

INTRODUCTION OF IN SITU SIMULATION TRAINING FOR NEONATAL RESUSCITATION TO FINAL YEAR MBBS STUDENTS

Pushwinder Kaur^{1*}

1. Associate Professor, Department of Pediatrics, PIMS, Jalandhar.

*Corresponding author – Pushwinder Kaur

Email id – pushwinder566@gmail.com

Received:15/01/2020

Revised:13/01/2020

Accepted:25/02/2020

ABSTRACT

Background: Neonatal mortality occupies half of under-five mortality worldwide. Effective neonatal resuscitation at the time of birth accounts for declining neonatal mortality rate, learned through introduction of In situ simulation training to medical students, nurses and other paramedical staff at the early stage. **Methods:** A cross sectional study was conducted on 30 final year MBBS students during clinical posting in the Department of Pediatrics, Punjab Institute of Medical Sciences, Jalandhar in May, 2019. Students were exposed to In situ simulation training for neonatal resuscitation. Assessment of the students was done followed by feedback from students as well as faculty. Data collected was categorized as per Likert's scale. **Results:** Students felt better perception of the topic and gained confidence after the hands on training. Students showed better motivation. In situ simulation generated interest in them to learn more regarding the neonatal resuscitation. Students identified the lacunae between knowledge and clinical skills. Teachers also identified the lacunae between student's knowledge and clinical skills. Teachers identified the student's areas of improvement. **Conclusions:** Introduction of In situ simulation for neonatal resuscitation among final year MBBS students results in remarkable improvement in clinical skills as well as better perception of the steps of neonatal resuscitation.

Keywords: In situ simulation, Neonatal resuscitation.

INTRODUCTION

In 2017, neonatal mortality rate in India was 24, out of which birth asphyxia affects 20% of the newborns as a cause of neonatal mortality. Definitely the Neonatal Mortality Rate is declining steadily over last one decade, the Neonatal Mortality rate in Punjab is 21, attributed to timely intervention and trained staff attending the deliveries. Approximately 10% of newborns need tactile stimulation to breathe at the time of birth and 3-6% need positive pressure ventilation. (1) It is proved that the effective delivery of neonatal resuscitation could save 60000 neonates in India annually.(2) Various studies conducted on effect of In situ simulation in Neonatal resuscitation showed variable results, with some showing improvement in initial resuscitation and PPV skills, contrary to others which demonstrated no change in initial resuscitation or PPV skills.(3,4,5,6).

It is seen that many times students are not proficient enough to resuscitate a newborn independently in labour room, which is a life saving activity for newborns. Though neonatal resuscitation has a step ladder pattern with increasing skill perception at each succeeding level, students should be atleast accustomed with initial steps and bag and mask ventilation independently, as only 1% newborns need higher level of resuscitation. Many studies have also quoted that primitive lecture based learning is less fruitful as compared to the Hands on training. (7)

This study was conducted with the specific objectives: 1. To assess the perception of faculty and students about In situ simulation training as method of teaching. 2. To study the effect of In situ simulation training on student's motivation and

interest. 3. To study the improvement of psychomotor skills among students after introduction of this method. Many times lack of availability of trained health worker at the time of delivery leads to poor resuscitation and birth asphyxia in new-borns. It is seen that effective resuscitation done, even at areas with less resources does help in saving precious lives. With this notion in mind, I decided to conduct this study which will make students more clinically competent to deliver better service as a health care professional in clinical scenario.

MATERIALS AND METHODS

A cross sectional study was conducted after taking clearance from Institutional Ethics Committee, as one day workshop for In situ simulation training for neonatal resuscitation on 30 final year MBBS students during clinical posting in the Department of Pediatrics, Punjab Institute of Medical Sciences, Jalandhar in May, 2019. Questionnaire for the written and clinical assessment were structured beforehand and arrangements for the mannequins were done. Feedback questionnaire was validated by the faculty of Pediatrics department. Faculty and Students were sensitized prior to the study. Students were enrolled in the study after taking consent. Initially, the students were exposed to lecture using Audio-visual Aid followed by Hands on Training on Mannequins. Written assessment was conducted in the form of Multiple choice Questions, with maximum of 20 marks and no negative marking. Each question carried one mark. Clinical skills were assessed on the mannequins by one Professor and three Associate Professor independently without any interaction with students. The procedural stations were assessed by using checklist. Post session feedback from the students and faculty was also taken, by a questionnaire, graded on likert's scale.

