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Original Article

Evaluation of a multimodal teaching method on essential newborn care among health providers at a tertiary care hospital

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ABSTRACT

Background: There is an unmet need for in-service training of health providers for essential new-born care. This study evaluated the ability of a multi-modal training workshop on new-born care to improve the knowledge and skills of health providers.

Methods: This was an intervention based pre-and post-study on 54 students who attended a two-day workshop on essential new-born care. The teaching used self-directed learning, demonstration, videos, webinars, podcasts, group discussion, role-play and individual feedback. Knowledge was assessed by a set of 25 peer-reviewed multiple-choice questions (MCQs), both pre-and post-test and skills by 3 peer-reviewed and validated objective structured clinical examination (OSCE) stations in the post-test period. Follow-up assessment after 10 months was also done for 30 students.

Results: There was a significant improvement in the knowledge scores on MCQs after the workshop [16.65 ± 1.84 vs 12 ± 2.98 , mean difference 4.65, 95%CI (3.85 to 5.44); p value < 0.0001]. The skill scores assessed by the OSCE were 92.35%, 83.50% and 78.86% of the expected scores respectively with a composite OSCE stations score of 83.90% of the expected score (100%). Follow-up assessment after 10 months showed a significant decline in knowledge scores, though skill scores were retained.

Conclusion: An essential new-born care workshop using multi-modal teaching methods resulted in an improvement in knowledge and skill scores among a diverse mix of nurses and doctors. This model of learning was acceptable and can be adapted for future training of health providers. There is a need for regular refresher training to maintain knowledge and skills.

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Introduction

India contributes to approximately 1/5th of the total global live births and has the dubious distinction of contributing to around 1/5th of under-5 mortality and 27% of neonatal mortality. More than 70% of infant mortality is due to neonatal deaths.¹ The three major causes of neonatal deaths in our country are preterm birth complications, infections and birth related complications.² There are also huge state-wise, urban-rural and gender differentials in Infant Mortality Rate (IMR) & Neonatal Mortality Rate (NMR). There has been remarkable progress in decreasing IMR with interventions like Oral Rehydration Solution (ORS), immunization, antibiotics for pneumonia etc., but the decrease in NMR is far from satisfactory.

The India Newborn Action Plan (INAP) launched in 2014 aims to achieve single digit NMR and stillbirth rate by 2030.³ The focus is on antenatal care of mothers, care during labour and childbirth, immediate new-born care and care of small and sick newborns. Care received by the mother and infant during the time of birth is crucial and nurses provide this care in most health-care settings and need to be proficient and skilled.

There are also other programmes like the Janani Shishu Suraksha Karyakram (JSSK) launched by the Govt of India under the National Rural Health Mission (NRHM) in 2011,⁴ providing for cashless delivery and free care for normal and sick newborns in Govt hospitals. The resulting increase in institutional deliveries has stretched the existing health care resources due to shortage of skilled and trained manpower for essential new-born care across the country.

Besides pre-service training, there are limited opportunities for in-service updating and refresher courses focusing on neonatal care for nursing staff.⁵ This facility-based new-born care workshop was designed to fill this need and test both the knowledge and skills of health care providers after the workshop and assess the acceptability and satisfaction of the teaching methods used.

Material and methods

Participants and setting

A total of fifty-four students (General Nursing and Midwifery (GNM) students, nurses-in-service, medical officers) participated in the workshop held in July 2017 at a tertiary care referral hospital of the Armed Forces. Each student was identified by a unique number assigned at the time of registration for the workshop to mask their identity.

The workshop was conducted by trained doctors and nursing faculty who had more than 10 years of experience in teaching and training in the field of new-born care.

Training content and methodology

The students were trained using the WHO-AIIMS Standard Treatment Protocol (STP) wall charts⁶ and the facility-based new-born nursing learners guide, 3rd edition⁷ which are

available free of cost from www.newbornwhocc.org. The workshop was conducted over two days and involved participatory learning in six groups of nine students each. The methods used self-directed learning, role-play, videos, demonstration, webinars, podcasts, hands-on practice on mannequins, assessment and individual feedback. Each workstation had two facilitators, who were subject experts (practicing clinicians, clinical instructors and faculty).

Each of the 6 group teaching sessions of STP wall charts on day one lasted 60 min (with regular breaks after every 2 h), which included 20 min each of teaching, demonstration and practice on mannequins/ group discussion.

