

Original Research



Practices of essential newborn care endorsed for every newborn and interventions recommended for pre-term babies in selected government hospitals of Colombo District, Sri Lanka

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Abstract

Introduction: World Health Organization (WHO) has identified essential newborn care interventions to improve the care of every newborn. In 2015, the WHO published evidence-based guidelines to improve pre-term birth. Though Sri Lanka also adheres to these recommendations on interventions to improve pre-term birth outcomes, coverage of them have not yet been assessed for the country and there is no recent assessment of essential newborn care coverage as well.

Objectives: To describe the practice of essential newborn care (ENC) for babies born pre-term and WHO recommended interventions to improve pre-term birth outcomes in government hospitals of Colombo District

Methods: A descriptive cross-sectional study with two components was conducted in seven government hospitals with obstetric and neonatal care facilities in Colombo District in 2017-2018. The first component describes the coverage of essential newborn care (ENC) assessed by direct observation among convenient sample of 77 deliveries. The second component assessed the practice of recommended interventions to improve pre-term birth. Data were extracted by pre-intern doctors from the medical records using a checklist on 510 pre-terms. Descriptive analysis was done.

Results: In relation to ENC, among 77 deliveries, preparation before delivery was satisfactory and it was >90%. Overall, the practice of immediate newborn care interventions were satisfactory, but a low coverage was found for maternal abdomen delivery 31(40.3%), delayed cord clamping 39 (50.6%), temperature measurement 8(10.4%), educating about vitamin K 29 (37.7%), breastfeeding counselling 40 (51.9%) and delayed weighing 26 (33.8%). Practising recommended pre-term interventions was satisfactory except for the use of magnesium sulphate which was received by only 38 (60.3%) and kangaroo mother care was given for only 74 (57.8%).

Conclusions & Recommendations: Most of the ENC practices and adhering to recommended interventions for pre-term were satisfactory except for a few. A refresher course of care for the preterm baby and ENC is recommended to the labour room staff.

Keywords: pre-term birth, essential newborn care, WHO recommended interventions

Introduction

Attention has been drawn towards preterm babies as they are more likely to have health problems than those who are born at term (1). The quality of healthcare services offered to these immature babies can be a critical factor in determining their survival (2). The WHO had introduced essential newborn care (ENC) as a comprehensive strategy designed to improve the health of newborns. It is estimated that universal coverage of these essential interventions would reduce neonatal death by about 71% (3). A mathematical model was used to evaluate the potential reduction in pre-term mortality in Sub-Saharan Africa in 2015 through WHO-recommended interventions for pre-term birth. The study found that the interventions could have saved the lives of almost 300 000 infants born prematurely in Sub-Saharan Africa. Moreover, it was identified that combined interventions are necessary to maximize the impact (4). ENC has been assessed in other countries and has identified several omissions and areas that need improvement that could lead to unnecessary complications (5-6).

Eight areas have been defined as ENC interventions for every newborn by the WHO. They include cleanliness, thermal protection, early and exclusive breast feeding, and initiation of breathing/resuscitation, eye care, immunization, management of newborn illness and care of preterm or low birth weight infants (7). Later, cord care and vitamin K administration were added to these (8). Available evidence shows that these ENC practices have not changed or updated recently. However, the importance of Kangaroo mother care for pre-terms and low birth weight infants is highlighted in the current literature (9-10) as it reduces neonatal sepsis and mortality. Introduction of heated humidified gases for resuscitation for preterm infants is a new introduction in Sri Lanka since carrying out this research. In addition, evidence-based interventions have been published to improve pre-term birth with the involvement of experts from all over the world by WHO (2). These main recommendations include

antenatal corticosteroids to improve new born outcomes (between 24 to 34 weeks), magnesium sulphate for imminent pre-term birth (before 32 weeks), antibiotics for preterm pre-labour rupture of membranes, avoiding the use of antibiotics for pre-term pre-labour with intact membranes, avoiding Caesarean section to improve pre-term newborn outcome, kangaroo mother care (for babies weighing 2000 g or less) and use of plastic bags to provide thermal care (less than 32 weeks), oxygen therapy and concentration (before 32 weeks), continuous positive airway pressure (CPAP) for newborns with respiratory distress syndrome (RDS), surfactant replacement therapy for intubated and ventilated newborns with RDS, and avoiding using tocolytics for inhibiting preterm labour (2).

