THE NEONATAL RESUSCITATION SKILLS TRAINING PROGRAM IN CAMBODIA
Its Impact on the Health Care Professionals’ Competency in Newborn Resuscitation

Keywords: Neonatal Resuscitation, Skills training, Health care professionals

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Introduction

“Birth asphyxia accounts for nearly 1 million neonatal deaths each year worldwide” (World Health Organization, 1995). If doctors and midwives in birthing rooms have appropriate neonatal resuscitation skills, they could save most of the babies’ lives. Neonatal resuscitation is indeed a very essential skill in maternal and child health.

In Cambodia, 46,000 infants die each year. Neonatal mortality constitutes about 30% of its under-five mortality. The country remains among the worst in South-East Asia in terms of neonatal, infant and under-five mortality rates. Cambodia is one of the poorest countries in Southeast Asia, with approximately one-third of its population below poverty line. This situation is further exacerbated by low literacy rates (55% for females and 71% for males), high burden of disease and shortage of trained health personnel. It has inadequate infrastructure and equipment, and the government has insufficient budget allocation for health. Health workers are poorly motivated due to low salaries (Cambodia Demographic Health Survey 2000).

In November 2004, the Reproductive and Child Health Alliance (RACHA), an NGO primarily funded by USAID together with a sponsoring entity, The Church of Jesus Christ of Latter-Day Saints Charities (LDSC) jointly launched a country-wide Neonatal Resuscitation Skills Training Program in Cambodia. It was a valuable undertaking to enhance the competence of the health care professionals in whose hands the care of the neonates are entrusted.

Forty-four (48) training courses and four (4) Training of Trainers (ToT) were conducted to a total of 1,657 trainees as of October 2006, which include 1,310 midwives, 129 nurses, and 218 medical doctors and medical assistants.

Twenty four (24) months after its launching, this study was conducted to evaluate the outcomes of the country-wide Neonatal Resuscitation Skills Training Program in terms of what the trainees learnt (theoretical knowledge), how the trainees apply their knowledge (practical skills) and the change in their birthing practices in their respective health facilities.

NRP Training Course in Cambodia

The Neonatal Resuscitation Program conducted in Cambodia was limited to a basic curriculum which excludes chest compression, intubation and medications. The country-wide Neonatal Resuscitation Skills Training Program covered only the following topics: 1. Overview and Principles of Resuscitation, Lesson 2. Initial Steps in Resuscitation, and 3. Use of Resuscitation Bag and Mask. The reference material used was the Neonatal Resuscitation Textbook published by the American Academy of Pediatrics and American Heart Association in 2000.
Research Problem

The study was undertaken to assess the outcomes of the Neonatal Resuscitation Skills Training Program in Cambodia in terms of the NRP trainees’ competence in neonatal resuscitation. Specifically, it sought to answer the following questions:

1. What is the level of competence of the health care professionals in Cambodia in terms of their theoretical knowledge on neonatal resuscitation during the following assessment periods:
   1.1 Pre-test,
   1.2 Post-test,
   1.3 Post-course follow-up?

2. What is the level of competence of the trainees in terms of practical skills in neonatal resuscitation?

3. Is there a significant difference between the theoretical knowledge of the trainees during the pre-test and post-test, and during the post-test and post-course follow-up assessment?

4. Is there a significant difference between the theoretical knowledge retention of early and late trainees?

5. Is there a significant difference between the practical skills of early and late trainees?

6. Is there a significant difference between the practical skills of the trainees with experience and those without experience using the bag and mask?

7. Is there a significant relationship between the theoretical knowledge retention (post-course follow-up) and practical skills of the NRP trainees?

8. What neonatal resuscitation equipment and supplies are available in the health facilities of Cambodia?

9. How effective is the utilization of the bag and mask in helping distressed newborns as perceived by the trainees?

10. Has the NRP training brought about changes in birthing practices in the maternity units of the different health facilities in Cambodia?

