

# Newborn Care Practices at Home: Effect of a Hospital-based Intervention in Sri Lanka

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## Summary

The aim of the present study was to evaluate the effect of an essential newborn care (ENC) training programme for maternity ward staff in improving newborn care practices after hospital discharge. A before-and-after study was conducted in the community involving mothers who had given birth in two hospitals in the Puttalam district in Sri Lanka. The intervention was a 4-day training programme and primarily aimed at increasing knowledge and skills of ENC among health care providers in the maternity units of these hospitals. Before the intervention, 144 mother–newborn pairs were followed-up and interviewed at their households within 28–35 days of delivery. Three months after the intervention, 150 mother–newborn pairs were interviewed at home. Results revealed that there was a significant improvement in umbilical cord care practices at home following the intervention. Application of ‘surgical spirit’ on umbilical cord has declined from 71.5% in the pre-intervention to 45.3% in the post-intervention samples ( $p < 0.001$ ). Pre-intervention breastfeeding rates were high, and there wasn’t any further improvement in the post-intervention. There was a 35% reduction in the proportion of newborns who developed any undesirable health events at home ( $p < 0.05$ ). Findings suggest that the implementation of a comprehensive 4-day training programme of ENC for maternity ward health professionals can be followed by a significant improvement in mothers’ practices on care of umbilical cord and clinical outcomes of newborns.

**Key words:** essential newborn care, training of health staff, neonatal care, Sri Lanka.

## Introduction

Four million newborns die each year, 99% of them in low- and middle-income countries [1]. The distribution of direct causes of death indicates that severe infections, prematurity related conditions and birth asphyxia account for most neonatal deaths [1, 2]. Majority of these deaths could be prevented through simple and cost-effective essential newborn care (ENC) interventions [3, 4]. Previous studies have highlighted that field-based health worker training was associated with a reduction in neonatal mortality and morbidity in the community [5–7]. In countries with high institutional birth rates, training of hospital health care providers is commonly viewed as an important strategy, since the most critical period of newborn care lies during the hospital stay. However, the hospital-based interventions should not only target on improving care practices within the hospital, but also should play a major role in developing mothers’ skills and confidence for caring newborns while at home.

ENC is based on principles of prevention of infection, thermal protection, resuscitation of newborn with asphyxia, early and exclusive

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breastfeeding, care of the low birth weight babies and identification and appropriate referral of sick neonates [3, 8]. It is estimated that 10–15% of under-five deaths in resource-poor countries could be prevented through achievement of universal coverage with exclusive breastfeeding alone [9]. The World Health Organization recommends keeping the umbilical cord clean and dry without special treatment, except in high-risk situations or in neonatal tetanus endemic areas [10], and the evidence from a recent meta-analysis is in favour of these recommendations [11]. Thus, the practice of appropriate cord-care and exclusive breastfeeding following hospital discharge deserves greater emphasis in newborn care.

Recognition of effective strategies which have an impact on both hospital and community practices will be useful for health policy makers in planning cost-effective interventions to improve newborn outcomes. Among the developing countries, Sri Lanka has reported a high institutional birth rate (of the total births, 92% in government hospitals and 4% in private health institutions) [12]. But, there is no information regarding the effect of hospital-based training strategies on newborn care practices during hospital stay or following discharge from hospital. The aim of the present study was to evaluate whether the implementation of ENC training programme for hospital health care providers was followed by improved newborn care practices of mothers and the clinical outcomes of newborns, after the discharge from hospital.

### Materials and Methods

The study was conducted in the district of Puttalam in the North Western province of Sri Lanka. In 2002, the district reported 12 513 live births among a mid-year-population of 721 230. The study followed a before-and-after design involving mothers who had given birth in hospitals before an intervention (pre-intervention) and 3 months after the intervention (post-intervention). The Ethical Review Committee of the Faculty of Medicine of University of Colombo granted ethical clearance for this project.

#### Intervention

The intervention was a 4-day training programme and primarily aimed at increasing knowledge and skills of ENC among midwives, nurses and doctors in the maternity units of two selected hospitals. These health care providers were trained to educate mothers on caring their newborns before, during and after the delivery, and specifically through a health education session before discharge from the hospital. It was expected that the intervention would improve newborn care practices of mothers and the clinical outcomes of newborns following hospital discharge. A 15-module training manual was compiled by the investigators in consultation with an

expert group and based on the findings of a baseline survey. The contents were mainly extracted from the WHO Training Modules on Essential Newborn Care and Breastfeeding [4], Teaching Aids on Newborn Care by the National Neonatology Forum India [13], and Resuscitation of the Newborn by Resuscitation Council, UK [14]. The 4-day training programme consisted of 32 training hours and was conducted with the involvement of 12 resource persons. The number of hours spent on each module is listed in Appendix 1. All the midwives, nurses and doctors ( $n=59$ ) in the obstetric units of the two hospitals participated in the training programme.

