Using Compression-Only CPR Mini-Training Sessions to Address Rural Bystander Care

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Abstract

Purpose: Rural populations face vast disparities in out-of-hospital cardiac arrest survival rates when compared with urban populations. Furthermore, rural areas have lower CPR training rates. Compression-Only CPR (COCPR) is a simplified resuscitation method that eliminates the task of rescue breathing. The simplified nature can significantly reduce training times and be more comprehendible and convenient for the general population. The purpose of this study is to assess the change in knowledge and self-confidence of rural college students to administer COCPR as a result of mini-training sessions.

Sample: Purposive sampling was used to focus on the 125 rural college students who received a COCPR mini-training session at the medium sized University located in a rural state with a historically low CPR training rate.

Method: Each participant completed a 14 question pre-survey, the COCPR training, and 13 question post-survey. Descriptive statistics on the pre-, post-, and subscale change scores for both

knowledge and self-confidence were computed and one-way between subjects ANOVAs were conducted to determine differences between group means related to prior CPR training.

Findings: The training resulted in a positive increase in the participants' knowledge and confidence to administer care. Furthermore, the participants indicated that they would recommend this training to others.

Conclusions: This study provides insight into the viability of providing COCPR in lieu of conventional CPR, supports having individuals trained at an earlier age to provide bystander care, and supports training individuals in rural areas where response time is delayed.

Keywords: Rural, Bystanders, CPR, Compression Only, Cardiopulmonary Resuscitation, Cardiac Arrests

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A recent report from the Institute of Medicine (2015) claims that out of the approximate 395,000 annual cases of cardiac arrest that occur in the United States outside of a hospital setting, less than 6% survive. In contrast, approximately 200,000 cardiac arrests occur annually in hospitals with overall survival rates of 18% to 20% (Merchant et al., 2014). Without trained medical staff readily available, out-of-hospital cardiac arrest patients must rely upon immediate action of bystanders. Unfortunately, less than half of out-of-hospital cardiac arrest patients receive immediate help from a bystander until emergency personnel can assist (American Heart Association [AHA], 2018). The lack of action may be due to lack of proper CPR training and/or lack of confidence in provision of care. It is thought that improving training and confidence levels of bystanders can significantly improve outcomes for out-of-hospital cardiac arrest patients.

Rural populations face disparities in out-of-hospital cardiac arrest survival rates when compared with urban populations (Anderson et al., 2014; Rivera, Kumar, Bhandari, & Kumar, 2016; Fabbri et al., 2006; Young, Woodall, Enraght-Moony, Tippett, & Plug, 2007). Consequently, trained bystanders may be even more critical for out-of-hospital cardiac arrest survival in areas with no centralized ambulance dispatch service, limited pre-hospital services, and prolonged call response times (Orkin, 2013). The provision of bystander CPR and CPR training vary widely based on geographic and demographic factors. A national study examining county-level training rates found that annual rates of CPR trainings were low and widely varied across different U.S. counties (Anderson et al., 2014). Counties with training rates that fell in the lower tertile were more likely to have more rural areas, lower population densities, fewer medical facilities/personnel, and higher cardiovascular-related mortality rates; the study attributed low rates of CPR training to lack of knowledge of training opportunities, and unavailability and unaffordability of training in remote locations (Anderson et al., 2014). Efforts focused on improving CPR education in all regions, especially rural areas, are needed to improve bystander intervention and out-of-hospital cardiac arrest survival rates.

Efficacy of Chest Compression Only CPR (COCPR)

Chest compression only CPR (COCPR) is a simplified resuscitation method that eliminates rescue breathing. The simplified nature can significantly reduce training times and be more comprehendible and convenient for the general population. In 2010, basic life support guidelines from the AHA and European Resuscitation Council (ERC) introduced COCPR as an alternative to conventional CPR with rescue breathing (CCRB) for untrained and basic responders (Koster, Baubin, & Bossaert, 2010). Several studies have been conducted to compare efficacy of COCPR to CCRB and most studies agree that there is not a significant difference of survival rates between

individuals who receive COCPR vs. CCRB (Iwami, Kitamura, Kiyohara, & Kawamura, 2015; Riva et al., 2019; Bobrow et al., 2010; Ogawa et al., 2011; Iwami, Kitamura, Kawamura et al., 2012). A recent nationwide study looking at out-of-hospital cardiac arrest across three periods of different CPR guidelines, found an almost two-fold higher rate of CPR before emergency medical services arrived and a six-fold higher rate of COCPR over time (Riva et al., 2019). These studies support the hypothesis that COCPR should be considered as the preferred bystander resuscitation method, as it is associated with higher CPR rates and overall survival in out-of-hospital cardiac arrest.

