

Original Research Article

Assessing competency in neonatal resuscitation among medical students, interns and postgraduate students: a study from a tertiary care hospital in North India

Piyush Gautam*, Nivedita Sharma

Department of Pediatrics, Dr. Rajendra Prasad Government Medical College, Tanda Kangra, Himachal Pradesh, India

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***Correspondence:**

Dr. Piyush Gautam,

E-mail: piyushgtm@yahoo.com

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ABSTRACT

Background: Birth asphyxia is a leading cause of neonatal mortality in India and many newborns suffer asphyxia due to lack of resuscitation skills among doctors. Fresh medical graduates get posted in the peripheral health centres where they handle all emergencies, including birth asphyxia. The aim of the study was to ascertain competency in neonatal resuscitation among medical students, especially interns who, within the next few months would be handling such babies.

Methods: Final year medical students (30), interns (30), and first and second year pediatrics postgraduate students (9) were included. They were assessed for knowledge by a questionnaire of 15 multiple choice questions (MCQ's), with a pass percentage of 73% (11/15). Practical skills were assessed by 4 assessors on a manikin using a skills assessment checklist of 11 skill items.

Results: The percentage of medical students, interns and postgraduates passing the theory test was zero, 15% and 33% respectively. In the skills assessment, it was found that bag and mask ventilation, the single most important and effective step in resuscitation was performed by only 17% MBBS students and 20% interns respectively. Though most postgraduates could perform majority of the skills, 44% did drying before suctioning which is a wrong sequence.

Conclusions: Medical students and interns are not competent in neonatal resuscitation. Even postgraduates, in absence of a structured training course are likely to fall short of the desired competency. So, there is an urgent need to train our medical students and interns so that as fresh graduates, they are competent to resuscitate asphyxiated newborns.

Keywords: Asphyxia, Competency, Neonatal, Resuscitation

INTRODUCTION

Birth asphyxia is defined simply as the failure to initiate and sustain breathing at birth.¹ It is a leading cause of neonatal mortality, contributing to almost 23% neonatal deaths worldwide.² A community based study from rural North India found birth asphyxia to be the leading cause of neonatal mortality.³ Approximately 10% of newborns require some assistance to begin breathing at birth and only 1% will need extensive resuscitation to survive.²

After birth, interruption of blood supply from the placenta means that the newborn is dependent on the lungs as the only source of oxygen. Therefore, the lungs must fill with oxygen over a matter of seconds, failing which the baby will suffer from asphyxia. Ventilation of the lungs is therefore considered as the single most important and effective step in cardiopulmonary resuscitation of the compromised newborn.² In India, many newborns suffer asphyxia due to lack of resuscitation skills among doctors. We do have the

Neonatal Resuscitation program (NRP), but such courses are meant primarily for paediatricians. In our country, most deliveries, especially in the rural areas, are attended by nurses or general practitioners, majority of whom are not trained in newborn resuscitation. Training medical students and interns in neonatal resuscitation can reduce the morbidity and mortality resulting from asphyxia. It is well known that birth asphyxia remains an important cause of adverse neurological outcome, including cerebral palsy, as was concluded in a meta-analysis by Zhang et al.⁴ Effective resuscitation at birth can prevent a large proportion of deaths and also the long-term neurodevelopmental effects resulting from asphyxia. A systematic review by Pammi et al showed that newborn resuscitation training programmes reduce early neonatal mortality.⁵ A study by Paula et al found that the medical school graduates' knowledge in neonatal resuscitation is quite precarious.⁶ Afzal et al, in their study found that the skill level of interns, who as medical students had not received any training in newborn resuscitation and basic life support, was significantly less as compared to those who had received such training.⁷ With this background, we carried out this study to assess competency in basic

neonatal resuscitation among medical students, interns and pediatrics postgraduate students.

METHODS

This was a cross-sectional observational study conducted in the department of Pediatrics at Dr. Rajendra Prasad Government Medical College Kangra at Tanda (HP) during the 1st week of July 2018 over a period of 4 days. The study was done on 3 groups of students, at various stages of their training, who had been exposed to the management of newborns with a delayed cry. There were 69 subjects, including final year medical students (n=30) who had completed their 1 month pediatrics posting, interns (n=30) who had completed their month Pediatrics posting, and first and second year Pediatrics postgraduate students (n=9) who had completed at least 1 month of their labour room posting. The students were assessed for both theoretical knowledge as well as practical skills in resuscitation. Knowledge was assessed using a multiple choice based questionnaire of 15 questions (formulated from Textbook of neonatal resuscitation, 6th edition: American Heart Association), as shown in (Table 1).

Table 1: Questionnaire for theory assessment.

