

BYSTANDER CPR TRAINING FOR LAYPERSONS AND CAREGIVERS OF  
THOSE AT HIGH RISK FOR SUDDEN CARDIAC ARREST: AN INTEGRATIVE REVIEW

A Scholarly Project

Submitted to the

Faculty of Liberty University

In partial fulfillment of

The requirements for the degree

Of Doctor of Nursing Practice

By

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Liberty University

Lynchburg, VA

August 2020

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Scholarly Project Chair Approval:

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Date

## ABSTRACT

Sudden Cardiac arrest (SCA) is the leading cause of death in the United States (U.S.) with approximately 475,000 deaths annually (AHA, 2018). Approximately 70% of these deaths occur as out-of-hospital cardiac arrests (OHCA; AHA, 2018). Currently, the survival rate for OHCA is 10% with the lack of bystander CPR being a large contributor to the high mortality rate (AHA, 2018). This project evaluated the literature related to bystander CPR training to determine if this training improves willingness to perform bystander CPR and overcomes common barriers that inhibit the initiation of bystander CPR in OHCA. The projected outcome for this project is to provide the evidence that bystander CPR training improves willingness to perform bystander CPR and overcomes barriers inhibiting the initiation of bystander CPR in OHCA.

*Keywords:* Bystander CPR training, barriers to bystander CPR and out-of-hospital cardiac arrest

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### **List of Abbreviations**

American Heart Association (AHA)

Cardiopulmonary resuscitation (CPR)

Coronary heart disease (CHD)

Ejection fraction (EF)

Ischemic cardiomyopathy (IC)

Myocardial infarction (MI)

Out-of-hospital cardiac arrest (OHCA)

Sudden cardiac arrest (SCA)



## SECTION ONE: FORMULATING THE REVIEW QUESTION

### Introduction

The leading cause of death in the United States and around the world is sudden cardiac arrest (SCA), accounting for approximately 475,000 deaths annually in the United States alone (American Heart Association, 2018). The majority of these deaths occur due to coronary heart disease (CHD) with the highest risk being those who have suffered from an ischemic cardiomyopathy (IC; Zaman & Kovoov, 2014). SCA occurring outside of an acute care setting is known as out-of-hospital cardiac arrest (OHCA) and this occurs in the home of the victim approximately 70% of the time (AHA, 2018). Those caring for the victim are only providing cardiopulmonary resuscitation (CPR), or bystander CPR, approximately 56% of the time in witnessed OHCA (Park et al., 2017). For every minute without bystander CPR initiation, survival rate will decline 5-10% (Park et al., 2017). This has led to a 10% survival rate for those who suffer from an OHCA event (AHA, 2018).

With approximately 350,000 people dying annually from OHCAs, interventions must be implemented to improve the survival rate for those experiencing these events. It has been shown that 45% of OHCA victims survive if bystander CPR is initiated and yet only half of all witnessed OHCA events have bystander CPR initiated (AHA, 2018). The American Heart Association strongly recommends that in order to improve survival rates, bystander CPR should be taught to those caring for populations at high risk for sudden cardiac arrest and the general public (Bhanji et al., 2015). Those suffering from an ischemic cardiomyopathy (IC) event within 30 days have been shown to be at highest risk for sudden cardiac arrest (Zaman & Kovoov, 2014). Common barriers seen to inhibit the initiation of bystander CPR are lower education and income levels (Nolan et al., 2018). In addition, lack of CPR training, confidence in performing

CPR, and increased age are also identified barriers seen to inhibit the initiation of bystander CPR. Therefore, the purpose of this integrative review is to analyze current evidence in order to provide an understanding of how bystander CPR training affects willingness to perform CPR, as well as barriers that prevent the initiation of bystander CPR.

## **Defining Concepts and Variables**

### ***Sudden Cardiac Arrest***

Sudden cardiac arrest is a sudden or unexpected stoppage of the heart and circulatory system that occurs due to a cardiovascular cause. It is usually triggered by an abnormal heart rhythm such as ventricular fibrillation (VF) or ventricular tachycardia (VT). SCA accounts for approximately 15-20% of all deaths and is a major concern for public health (Hayashi, Shimizu, & Albert, 2015). Those with CHD, specifically those who have suffered an IC with an ejection fraction (EF) of less than 40% are at highest risk for SCA (Hayashi, Shimizu, & Albert, 2015). Those with an EF of less than 30% have a 10% higher risk of SCA than those who have CHD with a normal EF (Hayashi, Shimizu, & Albert, 2015).

Patients with a history of myocardial infarction (MI) are at a four to six times higher risk of a SCA event, with the highest risk being within the first month following the myocardial infarction, due to increased risk of cardiac arrhythmia (Zaman & Kovoov, 2014). Those suffering from an IC event, which is defined as a reduced EF due to CHD, are at a 10x higher risk for SCA in the first thirty days following a MI than those who have a normal EF (Zaman & Kovoov, 2014). This shows that the population at highest risk for SCA are those who have had an IC within 30 days of a MI (Zaman & Kovoov, 2014).