Data analysis: All likert's scale responses were categorized into either positive(strongly agree, agree) and negative responses (neutral, disagree and strongly disagree). The data was represented in the form of Tables and Charts. Results obtained were analyzed using Microsoft Excel.

RESULTS

Table 1 shows the characteristics of the students involved in study. 30 male students in the age group of 21 to 25 years were enrolled.

Table 2 displays the data regarding feedback from students. 90% of the students enrolled in the study found use of mannequins as a very important teaching method. 93.3% of the students strongly

agree to gain in confidence and interaction of the faculty involved in the study. 96.6% of the students strongly agree to answer the queries by faculty. 76.6% of the students were very comfortable with the technique but 20 % showed neutral response. 76.6% of the students strongly agree felt the difference between hands on training and traditional method of teaching, whereas 20% agree to the point. 76.6% strongly agree to improvement in clinical skills after introduction of hands on training. 83.3% of the students strongly agree to increased motivation for learning. 80% of the students strongly agree to generation of interest after introduction of hands on training whereas 3.3% showed neutral response.

Table 3 displays the results of feedback from faculty. All the 4 faculty members involved in the study were satisfied with the introduction of hands on training, understand the training methods very well, found students very attentive, motivated for learning and enthusiastic in the class. 100% of the faculty members agree to student's improvement in psychomotor skills. 3 out of 4 faculty members found the technique very well understandable to the students and students asking for queries.

Table 4 depicting the results of total scores in knowledge and skills domain. Students scored 85% in knowledge domain and 90% in skills domain after the training.

Table 5 depicting the average score of students in three categories i.e; 0= Not Done, 1= Done incorrectly or not in order, 2= Done correctly. The average score in category 2 was 26.1, in category 1 was 3.2 and in category 0 was 0.5. Maximum students performed very well on performance evaluation checklist.

DISCUSSION

The utilization of hands on training on mannequins as an academic aid imparts a secure environment for students to learn the details about resuscitation training without any harm to the new-born. Our study was commenced with the aim of introduction of In situ simulation for neonatal resuscitation among final year MBBS students and to assess the perception, motivation and interest generated by this intervention among students. Our study showed all the students involved in the study were final year of MBBS and males in the age group of 21-25 years, with no previous exposure to hands on training for neonatal resuscitation. (Table 1) In contrast, Mohammad et al conducted a study on 35 nurses and

25 intern nursing student in the age group 28+2.3 years and 20+1.6years respectively, and more than two third nurses had experience of resuscitation.(7)

Our study revealed students had better perception of the neonatal resuscitation and faculty also observed that students had better understanding of neonatal resuscitation after the introduction of hands on training. (Table 2) It was found during training that students had an appetite for learning and were fast to pick up the details of resuscitation which was evident during the post-test evaluation as well. Perception was based upon the fact that majority of students performed sequential steps of resuscitation in order and briskly. Similarly, Amin et al in 2013 concluded that simulation training exhorted students perception of their knowledge, skills and confidence to train others in neonatal resuscitation. (8)

Our study revealed that 93.3% of students reported gain in confidence after this training. Simulation training not only developed their acumen and skills, but also their confidence as many of them who were shaky starters, felt at home over next few hours of training. (Table 2) Similarly, Weaver et al in 2011 denoted that enrolled students reports high confidence post simulation training reflecting the security of the environment. (9) Also Lambton et al in 2008 found that improvement in student confidence remain high throughout training. (10)

In addition, Maurya et al concluded that feedback about simulation teaching 86% nursing students were strongly agree with hands on training developed self-confidence. (11)

Our study demonstrated In situ simulation training for neonatal resuscitation generated interest and felt more motivated to learn about the topic. (Table 2) During the entire session, the students who were left spellbound by the enormity of the process of resuscitation were found to have equally stimulated to do the same in live patients. This revealed that their keenness to learn was remarkable.

