

# CPR Training of Parents of Preterm Babies before Discharge - Experience from a Tertiary Care NICU

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## Abstract:

### Objectives:

To evaluate the feedback of CPR training given to parents of preterm babies discharged from the NICU.

### Methods:

This was a retrospective study conducted using a questionnaire sent to parents of preterm neonates admitted to a neonatal intensive care unit (NICU) from January 2007 to May 2020. All parents of newborns under 30 weeks gestation who survived to discharge were considered eligible. Parents were given CPR training on a manikin by a Neonatal resuscitation provider (NRP) certified doctor. Babies less than 30 weeks were sent home with a disposable bag and mask after the training of the parents. The responses thus received were analysed.

### Results:

We analysed data from 60 responses (48.3%). 85% of the parents were given one-on-one training, the rest as classroom training. 68.3% felt that the addition of video demonstrations would be beneficial. 95% of parents said that the training helped increase their confidence in taking care of their babies. 78% felt it did not add to unnecessary parental anxiety. 5 babies received CPR at home, and all were told that the home CPR was successful on assessment at the hospital after the episode. 65% felt a repeat training would be helpful. All the parents educated about CPR opined that this training is essential for discharge preparation.

### Conclusion:

We conclude that parental CPR training backed by video demonstration prior to the instructor-led session and followed by repeat training after 3 months is desirable in the holistic care of preterm babies post-discharge.

**Keywords** - Critical care, Patient education, Discharge policy

**Key Message** - Routine CPR education of parents of preterm neonates, backed by video demonstration and repetition of training after 3 months is desirable; it improves the confidence of parents and reduces anxiety in the care of their premature infants.

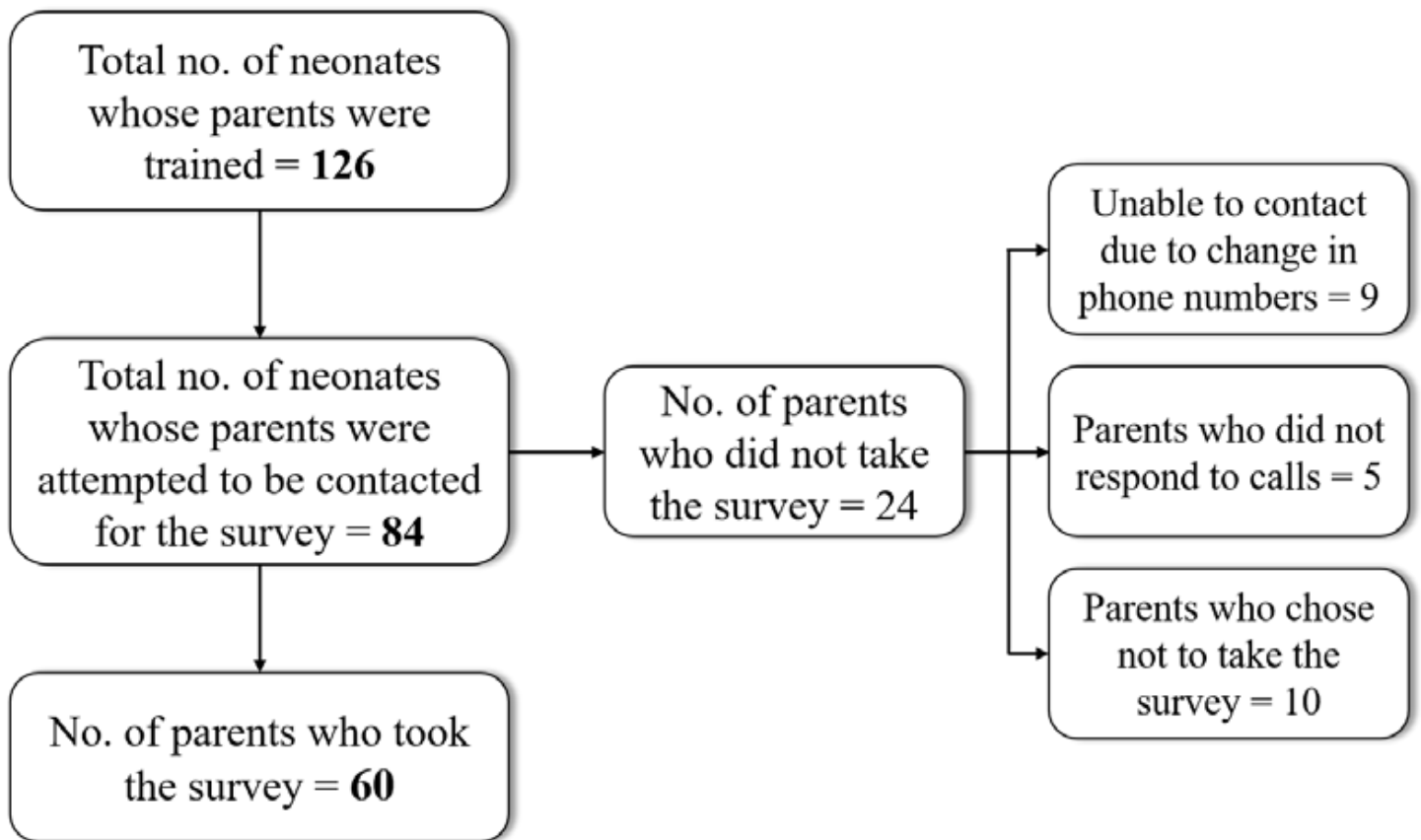
**“Routine CPR education of parents of preterm neonates, backed by video demonstration and repetition of training after 3 months is desirable; it improves the confidence of parents and reduces anxiety in the care of their premature infants.”**

