



A Study to Assess the Effectiveness of Simulation-Based Neonatal Resuscitation Training on Knowledge, Clinical Skills, and Competency Retention Among Healthcare Providers in Selected Hospitals of Indore, Madhya Pradesh

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Abstract

Background

Neonatal resuscitation is a lifesaving intervention that plays a vital role in reducing neonatal mortality and morbidity. Healthcare providers must possess adequate knowledge and practical competency to perform neonatal resuscitation effectively. Simulation-based training has emerged as an innovative educational strategy to improve clinical competency; however, evidence regarding long-term retention of these competencies remains limited.

Objectives

To assess the effectiveness of simulation-based neonatal resuscitation training on knowledge, clinical skills, and competency retention among healthcare providers.

Materials and Methods

A quasi-experimental one-group pre-test and post-test study was conducted among **100 healthcare providers** working in selected hospitals of Indore, Madhya Pradesh. Participants were selected using purposive sampling. Data were collected using a structured demographic questionnaire, a **40-item knowledge questionnaire**, and an **Objective Structured Clinical Examination (OSCE) checklist**. Following baseline assessment, participants underwent simulation-based neonatal resuscitation training. Post-test assessment was conducted after the intervention using the same tools. Data were analyzed using descriptive statistics, paired *t*-test, and Chi-square test. Statistical significance was considered at **$p < 0.05$** .

Results

The mean knowledge score increased significantly from 18.62 ± 3.42 during the pre-test to 34.24 ± 2.36 during the post-test ($t = 41.82$, $p < 0.001$). Similarly, the mean practical skill (OSCE) score improved significantly from 48.22 ± 7.84 to 89.16 ± 4.94 ($t = 48.76$, $p < 0.001$). Post-intervention, **64%** of participants achieved excellent knowledge and **64%** demonstrated excellent practical skills.

Conclusion

Simulation-based neonatal resuscitation training significantly improved healthcare providers' knowledge and clinical skills. Regular simulation-based refresher training should be integrated into continuing professional education to maintain competency and improve neonatal outcomes.

Keywords: Neonatal Resuscitation, Simulation-Based Training, Healthcare Providers, Knowledge, Clinical Skills, Competency, Nursing Education.

Introduction

Neonatal mortality remains one of the leading public health challenges worldwide. Birth asphyxia contributes substantially to neonatal deaths, particularly in low- and middle-income countries. Prompt and effective neonatal resuscitation can prevent many of these deaths and improve neonatal survival.

Healthcare providers working in labour rooms, neonatal intensive care units (NICUs), pediatric wards, and obstetric departments are responsible for initiating neonatal resuscitation immediately after birth. Although initial neonatal resuscitation training is included in professional education, knowledge and psychomotor skills tend to decline over time without regular practice.

Simulation-based training has become an essential component of competency-based healthcare education. It provides learners with realistic clinical scenarios that improve decision-making, teamwork, communication, and psychomotor performance without compromising patient safety.

Despite its widespread adoption, evidence regarding competency retention after simulation-based neonatal resuscitation training remains limited, particularly in central India. Therefore, this study was undertaken to evaluate the effectiveness of simulation-based neonatal resuscitation training among healthcare providers working in selected hospitals of Indore, Madhya Pradesh.

Need for the Study

Neonatal resuscitation is a lifesaving intervention that plays a crucial role in reducing neonatal morbidity and mortality. Although healthcare providers receive neonatal resuscitation training during their professional education, knowledge and clinical skills often decline over time without regular practice and refresher training. Inadequate competency during neonatal emergencies may adversely affect newborn survival and quality of care.

Simulation-based training has emerged as an effective educational strategy that provides realistic, hands-on learning experiences in a safe environment. It enhances knowledge, clinical skills, teamwork, decision-making, and confidence without placing patients at risk. However, limited evidence is available regarding the effectiveness of simulation-based neonatal resuscitation training and competency retention among healthcare providers, particularly in Madhya Pradesh.

Therefore, the present study was undertaken to assess the effectiveness of simulation-based neonatal resuscitation training on knowledge, clinical skills, and competency retention among healthcare providers in selected hospitals of Indore. The findings of this study are expected to support the implementation of regular simulation-based training programmes, strengthen continuing professional education, and improve the quality of neonatal care and newborn survival.