Our study showed students identified the gap between knowledge and clinical skills. Similarly, faculty also identified the gap in student's knowledge and clinical skills and areas of improvement in their teaching. (Table 4) Written test evaluation significantly revealed that students scored 85% in knowledge domain and 90% in skills domain. After learning the process of resuscitation through didactic lecture and subsequently seeing the performance of faculty on mannequins on the faculty, the students realized that knowledge goes

hand in hand with practice, hence bridging the gap between two was essential by doing the task mentally and physically.

Our study described that majority of the students were comfortable with the training and they felt hands on training as a better way of teaching than traditional method of teaching. (Table 2) The response of students during the entire session revealed that they were at ease with the modern method of simultaneous application of visual, auditory and psychomotor tools of teaching.

Our study denoted that students had significant improvement in clinical skills after introduction of the hands on training. Although no pre-test was taken to assess their prior knowledge, it was assumed that such knowledge would have not been available to them in the past. Hence the results of the test were synonymous with efficacy of teaching. (Table 2) Similarly, Agha S et al in 2015 concluded that most of the medical students were satisfied that simulation based learning improved their knowledge retention, skills and communication. (12)

Our study had some limitations. Firstly, small sample size is one limitation. Our study was conducted on only 30 students, very less number of students to make a generalization. As this study was conducted over a short period of time, involving 150 students at one time require more manpower and infrastructure. So depending upon the feasibility and availability of resources students were enrolled in this study.

Secondly, pre-evaluation was not done. Pre evaluation gives the impression of already existing knowledge about the neonatal resuscitation, hence we were unable to infer the extent of new learning acquired through introduction of hands on training.

Thirdly, this study was conducted in only single institution. However, it is recommended that for generalization the sample size should be large and data should be collected from different institutions.

CONCLUSIONS

The present study concluded that In situ simulation training for neonatal resuscitation promotes confidence, motivation and interest in learning through practice on mannequins. Also, it is a practical and valid tool to improve student's performance, effectiveness and productiveness at clinical level.

WHAT IS ALREADY KNOWN?

Simulation based training improve student's knowledge retention, skills and communication.

WHAT THIS STUDY ADDS?

Simulation based training improves student's confidence, motivation and interest.

Students identified the gap between theoretical knowledge and clinical skills.

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How to cite this article: Kaur P., Introduction of in situ simulation training for neonatal resuscitation to final year MBBS students. *Int.J.Med.Sci.Educ* 2020;7(1):15-22

Table1: Characteristics of Final year MBBS students.

Items	Number	%age
Number	30	100
Males	30	100
Females	0	0
Age group		
21-23years	14	46.6%
23-25 years	16	53.4%
Mean \pm SD (age)	23.03 \pm 0.79	
Previous involvement in neonatal resuscitation or training.	0	0

Table 2: Feedback from students

Questions	Grade	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
1. How far did you find use of mannequins as teaching method as important?		0	0	1(3.3%)	2(6.6%)	27(90%)
2. How well did this training improved your confidence?		0	0	0	2((6.6%)	28(93.3%)
3. How well did the faculty interacted?		0	0	0	2(6.6%)	28(93.3%)
4. How well did the faculty answer the queries?		0	0	0	1(3.3%)	29(96.6%)
5. How well were you comfortable with the technique?		0	0	6(20%)	1(3.3%)	23(76.6%)
6. How far do you feel that the hands on training was different from traditional method of teaching?		0	0	1(3.3%)	8(26.6%)	21(70%)
7. How far did this training modify your perception of neonatal resuscitation?		0	0	1(3.3%)	3(9.9%)	26(86.6%)
8. How well did the hands on training improve clinical skills?		0	0	2(6.6%)	5(16.6%)	23(76.6%)
9. How well this technique motivated you for learning?		0	0	1(3.3%)	4(13.3%)	25(83.3%)
10. How well this technique generated interest in you?		0	0	1(3.3%)	5(16.6%)	24(80%)