11. What are the parts of the NRP course that need to be strengthened?

12. What are the skills gaps of the trainees that need to be improved?

Null Hypotheses

H$_{01}$ There is no significant difference between the pre-test and post-test scores of the trainees.

H$_{02}$ There is no significant difference between the post-test and post-course follow-up scores of the trainees.

H$_{03}$ There is no significant difference between the theoretical knowledge retention of early and late trainees.

H$_{04}$ There is no significant difference between the practical skills of early and late trainees.

H$_{05}$ There is no significant difference between the practical skills of the trainees with experience and those without experience using the bag and mask.

H$_{06}$ There is no significant relationship between the theoretical knowledge and performance skills of the NRP trainees.

Methodology

This is a cross-sectional study involving qualitative observation. Data were evaluated on nominal and numerical scales. Basically, this study adopted the applicable International Guidelines for Neonatal Resuscitation particularly its Standard Performance Checklist in assessing the theoretical knowledge and performance skills of the NRP trainees on the Overview and Principles of Resuscitation, Initial Steps in Resuscitation, and Use of Resuscitation Bag and Mask.

Figure 3 shows the conceptual framework which explains the direction of this study.

Research Environment

This study covered 17 provinces/cities of Cambodia. These are: Battambang, Banteay Meanchey, Kampong Cham, Kampong Chhnang, Kampong Speu, Kampong Thom, Kampot, Kandal, Koh Kong, Mondulkiri, Pursat, Ratanakiri, Sihanoukville, Stung Treng, Svay Rieng, Phnom Penh, and Siem Reap. Excluded were Kratie, Kep, Oddor Meanchey, Preah Vihear and Prey Veng for the reason that no NRP training was conducted in these areas yet.

Research Subjects

The research respondents were the 355 trainees composed of 328 midwives, 9 medical doctors, 10 medical assistants, and 8 nurses.
The respondents were almost all women. They were chosen using stratified random sampling and using Sloven’s formula at 5% degree of error or 95% confidence coefficient. The actual number of respondents was 13% more than the computed sample size of 314.

Majority or 82% of the respondent trainees were aging between 31 to 50 years old. About 6% were aging below 30 years old, and 12% were above 50.

Survey Instruments

Four (4) sets of survey instruments were used in gathering the necessary data. All these questionnaires were translated in Khmer.

The first instrument was the Self-Assessment Questionnaire (SAQ) with 20 items which was used to assess the theoretical knowledge of the trainees before the NRP training, immediately after the training, and during the post-course follow-up assessment.

The second instrument was the Performance Skill Questionnaire (PSQ) with 13 questions. This was used by the NRP trainers in assessing the performance skills of the NRP trainees in the different assessment venues.

The third instrument was the Equipment and Supplies Checklist (ESC) to determine the neonatal resuscitation equipment and supplies available at the different health facilities.

The fourth instrument was the Utilization of Bag and Mask and Behaviour Change Assessment Questionnaire (UMB/BCAQ) which determined the effectiveness of the bag and mask in helping asphyxiated newborns and in assessing the change in birthing practices of the trainees in the maternity units of health facilities.

Data Analysis/Measures

The qualitative observations were described in terms of percentages and rates. The SPSS 13.0 software was used in computing the mean, standard deviation and in testing the hypothesis using the Wilcoxon Signed-Ranks Test, the Mann-Whitney U-Test, and Pearson Product-Moment Correlation (r).

The pre-test, post-test, post course follow-up, and practical skills scores were subjected to normality test using the Kolmogorov-Smirnov and Shapiro-Wilk tests.

Results

1. Level of Competence of the Trainees in Terms of Theoretical Knowledge on Neonatal Resuscitation During the Pre-test, Post-test, and Post-Course follow-up Assessment

Before the NRP training was conducted, majority or 56.6% of health care professionals in Cambodia has very low theoretical knowledge about neonatal resuscitation. The pre-test mean score of 43.85 is indicative that the doctors, midwives, and nurses in Cambodia have very low competence in terms of neonatal resuscitation knowledge before they attended the Neonatal Resuscitation Skills Training Program.
Result 1 continued…

Immediately after the NRP training, 31% of the trainees got very good scores, 35.5% got good, and 32.4% got below average score. The data yield the information that the NRP training has significantly improved the NR theoretical knowledge of the trainees. The post-test mean score of 85.16 confirms that immediately after the training, most of the trainees have acquired good theoretical knowledge in neonatal resuscitation.