Sri Lanka is a lower middle-income country in South Asia with a population of 22.16 million (11). The crude birth rate of Sri Lanka is 12.9 and the incidence of pre-term births is 7.9% (11-12). In 2020, there had been a case load of 23 835 pre-term births with 301 706 live births. It has been shown that more than one-third of neonatal deaths in Sri Lanka are due to pre-term births (13). The Sustainable Development Goal (SDG) target of Sri Lanka for neonatal mortality rate is 2.2 per 1000 live births by 2035 from the current rate of 6.3 per 1000 live births (14). To achieve this target, it is imperative that the issue of preterm birth is addressed by improving the essential interventions for babies born pre-term. The WHO also has identified pre-term births as one of the major bottlenecks and a challenge which needs timely and effective interventions in order to achieve the goals (15).

Though Sri Lanka has gained impressive achievements in reducing child and infant mortality, the proportion of neonatal deaths contributing to infant mortality shows an increasing trend during the past few years (16). Thus, it is imperative that attention be drawn to reducing neonatal deaths. At the same time, as 26.2% of infant deaths are due to prematurity (16), attention needs to be directed

towards pre-term care. There is a lacuna of evidence on pre-term care in the country as well as in the South Asian region and the available evidence is also not recent (17). Research from other developing countries covers mainly the knowledge and the practices during home delivery (18-19). Only the ENC has been assessed in Sri Lanka, and it was also in one district in 2004 (20). The coverage of WHO recommendations on interventions to improve pre-term birth outcomes has not been assessed in Sri Lanka including from other countries. The lack of data on these aspects is a major drawback to improving care through evidence-based interventions. When considering ways to reduce neonatal mortality and as almost all are hospital deliveries, attention to the quality of services within hospitals is important. In this regard, a comprehensive study on the coverage of essential interventions on pre-term babies and ENC was designed to fill the gaps. The objective of this present study was to describe the coverage of ENC and recommended interventions for babies born pre-term in government hospitals in Colombo District, Sri Lanka.

Methods

A descriptive cross-sectional study was carried out from October 2017 to March 2018 in all the government hospitals with obstetric, paediatric and neonatal care facilities in Colombo District of Sri Lanka. There were two components to this study, and both were carried out in seven government hospitals with above facilities. The component I was to assess compliance with the WHO recommended ENC based on direct observations of 77 deliveries. Component II was done to assess the essential interventions to improve pre-term birth outcomes based on data extracted from medical records of 510 mother and baby dyads. The sample size was evaluated with a minimum sample size calculation with a statistical formula with the prevalence of practices being considered as 50% (21). The minimum sample size required was 385 and the study

included 510 subjects/participants.

To evaluate ENC, modified checklists based on the USAID assisted project and WHO guidelines were employed under the guidance of consultant neonatologists (22). Four pre-intern medical officers were responsible for data collection in the labour rooms, encompassing assessments of pre-delivery preparations and post-delivery newborn care. To ensure accuracy and consistency, the principal investigator (PI) provided comprehensive training to the data collectors. During the training, all of them independently marked the checklist for a single delivery, repeating the process until the data collectors' observations aligned with those of the PI. Discrepancies were thoroughly discussed during the training sessions.

The ENC care was assessed among 77 deliveries involving either term or pre-term live births during the study period. It was assumed that ENC would not differ based on whether the baby was born pre-term or full-term. Observatory data were collected using a pretested checklist which was a USAID assisted project and WHO checklists (22) modified under the guidance of consultant neonatologists. Dates for data collection were randomly selected for each hospital, and the first four consecutive deliveries occurring while the data collector was present at the hospital were included. A maximum of four deliveries were observed per day. The number of observations from each institution was determined proportionately to the respective hospital's delivery rate. Babies delivered via caesarean section and stillborn infants were excluded from the study.