Question	Choices
1.% newborns require some resuscitation at birth.	a) 5% b) 10% c) 15% d) 20%
2. During resuscitation, calculation of HR is done by counting the HR for:	a) 5 sec b) 6 sec c) 10 sec
3. Which apnoea is more dangerous?	a) Primary b) Secondary.
4. Chest compressions are started when heart rate is less than -----/minute	a) Two finger technique b) Two thumb technique c) Palm technique
5. The preferred technique for chest compressions is?	a) Increase in heart rate; b) Decrease in heart rate c) Apnea; d) Decrease in BP.
6. First sign of perinatal compromise is	a) 90 b) 100 c) 120 d) 140
7. Number of chest compressions to be done in 1 minute is:	a) Dry-Oronasal suction-Stimulate b) Oronasal suction-Dry-Stimulate c) Dry-Stimulat-Oronasal suction
8. Correct sequence of neonatal resuscitation is:	True/False
9. 1 minute Apgar score of 4 is an important clue to initiate resuscitation:	a) 1:1 b) 2:1 c) 3:1 d) 5:1
10. The ratio of compression to ventilation in neonatal resuscitation is:	a) IPPV; b) IPPV+chest compressions c) Inj Adrenaline; d) All of the above
11. A neonate is just delivered and you find irregular respiration, HR-40/min. Next step would be:	a) Assess heart rate; b) Assess respiration c) Reposition; d) a and b
12. In neonatal resuscitation, which step is followed after a newborn has been dried and stimulated?	a) 0.1 ml/kg of 1:1000; b) 0.1 ml/kg of 1:10000 c) 0.01 ml/kg of 1:10000
13. Correct dose of Injection Adrenaline in neonatal resuscitation is:	a) 100 mm Hg; b) 150 mm Hg c) 200 mm Hg; d) 250 mm Hg
14. Pressure of suction apparatus should be set at:	a) HR<100 b) HR<60 c) Weak radial pulse d) Irregular respiration
15. Which is not an indication of starting CPR?	

A minimum of 11 marks out of 15 (73%) were required for passing. Practical skills were assessed by 4 assessors, 1 consultant and 3 senior residents trained in neonatal advanced life support course (NALS), on a neonatal manikin using a skills assessment checklist of 11 skill items. Each skill item was marked as passed if performed correctly and failed if performed incorrectly or out of order. The skills tested are shown in Table 2.

Table 2: Skills assessment checklist.

S. no.	Skill	Response
1.	Prepares before delivery/checks equipment	Yes/No
2.	Anticipates high risk deliveries based on mother's antenatal history	Yes/No
3.	Provides warmth and positions the neonate correctly	Yes/No
4.	Clears airway and suctions if necessary (mouth before nose)	Yes/No
5.	Able to make correct seal of mask before ventilation	Yes/No
6.	Provides effective ventilation at correct rate: 40-60/minute	Yes/No
7.	Knows the correct site to do chest compressions (above xyphoid process)	Yes/No
8.	Performs effective chest compressions at adequate rate: compression ventilation ratio of 3:1 (90:30 in 1 minute)	Yes/No
9.	Achieves appropriate depth of compressions	Yes/No
10.	Knows how to coordinate compression and ventilation	Yes/No
11.	Knows the correct dose and method of preparing injection adrenaline	Yes/No

The study was approved by College Ethics Committee. Statistical analysis of data was done on Microsoft excel (2010) datasheets, analyzed and expressed as mean with standard deviation and range for various parameters was calculated. Descriptive analysis was used to describe the results.

RESULTS

The study subject profile is depicted in Table 3. The results of the theory and skills assessment are shown in Figures 1 and 2 respectively. Mean±SD score (out of 15) of medical students, interns and postgraduate students in the theory was 4.7±1.87, 8.2±1.77, 10.2±2.22 respectively. The number of students in the three groups passing the theory test (requiring a score of 11/15) was zero, 5 (16.6%) and 3 (33.3%) respectively. When skills were assessed, it was found that bag and mask ventilation, the single most important and effective step in resuscitation was performed correctly by only 5 (16.6%) medical students and 6 (20%) interns. Medical students could satisfactorily perform only two skills i.e., preparation before delivery and risk assessment, being performed by 87% and 77% students respectively. The same skills were performed by 73% and 57% interns respectively. Though most postgraduates could perform majority of the skills, surprisingly, 4 out of 9 (44.4%) did drying before suctioning, which is a wrong sequence of resuscitation.

Table 3: Study participants.

