

# Effectiveness of Neonatal Resuscitation Program in Improving Knowledge and Skills Among Nursing Officers Working in Maternal and Child Health Wards

## Abstract

**Background:** Newborn resuscitation involves reviving a newborn soon after birth to ensure normal breathing and circulation. This study aimed to evaluate the knowledge and skills of nursing officers in the Neonatal Resuscitation Program. **Materials and Methods:** A quasi-experimental study was conducted on 60 nursing officers, with 30 in the experimental group and 30 in the control group. They were working in Maternal and Child Health wards from March to April 2022. The participants were selected through simple random sampling from SGT Medical College Hospital and Research Institute and Kalawati Hospital in Gurugram, Haryana, India. The experimental group received a full day of hands-on Neonatal Resuscitation training on a rotating basis. Data were collected using a structured knowledge questionnaire and checklist to assess the knowledge and skills of both groups. Data analysis was performed using IBM SPSS for calculating frequency, percentage, Chi-square, and paired *t*-test. **Results:** In the experimental group, the mean (standard deviation (SD)) knowledge score increased from 12.46 (1.85) to 17.80 (2.07). However, there was no improvement in the control group 12.1 (2.84) to 11.70 (2.76). The mean (SD) skill level also increased in the experimental group from 9.43 (2.48) to 12.60 (2.71) as compared with the control group, from 9.73 (1.74) to 9.73 (1.50). A paired *t*-test was used, showing a significant difference between pre- and postknowledge ( $t_{60} = 7.55, p = 0.05$ ) and skills scores ( $t_{60} = 32.97, p = 0.05$ ) among the experimental group, with no significant difference in the control group. **Conclusions:** The study concluded that participation in a skill training program significantly improved the knowledge and abilities of nursing officers in neonatal resuscitation.

**Keywords:** *Demonstration, maternal and child health nursing wards, neonatal resuscitation program, nursing officers*

## Introduction

Neonatal resuscitation is used to revive a newborn that is not breathing or has other serious problems. In the first 28 days of life, 2.5 million infants worldwide are born, an additional 2.6 million babies are stillborn, and 50% of them were alive when labor first started.<sup>[1]</sup> Neonatal resuscitation is a series of emergency procedures performed by healthcare workers, such as doctors and nurses, to support newborn babies who are not breathing, gasping, or have a weak heartbeat at birth.<sup>[2,3]</sup> There is evidence that either insufficient or excessive oxygenation can be hazardous to the newborn infant, making it especially crucial to regulate oxygen optimally during neonatal resuscitation. Numerous organs can become injured by hypoxia and ischemia.<sup>[3-5]</sup>

Neonatal resuscitation, a sequence of procedures carried out at the time of birth to assist the child in breathing, is a straightforward, inexpensive intervention that has been demonstrated to drastically lower neonatal death from birth asphyxia by 20%–30%.<sup>[2,6-9]</sup> These programs provide standardized training to help healthcare professionals improve their knowledge and skills in newborn resuscitation. The early detection of a declining newborn to prevent cardiac arrest and the commencement of rapid basic life support procedures at the bedside are two important parts of the role of nurses.<sup>[10-12]</sup>

Many studies have been conducted to assess the knowledge of healthcare workers regarding neonatal resuscitation. However, there is an increasing need for neonatal resuscitation in developing countries where

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health facilities are not well developed.<sup>[1-3]</sup> Sometimes, in remote areas, the nurse alone must conduct the delivery. Most of the time, the nursing officer knows about neonatal resuscitation, but they do not know about the proper steps and the proper way to conduct neonatal resuscitation. Therefore, there is a need to educate and develop the basic skills of nursing officers regarding neonatal resuscitation, its importance, and how to give a new life to the baby by providing neonatal resuscitation. The main aim of this study was to assess the effectiveness of the neonatal resuscitation program for improving knowledge and skills among nursing officers.