### ***Out-of-Hospital Cardiac Arrest***

Out-of-hospital cardiac arrest is defined as SCA that occurs outside of an acute care setting. Approximately 475,000 Americans die annually from sudden cardiac arrest with at least 350,000 of these deaths occurring outside of the hospital among the general public (AHA, 2019). The most common place for an OHCA to occur is in the victim's home (AHA, 2019).

### ***Cardiac Caregiver***

A cardiac caregiver is any person who provides assistance during daily life to someone who has a history of cardiac disease. Approximately 75% of OHCAs occur in the home (AHA, 2019). Therefore, a cardiac caregiver may be present during the OHCA event and have the opportunity to provide bystander CPR (Bhanji et al., 2015).

### ***Bystander CPR***

Bystander CPR is defined as the initiation of CPR by someone who witnesses a SCA event. Approximately 45% of out-of-hospital cardiac arrests survive with the initiation of bystander CPR, but currently only 45.7% of OHCA receive immediate CPR (AHA, 2018). This has led to a 90% mortality rate for those who suffer OHCA (AHA, 2018). However, if bystander CPR is performed at the onset of SCA, then a patient's chance of survival may double or even triple (AHA, 2018). This is why the AHA recommends that bystander CPR be taught to those caring for individuals at high risk for SCA, as there is a low risk of harm with high potential benefit when bystander CPR is initiated during an OHCA event (Bhanji et al., 2015).

### **Identified Barriers to Bystander CPR**

There are many identified barriers to the initiation of bystander CPR. Within the United States, it has been shown that those living in low-income neighborhoods, especially those that are Black or Spanish-speaking neighborhoods, are less likely to have bystander CPR performed in OHCA events (Nolan et al., 2018). These neighborhoods are associated with lower levels of

education and a lower likelihood of ever being trained in bystander CPR (Nolan et al., 2018). An additional study showed that 49% of people surveyed were not confident in their skills to perform CPR if needed (Dobbie et al., 2018). Confidence may also be defined as self-efficacy for the purpose of this review. Finally, Dobbie et al. (2018) showed a correlation between increased age and lack of CPR training.

### **Rationale for Conducting the Review**

Upon review of the literature, it was seen that bystander CPR improves survival rate by two to three times and is recommended as a way to reduce mortality rate (Nolan et al., 2018). However, bystander CPR is only initiated approximately half of the time in witnessed bystander CPR (AHA, 2018). Therefore, a gap was identified that if bystander CPR reduces mortality, then why is it not being initiated? This integrative review was conducted to analyze and synthesize the literature discussing bystander CPR training's effects on willingness to perform bystander CPR and its ability to overcome perceived barriers to initiating bystander CPR in the case of witnessed OHCA.

### **Purpose and Review Questions**

There is a 90% mortality rate seen in those who suffer from OHCA (AHA, 2019). Uninitiated bystander CPR increases mortality in OHCA and yet there is a lack of willingness to perform bystander CPR, as well as frequent barriers that inhibit the initiation of bystander CPR in OHCA. The purpose of this review was to perform a critical analysis of the literature involving laypersons' willingness to perform bystander CPR and perceived barriers to the initiation of bystander CPR. This analysis investigated if bystander CPR training is shown to overcome perceived barriers and improve willingness to perform bystander CPR. This aligns

with the AHA's recommendation of teaching bystander CPR to caregivers of high-risk patients for SCA in order to increase survival rates of OHCA victims (Bhanji et al., 2015).

This integrative review addressed the following review questions:

1. Does the training of laypersons or caregivers of those at highest risk for OHCA improve willingness to perform bystander CPR in the case of witnessed OHCA?
2. Does the training of laypersons or caregivers of those at highest risk for OHCA help to overcome perceived barriers to initiating bystander CPR in the case of witnessed OHCA?

### **Formulate Inclusion and Exclusion Criteria**

Studies were included that discuss bystander CPR training and its effects on willingness to perform bystander CPR and overcoming perceived barriers that inhibit the initiation of bystander CPR. Excluded studies were ones that focused on specific interventions such as targeted temperature management, epinephrine, early defibrillation or airway management. An integrative review allows many different types of studies to be reviewed so limitations were not based on study design. However, studies were limited by date, subject age, language and text availability.

**Table 1**

#### ***Inclusion and Exclusion Criteria***

| <b>Inclusion</b>            | <b>Exclusion</b>             |
|-----------------------------|------------------------------|
| Publications from 2014-2019 | Publications prior to 2014   |
| Subjects over the age of 18 | Subjects less than age of 18 |
| English language            | Non-English language         |
| Full-text                   | Abstract only                |

## **Conceptual Framework**

The framework utilized for this integrative review was the Whittemore and Knafl (2005) updated methodology. This methodology was chosen due to its inclusion of diverse research methods and systematic approach of data analysis. Each manuscript utilized within the review will also be assigned a level of evidence according to Melnyk's (2015) system of hierarchy.