Study subject	Number (n)
MBBS students	30
Interns	30
Postgraduate students	9

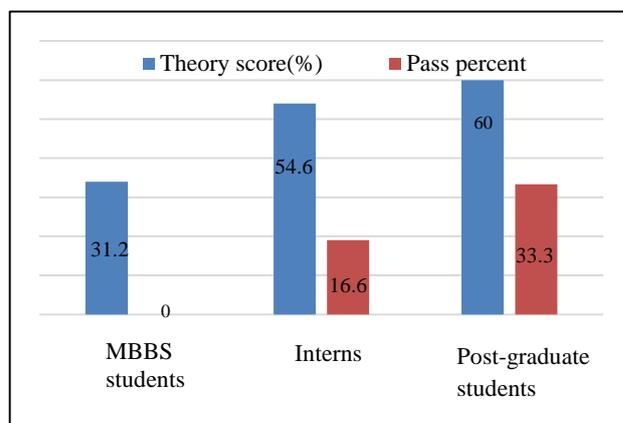


Figure 1: Mean score (%) and students passed (%) in MCQ test.

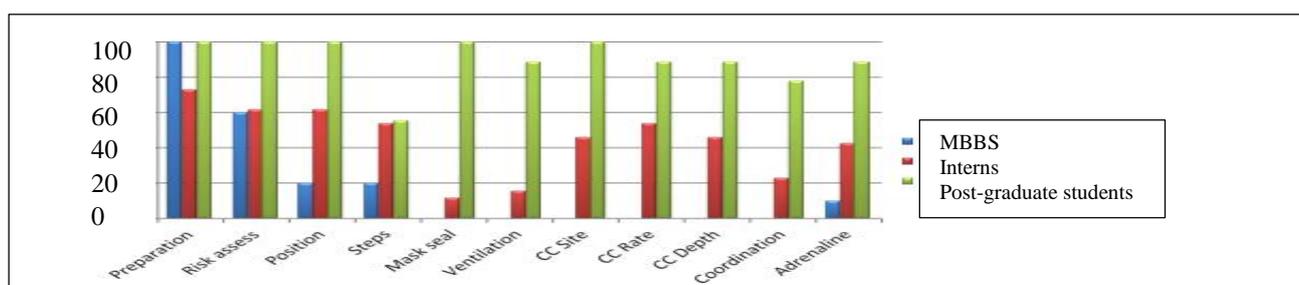


Figure 2: Number of students (%) able to perform each skill.

CC: Chest compression.

DISCUSSION

Neonatal resuscitation is a core competency that every medical graduate must be fluent in. But the current teaching curriculum does not provide necessary training for fresh graduates to be competent in neonatal resuscitation. In our study, the medical students' theoretical knowledge as well as practical skills were found to be poor. None of them could qualify the theory test while they could satisfactorily perform only two skills, namely, preparation before delivery and risk assessment, being performed by 87% and 77% students respectively. The reason for this could be that both these skills require only observation and history taking, which they were already doing in the labour room.

Only 5 (17%) students could perform effective ventilation. This was after they had spent 1 month in the labour room, attending deliveries and witnessing resuscitation of quite a few neonates with birth asphyxia. The interns fared no better, only 15% securing pass marks and 20% able to perform effective bag and mask ventilation, the most basic skill in neonatal resuscitation. Such untrained interns get posted in the periphery where they are expected to handle asphyxiated newborns. A study by Afzal et al demonstrated that 78% interns lacked skills in neonatal resuscitation and that training at undergraduate level can significantly improve these skills.⁷ A study conducted in Kenya showed that more than 70% of the health professionals considered that their knowledge about neonatal resuscitation was inadequate because of inadequate medical training.⁸

In our study, the performance of the postgraduates was also not upto the mark. Surprisingly, 4 out of 9 (44%) were drying the baby before oronasal suction, which is a wrong sequence in the steps of resuscitation. All 4 of them had not taken NRP course. Studies have shown that knowledge and proficiency in neonatal resuscitation of even pediatrics residents may not be up to the desired level.^{9,10} A one-time certification in NRP does not imply competence.

A study by Patel et al showed across a variety of caregivers and time periods, that skill and knowledge retention deteriorate before the recertification of NRP course.¹¹ Shikuku et al in a study on nurses and midwives, concluded that lack of regular updation of training in neonatal resuscitation may result in deterioration of these skills.¹²

Hence refresher courses must be undertaken by the residents that reviews their core skills and knowledge base of NRP and helps to recover any lost skills.

Limitations

The study had some limitations. Participants were tested for technicality of skills but not for timeliness. Only the

most basic skills were tested, skills such as airway management were not tested.

CONCLUSION

Medical students and interns are not competent in neonatal resuscitation. Even postgraduate students, who are supposed to be skilled in resuscitation may not be upto the mark if they do not undergo necessary training in the desired skills. Hence, a structured training programme in neonatal resuscitation like neonatal advanced life support (NALS) for medical students and interns is a must. Postgraduate students need to undergo such courses before and during labour room and intensive care rotations. These courses must be refreshed frequently to maintain the skill level.

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