

Title page

Title: An Evaluation of Expectant Parents Knowledge, Satisfaction and Use of a Self-Instructional Infant CPR kit

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Abstract

In many parts of Europe as in Ireland, maternity services do not provide infant CPR training routinely to expectant or new parents. Little is known of the views of expectant women and their partners about learning the skills of infant CPR as part of their antenatal education. The aim of this study was to evaluate knowledge, satisfaction and use of a 22 minute Self-Instructional Infant CPR kit to facilitate the teaching of infant CPR and the relief of choking in an infant.

Methods: Expectant women with their partners were recruited through the antenatal education classes from one maternity hospital in Ireland. An uncontrolled pre-post- test design was used and participants were surveyed immediately pre and post training and six months following training.

Results: The study sample comprised of seventy seven participants including 42 nulliparous women at least 32 weeks gestation or greater. It found significant difference in knowledge scores following training compared to baseline $p < 0.0001$ and at six months $p < 0.0001$ compared to immediate post training for both infant CPR and choking prevention. There was a 70% ($n=58$) response rate at 6 months with 84.5% reporting average or above confidence levels for performance of Infant CPR. The multiplier educational effect was 37.9% with 22 out of 58 participants sharing the kits with family and friends. Participants (57 out of 58) indicated that the maternity services should facilitate infant CPR training for expectant women and their partners.

Conclusion: Expectant women and their partners are very motivated to learn the skills of infant CPR. The facilitation of a 22 minute self- instructional infant CPR kit is effective in increasing infant CPR knowledge and confidence in parents at six months post training. Findings provide the views of expectant and new parents on the relevance of acquiring the skills of infant CPR as part of their preparation for parenthood.

Key words: Infant CPR training; expectant women; antenatal education; fathers; confidence

Introduction

In many parts of Europe as in Ireland, maternity services do not provide infant CPR training routinely to expectant or new parents. Much of the literature on learning infant CPR focuses on the benefits in relation to the preterm or ill neonate with very little if anything known on the views of expectant women and their partners. Paediatric arrest outcomes have improved due to advances in resuscitation science and so it is important that all providers should be encouraged to recognize and do something when a child shows no signs of life (Sutton et al., 2013). Early and effective bystander CPR is generally associated with improved outcome, yet, similar to adult arrest, paediatric bystander CPR is rarely performed (Dawkins et al., 2008). While little evidence exists on the benefits of educating parents (Vaillancourt et al., 2008) training those most likely to encounter an infant increases the possibility of survival (Pierick et al., 2012). While there has been a steady decline since the 1980's sudden infant death (SIDS) remains the third leading cause of infant mortality in the United States (Hoyert, 2012) and in Ireland accounts for 8.1% (22) of infant deaths (CSO Report, 2010). Reducing the risk of SIDS is central to parent education in all maternity services yet as health care providers we do not provide education on the skills of infant CPR. Conventional CPR education programmes may well be outside the remit of most maternity hospitals and so the effectiveness of CPR self-training kits (Lynch et al., 2005) makes the possibility of infant CPR training more readily accessible when compared to traditional training.

A number of studies have shown that infant CPR training increases self efficacy and reduces anticipated anxiety in new parents (Schlessel, et al., 1995; Dracup, et al., 1998;McHugh, 2000), that parents have found learning CPR beneficial (Conroy et al., 1990;Donaher-Wagner & Braun, 1992) promoting a sense of control amongst parents of at risk neonates (Moser et al., 1999). Parents of preterm infants who viewed an instructional DVD from the American Heart Association had better skills acquisition than the parents who attended a standard class without the DVD intervention (Brannon et al., 2009). Self- instructional training for parents of high risk infants is seen as an excellent means of training parents and caregivers (Pierick et al., 2012). It has long been recommended that infant CPR training should be provided to parents, babysitters and child care providers (Cyr, 2012).While infants are less likely to survive out of hospital cardiac arrest, paediatric basic life support involving community effort and early CPR provides the best chance of survival(Berg et al., 2010). Learning skills rather than information transfer has been identified as a particular need of expectant parents in relation to antenatal education (Svensson et al., 2008). Learning the skills of infant CPR and what to do in the event of an infant choking has particular relevance for expectant and new parents as they begin their transition to parenthood. The 10th edition of the UK First aid manual has been informed by findings that parents' lacked awareness of the actions to take in the event of an infant choking (St. John Ambulance, 2014). When asked by a midwife from New Zealand why we don't provide routine training in infant CPR, I could not provide a satisfactory answer and so began this study.