#### Study sample

The study population consisted of mother–newborn pairs who received care from these two hospitals, irrespective of the mode of delivery. Those excluded were cases where either the mother or newborn was treated in an emergency setting (e.g. special-care baby unit, premature baby unit, intensive care unit) and there were multiple births, still births or neonatal deaths in the present pregnancy. On the basis of the results of some previous studies, it was estimated that the baseline levels of most newborn care practices were around 50%. To detect a 15% increase in the stated outcomes (50–65%), with a power of 0.90 and  $\alpha$  error of 0.05, it was estimated that 223 mother–newborn pairs were required in each study period [15].

#### Data collection

Basic socio-demographic data, details to locate the households, knowledge about care of the newborn and satisfaction with the care were obtained through exit interview at the hospital upon discharge. During the post-intervention phase, only those mothers who participated in a post-natal health education session were selected for the exit interview and the subsequent follow-up in the community. The trained interviewers followed-up these mothers at their households within 28–35 days after delivery. The follow-ups were confined to a defined geographical area (Chilaw and Marawila medical officer of health areas). If a mother could not be traced at the first instance, a subsequent attempt was made to meet her within the specified duration, i.e. up to a maximum of 42 days of delivery. The information obtained through the household questionnaire focused on the domiciliary care provided by public health midwife, cleanliness in caring the newborn including care of the umbilical stump, breastfeeding practices and health problems in the newborn.

#### Data analysis

Data analyses were performed using SPSS version 10.0 (SPSS Inc., Chicago, IL, USA). The chi-square test was applied to compare the frequency of

individual practices before and after the intervention. Of the 223 mother–newborn pairs interviewed upon discharge in the pre-intervention phase, 79 (35.4%) were not followed up at home because these mothers lived outside the defined area. The corresponding number in the post-intervention phase was 73 (32.7%) among 223 discharged mothers. Thus, the analysis included 144 respondents in the pre-intervention and 150 in the post-intervention samples. The non-reachable mother–newborn pairs were not different from respondents with respect to basic socio-demographic and health-care-related characteristics.

## Results

### *Characteristics of the sample*

As shown in Table 1, the differences in the baseline characteristics of mother–newborn pairs were not statistically significant between the two samples. Teenage mothers represented 10.4 and 8.7% in the pre- and post-intervention samples, whereas the first-time mothers represented 41.7 and 43.3%, respectively. Forty-six mothers in the pre-intervention and 45% in the post-intervention samples had completed 10 years (General Certificate of Education Ordinary Level) of education. The proportion of Caesarean deliveries was 19.4% in the pre-intervention compared with 17.3% in the post-intervention. The proportion of mothers who registered for antenatal care before 14 weeks and those received antenatal education of newborn care were not significantly different between pre-intervention and post-intervention samples.

### *Perceptions about the health advices*

During the exit interview, mothers were asked whether they were satisfied with the health advices given by the hospital health staff to look after the newborn baby. Mothers were also asked if they were satisfied about the opportunity given to them to clarify doubts about the care of the newborn. The responses were marked in a 5-point Likert scale. In the pre-intervention group, 56.7% were satisfied with the health advices on caring the newborn compared with 92.5% in the post-intervention. With respect to opportunity to clarify doubts, 47.9% in the pre-intervention and 84.7% in the post-intervention samples expressed their satisfaction.

### *Care of the umbilical cord*

Table 2 indicates that application of ‘surgical spirit’ on umbilical cord has declined significantly from 71.5% in the pre-intervention to 45.3% in the post-intervention samples ( $p < 0.001$ ). There were significant reductions in the unwanted cord-care practices such as putting dressing to umbilical stump

TABLE 1  
*Baseline characteristics of mother–newborn pairs*

Characteristic	Pre-intervention sample (n = 144)		Post-intervention sample (n = 150)	
	No.	(%)	No.	(%)
Maternal age (years)				
≤19	15	10.4	13	8.7
20–34	117	81.3	123	82.0
≥35	12	8.3	14	9.3
Parity				
Primiparae	60	41.7	65	43.3
Multiparae	86	59.7	85	56.7
Ethnicity				
Sinhalese	119	82.6	121	80.7
Tamil	10	6.9	11	7.3
Moore	15	10.4	18	12.0
Maternal educational level				
Below GCE (O/level)	78	54.2	83	55.3
GCE (O/level) and above	66	45.8	67	44.7
Maternal employment				
Employed	19	13.2	25	16.7
Not employed	125	86.8	125	83.3
Registration for antenatal care				
<14 weeks	111	77.1	114	76.0
≥14 weeks	33	22.9	36	24.0
Antenatal education of newborn care				
Received	105	72.9	104	69.3
Not received	39	27.1	46	30.7
Mode of delivery				
Vaginal	116	80.6	124	82.7
Caesarean	28	19.4	26	17.3
Birth weight of newborn				
<2500 g	20	13.9	23	15.3
≥2500 g	124	86.1	127	84.7

GCE (O/level), General Certificate of Education Ordinary Level.