### ***Problem Identification***

The trigger for this IR was the 90% mortality rate for those who suffer from an OHCA and the lack of bystander initiation despite decreased mortality with the initiation of bystander CPR (AHA, 2019). When bystander CPR is initiated, 45% of OHCA victims survive and yet bystander CPR is only initiated in 45.7% of witnessed OHCA (AHA, 2018). Evidence to support the high mortality rate of OHCA and continued need for improved bystander CPR rates was gathered from the American Heart Association's national statistics, guidelines, and recommendations for treatment.

### ***Search Strategy***

A librarian assisted in the development of an appropriate search strategy for this integrative review. Key terms were developed, along with inclusion and exclusion criteria. Search terms included bystander CPR training, barriers to bystander CPR, and out-of-hospital cardiac arrest. Automated external defibrillation was an exclusion term, as this integrative review was focused on bystander CPR training alone as the intervention to improve willingness to perform CPR and overcome perceived barriers. In addition, limitations were set based on date, language, and full text availability.

### ***Data Evaluation***

When evaluating studies for inclusion, the AGREE II tool was utilized for practice guidelines. In addition, Melnyk's Rapid Critical Appraisal Checklist (2009) was used to assess credibility and applicability of the other study designs.

### ***Data Analysis***

During this IR, articles found during searches were saved to the institutional database that was utilized. Articles were then reviewed manually to assess answers to the following review questions: Does training of laypersons or caregivers of those at highest risk for OHCA improve willingness to perform bystander CPR in the case of witnessed OHCA, and Does the training of laypersons or caregivers of those at highest risk for OHCA help to overcome perceived barriers to initiating bystander CPR in the case of witnessed OHCA? These articles were placed into an applicability table for analysis of the common themes (Appendix C). Articles that did not answer the review questions were deleted from the table. In addition, data were analyzed in a hierarchical format that was based on the article's level of evidence according to Melnyk's (2015) level of evidence hierarchy.

### ***Data Reduction***

The initial search of the literature resulted in 193 articles. Duplicates were removed which resulted in 188 articles. These articles were then further limited to exclude interventions other than bystander CPR training such as use of epinephrine, advanced airway management, and the use of an automated external defibrillator. This resulted in 71 articles for review. These articles were then placed into an Excel spreadsheet and manually reviewed to see if they answered the review questions. Articles that discussed bystander CPR training and willingness to perform bystander CPR and/ or bystander CPR training, and overcoming perceived barriers to

the initiation of bystander CPR were included and all other articles were excluded. This allowed for a total of 13 articles to be included in the integrative review for further analysis and synthesis.

### ***Data Display***

Data reduction for this IR is displayed using the Prisma diagram. Analysis of the articles is shown in a literature matrix that includes level of evidence and strengths and weaknesses of the article. Data synthesis is shown in an applicability table that demonstrates how each article included answers one or both of the review questions.

### ***Data Comparison***

Concept mapping is utilized to show thematic analysis of the articles and how they answered the review questions. In this IR, conflicting evidence was discovered for bystander CPR training and its effects on willingness to perform CPR. Concept mapping was utilized to assist in visualization of these data, and provided clarity to conflicting themes and interpretation of the data (Whittemore & Knafl, 2005).

### ***Conclusion Drawing and Verification***

After the articles were compared, it was noted that bystander CPR does overcome barriers to initiate bystander CPR (Bhanji et al., 2015; Gonzalez-Salvado et al., 2018; Kragholm et al., 2017; Lund-Kordahl et al., 2019). There were mixed results for bystander CPR improving willingness to perform CPR. This helped to identify areas for further study and recommendations for practice.

### ***Presentation***

Further discussion of the conclusions drawn from the IR are presented in the final section. In addition, the need for increased funding and further areas of study are presented.