This study evaluated expectant parents' knowledge, satisfaction and use of a self-instruction infant CPR kit, developed by the American Heart Association together with Laerdal Medical (Laerdal Medical, 2011). The objectives were to assess parents' knowledge of infant CPR prior to, and on completion of, infant resuscitation skills training; to assess parents use and satisfaction with infant CPR Anytime™ and to evaluate the medium term impact of training in infant resuscitation skills on parents' knowledge at six months' post- training. The participants found the training enjoyable and worthwhile and the high response rate at six months coupled with their recommendations does add weight to the importance of looking at strategies to incorporate infant CPR training within the maternity services.

Materials and methods

Study design, population and setting

The study was conducted in 2013 in the University Maternity Hospital, xxxxx, Ireland with the approval of the Regional Hospital Research Ethics Committee. An uncontrolled pre-post-test design was used to evaluate expectant parents' knowledge, satisfaction and use of the self-training kit immediately pre and immediately post training and six months following training. A pragmatic decision was taken not to evaluate expectant women or their partners for proficiency in case this acted as a deterrent to recruitment in this under researched group.

The maternity hospital offers five antenatal classes including an introductory class offered prior to 20 weeks gestation. Only women attending their second antenatal class, available to them from 32 weeks gestation onwards together with their partners/support person were invited to participate in the study. The antenatal classes are free and run weekly on a rolling basis with the group size normally twenty women plus their partner or support person. A convenience sample (n=77) of attendees were recruited in Dec 12/Jan 2013 from four evening classes and one afternoon class where a short information session and an information leaflet had been provided at the previous week's class.

Participants arrived one hour prior to their antenatal class if they wished to take part and written informed consent was obtained. Participants were asked to provide a phone number only so that a text message reminder could be sent to complete the questionnaire at six months. Couples were excluded if they spoke a language other than English.

Intervention

Infant CPR anytime™ contains a 22 minute self- instruction DVD and infant manikin and this was used to facilitate the teaching of infant CPR and the relief of choking in an infant. Each couple received a kit to take home. The DVD begins with a scenario of a couple's experience of infant resuscitation and as this may have proved upsetting to women in late pregnancy the opinion of a woman who was 32 weeks gest (a midwife with extensive neonatal experience) and her husband was sought. They considered that the scene provided motivation to learn the skills of infant CPR. The DVD was played to each group (max of four couples) and to allay any anxiety that these expectant parents were being judged on their skills no prompting or correction of technique was offered. The practise-while-watching technique enabled participants to fully engage, and correct their technique as they went along or partners laughingly corrected each other. Each person when asked expressed their satisfaction with the training and there was a very noticeable increase in group interaction following completion of the training.

Instrument

The questionnaire was adapted with permission from the Irish Heart Foundation CPR 4 Schools Evaluation Study which used a survey design to evaluate knowledge and acceptance of CPR amongst a sample of 1,500 16-17 year old students using the self-instruction kits (Burke et al., 2010). Ten Infant CPR Knowledge items, with each correct answer having a value of one, were measured using multiple choice questions testing key points learned during instruction and consistent with standardised CPR examinations. One item on confidence and one item on willingness to use infant CPR were measured with a 5 point Likert scale. One item on willingness to show others expanded upon to identify the multiplier education effect. There were three knowledge items of key action points in the event of an infant choking each correct answer having a value of one. Open ended questions and invited comments were used to assess participants' satisfaction with infant CPR training. Participants were asked at six months whether there was any situation where the skills of infant CPR were used and whether the maternity services should facilitate infant CPR training. The questionnaire reflects the key knowledge points from the American Heart Association (AHA) validated infant CPR self-instruction DVD and was reviewed for content validity by an Irish Heart Foundation resuscitation expert. A group of twenty student midwives checked for face validity having viewed the self- instruction DVD and some minor adjustments were made to the wording of the questionnaire. Data was collected at three time points: Time 1 Immediately pre training, Time 2 Immediately post training and Time 3 at six months following training in June/July 2013.

Statistical analysis

SPSS version 19 for Windows (SPSS Inc., Chicago, IL, USA) was used for data analysis. Descriptive stats (frequencies and percentages) were calculated for knowledge and confidence. The mean and median were determined for numerical variables. Wilcoxon Signed Ranks Test was used to compare knowledge of infant CPR and knowledge in relation to infant choking at times 1 2 and 3. Open ended questions were analysed using simple content analysis.