To assess the essential interventions to improve pre-term birth outcomes, data extraction sheet based on the recommended interventions was developed. The study population comprised live-born pre-term babies completed 24 weeks to 36 weeks. Babies with severe congenital abnormalities, birth weight less than 500 g and who had no dating scan before 22 weeks of period of amenorrhoea (POA) were

excluded. To avoid human errors, a pretested web-based computer application specifically designed for POA calculation was used. The American College of Obstetricians and Gynaecologists recommends the "Best Obstetric Estimate (BOE)" as a standard method for identifying pre-term infants, which considers both the last menstrual period (LMP) and ultrasonography (23). In this study, we used the BOE as the standard method to identify pre-term births. The decision to use either the LMP date or ultrasound scan date is based on the discrepancy of dates according to the POA determined by LMP. The BOE method has been successfully implemented in previous studies to determine gestational age (24-25).

Data analysis

Data were entered into a datasheet and analysed using Microsoft Excel. The coverage of essential interventions for pre-term babies and coverage of ENC at birth were described as frequencies and percentages out of the total who was supposed to get that intervention.

Results

No one, either pregnant mother or the staff opposed the observation, thus the response rate was 100%. The before and immediately after delivery practices of ENC at birth in hospitals are shown in Table 1. As the number of observations was low, including an analysis on ENC at the institutional level was considered not beneficial. The before-delivery preparations were satisfactory and coverage of all the observed variables was more than 90%. All deliveries observed had all the needed instruments and had clean and dry surfaces that the mother and baby come into contact. When considering the immediate newborn care, wiping of the mouth and nose with gauze when the head was delivered, was done only in 53 (68.8%) deliveries. Only 31 (40.3%) babies were delivered on to the mother's abdomen. Stimulating the baby, while drying was done only in 48 (62.3%) deliveries. Other care practices were

quite satisfactory.

Table 2 displays the subsequent care practices for the newborn following immediate care among the ENC criteria. Delaying the clamping and cutting the cord for 2-3 minutes or until the cord ceases to pulsate was observed in half of the deliveries. Clamping or tying the cord after completing active management of the third stage of labour and when the mother and baby are stable was observed in 49 (63.6%) deliveries. Instillation of eye drops is not a routine practice in Sri Lanka and was observed only in 4 (5.2%) deliveries. Placing an identification band was done in all deliveries (100%).

Regarding the thermal care, keeping the baby warm by skin-to-skin contact on the mother's chest, with the body and head covered by a cloth or hat or if unable to do so wrapping the baby well and covering the head was practiced in 64 (83.1%) deliveries. Checking the baby's axillary temperature with a thermometer was done only in 8 (10.4%) babies. Vitamin K was given to all babies, but explaining about it was done only in 29 (37.7%) instances. Wiping the injection site was done in 53(68.8%) babies and the anterolateral part of the thigh was used for injection in 67 (87.0%) babies.

The breastfeeding commenced within one hour among 69 (89.6%) mothers out of them, positioning of mouth was not verified in 3 mothers. Counselling on breastfeeding was given to about half of the mothers. The recommended delaying the weighing of the baby until the baby was stable and warm and after the first breastfeeding was not practiced often and it was done only for 26 (33.8%) babies. Placing a clean cloth or paper on the pan of the weighing scale was done in all instances.

Table 3 displays the practices in relation to strong and conditional recommendations of essential interventions for preterm babies in the Colombo District. The number of babies who required each intervention varied according to their POA and other

conditions and thus, the indicated number is mentioned under each intervention. The six strongly recommended interventions that were assessed had been adhered to by more than 70% of instances except for magnesium sulphate and Kangaroo mother care. There were 68 mothers who delivered babies before 32 weeks, out of whom 38 (60.3%) received magnesium sulphate which is a

recommended intervention for the prevention of cerebral palsy. Some form of Kangaroo mother care was received by 74 (57.8%) babies out of the 128 indicated babies. Antenatal corticosteroid therapy was indicated for 146 women at risk of preterm birth from 24 to 34 weeks and out of them, 108 (74.0 %) received it.

