Teaching parents infant resuscitation

Cardiopulmonary resuscitation (CPR) teaching for parents before an infant's hospital discharge is the usual practice in many neonatal intensive care units. A thorough literature review was conducted to ascertain whether teaching infant resuscitation to parents of neonates about to be discharged decreases mortality and morbidity rates. In addition the review sought to find out if teaching resuscitation influenced parental anxiety levels. The implications for clinical practice are considered.

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Keywords

cardiopulmonary resuscitation; neonatal intensive care; mortality and morbidity rates; parental anxiety

Key points

Parsons, S., MacKinnon, R J. Teaching parents infant resuscitation *Infant* 2009; 5(3): 77-80.

1. The literature review suggests that teaching infant CPR to parents of high risk neonates is considered beneficial in improving mortality. However the evidence for this is very limited.
2. The overall trend is supportive of CPR teaching in that it increases parental confidence and decreases anxiety levels.
3. The review found that parental CPR knowledge decreases over time.

Cardiopulmonary resuscitation (CPR) is an emergency procedure for artificial life support, consisting of artificial respiration and manual external cardiac massage. Evidence has shown that prematurity is a significant contributor to sudden infant death syndrome (SIDS)[1].

It has been found that the most significant predictor of infant survival from a sudden death event is the time from cardiopulmonary arrest to resuscitation[2-5]. This is particularly true of infants who are most likely to suffer a respiratory arrest that responds quickly to resuscitation[6]. As a significant number of infants who arrest do so in the home, it is logical to target parents for CPR training. Such training is particularly critical for parents of infants who are at increased risk for sudden death by virtue of a premature birth, congenital anomaly, or medical condition. In fact, CPR training for parents before infant hospital discharge is the usual practice in many neonatal intensive care units (NICUs) and in some is a requirement for discharge.

The families of babies born prematurely or with significant health problems experience much stress, anxiety, loss of control and uncertainty. Many are fearful of leaving the security of the hospital setting. Under these difficult circumstances the impact of teaching CPR may have two opposing effects on parents – either increasing their anxiety, by reminding them that their infant is at risk of needing resuscitation, or offering empowerment and reassurance that they have the skills to use in an emergency.

The Resuscitation Council of the UK has published two sets of guidelines which are relevant to this project, one for newborn life[7] support and another for paediatric life support[8].

In the neonatal unit at St Mary's hospital the aforementioned neonatal guidelines have been adapted to be taught to parents prior to the discharge of their baby (**FIGURE 1**). This training is offered to all families of infants admitted for longer

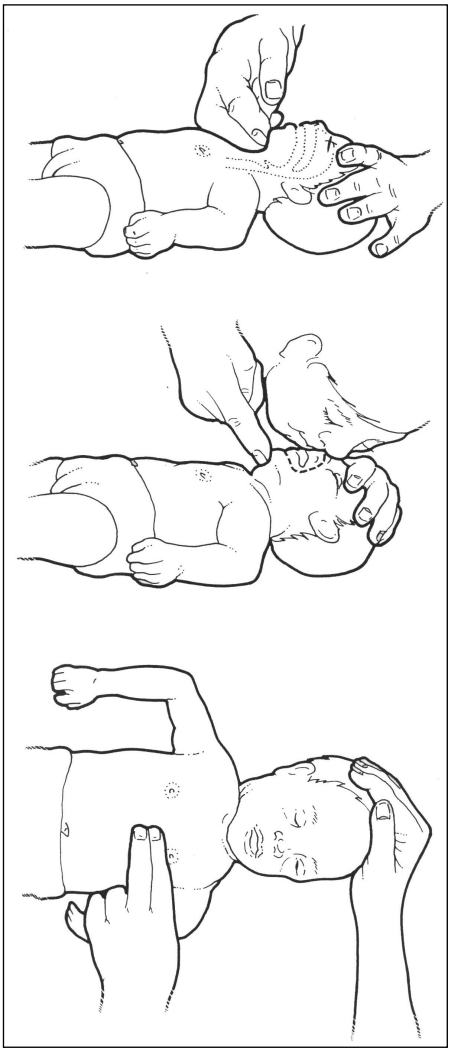

FIGURE 1 Infant basic life support. *Image courtesy of Laerdal Medical.*

than 48 hours or at consultant request. However, if a neonate was to be re-admitted to another department such as Accident and Emergency, paediatric guidelines would be used.