Results

Forty two nulliparous women of at least 32 weeks gestation along with 33 Partners a grandmother and a sister (35) participated. Thirty three mothers and 25 partners returned questionnaires at 6 months indicating a response rate of 70%. Prior training in CPR was predominately first aid training varying from 5 to 20 years ago with 35.1% (27) participants reported some training in CPR and only three participants reporting training in the two years prior to the study.

Table 1 Study Population

Knowledge of Infant CPR

The results of the individual knowledge scores increased immediately following training compared to pre-training as would be expected and also showed a sustained increase at six months compared with pre training scores. Correct scores were sustained across time 2 and time 3 and particularly for correct response, position of finger tips, correct infant position for giving breaths, and action to take where there is no chest rise (Table 2). The percentages of correct scores on Knowledge of Infant CPR are displayed in Table 3 and allow for comparison across the three time points.

The Wilcoxon Signed Ranks test was applied and the differences in correct scores were significant for pre and post training ($z=-7.604$ $p<0.0001$) pre training and 6 months ($z= -5.781$ $p<0.0001$) and between post training and 6 months ($z= -5.874$ $p<0.0001$). There was a mean score of 3.3621 pre-training, a mean of 8.8621 post training, and a mean at 6 months of 6.1552. The mean scores for women and partners (excluding support people) are displayed in Table 4. While the mean knowledge for expectant women was lower before training, this was higher following training when compared to their partners.

Table 2

Table 3

Table 4

Willingness to give Infant CPR

When asked how likely they would be to start CPR with an infant who was not breathing the percentage of participants who definitely would give CPR increased from 43.4% (33) to 80.3% (61) immediately following training and to 60.3% (35) at six months. Prior to training 26.3% (20) were unsure whether they would give infant CPR.

Table 5

Reported confidence in giving Infant CPR

Training had a very powerful effect on reported confidence in giving infant CPR immediately following training and that level of reported confidence was still evident at six months. 53.9% (41) of participants were definitely not confident to perform infant CPR prior to training with 53.3% (40) reporting more than average confidence following training and 29.3% (22) reporting that they were extremely confident in giving infant CPR. At six months 41.4% (24) of participants reported average confidence with 39.7% (23) reporting above average confidence.

Table 6

Knowledge of choking prevention

Three questions were asked in relation to infant choking with a choice of one out of two answers. The questions related to what actions to take to support the head, the correct way of giving chest thrusts and the actions needed if an infant stops breathing. Using the Wilcoxon Signed Ranks test the differences in correct scores were significant for pre and post training

($z=-5.663$ $p<0.0001$) pre training and 6 months ($z= -3.897$ $p<0.0001$) and between post training and 6 months ($z= -2.644$ $p<0.0001$). There was a mean score of 2.0755 pre-training, a mean of 2.8302 post training, and a mean at six months of 2.5472.

Multiplier Education effect

Asked whether they should show family members and child minders how to do infant CPR 77.6% (59) participants indicated that they should at pre training, with 97.4 % (74) indicating post training and 81% (47) at 6 months. There was a multiplier educational effect following training amongst family and friends. 37.9% (22 out of 58) participants reported at six months that other people had used their kit. Seventeen people provided details of how many people: 4 reported 1 person; 6 reported 2 people; 5 reported 3 people; and 2 reported 7 people. The kits were shared with 45 family members in total. Asked at six months whether the kit prompted discussion at home 72.7% (40) said yes and 65.4% (34) reported that the kit prompted discussion at work. There were lots of references to other expectant couples wishing to learn the skills and examples of the participants encouraging others to learn infant CPR and generating awareness amongst their families and friends:

A friend who had been pregnant before us and did not get the course said how useful it would be and I have since recommended it to a couple of work colleagues (partner¹⁷)

We told a lot of people that we did the course... It was very good and not very time consuming. Our sister -in- laws baby nearly choked on Christmas day and nobody knew what to do (Mother⁷)

At the six months questionnaire the infants were between 3 and 4 months old and none of the participants had cause to use the skills of infant CPR. 98.3% (57 out of 58) participants indicated that the Maternity Service should facilitate infant CPR training for expectant women and their partners.

Recommendations

The recommendations were that infant CPR should be included in antenatal classes, that infant CPR training should be available for all new parents, that it should be available on-line for reference by parents, that the steps should be reviewed with women prior to leaving hospital. One mother recommended having a trained member of staff to double check technique.