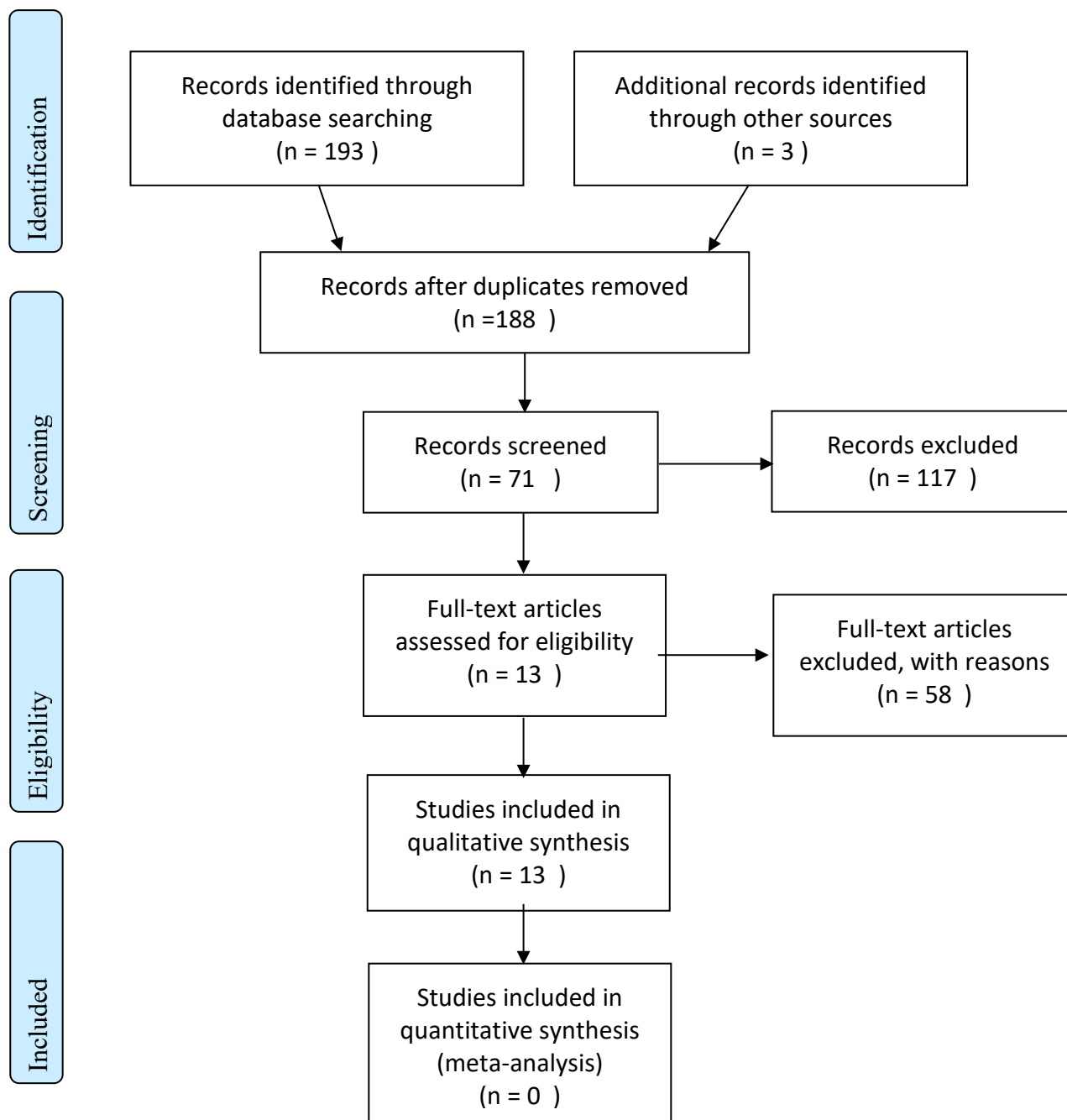


## **SECTION TWO: COMPREHENSIVE AND SYSTEMATIC SEARCH**

A Liberty University research librarian was consulted to discuss search strategies for this integrative review, which helped to reduce bias during this step of the IR process. In addition, it was helpful in choosing proper databases and search criteria to capture the correct data included for review.

### **Search Organization and Reporting Strategies**

The first step in the search process was choosing appropriate databases. After discussing with the librarian different choices, the reviewer decided to utilize PUBMED, ProQuest, and ScienceDirect. Key words used in the search were bystander CPR training, barriers to bystander CPR, and out-of-hospital cardiac arrest. However, this created a large amount of studies; therefore, exclusion criteria needed to be added. After exclusion criteria were added such as date, text availability, population age, and English language, search results were saved in a table. Duplicates were manually deleted, and the remaining articles were reviewed for further exclusion such as use of automated defibrillation, epinephrine, and advanced airway management. Results were entered into a Prisma Flow Diagram shown in Figure 1.

**Figure 1***PRISMA 2009 Flow Diagram*

*Note.* Prisma flow diagram portraying data search and reduction process.

## **Terminology**

The main search occurred through three database searches, which included PubMed, ProQuest, and ScienceDirect. However, three articles were included that were obtained through Liberty University's library search interface from research completed on a separate project. As stated previously, the key words were entered into the database. When searching all databases the search included bystander CPR training, barriers to bystander CPR, and out-of-hospital cardiac arrest. ProQuest yielded 41 articles, ScienceDirect yielded 64 articles, and PUBMED yielded 88 articles. These were further limited by date and the exclusion criteria of not automated external defibrillation to a total of 71 articles for review. These articles were then manually reviewed and the choice to utilize 13 articles and exclude 58 for the IR was made, based upon if the article answered one or both of the two review questions (i.e., Does bystander CPR training improve willingness to perform CPR and Does bystander CPR training help to overcome barriers in the initiation of bystander CPR?).