Table 1: Essential newborn care practices before and immediately after delivery (N=77)

Observed practice	No. (%)
Before delivery preparation	
Warm labour room (25-28 °C/77.0-82.4 °F)	74 (96.1)
Well-lit labour room with a torch for emergency	76 (98.7)
The labour room free from drafts	73 (94.8)
All surfaces clean and dry	77 (100.0)
All needed equipment, instruments and supplies available	77 (100.0)
The warmer switched on prior to delivery	70 (90.9)
The towels/caps etc. warmed up prior to delivery	70 (90.9)
Practices immediately after delivery	
The mouth and nose wiped with gauze	53 (68.8)
The baby delivered on to the mother's abdomen	31 (40.3)
Preterm baby delivered into a plastic bag (n=3)	0 (0.0)
The time and sex noted and informed to the mother	70 (90.9)
Thoroughly dried the baby except for the hands	74 (96.1)
Stimulated the baby while drying	48 (62.3)
Assessed the baby's breathing	74 (96.1)
When not crying or breathing within 30 seconds, cord is cut and resuscitation started (n=5)	4 (80.0)
The baby covered with a clean, dry cloth including the head	74 (96.1)

Discussion

Globally different evidence-based interventions and practices are identified and introduced in order to improve the outcome of the service receiver. Similarly, to improve neonatal morbidity and mortality, ENC and essential interventions are practiced globally and identifying the gaps in implementation will further improve the intention of introducing the same. According to the current evidence, this is the first documented study done on the essential interventions for pre-term babies globally and recent study on ENC in Sri Lanka.

The observations conducted to investigate adherence to ENC practices revealed satisfactory before delivery preparations. Among the immediate newborn care practices having skin to skin contact baby delivering onto mothers' abdomen was practiced in less than half of the cases but later keeping the baby warm by skin-to-skin contact (SSC) on the mother's chest was practiced well. This indicates an improvement compared to a previous Sri Lankan study where it was found that the practice was poor before intervention but improved after training (20). As these practices improve thermal

protection, it was also found that immediate or early SSC promotes breastfeeding thereby helps to avoid illness and improve the health of the infants (26). There is room for improvement in stimulation while drying as it will improve breathing. A study done in

Tanzania in 2019 reported stimulation while drying as 8% (5) while our figure was 62.3%. Compared to previous assessments in Sri Lanka, breastfeeding practices were satisfactory in both studies (20).

Table 2: Subsequent care practices for the newborn following immediate care after delivery (N=77)

Observed characteristics	No. (%)
Clamping /cutting and the care of the umbilical cord	
Waited for 2-3 minutes until the cord ceased to pulsate to cut it	39 (50.6)
Tied the cord when the mother and baby are stable and after completing acute management of third stage of labour	49 (63.6)
Tied the cord with a ligature or placed the disposable cord clamp	68 (88.3)
Care of the eyes	
Instilled eye drops, one drop in each eye	4 (5.2)
Identification of the baby	
Placed an identification band	77 (100.0)
Thermal care	
Kept the baby warm- skin-to-skin contact on the mother's chest	64 (84.2)
Preterm baby is sent to ward/ NICU in a portable incubator	2 (33.3)
Checked the baby's temperature	8 (10.5)
Administer vitamin K1	
Explained to the mother	29 (37.7)
Wiped the injection site	53 (68.8)
Inject intramuscularly in the anterolateral part of the thigh	67 (87.0)
Commencement of exclusive breastfeeding	
Supported the mother in breastfeeding within one hour	69 (89.6)
Verified that the baby's mouth is latched well	66 (85.7)
Counselling of the mother	
On the importance of exclusive breastfeeding & colostrum	40 (51.9)
To feed frequently on demand	42 (54.5)
Weighing the baby	
Delayed taking the weight until first breast feeding	26 (33.8)
Placed a clean cloth on the weighing scale	77 (100.0)

Among the poorly adhered practices, specifically, delayed cord clamping for up to 3 minutes or until the cessation of cord pulse was not practiced in nearly half of the cases. The previous study done in Sri Lanka had not assessed this aspect to compare with our findings (20). In a study done in Nepal found that delayed cord clamping is practiced among 68.15% of deliveries though the other three elements assessed fell short compared to our findings (27).