Very good program a very important skill for parents I recommend inclusion in all pre-natal classes. (Partner⁴⁰)

Invited comments

Invited comments focused on skills acquisition, confidence and satisfaction. There were many references to the usefulness of practicing chest compressions and the clicking noise which indicate the correct depth:

...I thought I was doing the chest presses and breathing correctly but I wasn't and the practice baby shows you very clearly with the clicking noise and rising chest. (Partner³)

While participants recognised the rarity of the event training allayed their anxieties and they felt a lot more confident about being able to use CPR:

Excellent and well- timed because it certainly put my mind at rest and I am more confident about being able to use CPR – though hopefully I won't need to!' (Mother³⁷)

Very useful thanks. Very good scheme I would have been very, very doubtful about using CPR (Partner²⁴)

Participants found the training to be excellent they expressed their appreciation and stated that it was invaluable to them to learn infant CPR:

An infant's life is too precious to leave to chance and paramedics. I believe first response for all infant incidents is vital and training brings security to parents SIDS is a real issue but as a first time mother I definitely felt that in a situation of my baby stopping breathing I could make some effort to help her. (Mother¹⁹)

Discussion

Findings from this study contribute to the body of knowledge in relation to the importance of infant CPR training for expectant women and their partners. This study shows that skills, in relation to infant CPR and what to do in the event of an infant choking, are seen by expectant women and their partners as being very relevant in the transition to parenthood. The study in what is an under researched area found significant changes in knowledge following training compared to baseline and at six months compared to immediate post training for both skills of infant CPR and choking prevention. A study conducted with new mothers in the USA using the Infant CPR Anytime™ self- training kit prior to discharge from hospital reported that proficiency scores were significantly higher in the CPR kit experimental group (n=79) than in the comparison group (n=25) of previous trained mothers (Barr et al., 2013). The level of CPR training amongst participants is worth noting when compared with the present study of three participants trained in CPR in the previous two years: 49 mothers had previous training, 8 were offered CPR training during pregnancy and 9 were offered training during their hospital stay. In this study participants found the clicking noise indicating the correct depth for chest compression to be very useful and were surprised by the depth of the compressions. In an observational study of telephone-cardiopulmonary resuscitation none of the participants pressed to the recommended depth on the infant mannequin (Dawkins et al., 2008). Learning the skills in the event of an infant choking has particular relevance for parents. St John's Ambulance (2014) survey of a 1000 parents of under- fives, widely reported in the media, commissioned for the 10th edition of the UK First aid manual and resulting in a change of advice, found that 38% of parents had seen their child choke and half of the parents said they did not know the correct way to help their child or how to clear the obstruction.

In this study 53.9% (n 41) of participants were definitely not confident in performing infant CPR prior to training compared to 53.3 (n 40) reporting more than average confidence immediately post training and 39.7% (n 23) at six months. Barr et al., (2013) also reported that mothers felt more confident as care givers following training. The evidence to date on the benefits of providing infant CPR training is mostly in the context of the ill neonate where the provision of training reduces anxiety for parents (Pierick et al., 2012). This study provides evidence that facilitating the skills of infant CPR in the antenatal period increases expectant and new parents' confidence in the use infant CPR. Self- efficacy in relation to infant care has been associated with exposure to experience with father's reported self- efficacy lower than mothers due to their decreased opportunity for infant care experiences (Brage, Hudson et

al., 2001). Providing expectant couples with the opportunity to gain confidence in the skills of infant CPR must be seen as important in terms of self-efficacy in relation to infant care for both mothers and fathers. While concern that infant CPR training may increase anxiety for expectant parents exists, this is not supported in the literature (Schlessel et al., 1995). The recommendation from the American Heart Association is that training those most likely to encounter an infant increases the chances of survival (Berg et al., 2010). Participants in this study viewed acquiring the skills of infant CPR as a source of reassurance. They considered it very important that they could make some effort to help their infant in the unlikely event of their infant needing resuscitation. The infants were three to four months at the time of the six month questionnaire and there was no report of anyone having to use the skills of infant CPR. While the literature shows that the retention of skills is low (Wik et al., 2002) brief exposure to training and simulation in an emergency situation is considered effective for lay bystanders to feel confident, competent and willing to help in a real emergency (Lynch et al., 2005).