## Introduction

Cardiopulmonary resuscitation (CPR) is an emergency lifesaving procedure performed when the heart stops beating. Around the turn of the 20th century, preterm infants were discharged only when they achieved a certain weight, typically 2000 gm(5lb). Studies (1-3) have shown that preterm neonates can be sent home earlier without adverse health effects based on physiologic criteria rather than body weight. Evidence has shown that preterm neonates with low birth weight who require neonatal intensive care experience a much higher rate of hospital readmission and sudden deaths during the first year after birth than healthy term infants (1,4). The most important predictor of infant survival from an acute life-threatening event (ALTE) is the time from cardiopulmonary arrest to resuscitation (2,3,5,6). More so in neonates, this is the case, who are likely to suffer a respiratory arrest that responds quickly to resuscitation (7). This emphasizes the importance of systematic preparation for discharge and good follow-up thereafter of high-risk preterm neonates to reduce the chances of such life-threatening events (4).

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Preterm neonates should demonstrate some physiologic competencies before being discharged from the hospital. These include oral feeding sufficient to support appropriate growth, thermoregulation in a home environment, and sufficiently mature respiratory control. The first two are usually achieved around 34-36 weeks' postmenstrual age (4,13,19), but the maturation of respiratory control to the point that allows safe discharge may occasionally take up to 44 weeks' postmenstrual age (6,7). Infants born as very or extremely preterm and have a prolonged and complicated stay in the hospital tend to take longer to achieve these competencies. But they may be discharged home much earlier if they exhibit thermostability and reasonable weight gain, as plotted on the Fenton's growth chart. NICU graduates are discharged when they satisfy the above criteria. Their parents have demonstrated the necessary skills to provide all care components at home, including CPR,



should the need arise.

At the time of discharge, most parents lack confidence and are anxious about their capability to handle the babies at home. Hence, we thought that our intervention of training parents of neonates born <34weeks would help in the holistic care of these babies, including handling emergencies at home post-discharge. Many studies have emphasized that pre-discharge infant cardio-pulmonary resuscitation training is essential or highly desirable. As shown by literature, it is a routine pre-discharge requirement in most developed countries, but this training is not reported or published in our country. Based on our hospital protocols, we initiated this training at its inception 13 years ago. We wanted to review our data over these years to see if it has made an impact or a difference.

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#### **Materials and methods:**

This retrospective study was conducted at a tertiary care neonatal intensive care unit in India from January 2007 to May 2020. Informed consent for the survey was taken, and the Institutional Review Board approved the study. Initially, only parents of babies less than 30 weeks gestation were being given the training to perform CPR; however, since December 2019, due to a change in the unit protocol, all parents of babies with gestational age less than 34 weeks were admitted to the NICU were trained and included in the study. Babies (less than 30 weeks initially and less than 34 weeks later), deceased, and babies more than these respective gestational age groups were excluded. Parents of these babies were given CPR training (AHA NRP guidelines) in a language they could understand using a manikin, on the day of the transfer to wards or discharge from the NICU, by an NRP-certified doctor who is recertified every 2 years. The training included a brief description of CPR, when it needed to be initiated, and the steps of CPR, and ended with a physical demonstration of the same on a manikin. Parents were also given a chance to practice the steps on the manikin. Each session lasted around 20 minutes. At no additional cost, a new disposable self-inflating bag and mask were procured for each of these neonates and sent home at discharge after their parents underwent CPR training. The authors prepared a questionnaire/survey in English or the local language on request, with 22 questions. Parents were first called and spoken to and were then messaged a web link to complete this survey. All parents had access to the internet and the necessary device. The data from the survey was later analysed and reported.