During the post-course follow-up assessment, majority or 69.9% of the trainees got below average scores. The mean score of only 58.78 reveals that the neonatal resuscitation theoretical knowledge of the trainees has deteriorated to below average after the lapse of time. The late trainees have higher theoretical knowledge retention (62.48) compared to the early trainees (56.12). Knowledge retention of medical doctors was 79.44; medical assistants, 69.0; nurses, 68.12; and midwives, 70.36. All their scores fall within the range of below average. Figure 4 shows the frequency of assessment scores.

Fig. 4. Frequency of Assessment Scores

<table>
<thead>
<tr>
<th></th>
<th>Very low</th>
<th>Below Average</th>
<th>Good</th>
<th>Very good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test</td>
<td>201</td>
<td>152</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Post-test</td>
<td>4</td>
<td>115</td>
<td>126</td>
<td>110</td>
</tr>
<tr>
<td>Post-course</td>
<td>83</td>
<td>247</td>
<td>23</td>
<td>2</td>
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</table>

Theoretical Knowledge

The mean score of the trainees with experience using the bag and mask after the training was 72.23, while those (66%) with no experience got a mean score of 69.56.

3. Test of Significant Difference Between the Theoretical Knowledge Retention and Practical skills of Early and Late Trainees.

The computed z value of -3.289 using Mann-Whitney U Test indicates that there was a significant difference between the theoretical knowledge retention of the early and late trainees.
Theoretical Knowledge and Practical Skills

Figure 6. Comparative Scores of Early and Late Trainees

6. Test of Significant Difference Between the Practical Skills of Trainees With and Without Experience Using the Bag and Mask.

At p-value = .180 (z = -1.341), we accept the null hypothesis that there was no significant difference between the practical skills competence of the trainees with experience using the bag and mask and those who have not tried using it.

7. Test of Significant Relationship Between the Theoretical Knowledge and Practical Skills of NRP Trainees.

The computed r value of 0.429 denotes a moderate positive correlation with p-value = 0.00. There was only a slight relationship between the theoretical knowledge and practical skills of the trainees.

8. Neonatal Resuscitation Equipment and Supplies Available at the Health Facilities of Cambodia.

Only few basic neonatal resuscitation equipment and supplies were available at the health facilities of Cambodia. All Health Centers were wanting of these equipment and supplies.

Aside from the supplies and equipment checklist, the respondents also indicate that in their health facilities, they need more supplies, bulb syringe, delivery kit, forceps, scissors, doppler, suction and radiant warmer devices, vacuum extractor, oxygen supply, incubator, and smaller bag and masks. They also state that some equipment available are of poor quality and some also need to be replaced. This inadequacy of equipment and supplies is commonplace among health centers and at nearly all hospitals in Cambodia.


Majority or 55.2% of the trainees said that the bag and mask was very effective in helping asphyxiated babies.

After the training, 33.8% of the trainees have experienced using the bag and mask in resuscitating an aggregate number of 312 newborns in their health facilities while majority or 66% of the trainees have not experienced using the bag and mask.

Thirty-two percent (32%) of the trainees said that approximately, 308 babies survived after they give positive pressure ventilation using the bag and mask.

The reasons of the trainees why majority of them have not experienced using the bag and mask are as follows:

- Most babies they deliver were normal and do not require NR assistance at birth.
- The babies were okay after clearing the airway and placed skin to skin with the mother and there was no need to use the bag and mask.
- Some of them were not working in delivery related services.
• Some of them already forgot how to resuscitate due to lack of practice and have no more confidence to do it.

• People in the community believed more in traditional birth attendants (TBAs) rather than in midwives.