Effects of COCPR Training

As more findings suggest that COCPR is as effective as CCRB, education and training programs require modification to include the simpler and better-retained COCPR. More convenient CPR training may influence more individuals to become knowledgeable and confident in their CPR delivery skills. Shorter training times and simpler techniques can increase the convenience of CPR training and increase the confidence levels and skill retention of the general population. A study conducted in Korea examined the effect of basic life support training on bystanders' willingness to perform both COCPR and CCRB. The study found that respondents were more willing to perform CPR if they could perform COCPR; the study also found that the number of respondents willing to perform COCPR increased from 30% before to 72% after training (Cho et al., 2010). A randomized control trial comparing the long-term retention of CPR skills by the general public between those receiving COCPR training versus conventional CPR training, found that one year after training the number of total and appropriate chest compressions was significantly higher in the COCPR group (Nishiyama et al., 2014). These studies demonstrate that COCPR is a preferred method that is effective at increasing long term retention of CPR skills.

Increasing knowledge of and self-confidence with COCPR can increase bystanders' willingness to initiate resuscitation and increase survival rates for out-of-hospital cardiac arrest. As such, COCPR trainings should be more readily available resulting in more trained individuals, particularly in rural areas. Additionally, a study examining the disparities in survival with bystander CPR following cardiopulmonary arrest based on neighborhood characteristics found that neighborhoods with more high school age persons displayed the lowest survival (Rivera et al., 2016). Targeting high school students, college students, and other young adults to receive training could conceivably change survival outcomes in rural and other neighborhoods facing survival disparities (Rivera et al., 2016).

The purpose of this study was to assess the change in knowledge and self-confidence of rural college students to administer COCPR as a result of mini-training sessions administered by trained paramedics. The primary research questions consisted of: does the training increase the knowledge and confidence of participants for performing COCPR, and do the participants think this is a valuable program that should continue to be utilized?

Methods

Sample

Purposive sampling was used to focus on 125 rural college students who completed the program. The study submission and written informed consent were approved as an expedited project by the University's Institutional Review Board (Protocol Number: 2014.204). Materials marketing the COCPR mini-training sessions were distributed across a medium sized university located in a rural state with a historically low CPR training rate. The free training sessions, conducted by students who were also trained paramedics, were delivered at a primary student

gathering location on campus during the lunch hour and for student organizations upon request. Participation was voluntary and uncompensated.

Data Collection

A one group pre-test post-test quasi-experimental design was utilized. The participants completed the informed consent, a pre-survey, received the COCPR mini-training sessions, and completed a post-survey. The pre-survey consisted of 14 questions. Seven questions assessed self-confidence to provide care to someone in cardiac arrest utilizing a 7-point Likert scale ranging from not confident at all to extremely confident. Three multiple choice questions assessed knowledge of COCPR; the remaining questions addressed experience with CCRB and COCPR.

The COCPR mini-training session was then administered and consisted of education, a demonstration by trained paramedics, and an opportunity for the participants to practice the steps on the manikins. These additional steps to include the live demonstration and practice resulted in a 5-minute training duration. The post-test survey consisted of 13 questions to include the same seven questions assessing self-confidence to provide care to someone in cardiac arrest utilizing a 7-point Likert scale and three multiple choice questions assessing knowledge of COCPR. The final questions addressed the program effectiveness utilizing a 7-point Likert scale ranging from strongly disagree to strongly agree.

Data Analyses

Descriptive statistics on the pre-subscale scores, post subscale scores, and subscale change scores for both knowledge and self-confidence were computed. One-way analysis of variances was used to determine the existence of statistically significant differences between group means when comparing the effect of prior CPR training on change in knowledge and confidence.

Results

Of the participants (N = 125), 41% had prior CCRB training in the past two years, 39% had prior CCRB more than two years ago, and 25% had no prior CCRB training. 28% had prior COCPR training in the past two years, 20% had COCPR training more than two years ago, and 52% had no prior COCPR training. Only three participants had ever administered care using COCPR and five utilizing CCRB.

The mean post-test confidence scores were greater than the pre-test confidence scores resulting in a positive increase in the change in confidence (M = 4.71, SD = 1.26) for: providing care to someone in cardiac arrest (M = 2.13, SD = 1.68), finding the proper hand position placement to deliver chest compressions (M = 1.94, SD = 1.83), administering chest compressions correctly (M=1.80, SD = 1.98), and providing compression only CPR to someone in cardiac arrest (M = 2.28, SD = 1.93). Likewise, the mean post-test knowledge scores were greater than the pre-test knowledge scores resulting in a positive increase in the change in knowledge scores (M = .87, SD = .93).