Given the numerous benefits of this practice, including improved cardiovascular adaptation, better hemodynamic stability, decreased intra-ventricular haemorrhage, reduced need for transfusion, and reduced risk of late-onset sepsis among pre-term infants, as well as improved iron status and prevention of infant hypochromic anaemia among term infants (28), it is critical to address this issue, particularly in light of the high prevalence of

anaemia in Sri Lanka. Studies have shown that delayed cord clamping significantly benefits infants born to anaemic mothers even at 4 and 8 months (29). With the prevalence of anaemia in Sri Lanka at 34% among pregnant mothers and 44% among 6–8-month-old infants (30), addressing this issue is urgent and can be implemented easily without any additional cost especially in the economic crisis.

Explanation of why vitamin K is given and breastfeeding counselling in the labour room also needs improvement as it was observed among 37.7% and 50.6% of mothers respectively. These aspects need attention as a country we now concentrate on the quality aspects of healthcare as well. As there has not been a change in the recommended practices during the recent past since the conduction of this study the findings are still applicable today and it will fill the data gap and add evidence for the betterment of healthcare.

When considering the essential interventions for preterm babies in the Colombo District it was found that coverage of many recommendations has been more than 70% but magnesium sulphate therapy which is a recommended intervention for the prevention of cerebral palsy and Kangaroo mother care falls short of this level. Not giving magnesium sulphate may be due to late presentation to the hospital and if it was not the reason, it needs to be addressed to improve the pre-term outcome. Considering the psychological, physiological and clinical advantages of Kangaroo mother care which reduces morbidity (10), it needs further attention as it can be improved without any cost and difficulty.

According to the WHO guideline, there is inadequate evidence on the usefulness of plastic bags/wraps in providing thermal care for pre-term babies immediately after birth. However, to avoid hypothermia plastic bags or wraps may be considered as an alternative during stabilization and transfer (2). These were used on 26 (41.3%) babies

born before 32 weeks at birth and 13 (20.6%) at transfer. As national guidelines for maternal care (31) advises to use plastic bags /wraps for babies less than 32 weeks this needs further attention. Any published research based on the WHO recommendations on interventions to improve pre-term birth outcomes could not be found at present to compare the findings and to comment.

There were several limitations of the study. The observational study results might have got distorted because the staff tends to behave differently when they know that they are being observed (Hawthorne effect). To avoid this effect, the date of the visit was not informed and the observed variables were not disclosed to the labour room staff. As all the observations were done during daytime when adequate staff is on duty, it might have affected the results. The aspects of the ENC excluding preparation of mother for delivery and items related to HIV were used in this research. The details regarding preparation of mother for delivery were excluded as the study was planned to observe the mothers during delivery and items related to HIV were excluded as the HIV prevalence is low in the country.

All 10 main recommended essential interventions for pre-term babies were planned to be assessed. However, the optimal mode of delivery whether Caesarean section was done to improve neonatal outcome or for any other reason, as well as details of Oxygen therapy and concentration used in the management of the neonates, could not be assessed as documentation on many of the medical records were poor and could not retrieve those data. Even though the data collection on recommended interventions was done before discharge during a stressful period for the mother, it did not have an adverse effect on data as it was mainly by scrutinizing the records.