(from 13.9% to 5.3%;  $p < 0.05$ ) and covering the stump with baby’s nappy (31.9–14.0%;  $p < 0.01$ ). In the pre-intervention phase, only 35.4% of newborns were bathed before cord stump had fallen off, and this proportion increased to 53.3% ( $p < 0.01$ ) following intervention. According to the exit interviews, there was a significant increase in the knowledge among mothers on the care of umbilical cord. Such improvement was accompanied by improved practices on care of umbilical cord following the intervention.

### *Breastfeeding practices*

As shown in Table 2, the indicators of breastfeeding were very satisfactory in the pre-intervention sample, with 91.7% newborns were exclusively breastfed,

TABLE 2  
Care of the umbilical cord and breastfeeding practices before and 3 months after intervention

Practice	Pre-intervention (n = 144) %	Post-intervention (n = 150) %	Significance
Care of the umbilical cord			
Umbilical stump was covered with a dressing	13.9	5.3	$\chi^2 = 6.24$ $p = 0.012$
The stump was washed with water while bathing	60.4	69.3	$\chi^2 = 2.57$ NS
The stump was dried thoroughly after bathing	75.0	78.7	$\chi^2 = 0.56$ NS
Surgical spirit was applied on the stump	71.5	45.3	$\chi^2 = 20.7$ $p = 0.000$
Baby was bathed before the cord stump had fallen	35.4	53.3	$\chi^2 = 9.55$ $p = 0.002$
Umbilical stump was covered with the baby's nappy	31.9	14.0	$\chi^2 = 13.44$ $p = 0.002$
Breastfeeding practices			
Exclusive breastfeeding rate by 28 days	91.7	93.6	NS
Predominant breastfeeding rate	98.6	98.0	NS
Ever-breastfed rate since arrival at home	100	100	NS
Bottle feeding rate	4.9	4.0	NS

NS, not significant ( $p \geq 0.5$ ).

100% ever-breastfed and 4.9% bottle-fed by 4 weeks of age. These rates remained relatively constant at the post-intervention sample, without any significant improvement or decline.

#### Clinical outcomes of newborns

The numbers and rates of different undesirable health events of the newborns, as reported by mothers in the pre- and post-intervention samples are listed in Table 3. Nine (6.3%) newborns in the pre-intervention had skin pustules compared with five (3.3%) in the post-intervention sample ( $p > 0.05$ ). Eight (5.6%) newborns had signs suggestive of umbilical sepsis in the pre-intervention compared with five (3.3%) in the post-intervention ( $p > 0.05$ ).

As summarized in Table 4, during the post-intervention phase, 33 out of 150 newborns (22.0%) had experienced any undesirable health events since being taken home until the completion of the neonatal period. In comparison with the corresponding baseline rate, this was a 35% reduction ( $\chi^2 = 5.28$ ;  $p < 0.05$ ), indicating the effect of the intervention at community level. Even though the incidence of superficial infections has declined from 15.3/100 newborns to 8.7/100 newborns, the difference was not statistically significant, probably due to the small sample size.

#### Discussion

Our results indicate that educating health care workers about the current recommendations of umbilical cord care was an effective strategy in changing maternal behaviour. Given the evidence of no additional benefits of topical antiseptics [11, 16], and the country's achievement of neonatal tetanus elimination status [17], maternal and child health services in Sri Lanka recommends that umbilical cord should be kept open without any application or

TABLE 3  
Undesirable health events among newborns since being taken home until completion of 28 days, before and 3 months after intervention

Undesirable health event	Pre-intervention (n = 144)		Post-intervention (n = 150)	
	No.	(%)	No.	(%)
Infections				
Umbilical sepsis	8	5.6	5	3.3
Skin infection	9	6.3	5	3.3
Conjunctivitis	3	2.1	2	1.3
Rapid breathing or chest in-drawing	6	4.2	1	0.7
Diarrhoea	1	0.7	1	0.7
Upper respiratory infections	12	8.3	10	6.7
Oral thrush	2	1.4	1	0.7
Hypothermia	1	0.7	0	0.0
Unexplained fever	3	2.1	5	3.3
Other morbidities				
Constipation	3	2.1	2	1.3
Convulsions	1	0.7	0	0.0
Neonatal jaundice	6	4.2	5	3.3
Other signs and symptoms not classified elsewhere	3	2.1	2	2.1