Despite widespread acceptance of the importance of CPR, few data exist about the manner in which CPR should be taught to parents or which guidelines are used.

Literature review

A structured literature search using the Best Bets approach[9] and the Ovid interface was carried out to answer the following questions:

- In neonates about to be discharged does teaching parents resuscitation decrease morbidity and mortality rates?
- In neonates about to be discharged does teaching parents resuscitation decrease or increase the level of parental anxiety?

Medline, Embase and Cumulative Index to Nursing & Allied Health Literature (CINAHL) databases were all searched using a multifile approach and exploding and combining key terms. These were 'resuscitation' limited to newborns and humans; 'teaching' and 'parents'. The Cochrane database, NICE and Pub Med were also searched for any further articles. A total of 27 papers were identified by this search strategy. Sixteen of these papers were relevant, with data to critically appraise. The papers were critically appraised using guidelines available on the Best BET website and also the tables provided by the Oxford Centre for Evidence-Based Medicine Levels of Evidence to grade the papers.

Results

Dracup and colleagues (2000) found that depression in 335 parents measured using the epidemiologic studies of depression scale, did not significantly change over time in CPR video, CPR social support, CPR instructor or the control groups[10]. They observed that anxiety levels at six months had decreased in all groups except in the CPR video group; the most significant decrease in anxiety levels was in the control group. The reason for this may be that *'those parents who do not rehearse what to do in an emergency with their infant experience the least anxiety over time.'* In terms of psychosocial adjustment, over time the CPR social support group fared best. There were 13 successful resuscitations from the treatment groups, none in the control group and no unsuccessful resuscitations. Limitations of this study were the high drop-out rate, loss of data, parents being assigned in sequential blocks and that the fifth hospital from which patients were gathered had no control group.

The study concluded that CPR training does not add to the psychosocial burden facing parents of high risk newborns when they take their children home. It also found that parental anxiety is improved when teaching is delivered in a format combining CPR with an instructor or with focused social support.

Schlessel and co-workers[11] looked at CPR knowledge, self-efficacy and anticipated anxiety before CPR training and 1 month later between two groups, one which received CPR training (n=36) and the other which did not (n=47). They found that there was an increase in CPR knowledge in both groups, but change in knowledge was significantly greater ($p<0.0001$) in the study group (1.55) than in the control group (0.28). However, when ANOVA was applied the change in CPR knowledge was no longer significant between the groups. They also found that anticipated anxiety decreased more in the study group. Self efficacy increased significantly ($p<0.0001$) one month after training among CPR trained parents (-3.1) compared to the control group (1.0). The study concluded that CPR training may not affect CPR knowledge.

Limitations include that the sample was from parents of healthy infants, rather than high risk neonates. Also, the sample was small and only preliminary.

In 1998 Dracup and colleagues compared three different methods of teaching CPR to 480 parents of infants at high risk of sudden cardiopulmonary arrest[12]. Univariate analysis revealed unsuccessful learners had less years in education, lower income, no previous CPR training and better psychosocial adjustment to their infant's illness.

The proportion of successful learners was significantly higher in the two instructor-taught classes than in the self-training video class. They developed a predictive profile using multiple logistic regression analysis, showing CPR learned in self-training video groups, fewer years of education and better psychosocial adjustment independently predicted unsuccessful learners. The study suggests that while most parents can demonstrate successful CPR skills, self-training video training may not be an adequate substitute for instructor taught CPR.

Another study by Dracup and workers (1998) measured CPR skills at six months in 94 parents following CPR training[13]. They found that CPR skills retention decreased significantly six months after training. Only 33.7% were able to perform CPR at this stage. The psychosocial study was significant as subjects having greater social support at the time of training demonstrated better skills retention. The reason for this is postulated that these parents were able to concentrate on the information from CPR training better than those with less support.

Subjects who had previous CPR training were five times more likely to demonstrate successful CPR at six months than those with no training ($p<0.004$). This suggests that exposure and opportunity to review and practice CPR enhances skills retention. They also found that higher anxiety at time of training predicted better retention ($p=0.01$). This was an unexpected finding, as other research suggests increased anxiety decreases ability to learn and retain information, however, anxiety about infant welfare may have motivated parents to attend carefully to CPR instruction.
Of the 94 subjects, seven reported using CPR to resuscitate their infant and all seven were successful. The study concludes that CPR skills decay is significant for parents of infants at high risk of cardiopulmonary arrest.