### **SECTION THREE: MANAGING THE COLLECTED DATA**

Once the searches were completed, the articles were then exported into an Excel spreadsheet. These studies were manually sorted, and duplicates removed. Studies included in the IR were then placed into two Microsoft Word tables for analysis of applicability and level of evidence. Quality appraisal was performed for each article and strengths and weakness were included within the literature matrix.

### **SECTION FOUR: QUALITY APPRAISAL**

Quality of each reference was critically appraised by a single reviewer. The Appraisal of Guidelines Research & Evaluation II (AGREE) was utilized in the appraisal of clinical practice guidelines (AGREE, 2018). In addition, Melnyk's Rapid Critical Appraisal Checklist (2009) was

used for other studies. Studies were then placed in Melnyk's system of hierarchy table and each reference was assigned a level of evidence along with strengths and weaknesses found utilizing the critical appraisal tools. Those studies with low-quality ratings and lower level of evidence were included in the synthesis, which allows for more diversity and reduced risk of bias (Toronto & Remington, 2020).

### **Sources of Bias**

Bias may be present during any stage of a research project. Studies included in the IR may have bias during the selection process, measurement of data, attrition or performance sections. The IR itself may be subject to bias and cause a lack of trustworthiness in the review's transferability, credibility, dependability, or confirmability (Toronto & Remington, 2020). In order for bias to be reduced within this IR, a librarian was consulted to assess search strategies and data. In addition, lower level of evidence articles and one theory-based article were included to allow for inclusivity and reduce bias. However, articles were reviewed manually with the use of Excel and Microsoft Word. This creates a higher risk of bias than if sorting software was utilized.

### **Internal Validity**

As bias is one factor that may reduce internal validity, lower level of evidence studies have been included in this IR. There were a wide range of studies that were reviewed in order to increase validity and reduce bias within the IR. Included in the literature matrix for analysis are level 1 studies (1), level 3 studies (3), level 4 studies (2), level 6 studies (6), and a level 7 study (1).

## Appraisal Tools

The AGREE II tool was utilized in quality appraisal of the practice guidelines presented by Bhanji et al (2015). Scope and purpose is the first domain reviewed in the practice guidelines. This committee was formed due to the lack of consistency in care of those suffering from SCA and their purpose was to review current evidence, recommend best practices, and areas for further research (Bhanji et al., 2015). Seventeen patient/ problem, intervention, comparison, and outcome (PICO) questions were discussed in relation to the topic of SCA. Domain 2 reviews stakeholder involvement. The Education, Implementation and Teams task force from the International Liaison Committee on Resuscitation developed these PICO questions based on evolving literature and input from the general public (Bhanji et al., 2015). These guideline findings are geared toward healthcare workers and those within the community. Rigor of Development is reviewed next. Bhanji et al (2015) performed detailed systematic reviews of the evidence based on recommendations from the Institute of Medicine of the National Academies. The Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) process was utilized in determining strength of evidence and recommendations for practices (Bhanji et al., 2015). These processes were clearly defined within the article. The next domain is clarity of presentation. The recommendations are clearly presented for each PICO question that is answered and strength of recommendation based on evidence is present for each recommendation. Applicability is the fifth domain. Tools and recommendations for change are provided such as teaching compression-only CPR to laypersons to increase willingness to perform bystander CPR (Bhanji et al., 2015). However, there is a low quality of evidence and further research is needed to address better facilitators and barriers to application. The final domain addresses editorial independence. Conflicts of interest are not specifically addressed in

this section of the guidelines. However, they do refer the reader to Part 2 of the guidelines which specifically addresses conflicts of interest. There were no significant conflicts of interest noted.

For all other articles, Melnyk's Level of Evidence and Rapidly Critical Appraisal Tool were utilized for quality of evidence. The results were placed in a literature matrix that is ranked by level of evidence (Appendix A). Strengths and weakness are included in this table to show quality of the individual articles. The majority of the articles were qualitative in design and therefore considered lower level of evidence, however, these articles are clinically relevant and applicable at the local, regional and national levels.

### **Applicability of Results**

This review set out to answer two questions. Does the training of laypersons or caregivers of those at highest risk for OHCA improve willingness to perform bystander CPR in the case of witnessed OHCA, and Does the training of laypersons or caregivers of those at highest risk for OHCA help to overcome perceived barriers to initiating bystander CPR in the case of witnessed OHCA? Six articles were appraised that addressed both review questions. Five articles addressed CPR training assisting in overcoming perceived barriers to initiating bystander CPR and two articles addressed bystander CPR training assisting with willingness to perform bystander CPR training. A table was created to show how each individual article answers one or both of these review questions (Appendix D).

