A Tribute to Prof. Dulitha N Fernando

Review

Translation of evidence into practice: revisiting essential newborn care study outcomes**Upul Senarath**

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Professor Dulitha Nandanie Fernando (1944-2021) is much recognized for her contribution to high-quality research that generated evidence for public health policy and practice in Sri Lanka. The present article is one such example of her contribution to the translation of evidence into practice in maternal and child health. The article aims to demonstrate how the knowledge generated through a study conducted on essential newborn care in Sri Lanka during 2003-04 period enriched the global evidence base and impacted the newborn care programme and services in Sri Lanka.

Translation of research into practice

The gap between research findings and practice has been a concern especially in low- and middle-income countries (LMICs). There are numerous evidence-based health care practices, however adoption of such practices to improve health services is not optimal in many settings. Thus, it is necessary to test the effectiveness of interventions to promote and sustain the adoption of evidence based practices. The concept of translation research warrants the scientific investigation of methods that affect adoption of evidence based health care practices to improve clinical and operational decision making (1).

Numerous evidence-based practice guidelines have been developed by expert groups of different disciplines across the world, especially during the past two decades. Green and Seifert highlighted that

translation of new knowledge into practice proceeds through three stages, namely from awareness through acceptance to adoption (2). Educational methods, such as disseminating practice guidelines and continuing medical education, predominantly aim at awareness and acceptance. However, there is little understanding of how adoption actually takes place.

Essential Newborn Care (ENC) was designed to improve health of newborns through a minimum set of interventions that should be made available for all births (3). Essential newborn care is based on simple principles of prevention of infection, thermal protection, resuscitation of newborns with asphyxia, early and exclusive breastfeeding, care of low birth weight babies and identification and appropriate referral of sick neonates (4). Although cost-effective interventions to prevent neonatal deaths had been available in many developing countries, these

interventions were either not implemented on a wide-scale, were poorly implemented, or failed to reach populations with the greatest need (5).

Conceptualization of the research question

Training of health care providers is commonly viewed as an effective way to translate evidence into practices (6). Available studies on the effects of training for health care providers in hospital settings indicated that the implementation of such programs would be followed by moderate improvement in ENC practices during and after delivery (7-8). At the time of conceptualization of this study in the year 2002, the concept of ENC was new to many countries in the world including Sri Lanka. There were no special training programs on ENC either in the basic or in-service training courses within the health system. Introduction of the concept of ENC and appropriate training were identified as a need by the stakeholders of maternal and child health policy including its main stakeholder, the Family Health Bureau (FHB). The aim of the original study was to evaluate the effectiveness of a training program for health care providers in improving practices on a long-term basis of ENC in obstetric units.

Design, intervention and analysis

A two-group parallel arm, quasi-experimental study was conducted in the district of Puttalam in Sri Lanka during 2003-2004 period. The study followed a before-and-after design involving hospitals with delivery facilities (at least one delivery per day on average), which were randomly assigned either to an intervention or control group. The study participants consisted of mother-newborn pairs who received care from these hospitals. Multiple births, still births, or neonatal deaths and those who were treated in an emergency setting (e.g., special care baby unit, premature baby unit, or intensive care unit) were excluded. The sample included 446 mother-newborn pairs pre-intervention and 446 post-intervention (223 each in intervention and control groups).

The intervention was primarily targeted on midwives, nurses and doctors in the obstetric units to

improve their knowledge on ENC and develop the corresponding skills. A 15-module training manual was compiled by the investigators in consultation with an expert group. The contents were mainly based on the WHO Training Modules on Essential Newborn Care and Breastfeeding (9). A 4-day training program consisting of 32 training hours was conducted with the involvement of 12 resource persons. Among the teaching strategies, there were lecture discussions, demonstrations, hands-on training, practical assignments, and small group discussions. The control group followed the routine practices.

Data were collected using three methods: direct observation of practices during delivery in the labor room; exit interview of mothers; and field-based follow-up at household around 28-35 days of delivery. Data were collected before the intervention, and three months after completing the intervention. A similar number of direct observations (n=48), and exit interviews (n=446) were conducted in the hospital settings before and after, using the same tools. In the field-based study, 144 mother-newborn pairs were interviewed at home before the intervention and 150 mother-newborn pairs three months after the intervention. Pre- and post-intervention changes were examined within each arm, and between-arm comparisons were performed using Chi-squared test and independent sample t test. The detailed methodology is available in several journal articles published during 2006-07(10-13).

Reporting and dissemination of key findings

The findings of the study were disseminated through several means. The training manual and summary results were handed over to the FHB at central level, Medical Officer Maternal and Child Health of Puttalam District, and to all health institutions participating in the study. Results were presented at national level at the Annual Academic Sessions of the College of Community Physicians of Sri Lanka (2004) and Perinatal Society of Sri Lanka (2006), and at international level at the Asia Pacific Congress of Paediatrics (2007).

In order to disseminate the findings among a wider scientific community, four articles were published in

peer reviewed international journals during 2006-2007 period (10-13). The themes focused on each article were: maternal knowledge on newborn care (13), maternal satisfaction with care in obstetric wards (10), effectiveness of intervention in improving ENC at the hospital setting (12), and at home during neonatal period (11). The key findings of the study are summarized in Table 1.