Table 3: Feedback from Faculty

Grade Questions	1 (Strongly Disagree)	2 (Disagree)	3 (Neutral)	4 (Agree)	5 (Strongly Agree)
1.How well were you satisfied with the technique?	0	0	0	0	4(100%)
2.How well did you understand this teaching method?	0	0	0	0	4(100%)
3.How far you found the technique understandable to the students?	0	0	0	1(25%)	3(75%)
4.How far you found students attentive in the class?	0	0	0	0	4(100%)
5.How far you found students asking queries?	0	0	0	1(25%)	3(75%)
6.How far did you find students enthusiastic about this technique?	0	0	0	0	4(100%)
7.How far you found student's improvement in psychomotor skills ?	0	0	0	4(100%)	0
8.How far did you find students motivated for learning.	0	0	0	0	4(100%)
9.How far did you find students enjoying this technique of learning better than traditional method of teaching?	0	0	0	0	4(100%)
10.How far did you find students engaged and involved during session?	0	0	0	0	4(100%)

Table 4: Distribution of each question as per domain and overall score in respective domain.

Domains	Questions	Overall score (% age)
Knowledge	<ol style="list-style-type: none"> 1. Approximately 10% of newborns require some assistance to begin breathing at birth. 2. At every birth the presence of person skilled in neonatal resuscitation is not required ; a skilled person is required only in condition of increased risk of asphyxia. 3. The most important and effective action in a neonate requiring resuscitation is to ventilate the lungs. 4. Bag and mask should be ready in the labor room only in condition of increased risk of asphyxia, otherwise bag and mask should be kept in safe custody. 5. All newborns require an initial assessment to determine whether resuscitation is needed or not. 6. Some babies who do not breathe at birth respond to stimulation but others need bag and mask ventilation to start breathing. 7. With proper bag and mask ventilation the majority of newborns not breathing after initial steps begins spontaneous breathing. 8. The volume of bag used for ventilating a newborn should be 240-500ml. 	85%
Skills	<ol style="list-style-type: none"> 1. If newborn is not crying and meconium is present you should first suction mouth then nose before doing anything else. 2. The baby should be assessed immediately after birth and if the baby is not crying the birth attendant should wipe dry, provide warmth, reassess breathing, if not breathing then positions, clears airway, stimulates and repositions. 3. If the baby is not crying at birth, there is no activity and the baby is cyanosed , the baby is probably dead and there is no need to initiate resuscitation. 4. Appropriate from of tactile stimulation are ; slapping or flicking the sole as of feet or gently rubbing the back. 5. During selection of mask for assisted ventilation be careful that the mask should cover the chin, mouth and nose but not eye. 6. Immediately after starting bag and mask ventilation you should see if the chest is rising. 7. If the chest is not rising after bag and mask ventilation , it may be due to inadequate seal, blocked airway or not enough pressure being given by bag. 8. When ventilating a baby you should provide bag and mask ventilation at a rate of 40-60 breaths per minute. 9. Increase in heart rate is a very important sign of improvement after bag and mask ventilation. 10. To evaluate the efficacy of bag and mask ventilation the heart rate should be counted minimum for one minute. 11. To evaluate the efficacy of bag and mask ventilation the first assessment of heart rate should be done after ventilating for 2 minutes at a rate of 40-60 times per minute. 12. If a baby is not breathing at birth, he/she can be effectively resuscitated with bag and mask ventilation even if oxygen is not available. 	90%

Table 5: Clinical skills score.

ITEM	0	1	2
1.Demonstrates preparation of personnel, equipment and supplies	0	1	29
2.Tests function of Bag and mask	0	2	28
3.Asks for meconium, if present and baby not crying then carries out suction first	1	2	27
4.Dries, removes wet towel	0	1	29
5.Assesses baby's breathing	0	0	30
6.If baby not crying / breathing well then positions the baby and clears mouth then nose	1	3	26
7.Stimulates to breath and repositions	0	1	29
8.Requests description of breathing	3	5	22
9.Indicates need for positive pressure ventilation	0	4	26
10.Positions the head and applies the face mask correctly	0	5	25
11.Looks and asks is the chest rising?	2	3	25
12.Takes corrective action if chest rise not adequate	0	3	27
13.Ventilates for 30 seconds with appropriate rate and pressure	1	4	25
14.Asks to count heart rate correctly in 6 seconds if not breathing well	1	5	24
15.Takes action according to heart rate	0	7	23
16.Continues / discontinues positive pressure ventilation appropriately and indicates need for observational care or seek advanced care / organize referral.	0	6	24
Student's average score	0.5	3.2	26.1