### **Reporting Guidelines**

There are recommended guidelines for bystander CPR training or laypersons and those at high risk for SCA. These recommendations include the use of Basic Life Support courses or self-training methods with brief instructor-led portion (Bhanji et al., 2015; Yavagal, 2017). However, these recommendations are based on low-quality of evidence with the high potential for benefit

(Bhanji et al., 2015; Yavagal, 2017). There is a great need for higher quality of research in the topics of bystander CPR and effectiveness of training to improve bystander CPR rates.

## **SECTION FIVE: DATA ANALYSIS AND SYNTHESIS**

### **Data Analysis Methods: Thematic Analysis**

The trigger for this review was that there is a 90% mortality rate in OHCA despite the evidence showing that bystander CPR reduces mortality (AHA, 2019). Therefore this IR reviewed current bystander CPR training guidelines and sought to answer the following questions:

1. Does the training of laypersons or caregivers of those at highest risk for OHCA improve willingness to perform bystander CPR in the case of witnessed OHCA?
2. Does the training of laypersons or caregivers of those at highest risk for OHCA help to overcome perceived barriers to initiating bystander CPR in the case of witnessed OHCA?

Eight articles were reviewed that addressed the first question, Does the training of laypersons or caregivers of those at highest risk for OHCA improve willingness to perform bystander CPR in the case of witnessed OHCA, produced mixed results.

Six articles were found that supported bystander CPR training's ability to improve willingness to perform bystander CPR (Bhanji et al., 2015; Brown, Bottinor, Carroll, & Hirsch, 2016; Dobbie, 2018; Fratta et al., 2019; Kragholm et al., 2017; Lu, 2017). These six articles were a mixture of quantitative and qualitative studies. Included in these articles were the practice guidelines recommending that compression-only CPR training be provided to laypersons due to evidence showing that it may improve willingness to perform bystander CPR (Bhanji et al.,

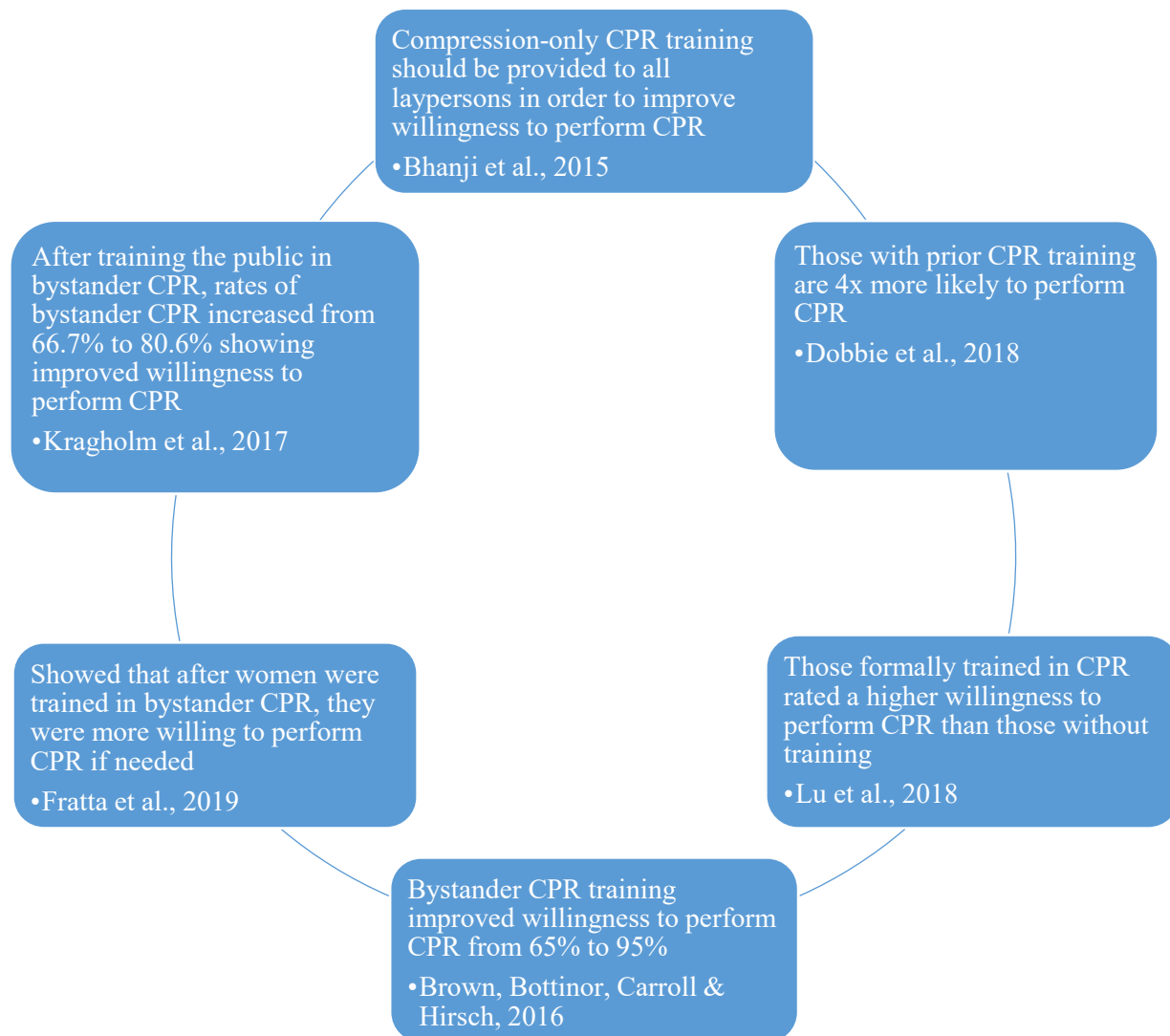
2015). There were two articles that showed bystander CPR training alone does not improve willingness to perform bystander CPR (Bray et al., 2017; Panchal et al., 2015). Bray et al.'s findings did not show a correlation between bystander CPR training and willingness to perform bystander CPR. However, Panchal et al. theorized that until behavioral change is addressed, training alone will not be sufficient to improve willingness to act when necessary. Therefore, a theory of behavioral change should underpin the bystander CPR training courses in order to improve willingness to perform bystander CPR.

