.							
Gender (M/F)							
Date of Birth							
Birth Weight (In grams)							
Gestation in weeks							
Inborn Baby? Yes/ No							
Baby had respiratory distress after birth? Yes/ No							
Did Baby have any contraindication to CPAP? Yes/ No							
Did baby receive delivery room CPAP? Yes/ No							
Was baby diagnosed to have RDS?							
Was surfactant given? Yes/ No							
Did baby require ventilator support? Yes/ No							

NOTE: SOME CHANGE IDEAS TO TEST

- Ensure that the delivery room has a T-piece resuscitator or neopuff available and staff are trained in its use.
  .

POTENTIAL BARRIERS TO CHANGE

- Healthcare providers may get overwhelmed by the introduction of new equipment especially since some of them are currently still learning delivery of basic NRP (Newborn resuscitation protocol).

Additional PBP's to Consider Implementing

1. **Ensure compliance to protocol for feeding of preterm babies to ensure babies reach full feeds (in days after birth) within the accepted benchmark for their gestational age.**

2. **Compliance to Kangaroo Mother Care (KMC).**

3. **Axillary temperature taken within 15 minutes of physical entry into the NICU in babies brought in after neonatal transport e.g. after transport for CT-Scan, surgery etc.**

4. **Ensure preterm neonates with respiratory distress and without any contraindication to CPAP therapy are continued on CPAP therapy in the NICU.**

5. **Ensure premature babies with diagnosed respiratory distress syndrome, administered are given Surfactant.**

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