Table 3: Practice of recommended essential interventions for preterm babies*

WHO recommendation	No.	%
<u>Strong recommendations</u>		
Antenatal corticosteroid therapy for women at risk of preterm birth from 24 to 34 weeks (n=146)		
Given	108	74.0
Not given	38	26.0
Magnesium sulphate for imminent preterm birth <32 weeks (n=63)		
Given	38	60.3
Not given	25	39.7
Antibiotic administration for PPROM of membranes (n=145)		
Given	121	83.4
Not given	24	16.6
Antibiotic administration for preterm labour with intact amniotic membranes (n=365)		
Given	0	0.0
Not given	365	100.0
Continuous positive airway pressure therapy for the preterm newborns with RDS (n=104)		
Given	91	79.8
Not given	13	20.2
Kangaroo mother care for stable babies $\leq 2000\text{g}$ (n=128)		
Initiated as soon as the newborn is clinically stable	9	7.0
Close to continuous KMC	9	7.0
Intermittent KMC - continuous KMC is not possible	56	43.8
KMC is not given	16	12.5
No data	38	29.7
<u>Conditional recommendations</u>		
Erythromycin as the antibiotic of choice for prophylaxis for PPROM (n=121)		
Erythromycin given	93	76.9
Other antibiotic given	28	23.1
Tocolytic treatment for the risk of imminent preterm birth (not recommended) <34 weeks (n=121)		
Given	43	35.5
Not given	78	64.5
Surfactant replacement therapy for intubated and ventilated newborns with RDS (n=48)		
Given	38	79.2
Not given	10	20.8
Plastic bag use for < 32 weeks (n=39)		
Immediately after birth	26	41.3
Transferring neonate to specialized neonatal care units	13	20.6
Not used / No data	24	38.1

* Different recommendations aim at different categories, thus the total numbers differ

Conclusions & Recommendations

With regards to essential interventions for preterm babies, satisfactory coverage was observed for six interventions and unsatisfactory coverage for four. The coverage for ENC during pre-delivery period

showed >90% coverage. Improvements such as wiping the mouth and nose with gauze, stimulating while drying and delivering onto mother's abdomen can be achieved without significant difficulty or cost.

For subsequent care, most of the practices were satisfactory. However, delayed cord clamping needs attention as its benefits are substantial. Therefore, proper attention needs to be given to the identified gaps, along with refresher training, to ensure all essential interventions are provided to preterm infants. It is crucial to address the identified gaps and ensure that healthcare providers are adequately trained and equipped to provide essential care to preterm infants. Refresher training can improve the quality of care provided, ultimately leading to better health outcomes for pre-term infants. By addressing these gaps and providing appropriate training, healthcare institutions can improve the quality of care for preterm infants, which can have a significant impact on their health outcomes.

Public Health Implications

- Practicing essential newborn care and interventions recommended for preterm babies is crucial to achieving better outcomes among these infants. Identifying any lapses in these practices and addressing them is essential to achieving high standards of healthcare. The areas of poor performance identified in this research can be rectified easily through refresher training and supervision.
- Therefore, it is imperative that healthcare institutions prioritize training and supervision for healthcare providers who work with preterm infants. By doing so, they can ensure that essential newborn care and interventions are provided effectively, resulting in better health outcomes for these infants.

Author Declarations

Competing interests: The authors state no conflict of interest.

Ethics approval and consent to participate: Ethical clearance (RP/ 2017/02 of 20.04.2017) was granted by the Ethics Review Committee of the Faculty of Medicine,

General Sir John Kotelawala Defence University, Sri Lanka. Institutional level ethical clearance was also obtained from Colombo South Teaching Hospital and Castle Street Hospital for Women. Administrative clearance was obtained from the Ministry of Health, Directors of the hospitals and consultants in charge of the obstetric and neonatal units. Informed consent was obtained from all mothers included in this study.

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Author contributions: DP designed the study, coordinated data collection, and performed the statistical analysis, interpreted the data and drafted the manuscript. RDAS and KJ contributed to the study by providing their input in the study design, reviewing the statistical analysis and manuscript, and adding technical insights. All authors have accepted responsibility for the entire content of this manuscript and approved its submission.

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