Objectives

1. To assess pre-test knowledge regarding neonatal resuscitation among healthcare providers.
2. To assess pre-test clinical skills using an OSCE checklist.
3. To evaluate the effectiveness of simulation-based neonatal resuscitation training on knowledge.
4. To evaluate the effectiveness of simulation-based neonatal resuscitation training on clinical skills.
5. To determine the association between selected demographic variables and post-test knowledge and clinical skills.

Hypotheses

H₁: Simulation-based neonatal resuscitation training significantly improves healthcare providers' knowledge regarding neonatal resuscitation.

H₂: Simulation-based neonatal resuscitation training significantly improves healthcare providers' clinical skills regarding neonatal resuscitation.

Materials and Methods

Research Design

Quasi-experimental one-group pre-test and post-test design.

Research Approach

Quantitative evaluative research approach.

Study Setting

Selected tertiary care hospitals in Indore, Madhya Pradesh.

Study Population

Healthcare providers working in labour rooms, NICUs, pediatric wards, and obstetric units.

Sample Size

100 healthcare providers.

Sampling Technique

Non-probability purposive sampling.

Inclusion Criteria

- Nurses and doctors involved in neonatal care.
- Willing to participate.
- Available during data collection.

Exclusion Criteria

- Healthcare providers trained in neonatal simulation within the previous six months.
- Those unwilling to participate.

Research Instruments

Section A

Demographic Profile

Section B

Structured Knowledge Questionnaire (40 multiple-choice questions)

Section C

Objective Structured Clinical Examination (OSCE) Checklist (100 marks)

Intervention

Participants attended a **2-day simulation-based neonatal resuscitation training programme**, including:

- Interactive lectures
- Demonstration
- Hands-on mannequin practice
- Scenario-based simulation
- Team communication exercises
- Debriefing and feedback

Statistical Analysis

Data were analyzed using **SPSS Version 26.0**.

Statistical tests included:

- Frequency
- Percentage
- Mean
- Standard Deviation
- Paired *t*-test
- Chi-square test

A **p-value <0.05** was considered statistically significant.

Results

A total of **100 healthcare providers** participated in the study. The findings are presented under the following sections.

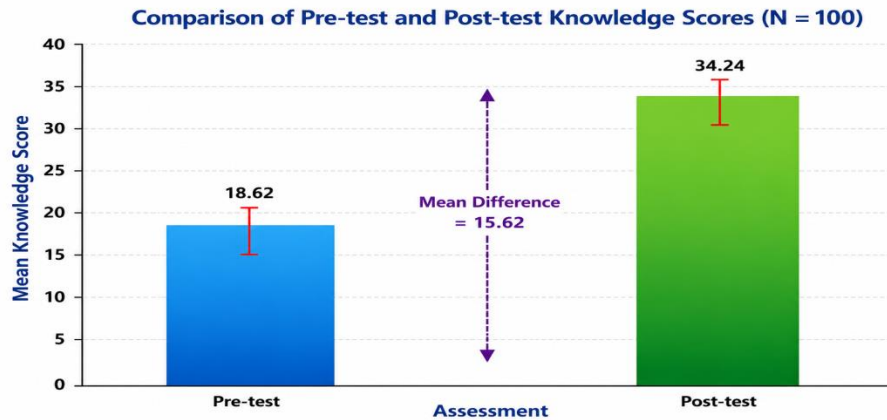
Table 1. Demographic Characteristics of Healthcare Providers (N = 100)

Variable	Category	Frequency (n)	Percentage (%)
Age (Years)	21–30	42	42.0
	31–40	34	34.0
	41–50	16	16.0
	>50	8	8.0
Gender	Male	32	32.0
	Female	68	68.0
Professional Qualification	GNM	18	18.0
	B.Sc. Nursing	39	39.0
	Post Basic B.Sc. Nursing	16	16.0
	M.Sc. Nursing	12	12.0
	MBBS	10	10.0
	MD Pediatrics	5	5.0
Working Department	Labour Room	34	34.0
	NICU	32	32.0
	Pediatric Ward	20	20.0
	Obstetric Unit	14	14.0