Nine newborns in the pre-intervention and seven newborns in the post-intervention phase had more than one undesirable health events.

dressings. However, the use of topical applications on cord stump was a common practice at home, with 71.5% of mothers in the pre-intervention sample applying 'surgical spirit' on it. This was possibly due to the inappropriate health messages that mothers

TABLE 4  
*Clinical outcomes of newborns since being taken home until completion of 28 days, before and 3 months after intervention*

Indicator	Pre-intervention % (n = 144)	Post-intervention % (n = 150)	Percent change from pre to post	Significance
Newborns with any undesirable health event	34.0	22.0	-35.3	$\chi^2 = 5.28$ $p = 0.02$
Total undesirable health events per 100 newborns	40.3	26.7	-33.7	$\chi^2 = 6.13$ $p = 0.013$
Incidence of superficial infections <sup>a</sup> per 100 newborns	15.3	8.7	-43.1	$\chi^2 = 3.06$ NS
Re-admissions to hospital per 100 newborns	1.39	1.33	-4.3	$\chi^2 = 0.21$ NS

<sup>a</sup>skin pustules, red eyes with purulent discharge, whitish plaques in the oral mucosa and signs suggestive of umbilical sepsis were considered as superficial infections.

NS, not significant ( $p \geq 0.5$ ).

received from health staff or other sources about cord-care. Thus, the perinatal health care providers should be trained to disseminate consistent messages about the current recommendation of cord-care in the country.

The present study revealed that 91.7 and 93.6% in the pre- and post-intervention samples of newborns, respectively, were exclusively breastfed at 28 days of life. Successful breastfeeding practices in the community were attributed to the consistent efforts made by the health services in training health care providers and educating mothers during pregnancy, delivery and postpartum periods on breastfeeding [18–20]. Social and cultural aspects, which were in favour of breastfeeding, would also have contributed in promoting these practices. A nationally representative survey (The Demographic and Health Survey 2000) revealed that exclusive breastfeeding rate was 50.8% at 4 months [12]. The factors associated with poor exclusive breastfeeding rate in the country include lack of antenatal education on breastfeeding, Caesarean or complicated vaginal deliveries, mother's employment away home and mothers' perception of inadequate milk [19]. Several previous studies have shown that a breastfeeding training programme for maternity ward staff was followed by increased breastfeeding rates in community [21, 22]. In order to sustain high breastfeeding rates, we recommend that the training programmes for health staff on breastfeeding should be continued, focussing on women at risk of discontinuation of exclusive breastfeeding.

A field trial in India provided evidence for decline in a broad range of morbidities following an introduction of a comprehensive home-based neonatal care package [6]. The effect of our intervention did not reflect on individual morbidities, but occurred on overall incidence of morbidities. A higher sample size would require to make comparisons between individual morbidities with adequate statistical power. However, the focus of our intervention was on newborn care practices and overall neonatal outcome. The reduction in

incidence of infections (Tables 3 and 4) could be mainly attributed to the improved practices of cleanliness including appropriate care of the umbilical cord.

One limitation of our study design was the absence of a control group, thus we cannot exclude the natural changes in practices over the time that could occur in the absence of the intervention. We could not achieve the expected sample size since the household interviews were confined to a defined geographic area.

In conclusion, our findings suggest that the implementation of a comprehensive 4-day training programme of ENC for the maternity ward health professionals can be followed by a significant improvement in mothers' practices on care of umbilical cord. This intervention possibly has an effect on reducing undesirable health events generally among healthy newborns following the discharge. However, the study does not provide sufficient evidence regarding the influence on incidence of individual health problems.

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## APPENDIX 1

*Duration of training modules in the 4-day training programme on ENC for health care providers*

Training module	Duration
Introduction to workshop	1 h
1. Neonatal health and principles of essential newborn care	1 h
2. Care of the healthy newborn	2 h
3. Cleanliness/prevention of infections in the maternity unit	4 h
4. Initiation of breathing and resuscitation at birth	3 h 30 min
5. Partogram with special emphasis on the health of the newborn	1 h
6. Breastfeeding management in the healthy newborn	2 h
7. Breastfeeding difficulties	1 h 45 min
8. Baby friendly hospital initiative	1 h
9. Neonatal infections	2 h
10. Neonatal jaundice	1 h
11. Care of the premature/low birth weight baby	2 h
12. Newborns with birth trauma or birth defects	1 h 45 min
13. BCG immunization	2 h
14. How to give an effective health talk	2 h
15. Care of the newborn in the community	1 h 30 min
Preparation of action plans, presentations and winding-up	2 h 30 min
Total duration	32 h