Figures 2 and 3 depict the results found on bystander CPR training and willingness to perform bystander CPR. Figure 2 displays those articles that agree bystander CPR training improves willingness to perform bystander CPR and Figure 3 shows the articles that do not agree.



**Figure 2**

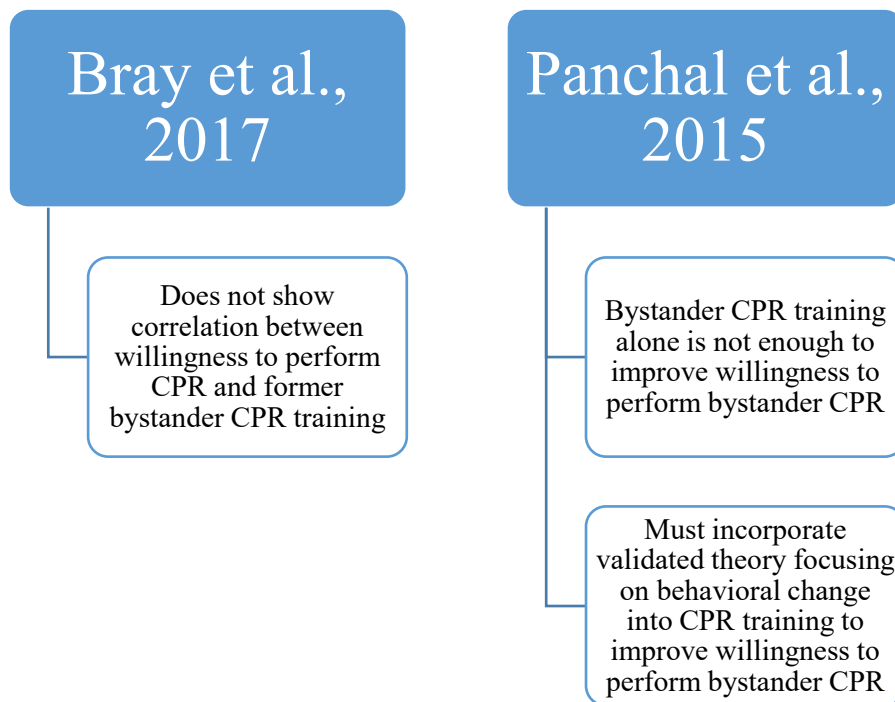
*Articles supporting bystander CPR training to improve willingness to perform CPR*



Note: Bystander CPR training does improve willingness to perform bystander CPR

**Figure 3**

*Articles that do not support bystander CPR training to improve willingness to perform CPR*



Note: Bystander CPR training does not improve willingness to perform Bystander CPR

The second question reviewed in this IR asked, Does the training of laypersons or caregivers of those at highest risk for OHCA help to overcome perceived barriers to initiating bystander CPR in the case of witnessed OHCA? Eleven articles were reviewed that addressed this question. There were many common themes found when reviewing this topic. First, the lack of education and prior CPR training shows a higher likelihood of perceived barriers and inability to perform CPR if needed (Bray et al., 2017; Fratta et al., 2019) In addition, those with prior CPR training had the skills and knowledge to perform bystander CPR if needed (Jarrah, Judeh, & AbuRuz, 2018; Lu et al., 2017; Yoon, Ro, & Cho, 2019). Finally, bystander CPR training improves CPR skills and overcomes barriers that inhibit the initiation of bystander CPR (Bray et

al., 2017; Brown, Bottinor, Carroll & Hirsch, 2016; Cartledge et al., 2017; Gonzalez-Salvado et al., 2018; Kragholm et al., 2017; Lu et al., 2017; Lund-Kordahl et al., 2019).