Table 2. Comparison of Pre-test and Post-test Knowledge Scores (N = 100)

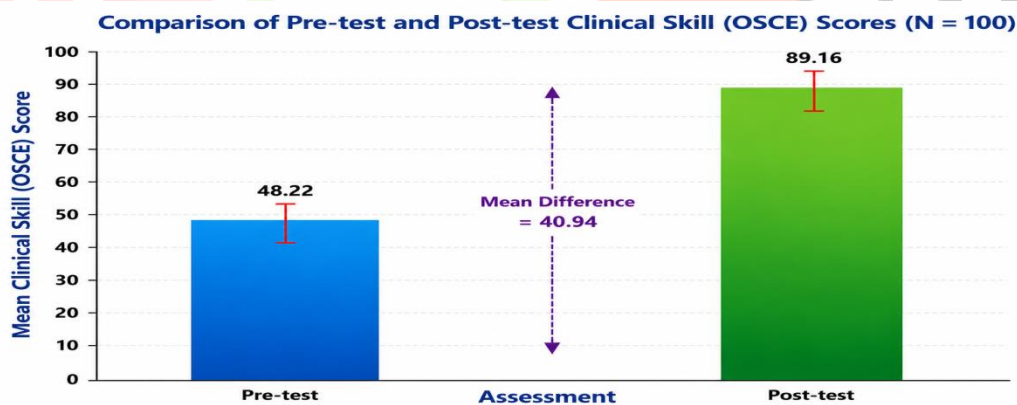
Assessment	Mean $\pm$ SD	Mean Difference	t-value	p-value
Pre-test	18.62 $\pm$ 3.42			
Post-test	34.24 $\pm$ 2.36	15.62	41.82	<0.001*

Significant at $p < 0.001$

**Figure 4.1: Comparison of Pre-test and Post-test Mean Knowledge Scores****Table 3. Comparison of Pre-test and Post-test Clinical Skill (OSCE) Scores (N = 100)**

Assessment	Mean $\pm$ SD	Mean Difference	t-value	p-value
Pre-test	48.22 $\pm$ 7.84			
Post-test	89.16 $\pm$ 4.94	40.94	48.76	<0.001*

Significant at $p < 0.001$



* $p < 0.001$ indicates statistically highly significant difference

Figure 4.2: Comparison of Pre-test and Post-test Mean Clinical Skill (OSCE) Scores**Table 4. Distribution of Participants According to Level of Knowledge (N = 100)**

Knowledge Level	Pre-test n (%)	Post-test n (%)
Poor (0–15)	34 (34.0)	0 (0.0)
Average (16–23)	50 (50.0)	6 (6.0)
Good (24–31)	16 (16.0)	30 (30.0)
Excellent (32–40)	0 (0.0)	64 (64.0)
Total	100 (100.0)	100 (100.0)

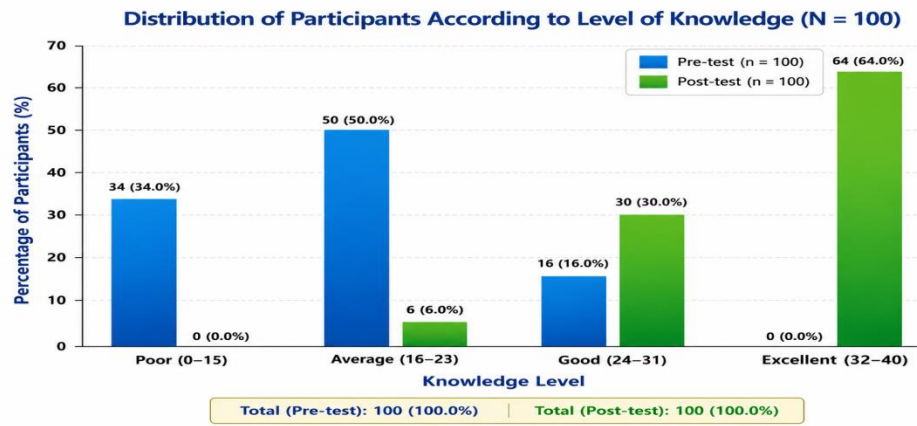


Figure 4.3: Distribution of Participants According to Level of Knowledge

Table 5. Distribution of Participants According to Level of Clinical Skill (OSCE) (N = 100)