Moser DK and colleagues (1999) found that all 335 parents enrolled in their study experienced moderately high anxiety, sense of burden and feelings of loss of control before CPR training[14]. Subjects in all three treatment groups reported improvements in anxiety, control and burden two weeks after training and continued improvement after six months. In contrast, perceptions were unchanged in the control group.

Overall, the CPR social support group showed the greatest drop in scores, however, the difference between the three treatment groups did not show enough magnitude to recommend one over the other in terms of reducing anxiety, sense of burden and increasing feelings of control. This is in contrast to the 1998 study by Dracup, which showed that CPR training was not as effective for parents training using videotape only[14].

The problem with the Moser study was

the high drop-out rate. The study concludes that CPR training promotes a sense of control, reduces anxiety and sense of burden.

Long carried out a study in 1992 comparing teaching 30 parents infant CPR by traditional lecture or audiovisual tape[15]. It was found that there was no significant difference between scores on a ten question cognitive test, 20 point checklist for psychomotor skills and demonstrating CPR on a manikin. The study concluded that parents learn as much from the audiovisual tape as from a traditional lecture. Also that parents take time to learn CPR thus a videotape allows them to review teaching at home. However, there are many problems with this test, including that the tools used are not reliable measures of infant CPR knowledge. The sample size was also very small.

Messmer's 1993 study looking specifically at mothers of cocaine-positive infants found that there was a significant difference in performance and knowledge between mothers taught through computer interactive video and traditional lecture, in that those taught traditionally had better performance and knowledge scores[16]. Though it was not formally measured it was reported that all the mothers felt more confident in their capability and better about themselves.

Bruce (1995) looking specifically at parental confidence using a post CPR training questionnaire, found that 98% of the 48 parents expressed an increase in confidence[17]. The study thus concludes that confidence is significantly increased by teaching CPR which would then lead to decreased anxiety levels in parents. There are a number of problems with the study, it is not rigorous, and there was no consistency to how much teaching the parents received. There were also no baseline characteristics collected on the study group.

In 1993 Komelasky and Bond found that CPR ability in 69 parents declined in all three groups over time, though it was most significant in the group with no reinforcement (Group 3)[18]. Also, in comparing the group with hands-on CPR practice and review (Group 1) against Group 3 there was the most significant difference between loss of skills. Thus, Group 1 had the best retention/least deviation from first test score, Group 2 (video review) had better retention of information than Group 3, but less than Group 1. The study concludes that reinforcement of CPR skills is crucial for retention of information and this should be an ongoing process.

Wright and workers looked at CPR written skills and CPR skills retention over time in 21 families[19]. They found that whilst there is a low loss of didactic knowledge, skills are less well retained, with loss of skills within 1-2 weeks across all groups. However the retention of skills is still higher than compared to studies of lay persons. Also although the decrease in skills knowledge is significant, the author suggests it *'may not be practically meaningful'* as it is felt that most parents still had enough knowledge to carry out initial resuscitation if necessary. The study concludes that parents learned and retained a significant amount of CPR knowledge and skills. There are a number of weaknesses with this study, not least that the data presentation is difficult to follow. Also it is a small sample; the reliability of instruments are not well delineated. Parents knew they would be visited at home and some parents had already received CPR training which may have given them an advantage.

Kaiserman and workers in 1989 found that test scores in 28 mothers increased immediately after viewing a 15 minute CPR videotape[20]. However, when the test was repeated at 4-6 weeks the scores decreased from the first test, but were still higher than the original pre-test (before viewing the video). Problems with this study includes the absence of a control group, the high drop-out rate and lack of demographic baseline data collected on the subjects. It was not rigorous and the questionnaire used had not been tested for reliability or validity. The study was based on healthy babies.

In 55 parents of apnoea-monitored infants Komelasky found no statistically significant differences in anxiety or knowledge over time, although the treatment families showed greater decline in anxiety scores and maintained or improved their CPR scores[21]. The reason for there being no statistically significant difference is attributed to the homogeneity of the sample. Demographic data showed most of the parents were married, employed, middle income suburban adults with at least a high school education, thus this stable social status may enhance their ability to adapt to their situation.

A problem with the study is that the data is presented classified into couples. Also, the study only measured state rather than trait anxiety so did not take into account anxiety proneness. Furthermore, for the second test the questionnaires were left at parents' homes so there is a possibility of parents reviewing past information, thus enhancing their scores.