**Table 1. Overview of the survey**

CHARACTERISTICS	Total number n=60 (%)
<b>Gestational age of the baby at birth (weeks)</b>	
≤ 28	13 (21.6)
29-31	19 (31.6)
32-34	28 (46.6)
<b>Single/Multiple births</b>	
Singleton	33 (55)
Multiple gestations	27 (45)
<b>Mode of CPR training</b>	
One on one session	51 (85)
Classroom session	9 (15)
<b>No. of those who wanted an addition of video demonstration</b>	41 (68.3)
<b>Did you receive training with bag and mask?</b>	
Yes	35 (58.3)
No	25 (41.7)
<b>No. of parents who wanted to be taught the use of bag and mask</b>	38 (63.3)
<b>Would you be able to identify the need for CPR in your baby?</b>	
Yes	54 (90)
No	6 (10)
<b>Do you think it increased your confidence level in the care of the baby?</b>	
Yes	57 (95)
No	3 (5)
<b>Do you feel the training caused unnecessary anxiety and nervousness?</b>	
Yes	13 (21.6)
No	47 (78.4)
<b>No. of people that felt that the training was an essential part of discharge</b>	60 (100)
<b>No. of parents who do not remember all the steps of the training</b>	20 (33.3)
<b>No. of parents who want repeat sessions within</b>	
> 3 months	20 (33.3)
< 3 months	17 (28.3)

**Results:**

During the study period, parents of 126 preterm babies were trained, out of which parents of 84 neonates were attempted to be contacted. The overall response rate to the survey was 71.4%, as shown in Figure 1. We analysed the data of 60 responses we received, and the following results refer to only those that participated in the survey. 46.6% of the babies were between 32-34wks as seen in Table 1. 27 were twins (with one survivor of a pair), and the rest were singleton babies. 85% of the parents were given one-on-one training, the rest as classroom training; however, only 23% of these parents perceived that classroom training may be better than one-on-one training. A majority of 95% found that the training given was easy to follow, and 68.3% thought that providing a video demonstration and one-on-one training would be more helpful. Bag and mask were used in 58% for demonstration. Only

manikins with the demonstration of mouth-to-mouth breathing and chest compressions were used for the rest. 63.3% of parents thought it would be good to use a bag and mask for training.

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**Table 2. Demographics of babies who received CPR at home**

CHARACTERISTICS	No. of neonates	
No. of babies who received CPR at home	5	
Gestational age	≤ 28 weeks	1
	29-31 weeks	2
	32-34 weeks	2
When did it happen	0-1 week after discharge	3
	> 1 month after discharge	2
How many recovered quickly at home	4	
How many were told of successful CPR by the Doctor on reaching the hospital	5	

Of the total number who responded, 92% understood in what way CPR helped babies in an acute life-threatening event. 90% of them felt that they could identify when their babies required CPR.

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Most parents (95%) said that the training helped increase their confidence in taking care of their babies. 78% felt it did not add to unnecessary parental anxiety. 5 babies received CPR at home. Of these babies, 3 received CPR in the first week after discharge and 2 after a month since discharge from the hospital, as shown in Table 2. 4 recovered from the episode quickly following home CPR. All parents correctly followed the steps as they had been advised to initiate CPR according to the assessment at the hospital after the episode. These parents, who found themselves in a situation that needed CPR, felt that they could execute it as taught.

67% of parents said that after three months, they could still recollect the steps of CPR taught during the training session. The need for repetition of training was felt by 65%, and they opined that it should be conducted after a time interval of 3 months since the last session. All 60 parents educated on CPR thought that this training is an essential part of discharge preparation.

#### **Discussion:**

The American Heart Association (AHA) educates more than 9 million persons annually about CPR. Parents need to be trained in infant CPR. In the United States, 2230 infants (<1yr of age) died of sudden infant death syndrome (SIDS) in 2005, making it the third leading cause of death there. Drake et al. found that parents considered CPR a priority when asked to rank discharge teaching topics in order of importance (8-10).

We chose to do this study as CPR training is an important aspect of pre-discharge preparation for parents of preterm babies, as has

been shown previously (10). Still, it is not routinely being done in most hospitals in our country, as evidenced by the lack of literature on the same. We hypothesised that getting feedback from parents who had received training in infant CPR would give us an overview of the effectiveness and scope for improvement of what we consider an essential practice.