Subsequent citations

The peer-reviewed journal articles of this study have been cited subsequently by several authors, and the number of citations according to the Google Scholar are summarized in Table 2. Altogether, 242 citations have been reported at the time of this publication, indicating that the knowledge disseminated through this study was useful for subsequent researchers. The most significant use is the incorporation of key results in several review articles and systematic reviews (n=27) including a Cochrane review, which have been published in high impact journals for global evidence (14-39). Majority of the systematic reviews focused on improving the quality of obstetric and newborn care in LMICs. Our study was cited frequently, with positive remarks about its methodological rigor, and direct relevance for evidence. For example, positive effects of the training package on newborn resuscitation and skin-to-skin care were well-recognized for high level of evidence(18,23)

The Cochrane review has found only a very few well conducted studies on the effects of in service training aimed at improving care of the newborn, and our study was one of the two studies included in the review (18). According to the Cochrane review, “In Senarath 2007, assessment of breathing of the newborn at birth and four of the five components of essential newborn care practices were improved in the intervention group after training”. Findings suggested that essential newborn care training slightly improves resuscitation preparedness with moderate certainty evidence. This study also contributed to the estimates of worldwide prevalence of mother-infant skin-to-skin contact after vaginal

birth in a global systematic review, in which it was revealed that the Sri Lankan prevalence of 50.2% found in the study, was the highest among the South Asian countries (25). On the other, some reviews highlighted limitations of this study including smaller sample sizes and observation bias.

Implications for MCH services

At the time of inception of this study, the neonatal mortality rate was showing a declining trend in Sri Lanka (Figure 1), but there were concerns about whether further reductions would be possible, and about the high neonatal morbidity. Our study demonstrated that evidence-based, cost-effective packages of interventions could improve newborn care, and thereby reduce adverse neonatal outcomes when appropriately implemented. The training manual developed for the study was utilized by the medical officer (maternal and child health) and pediatricians to train regional health staff in the respective district. However, its impact was not assessed. Subsequently, the FHB developed standards for newborn care for quality improvement of newborn health services in Sri Lanka (40). Essential and advanced newborn care packages were integrated into the intra-natal and newborn care programs at the national level. The key results of our study were useful in developing the guidelines and strategic plans, and in training of master trainers.

There were several advances in the intra-natal and newborn care programs few years following this study. The quality of newborn care has improved substantially with better newborn life support, implemented through the involvement of the College of Pediatricians and the Perinatal Society of Sri Lanka. As a result, the neonatal mortality continued to decline as shown in Figure 1. Further, proportional mortality rates due to preventable causes such as birth asphyxia, sepsis and prematurity have declined. It is not possible to attribute these improvements directly due to our study, however this study has become an eye opener and trigger to initiate the essential newborn care program in Sri Lanka.

Epilogue

Value of the research lies not only on its methodological rigor, but also on its visibility through timely dissemination and ability in translating the evidence into practices. Professor Fernando's dedication and commitment in mentoring junior researchers empowered them with high research skills, and helped carry forward an enabling research culture to the next generation. Trainees have learnt many lessons not only on the technical aspects of research, but also on the overall project management, while conforming to highest standards of research ethics. Professor Dulitha N Fernando

undoubtedly is the most renowned research mentor in my era, and her name will be remembered with gratitude among the medical fraternity in Sri Lanka.

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Competing interests: Author declares that there are no competing interest for the content of this publication.

Table 1: Conclusions of the study according to key research questions

Key research question	Conclusions
Maternal knowledge on newborn care	<ul style="list-style-type: none"> Mothers had a satisfactory level of knowledge about breastfeeding and recognition of danger signs, but knowledge about care of the umbilical cord was poor. Maternal education programmes should place more emphasis on first-time mothers, unemployed women, and those with delayed booking visits.
Maternal satisfaction with perinatal care	<ul style="list-style-type: none"> Providing immediate mother–newborn contact, information after examination and counselling on family planning enhanced maternal satisfaction with perinatal care. Special efforts should be made to develop interpersonal relationships, especially with first-time mothers and in higher level hospitals.
Effectiveness of the training program for care providers on ENC	<ul style="list-style-type: none"> A comprehensive 4-day training program can be followed by a significant improvement in essential newborn care practices in obstetric units. Follow-up in the community during 28-35 days of birth indicated a significant improvement in mothers' practices on care of umbilical cord and clinical outcomes of newborns.

Table 2: Research outputs of the essential newborn care study, with citations by subsequent researchers and reviewers

Journal publication	No. of citations	No. of review articles/ systematic reviews that incorporated the results of the publication
Senarath U, Fernando DN, Rodrigo I. Factors determining client satisfaction with hospital based perinatal care in Sri Lanka. <i>Trop Med Int Health</i> 2006; 11(9): 1442-1451	110	3
Senarath U, Fernando DN, Vimpani G, Rodrigo I. Factors associated with maternal knowledge of newborn care among hospital-delivered mothers in Sri Lanka. <i>Trans R Soc Trop Med Hyg</i> 2007; 101(8): 823-830.	59	2
Senarath U, Fernando DN, Rodrigo I. Effect of training for care providers on practice of essential newborn care in hospitals in Sri Lanka. <i>J Obstet Gynecol Neonatal Nurs</i> 2007; 36(6): 531-541.	57	19
Senarath U, Fernando DN, Rodrigo I. Newborn care practices at home: effect of a hospital-based intervention in Sri Lanka. <i>J Trop Pediatr</i> 2007; 53(2): 113-118.	16	3
Total	242	27

Figure 1: Infant and Neonatal Mortality Rates in Sri Lanka - 1970 to 2013

** Vertical arrow indicates the time of commencement of the study, in 2003

Source: Registrar General's Department

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