Conroy and workers (1990) studied 54 mothers and found that for knowledge of infant resuscitation skills there were certain increases in knowledge for specific questions immediately after training[22]. However six months later there were significant differences in knowledge for five out of the seven questions, for three of which there was a decrease since pre-training.

The study looked at confidence and anxiety levels. This showed post-education increase in levels of confidence and a decrease in anxiety. The study concluded that there is a need for mothers to have a participatory role in teaching and the opportunity to rehearse skills. Problems with this study are the absence of a control group and lack of demographic data collected. Also the data provided was not fully analysed and the study was for healthy babies.

In 1998 Clarke studied the relationship between an infant resuscitation training programme and its effect upon parental anxiety regarding cot death in 27 parents[23]. Anxiety levels were not greatly reduced by the training but nor were they raised. The study also showed parents felt more confident after training. However the sample size was small, and statistical analysis was thus affected. Also the sample was from a very specific population and comprised healthy babies.

McHugh looked at a specific pilot scheme, Babywatch and found that a high percentage of parents felt more confident after CPR training[6]. Training did not cause a significant increase in anxiety in parents. This was certainly not a rigorous study, it was of low, quality and did not include high risk neonates.

Higgins and colleagues surveyed paediatric Cardiology Centres in the United States[24]. The study found that over a 10-year period, of the children who had cardiac arrests the only ones who survived were those whose parents had received CPR training. Also that parental CPR was attempted only by the parents whose children had been in the hospital that taught CPR.

Discussion

Through critical appraisal of the papers in a structured search all 16 relevant papers, plus five which did not contain any data, concurred that teaching parents infant CPR is an important and beneficial practice.

There is substantial variation in the quality of the studies, some have small sample sizes, have high dropout rates and use instruments that have not been tested for validity or reliability. Of the five studies looking at anxiety, four studies[10,11,12,14] (Dracup et al (2000), Schlessel et al (1995), Dracup et al (1998) and Moser et al (1999)) report decreased parental anxiety levels after CPR training whereas Komelasky and Bond[18] found no significant difference in anxiety levels after teaching. Dracup et al[14] found anxiety decreased in all of the groups studied except the video instructor group, and anxiety decreased most in the control group.

Of two studies by Dracup et al focusing on depression[12,13] both showed no significant difference in depression over time.

There are seven studies looking specifically at CPR knowledge and retention. The study by Schlessel and workers showed an increase in knowledge in the study group after one month but it was not statistically significant[11]. Studies by Dracup et al[13], Komelasky et al[18], Wright et al[19], Kaiserman et al[20] and Conroy et al[22] showed that knowledge levels increased immediately after teaching. However they all show a general trend in knowledge decline over time. Wright and colleagues showed a decrease in knowledge and skills within 1-2 weeks[19], whilst Komelasky showed no significant difference in knowledge over time[18].

Self efficacy and confidence levels were shown to increase in all seven studies that considered these outcomes[1,11,16-18,23,24].

In terms of the most suitable method of teaching parents infant CPR there are four studies (Dracup et al[10], Dracup et al[13], Moser et al[14], Messmer et al[16]) which show that teaching with an instructor or with reinforcement and follow-up improves retention and knowledge levels. However one study by by Long[15] suggests that audiovisual tape is as good as lecture-based teaching.

Where demographic data was collected[12,13] it was found that those parents with decreased education and improved psychosocial adjustment were more likely to be unsuccessful at learning CPR, whilst those with increased anxiety, increased social support and previous CRR training were more successful. Another four studies (Dracup et al[13], Moser et al[14], Komelasky et al[18] and Conroy et al[22]) also show that reinforcement alongside teaching or past CPR training enhances retention.

Three studies (Dracup et al[10], Dracup et al[13] and Higgins[24]) include the number of babies from the studies which needed resuscitation by their parents. In both Dracup studies all of these babies were successfully resuscitated. In the Higgins study[24] only the children from the hospital that taught CPR received resuscitation from their parents. There were no survivors from the hospital that did not teach parent CPR.

Conclusion

The studies focus on the effect of teaching parents infant CPR on anxiety, depression, control, level of burden, knowledge retention, confidence levels, method of teaching and the effect of various demographic factors.

Overall the literature review suggests that teaching infant CPR to parents of high risk neonates is considered beneficial in improving mortality. However the evidence for this is very limited.

It also suggests resoundingly that parental confidence is increased by teaching and that parental anxiety is decreased.

The review raises further questions about the most appropriate method of CPR teaching for retention of knowledge and also how best parental CPR knowledge levels should be assessed.

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