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Conventionally, CPR is taught using a combination of didactic instruction and hands-on practice, followed by a written test. Most of our parents had one-on-one training sessions, occasionally a group training. It was a manual demonstration, and in response to the questionnaire, parents did express that a video-backed demonstration would be more helpful. Brannon et al. used an instructional video as an adjunct to the instructor-led demonstration. The group concluded that CPR is a psychomotor skill, so learning it requires more than just acquiring knowledge. Practice with a manikin is essential to ensure competence. An effective video instruction, while most likely cannot totally replace an instructor-led class, could be helpful in learning infant CPR (11).

A literature review by Parsons et al. (12) opined that teaching infant CPR to parents of high-risk neonates is considered beneficial in decreasing mortality. However, the evidence for this is very limited. The overall trend is supportive of CPR training. It increases parental confidence and decreases anxiety levels. Parents' memory of knowledge regarding CPR decreases over time. Our survey also showed similar findings. At discharge, the training did seem

to have boosted their confidence in taking care of their newborn, and it did not add to the overall anxiety among most parents.

In those instances where CPR was required at home, parents could resuscitate and then bring their infant to the hospital for continuing care. It was heartening to learn that the training was hugely successful, considering that most parents had understood when to use CPR and how it helps resuscitate. The aim is to increase this to 100%. Parents of one baby who required home CPR could not self-assess the effectiveness of CPR given. Henceforth, our training should also focus on educating parents on assessing the baby post-resuscitation. All parents were given adequate pre-discharge teaching regarding other aspects of their preemies' care and the resuscitation training that we provided.

Wintch et al. showed that 80% (4/5) of their subjects who required CPR post-discharge survived complete resuscitation efforts after full cardiopulmonary arrest and were neurologically intact (14). In all of our 5 babies who required home CPR, parents had correctly followed the steps as they had been advised to initiate CPR as per the post-resuscitation assessment done once they reached the hospital.

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***“The AHA gives CPR training kits to parents of high-risk neonates at discharge at a nominal fee. Providing these kits to carry home may also be useful (14,15). Hence, we also provide a complimentary manual resuscitator kit with masks of two sizes to parents of those born <30weeks and neonates born at 30-34 weeks who are discharged after a very stormy course in NICU.”***

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The inability to retain learned CPR skills has been researched. Studies have documented deficits in retention and performance skills beginning as early as 2 weeks after initial instruction, with continued deterioration up to one year later (16,17). The peak incidence of SIDS occurs between 1 and 4 months of age (18), so long-term retention of infant CPR skills is critical. Therefore, it has been reported that 3 to 6 months after initial instruction is the optimal timeframe for recertification. Most of our parents, too, felt the need for a repeat training session 3 months after the first one (rearranged words).

The limitation of this study was the sample size, which could have been better. The contact details of many parents were either changed or unavailable. There is also an element of recall bias as the survey was conducted after a long time for some. One of the

main reasons for more responses from parents in recent years was a better recall. As it was a retrospective study, contacting and convincing parents to take the survey was arduous. Not all parents agreed to participate. Some did not receive phone calls and some responded by saying they were busy and would not be able to complete the survey. Also, during the study period, there was a change in unit protocol, and parents of all preterms <34weeks were being trained instead of those only <30 weeks, as was done previously. We noticed that there were babies in the gestational age group of 30-34weeks who had episodes of apnoea at home and thereby changed the Unit protocol to include these parents to improve outcomes in these babies. The study's strengths were the simplicity of the survey method used and the number of responses we received, considering that the oldest of the babies whose parents responded was born 13 years ago.

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#### **Conclusion:**

Our study shows that parental CPR education seems to have improved their confidence in the care of these preemies and has not added to general parental anxiety. All parents also agreed that it is an essential step in the pre-discharge planning of preterm babies. Parental CPR training backed by video demonstration before the instructor-led session and followed by repeat training after 3 months is vital in the holistic care of preterm babies post-discharge and is highly recommended at all centres catering to this major subgroup of neonates admitted to the NICU.

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#### Contributor details -

Dr. Mathew Jisha - Coordinated and collected data, drafted the initial manuscript, carried out the initial analysis, and reviewed the manuscript.

Dr. Nagar Nandini - Conceptualized and designed the study, supervised data collection, revised the manuscript, critically reviewed it, and was the guarantor for the study.

Dr. Rajagopal Kumar Kishore - Critically revised and reviewed the manuscript for important intellectual content.

All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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