## Materials and Methods

This quasi-experimental study was conducted among 60 nursing officers working in Maternal and Child Health (MCH) wards from March to April 2022 at SGT Medical College Hospital and Research Institute and Kalawati Hospital, Gurugram, Haryana, India. The study sample was selected using a simple random sampling technique that met the inclusion and exclusion criteria, including nursing officers whose authorities refused to participate, and nursing officers who attended deliveries and voluntarily participated by signing informed consent forms. For this study, we needed a minimum of 30 participants in each group. We calculated the sample size using a specific formula, where  $Z_1 = 1.96$ ,  $Z_2 = 0.84$ ,  $S$  = an estimate of the standard deviation (SD) of the measured variables between the two groups, and  $d$  = the minimum difference in the average of the measured variables between the two groups. To show a significant difference, we considered  $0.7S$ , resulting in a total of 60 participants for the study.

In this study, a structured questionnaire and checklist were used. The questionnaire consisted of three parts: demographic variables such as age, educational qualification, years of experience in nursing, number of times each procedure was performed, and any previous training programs attended. The knowledge assessment score had 25 multiple-choice questions, with one point awarded for each correct answer and zero for each incorrect answer. The questions covered topics such as newborn resuscitation, initial steps of resuscitation, bag mask ventilation, chest compression, and medication. Each subgroup in this tool received a score from 0 to 25, and the scoring system categorized the scores as 0–8 (32%) (poor), 9–16 [36–64%] (moderate), and 17–25 [68–100%] (good).<sup>[13]</sup> The assessment of nursing officers' skills consisted of 20 items with yes and no responses for each, and the scoring system categorized the scores as poor practice (0–10) and good practice (11–20). The tool was validated using expert views and suggestions, and the reliability was assessed using the test and retest method for the questionnaire and an “*r*” value of 0.0.81, and the checklist ““*r*” value of 0.90. The study took place in the MCH ward of selected hospitals. After obtaining

permission from the relevant authorities, nursing officers who met the inclusion criteria were selected using a simple random sampling technique. The study design and method were explained to them, and the intervention was then implemented. Informed consent was obtained from the nursing officer.

Before the intervention, the researcher completed Neonatal Resuscitation training at the National Reference Simulation Centre, SGT University, and obtained a valid certificate. Following the random allocation of samples to the intervention and control groups, the intervention commenced. Pretest data were collected on the first day using a structured questionnaire comprising 25 items to assess knowledge and an observational checklist with 20 items to evaluate skill levels in both the experimental and control groups of nursing officers posted in MCH wards at two selected hospitals. Data collection took at least two months, with each session lasting 25–30 min.

In the experimental group, after the pretest, the investigator provided skill training in performing the initial steps of neonatal resuscitation to 30 nursing officers. This training included bag-mask ventilation, chest compression, and medication. The initial steps involve assessing if the baby needs resuscitation, tying and cutting the cord, informing the mother about the baby's breathing difficulty, transferring the baby to a warm, clean, flat, and dry surface, and providing warmth. The baby should be positioned on its back with the head slightly extended to open the airway. A folded piece of cloth should be placed under the baby's shoulders to maintain this position. If the baby does not cry after birth, drying, repositioning, and providing tactile stimulation should be performed. Safe and appropriate methods of providing tactile stimulation include slapping or flicking the soles of the feet and gently rubbing the newborn's back or extremities. If the baby is still not breathing normally after 30 s, ventilation with a bag and mask should be started. Chest compressions are recommended for a heart rate that is less than 60 per min, despite adequate ventilation with supplementary oxygen for 30 s. Drugs are rarely indicated in newborn resuscitation, and their use should be determined by the specific circumstances of the case and under expert guidance.<sup>[14,15]</sup>

The control group underwent pretests and posttests without any intervention. The data were analyzed using IBM SPSS and assessed using frequency, percentage, Chi-square, and paired *t*-tests. A comparison of the groups was made based on factors such as age, educational qualification, total years of experience, number of procedure occurrences, and participation in workshops or seminars using the Chi-square test. Additionally, the collected data were tabulated and analyzed with frequency, percentage, and paired *t*-tests. Statistically significant *p* values were considered when they were less than 0.05.