Participants were very willing to discuss and share infant CPR skills within their circle of family and friends. The multiplier educational effect also resulted in a sharing of kits by 37.9% of participants (22 out of 58). Pierick et al. (2012) in their study on using self-instructional CPR training for parents of high risk infants reported a similar figure of 3.1 additional persons using the kit for CPR training. A national study in Norway on the impact of training 12 year olds in CPR found that they were too young to impact on second tier commitment and motivation for training (Loren et al., 2008). Knowles theory of adult learning (Knowles et al., 2011) refers to the importance of motivation and the set to learn. This study highlights that expectant and new parents are a motivated and very valuable and under-utilized source when it comes to the establishment of a paediatric chain of survival. There was a 70% response rate at six months with 57 of the 58 respondents indicating that the maternity services should facilitate the skills of infant CPR. This study refutes the perception that teaching infant CPR to expectant women and their partners causes anxiety. It also suggests that placing an emphasis on facilitating training of expectant and new parents when they are motivated and set to learn may be of strategic importance in increasing the skills of CPR within the community.

The facilitation of infant CPR skills does not form part of routine antenatal education in Ireland or in other parts of Europe. The reason for this may reflect the emphasis of antenatal education on childbirth preparation and the tendency towards didactic (Tighe, 2010) rather than participatory teaching and learning strategies. A systematic review of the evidence on antenatal education shows that while research is limited parents wanted information and support matched in a timely way to the milestones of the developing baby (Schrader et al., 2009). Expectant and new parents' needs are in relation to parenting skills rather than receiving large amounts of information (Svensson et al., 2008). The needs of expectant parents are not always met where antenatal education classes may be large (Barlow 2009) with the emphasis on the educators' priorities in terms of education topics rather than parents need for information on parenting (Koehn 2002). A national survey of antenatal educators' educational practices in Ireland shows that the teaching and learning strategies used most frequently are modified lecture with some discussion, and, educator led discussion (O Sullivan et al., 2014).

The use of self-instructional training as a teaching and learning strategy for antenatal education classes is an effective means of providing expectant parents with relevant

knowledge and skills. In this study groups of four couples were facilitated simultaneously and the findings from the study show that the level of knowledge increased significantly and was sustained over a six month period. The level of engagement of participants was very evident reflected in expectant women's mean knowledge score of infant CPR increasing from 3.0938 to 9 immediately following training. There was a marked increase in the group interaction following all of the sessions and in particular it was interesting to see the men engaging in conversation with each other. Fathers often find themselves on the periphery of the childbirth experience and while a synthesis of the evidence shows that most fathers have a great desire to be fully engaged with the process of becoming a father they feel excluded by the system and are often seen as 'not- patient and not- visitor' (Steen et al., 2012). Facilitating the acquisition of skills that expectant and new parents find relevant, such as the skills of infant CPR, should be central to ensuring a parent- centred education programme. While all student midwives and midwives are trained in the skills of CPR the traditional four hour CPR classes more commonly run in the US would be difficult to facilitate within the maternity services. The effectiveness of self-training kits, (Lynch et al., 2005) together with the present study's findings that supports their use with expectant parents, provides some evidence to inform parent education practice in the facilitation of infant CPR training.

Limitations

This study was conducted in a large Maternity Hospital in Ireland in the context of very little exposure to CPR training with a group of expectant women and their partners. Whilst the questionnaires were completed pre and immediately post training in a controlled environment, parents returned completed questionnaires by post at 6 months and so significant difference in knowledge could be attributed to further exposure to the self-training kit. A pragmatic approach was adopted in the design of this study and while the importance of testing for proficiency is acknowledged, the objective in the first instance was to raise awareness of the importance of facilitating Infant CPR skills within the Maternity setting. It is acknowledged that this is a small study and it is important to note that the researcher facilitated the self-training sessions. In addition the participants were self-selecting and might therefore be expected to feel positively about the value of infant CPR training.

Conclusion and Recommendations

This study demonstrated that the facilitation of a 22 minute Self- Instructional Infant CPR training kit to expectant women and their partners as part of an antenatal education programme is effective in increasing infant CPR knowledge and confidence with these gains sustained at six months. It demonstrates that expectant women and their partners are very motivated to learn the skills of infant CPR and to share these skills with others in their circle. This study provides expectant and new parents views on the importance to them of acquiring the skills of infant CPR as part of their preparation for parenthood. Further development is needed on validity and reliability of a tool to test knowledge and proficiency of Infant CPR skills. Future research should focus on the facilitation of infant CPR skills in the maternity setting using a suitable model of implementation availing of cost effective means of delivery.

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