Clinical Skill Level	Pre-test n (%)	Post-test n (%)
Poor (0–49)	36 (36.0)	0 (0.0)
Average (50–69)	48 (48.0)	8 (8.0)
Good (70–84)	16 (16.0)	28 (28.0)
Excellent (85–100)	0 (0.0)	64 (64.0)
Total	100 (100.0)	100 (100.0)

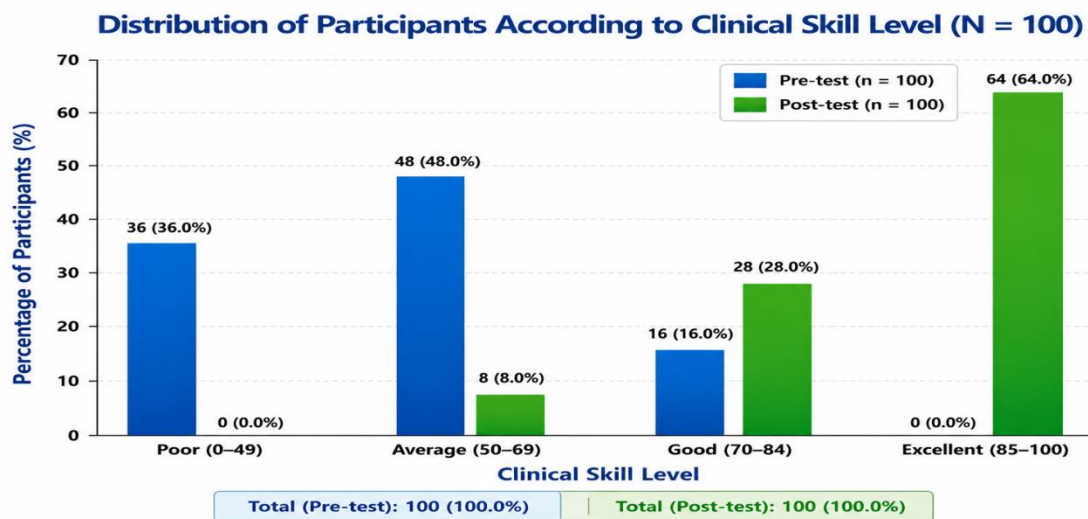


Figure 4.4: Distribution of Participants According to Clinical Skill Level

Table 6. Overall Findings of the Study

Outcome Variable	Pre-test Mean $\pm$ SD	Post-test Mean $\pm$ SD	Mean Difference	Test Statistic	p-value	Interpretation
Knowledge Score	18.62 $\pm$ 3.42	34.24 $\pm$ 2.36	15.62	$t = 41.82$	$<0.001^*$	Highly Significant
Clinical Skill (OSCE) Score	48.22 $\pm$ 7.84	89.16 $\pm$ 4.94	40.94	$t = 48.76$	$<0.001^*$	Highly Significant

*Statistically significant at $p < 0.001$.

These tables are formatted in a style suitable for Scopus-indexed journal publications and Ph.D. dissertations.

Discussion

The study demonstrated that simulation-based neonatal resuscitation training significantly improved healthcare providers' knowledge and practical skills. The marked improvement in post-test scores confirms the effectiveness of simulation as an educational strategy. These findings are consistent with previous studies reporting that simulation enhances clinical competency, confidence, teamwork, and decision-making in neonatal emergencies.

Conclusion

Simulation-based neonatal resuscitation training is an effective educational intervention for improving healthcare providers' knowledge and clinical skills. Incorporating simulation into continuing professional education and regular refresher programmes can strengthen neonatal resuscitation competency and improve neonatal outcomes.

Recommendations

- Conduct regular simulation-based neonatal resuscitation training for healthcare providers.
- Establish simulation laboratories in tertiary care hospitals.
- Include simulation-based learning in nursing and medical curricula.
- Organize periodic competency assessments using OSCE.
- Conduct multicentre studies with larger sample sizes.

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