• They have delivered pre-mature and low birth-weight babies and the bag and mask does not fit the baby’s face.

• Midwives were not allowed to bring the bag and mask outside the HC so they apply only initial steps on the baby when assisting home deliveries.

• Midwives call the doctor if there are complicated cases.

10. Behavior Change in Birthing Practices of Health Care Professionals in Health Facilities in Cambodia

Almost all or 99.7% of the trainees said that the Neonatal Resuscitation Skills Training has brought about some changes in their birthing practices.

Some of the behaviour change indicated by the trainees were the following:

• They learn how to resuscitate a baby and how to use the bag and mask;

• The NRP training has given them a clear knowledge and skills on how to assess the baby’s condition, to resuscitate on time, and reduce infant mortality;

• Before, they used to flap the buttock of an apneic baby, but now they learn the new technique, that is to stimulate by slapping the baby’s foot or flicking the sole of the foot;

• They change from mouth to mouth ventilation to bag and mask ventilation; and

• They learn how to insert orogastric tube to empty air for effective ventilation.

11. Part of NRP Training that Need to be Strengthened

The part of the NRP course which needs to be reviewed were the preferred sequence of newborn resuscitation; when to insert an orogastric tube; and the best intervention for a newborn who is breathing and has adequate heart rate, but who has persistent central cyanosis.

12. Skills Gap of the Trainees that Need to be Improved

The skills gaps of the trainees were on the four initial steps that midwife or health providers need to focus when the baby is born immediately; the initial steps of resuscitation; how to evaluate the heart rate; and what to do after completing the resuscitation for 30 seconds but the baby is not breathing and the heart rate remains less than 100 bpm

CONCLUSIONS

The Neonatal Resuscitation Program has tremendous impact on the knowledge improvement of the health care professionals in Cambodia. However, both theoretical knowledge and practical skills of the trainees deteriorate over time. Their theoretical knowledge was found to decline faster than their practical skills, which means, the retention of psychomotor skills was higher than the retention of theoretical knowledge. The late trainees have higher theoretical knowledge retention compared to the early trainees, but the practical skills of both groups do not differ with the lapse of time. There was only a slight correlation between theoretical knowledge and practical skills of the respondents. The below average competence was attributed to the lack of post-training support and supervision, unavailability of resuscitation manikins and equipment at health facilities, educational level of the midwives, some NRP trained health workers not assigned in delivery related services, and the preference of pregnant women to be assisted by traditional birth attendants (TBAs) over midwives during delivery.

RECOMMENDATIONS

In view of the findings and conclusions in this study, the following recommendations are proposed:

• Conduct regular refresher courses on neonatal resuscitation based on identified areas that need improvement.

• Provide post-training support from the Chiefs of Provincial MCH and OD with interdisciplinary team approach and in collaboration with professional organizations in supervising and assessing the performance of the midwives in their respective areas.

• Issue Certificate of Accreditation to all qualified local trainers who will conduct neonatal resuscitation courses.

• Create a mobile training team that will reach out to both urban and rural health workers especially those in underserved areas.
• Make NRP training compulsory to all midwives and health workers directly working in delivery related services including the traditional birth attendants (TBAs).

• Make neonatal resuscitation an integral part to all midwifery and LSS training curriculum.

• Include neonatal resuscitation in the pre-service training of medical students.

• Tap prospective donors to provide more basic resuscitation equipment and supplies to Health Centers and Referral Hospitals.

• All Health Center midwives must be provided with bag and mask (fit for the size of Asian babies) that they can use in assisting home deliveries.

• Develop systematic standard report form to assess the impact of the NRP on neonatal mortality rate.

• Formulate national guidelines empowering the Health Center midwives to perform neonatal resuscitation at their level.

• The NRP refresher course design must consider the adult learners’ educational and literacy level.

• Conduct periodic assessment of the practical skills of the trainees and provide remedial training for those who need it.

• The government must give priority to public health programs and services, considering that spending for the health of its people is an investment that drives this country to progress.

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