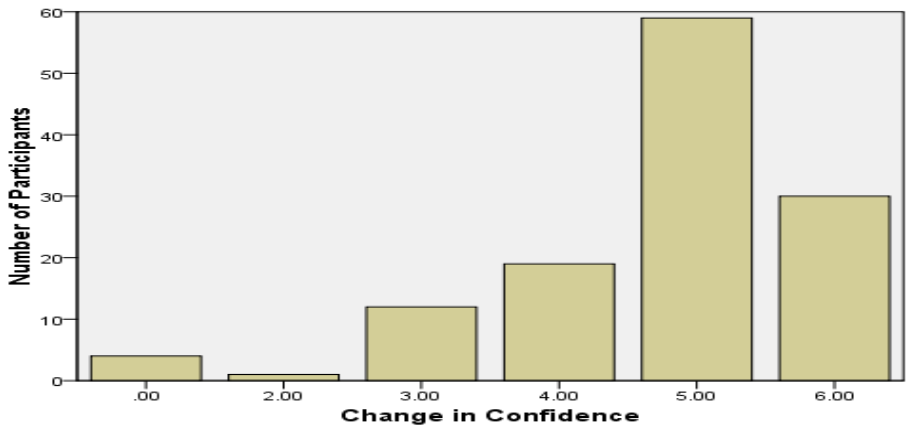

Figure 1. Change in Confidence of the Participants to Administer COCPR

http://dx.doi.org/10.14574/ojrnhc.v20i1.593

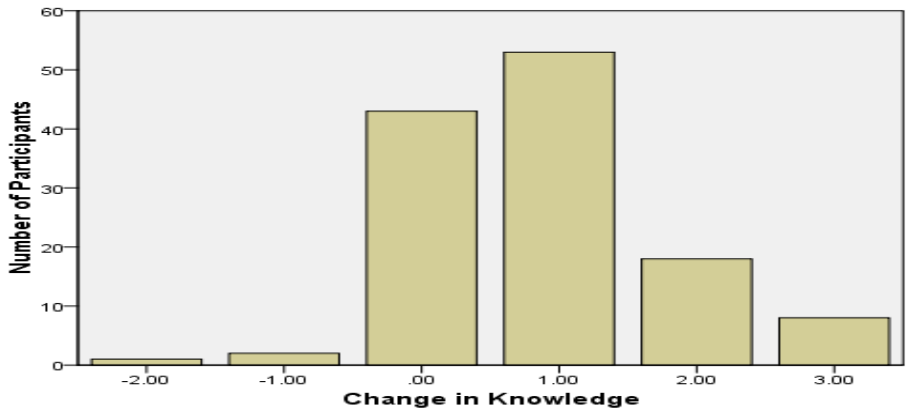

Figure 2. Change in COCPR Knowledge of the Participants

As determined by a one-way ANOVA, there was no statistically significant differences between group means when comparing the effect of prior CCRB training on change in confidence ($F(2, 122) = .36$, $p = .15$) and prior COCPR training on change in confidence ($F(2, 122) =. 17$, $p =. 842$). Likewise, there was no statistically significant differences between group means when comparing the effect of CCRB training on increase in understanding ($F(2, 121) = .30$, $p = .739$) and prior COCPR on increase in understanding ($F(2, 121) = 2.61$, $p = .078$).

The participants indicated that the training increased their understanding of how to properly provide COCPR ($M = 6.43$, $SD = .86$) and increased their confidence in their ability to administer care to someone in cardiac arrest ($M = 6.35$, $SD = .92$). They also indicated that they would recommend this training to others ($M = 6.73$, $SD = .53$).

Discussion

The purpose of this study was to assess the change in knowledge and self-confidence of rural college students to administer COCPR as a result of mini-training sessions administered by trained paramedics. This study clearly demonstrated that the mini-training sessions were effective at increasing both the knowledge and self-efficacy of the participants to administer care.

Limitations

Limitations exist that may affect the findings of this study. Our study focused on college students in one rural state and generalizations to other rural populations should be made with caution. Additional research could investigate improvements or declines in the provision of care and outcomes within rural regions.

Although this study was conducted in a rural area, EMS could be accessed in less than 15 minutes. Recent studies have demonstrated that people who waited longer than 15 minutes for an ambulance to arrive had a better chance of surviving if CCRB was performed (Orkin, 2013). The application of the 2010 AHA and ERC guidelines might not provide responders from remote areas with the skills needed to optimize out-of-hospital cardiac arrest outcomes in these settings. Further research is needed on resuscitations in remote settings to develop appropriate guidelines and training.

Implications for Rural Health Care Practice

When compared to CCBR, COCPR seems to be a good alternative for out-of-hospital, bystander witnessed, cardiac arrests. Studies have shown COCPR to be just as effective as CCBR in survivability (Bobrow et al., 2010; Riva et al., 2019; Ogawa et al., 2011; Iwami, Kitamura, Kawamura et al., 2012); additionally, controlled studies have shown that shorter COCPR training sessions may be just as effective as longer CCBR training sessions (Cho et al., 2010; Nishiyama et al., 2014). If there is a public interest in being educated on resuscitation, then COCPR training may be ideal. Training sessions can be shorter in duration than CCBR training and therefore be more convenient and affordable for the population to attend. An emphasis should be placed on getting past typical fears of initiating resuscitation in these training sessions (Savastano & Vanni, 2011). Rapid use of an external defibrillator tends to be an important element in resuscitation and

should also be an emphasis in COCPR training (Savastano & Vanni, 2011; Iwami, Kitamura, Kawamura, et al., 2012). Furthermore, COCPR trainings should still find opportunities for skill demonstration and practice, as evidenced in this study.

Conclusion

COCPR trainings that address resuscitation fears, emphasize the importance of defibrillators, and provide opportunities to practice skills should result in rural populations that are more knowledgeable and confident in regards to resuscitation for out-of-hospital, bystander witnessed, cardiac arrests. Ultimately, the goal is to address the disparities in out-of-hospital cardiac arrest survival rates in rural areas.

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