## Ethical considerations

The present study was taken ethical clearance from the Institute Ethical Committee of the Faculty of Nursing, SGT University, Gurugram (Ref. No. FON/SGTU/22/1336 dated 29.01.2022). A written consent from the nursing officers in the study was obtained, and the samples assured that their information was confidential.

## Results

The data were analyzed using descriptive and inferential statistics. Descriptive statistics included demographic distribution, while effectiveness was assessed using paired *t*-tests and associations with nominated demographic characteristics via Chi-square tests.

The study involved 60 nursing officers, and their demographic variables are summarized in Table 1. In the experimental and control groups, the majority were 40% aged 26–30 years and 36.60% aged 31–35 years. In terms of education, the majority (53.30% and 50%) had completed General Nursing and Midwifery. Regarding total years of experience, 50% and 40% had 1–3 years of experience. When it comes to the number of times the procedure was performed, 90% and 93.30% had performed it 1–5 times. As for in-service education/workshops/seminars attended, the majority (63.30% and 60%) did not attend. For those

who did attend, the majority (54.50% and 66.60%) attended once, while 45.40% and 33.30% attended twice.

## Assessing the level of knowledge among nursing officers working in MCH wards

The pretest knowledge scores of the experimental group showed that 93.30% (28) of the sample had moderate knowledge, while 6.60% (2) of the samples had good knowledge. In the control group, 83.30% (25) of the sample had moderate knowledge, 10% (3) had good knowledge, and 6.60% (2) had poor knowledge. The overall pretest mean and SD of knowledge were 12.46 (1.85) in the experimental group and 12.10 (2.84) in the control group among nursing officers working in MCH wards.

## Assessment of skill

The study evaluated the pretest skills of nursing officers in the MCH ward on neonatal resuscitation. The experimental group had 10 participants (33.30%) with good practice and 20 participants (66.60%) with poor practice, whereas the control group had 9 participants (30%) with good practice and 21 participants (70%) with poor practice. The overall pretest mean and SD of skills were 9.43 (2.48) in the experimental group and 9.73 (1.74) in the control group.

## Findings related to the distribution of posttest level on neonatal resuscitation program for improving knowledge and skills among nursing officers working in MCH ward

The posttest knowledge score of the experimental group showed that 76.60% (23) of the sample had good knowledge, whereas 23.30% (07) had moderate knowledge. In the control group, 86.60% (26) had moderate knowledge, 3.30% (1) had good knowledge, and 10% (3) had poor knowledge. The overall posttest mean and SD of knowledge was 17.80 (2.07) in the experimental group and 11.70 (2.76) in the control group among nursing officers working in MCH wards.

In Figure 1, it is shown that overall, 86.60% (26) had good practice in the control group. The overall posttest mean and SD of skills was 17.80 (2.07) in the experimental group and 11.70 (2.76) in the control group, respectively.

## Effectiveness of neonatal resuscitation program on knowledge and skill among nursing officers working in MCH ward

In Table 2, a paired *t*-test was used to compare the knowledge and skills scores of the experimental group before and after a neonatal resuscitation program. The calculated value (12.04 and 7.59) exceeded the tabulated value, leading to the rejection of the null hypothesis (H01) and acceptance of the alternate hypothesis (H02) at a significance level of  $p < 0.05$ . This indicates a significant improvement in knowledge and skills among nursing officers in the MCH ward.