On day two, the facility-based new-born nursing modules were covered in 3 sessions of 2 h each and included 15 min each of self-directed learning and webinars/videos or podcasts, followed by 30 min each of role-play and group discussion and lastly a 30-min individualized feedback.

The workshop ended with the post-test MCQs, OSCE stations and participant satisfaction assessment, followed by distribution of certificates.

Outcome assessment

The primary outcome of the workshop was assessment of improvement in knowledge and skills. Knowledge was assessed by 25 multiple-choice questions (MCQs) based on the content of the workshop (Care of at-risk and sick newborns, feeding of healthy and low birth weight newborns, hypothermia, shock, respiratory distress, jaundice, discharge advice, transport of a sick neonate) before and after the end of the training. The MCQs were peer-reviewed by faculty before the workshop. Skill assessment was done after the workshop by 3 Objective Structured Clinical Examination (OSCE) stations, which focused on case scenarios on feeding of an LBW newborn, measurement of temperature in newborns, and preparation of medications. The OSCE was also peer-reviewed and validated before the workshop.

At the end of the workshop, the content, teaching methodology and acceptability among the students was evaluated using a Likert's scale questionnaire, consisting of 15 questions (5-point scale; 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree).

A follow-up MCQ and OSCE assessment was done on 30 students who had initially participated in the workshop, in May 2018 (after 10 months). All these students continued to work in the paediatric ward, postnatal ward and Neonatal Intensive Care Unit (NICU) during their clinical rotation. The remaining 24 students (12 in-service nurses, 6 intern medical officers and 6 civilian nurses) were lost to follow-up due to exigencies of service (posting, leave etc.).

Data evaluation

Data was entered in Microsoft Excel and analysis was done using Graph Pad Prism software (Graph Pad Software Inc., USA). Mean and Standard Deviation (SD) were used for the MCQs and OSCE scores of knowledge and skill assessment, respectively. Continuous variables were compared using paired 't' test. *p*-Value of <0.05 was taken as significant.

Results

A total of 54 students participated in the workshop. Their qualifications and work profile are shown in Table 1.

Based on pre-and post-test MCQ scores, the knowledge of new-born care significantly improved among the participants after the workshop [16.65 ± 1.84 vs 12 ± 2.98 , mean difference 4.65, 95 % CI (3.85, 5.44); p -value < 0.0001] (Table 2). The median and inter – quartile range of knowledge scores of the participants have been depicted in the box and whisker plot (Fig. 1). Sub-group analysis was attempted, however, the participants in each group were small to have any meaningful interpretation.

Table 1 – Work profile of participants.

Category n = 54	
Gender (female)	50 (92.5%)
Clinical experience in new-born care	1 (0.5–3) yrs
Doctors: Basic qualification	
MBBS	6 (11.1%)
DNB (Paediatrics)	1 (0.01%)
Nurses: Basic qualification	
GNM students	30 (55.5%)
BSc Nursing	17 (31.4%)
Values expressed as number (%), median (range).	

The skill scores on OSCE stations for assessment of nasogastric feeding, measurement of temperature and preparation of medication was tested after the workshop and found to be 92.35 %, 83.50 % and 78.86 % of the expected scores respectively with a composite OSCE stations score of 83.90 % of the expected score (Table 3).

The participants expressed overall satisfaction with the workshop and the teaching methodologies used. They felt that it improved their confidence and proficiency and was very useful for their professional activities. They found the study material interactive and easy to learn. They also felt that the algorithmic approach and the related videos were very helpful, and they would be able to implement the techniques learnt into practice.

The follow-up assessment of the 30 students, after 10 months showed a significant decline in knowledge scores [12.83 ± 2.32 vs 17.17 ± 1.60 , mean difference 4.33, 95 % CI (3.21, 5.46); p -value < 0.0001]. The skill scores, however, showed a significant overall improvement (Table 4).

Discussion

The participants demonstrated an improvement in knowledge and skills regarding essential new-born care after the workshop. They also found the multimodality teaching – group discussions, demonstration, role play, videos, webinars,

Table 2 – Knowledge scores.