**Table 1: Frequency and percentage distribution of demographic characteristics, n=60**

Sample characteristics	Experimental group n (%)	Control group n (%)
Age		
20–25 years	9 (30)	9 (30)
26–30 years	12 (40)	10 (33.30)
31–35 years	9 (30)	11 (36.60)
Education		
ANM*	3 (10)	8 (26.60)
GNM**	16 (53.30)	15 (50)
BSc (N)***	11 (36.60)	7 (23.30)
Total year of experience		
<1 year	8 (26.60)	13 (43.30)
1–3 years	15 (50)	12 (40)
4–6 years	7 (23.30)	5 (16.60)
Number of times procedure performed		
1–5 times	27 (90)	28 (93.30)
6–10 times	3 (10)	2 (6.60)
In service education/workshop/seminar attended		
Yes	11 (36.60)	12 (40)
No	19 (63.30)	18 (60)
If yes, how many times attended		
Once	6 (54.50)	8 (66.60)
Twice	5 (45.4)	4 (33.30)

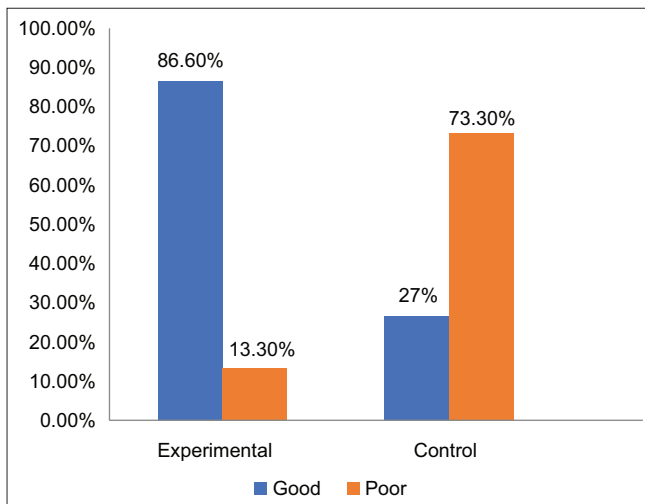
\*Auxiliary Nurse Midwifery; \*\*General Nursing and Midwifery;

\*\*\*Bachelor of Science in Nursing

**Table 2: Effectiveness of neonatal resuscitation program on knowledge and skill among nursing officers working in maternal and child health ward**

Score	Group	Pretest mean (SD)	Posttest mean (SD)	Mean difference	Paired sample “t”
Knowledge score	Experimental group (30)	12.46 (1.85)	17.80 (2.07)	5.33	7.55* <i>p</i> is 0.00
	Control group (30)	12.10 (2.84)	11.70 (2.76)	0.4	0.94 <i>p</i> is 0.35
Skills score	Experimental group (30)	9.43 (2.48)	9.73 (1.74)	3.3	32.97* <i>p</i> is 0.00
	Control group (30)	17.80 (2.07)	11.70 (2.76)	0.00	0 <i>p</i> <1 <sup>s</sup>

\*Paired *t*-test at 0.05 level of significance; SD=standard deviation; \$ NS=not significant



**Figure 1: Bar graph showing the posttest skills level in both experimental and control groups**

On the other hand, the control group showed a calculated value (0.94 and 0.00) of knowledge and skills score that was lower than the tabulated value. Consequently, the null hypothesis (H01) was accepted, and the alternate hypothesis (H02) was rejected at a significance level of  $p > 0.05$ . This suggests that there was no significant difference in the pre- and postknowledge and skills scores among the control group.

#### Findings on the association between postassessment level of knowledge and the selected demographic variables

The relationship between the postassessment level of knowledge and the demographic characteristics of the experimental group was analyzed using Chi-square tests for age, educational qualification, total years of experience, and the number of times the procedure was performed. The tabulated Chi-square values were  $\chi^2 = 0.00$ ,  $\chi^2 = 0.00$ ,  $\chi^2 = 0.00$ ,  $\chi^2 = 0.00$ , and  $\chi^2 = 0.05$ , respectively. This analysis showed that only age, educational qualification, total years of experience, and the number of times the procedure was performed had significant Chi-square values at the 0.05 level of significance. Therefore, the research hypothesis (H) was accepted, and the null hypothesis (H03) was rejected for these variables. However, at the 0.05 level of significance, in-service education/workshop/seminar attendance did not show significance. Therefore,

the null hypothesis (H03) was accepted, and the research hypothesis (H3) was rejected for this variable.