Outcome variables	Pre-test	Post-test	Mean difference, 95% CI	p Value [*]
MCQs ^a	12 ± 2.98	16.65 ± 1.84	4.65, (3.85 to 5.44)	< 0.0001
Values expressed as mean ($\pm$ SD).				
^a Max score 25.				
[*] p-Value by paired t test.

Fig. 1 – Box and whisker plot of knowledge scores.

Table 3 – Skill scores.

Outcome variables	Post-test score	Percentage of expected score [*]
Composite OSCE score ^a	35.24 ± 4.15	83.90%
OSCE station 1 (Assessment of nasogastric feeding)	12.93 ± 1.66	92.35%
OSCE station 2 (Measurement of temperature)	11.69 ± 1.81	83.50%
OSCE station 3 (Preparation of medications)	11.04 ± 1.80	78.86%
Values expressed as mean (±SD).		
^a Max score 42; all independent OSCE stations maximum score 14.		
[*] Expected score 100%.		

Table 4 – Follow-up assessment (n = 30).

Outcome variables	Initial assessment Jul 2017	Follow-up assessment May 2018	Mean difference, 95% CI	p value [*]
Knowledge scores				
MCQs ^a	17.17 ± 1.60	12.83 ± 2.32	4.33, (3.21 to 5.46)	<0.0001
Skill scores ^b				
Composite OSCE score	34.90 ± 4.73	37.50 ± 2.53	–2.60, (–4.29 to –0.91)	0.0038
OSCE station 1 (Assessment of nasogastric feeding)	12.83 ± 1.62	12.97 ± 1.33	–0.13, (–0.85 to 0.59)	0.7072
OSCE station 2 (Measurement of temperature)	11.90 ± 1.67	13.90 ± 1.03	–2.00, (–2.64 to –1.36)	<0.0001
OSCE station 3 (Preparation of medications)	10.90 ± 2.02	10.60 ± 1.81	0.30, (–0.72 to 1.32)	0.5521
Values expressed as mean (±SD).				
^a Max score 25.				
^b Max score 42; all independent OSCE stations maximum score 14.				
[*] p-Value by paired t test				

podcasts, assessment with individual feedback – to be very innovative and useful.

The medical officers and nurses showed a lower baseline score, probably reflecting a significant knowledge gap regarding essential new-born care among them. All the students showed a significant improvement in knowledge and skills after the workshop.

Traditional pre-service and in-service teaching generally involves didactic lectures or on-the-job training with no consistent or reproducible increase in knowledge or skills. There are limited opportunities for formal in-service training for nurses and there is a huge unmet need for training in new-born care.⁵ The workshop as a training modality has been employed earlier for NRP training,⁸ USG and ECHO learning workshops, ventilation workshops etc. This workshop attempted to utilise a multi-modal teaching method to impart essential new-born care to health care providers.

There have been other studies of different and newer, innovative models of learning among students, like webinars,⁹ e-learning,¹⁰ use of apps on smartphones^{11,12} that have all shown short-term improvements in both knowledge and skill scores among nurses and doctors after the training. Most of these newer learning models require easy access to smartphones, internet and a familiarity with the use of Apps. There has also been a revolution in the sphere of neonatal learning in the form of Online Training Programme in Neonatology

(ONTOP), driven by the limited training opportunities available in day-to-day clinical practice.¹³

The two-day hands-on workshop involved trained medical and nursing faculty who employed multi-modal teaching methods – videos, webinars, podcasts, demonstration on mannequins, role play, group discussion, individual feedback and opportunity to practice the skills on mannequins. Almost all aspects of facility-based new-born care were covered in the workshop, and it served as a refresher and update to the mixed group of nurses and doctors.

The follow-up assessment after 10 months showed a significant decline in the knowledge scores. However, the skill scores showed an overall improvement. This underlines the need for regular training and refresher courses. The retention of skills may be due to regular practice during the clinical rotation in the wards.

Our assessment has the inherent limitation of not testing the skills and team-work of the participants in a real-life clinical scenario. The same is possible by using high-fidelity simulation and case scenarios for teaching and training.^{14,15}

Conclusion

Essential new-born care workshop using multi-modal teaching methodologies resulted in an improvement in knowledge

and skill scores among a diverse mix of nurses and doctors. This model of learning was acceptable and can be adapted for future training of health care providers. In the long term, though skills may be retained due to clinical practice, there is a need for regular refresher training to maintain knowledge and skills.

Conflicts of interest

The authors have none to declare.

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