#### Findings on the association between postassessment levels of skills with the selected demographic variables

The relationship between the postassessment skill levels and the demographic characteristics of the experimental group was analyzed using Chi-square tests. The Chi-square values for age, educational qualification, total years of experience, number of times the procedure was performed, and attendance at in-service education/workshops/seminars were found to be  $\chi^2 = 0.05$ ,  $\chi^2 = 0.00$ ,  $\chi^2 = 0.00$ ,  $\chi^2 = 0.00$ , and  $\chi^2 = 0.00$ , respectively. This indicates that only educational qualification, total years of experience, number of times the procedure was performed, and attendance at in-service education/workshops/seminars were significant at the 0.05 level of significance. Therefore, the research hypothesis (H4) is accepted, and the null hypothesis (H04) is rejected. At the 0.05 level of significance, the computed Chi-square values for age were not significant. Consequently, the null hypothesis (H04) is accepted, and the research hypothesis (H4) is rejected.

#### Discussion

The pretest mean and SD of knowledge were 12.46 (1.85) in the experimental group and 12.1 (2.84) in the control group. The mean and SD of skills were 9.43 (2.48) in the experimental group and 9.73 (1.74) in the control group. The posttest mean and SD of knowledge were 17.8 (2.07) in the experimental group and 11.7 (2.76) in the control group, respectively. The overall posttest mean and SD of skills were 17.8 (2.07) in the experimental group and 11.7 (2.76) in the control group of the neonatal resuscitation program on knowledge and skill among nursing officers working in the MCH ward. The study was supported by Balakrishnamony and Balasubramanian.<sup>[16]</sup> Their study showed that in the experimental group, the mean posttest knowledge score was  $32.4 \pm 4.31$ , which was significantly higher than the pretest knowledge score of  $16.73 \pm 4.05$ .

Briggs *et al.*<sup>[17]</sup> found that the mean baseline knowledge and skills scores were  $35.22\% \pm 12.90\%$  and  $21.40\% \pm 16.91\%$ , respectively. After training, these scores increased to  $81.48\% \pm 7.05\%$  and  $87.40\% \pm 13.97\%$  respectively ( $p = 0.00$ ). These results are consistent with the findings

of Narayan *et al.*, where the mean (SD) score before the workshop was 9.03 (SD 2.66), and it increased to a mean (SD) of 15.53 (SD 1.93) after the event. The 95% confidence interval for this improvement was from -7.41 to -5.59, and the *p* value was  $p < 0.001$  (two-tailed). Additionally, Sahoo *et al.*<sup>[13]</sup> reported that 38 (76%) of nursing students in the experimental group had poor knowledge in the pretest, whereas 12 (24%) had an average level of knowledge, and none of them had good knowledge. In the control group, 28 (56%) of nursing students had poor knowledge, 22 (44%) had average knowledge, and none of them had good knowledge. In the posttest, 0 (0%) of nursing students in the experimental group had poor knowledge, 32 (64%) had an average level of knowledge, and 18 (36%) had good knowledge. In the control group, 24 (48%) of nursing students had poor knowledge, 26 (52%) had average knowledge, and none of them had good knowledge. The unpaired *t*-test showed a value of 13.04, indicating a significant difference in pretest and posttest knowledge. During the pre- and posttraining skill evaluation, the researchers were not blinded. However, bias was less likely to occur because the examination used a skills checklist and had clear scoring guidelines. Participants may have reviewed lecture notes beforehand, resulting in better scores. This could not be controlled for in this study.

## Conclusion

The results of the study indicated that neonatal resuscitation programs significantly improved the knowledge and skills of nursing officers in the experimental group. This suggests that all nursing officers can effectively handle newborn resuscitation, leading to a reduction in neonatal mortality and morbidity. However, it is important to note that despite efforts in the nursery, cardiac arrest incidents are not always preventable. Therefore, nursing officers must be prepared to intervene promptly and implement life support measures when necessary.

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## Conflicts of interest

Nothing to declare.

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