### **Descriptive Results**

The articles included in this IR were evenly divided between quantitative and qualitative evidence. There were six articles that were ranked as 1-4 and seven articles that were ranked as level 6-7 according to Melnyk's level of evidence. All articles included were within the 2014-2019 date range. There was a mixture of articles from the United States and other countries including Australia, Jordan, Spain, China and Korea. This shows that outcomes are consistent despite location or cultural influences.

### **Synthesis**

Overall, the consensus of the literature is that bystander CPR training will improve willingness to perform bystander CPR (Brown, Bottinor, Carroll, & Hirsch, 2016; Dobbie et al., 2018; Fratta et al., 2019; Kragholm et al., 2017; Lu et al., 2017). However, Bray et al. (2017) did not show a correlation between bystander CPR training and willingness. This is why the hypothesis presented by Panchal et al. (2015) that behavioral change theory must be applied to bystander CPR training courses should be taken into consideration. Having the skills to perform bystander CPR may not be sufficient to change one's behavior and cause one to act when necessary (Panchal et al., 2015).

When reviewing if bystander CPR training helps to overcome barriers in initiating bystander CPR when necessary, two main themes emerged. First of all, lack of CPR training does create more barriers that prohibit the initiation of bystander CPR (Bray et al., 2017; Fratta et al., 2019; Nolan et al., 2018). Secondly, bystander CPR training does empower laypersons and caregivers with the confidence to overcome perceived barriers and perform bystander CPR when

necessary (Bray et al., 2017; Brown, Bottinor, Carroll & Hirsch, 2016; Cartledge et al., 2017; Gonzalez-Salvado et al., 2018; Kragholm et al., 2017; Lu et al., 2017; Lund-Kordahl et al., 2019). Bystander CPR training should be taught to laypersons and caregivers of those at high risk for OHCA in order to provide them with the skills necessary should they witness an OHCA event. However, the utilization of which type of training is best for laypersons and caregivers of those at high risk has not yet been determined and further study is recommended (Bhanji et al., 2015; Fratta et al., 2019; Gonzalez-Salvado et al., 2018). In addition, two studies recommended incorporating training programs into cardiac rehabilitation, but recommended further study related to this topic (Cartledge et al, 2017; Gonzalez-Salvado et al., 2018).

### **Ethical Considerations**

The protection of human rights is of utmost importance and necessary for ethical research to occur. This is why the project leader and Chair have completed the Collaborative Institutional Training Initiative (CITI) for ethical research and the protection of human subjects (See Appendix C for CITI completion certificate of project leader). As this research does not include the use of human subjects, it is exempt from IRB review.

## **SECTION SIX: DISCUSSION**

### **Summary of the Evidence**

Research shows that 90% of OHCA events end in death, but that 45% of OHCA victims will survive if bystander CPR is initiated (AHA, 2018). Therefore, practice guidelines recommend that bystander CPR training be provided to laypersons and caregivers of those at high risk for OHCA (Bhanji et al., 2015). However, even after this recommendation bystander CPR only occurs in less than half of all witnessed OHCA events (AHA, 2018).

This IR sought to understand if bystander CPR training improves willingness to perform bystander CPR and overcome barriers to the initiating bystander CPR in the case of witnessed OHCA. Evidence revealed that bystander CPR does overcome barriers to initiating bystander CPR in the case of witnessed OHCA (Bray et al., 2017; Brown, Bottinor, Carroll & Hirsch, 2016; Cartledge et al., 2017; Gonzalez-Salvado et al., 2018; Kragholm et al., 2017; Lu et al., 2017; Lund-Kordahl et al., 2019). In the case of willingness to perform bystander CPR, the majority of the evidence agrees that bystander CPR training improves willingness to perform bystander CPR in the case of witnessed OHCA (Brown, Bottinor, Carroll, & Hirsch, 2016; Dobbie et al., 2018; Fratta et al., 2019; Kragholm et al., 2017; Lu et al., 2017). However, one study showed no correlation between bystander CPR (Bray et al., 2017), and another hypothesized that bystander CPR training alone is not sufficient to change willingness to perform bystander CPR when needed (Panchal et al., 2016).

### **Limitations**

There were noted limitations in this review. Bystander CPR and OHCA produced a large volume of literature and as a novice reviewer, it was difficult to narrow the initial subset of articles. However, with the assistance of the librarian, the search was narrowed to more specific review questions and inclusion and exclusion criteria. Data were placed into an Excel spreadsheet, but articles were manually sorted without the use of electronic software. In addition, this IR included articles that were lower level of evidence and at increased risk for bias. The highest concern for bias was the risk for lack of external validity. These studies were qualitative in nature with a small sample size and were localized to one setting.

## **Implications for Practice/Future Work**

Even though current practice guidelines recommend the training of bystander CPR training to laypersons and caregivers of those at high risk of OHCA, there is still a lack of bystander CPR in the case of witnessed OHCA. Panchal et al. (2016) suggested that this is due to the need for incorporation of behavioral change theory into bystander CPR. It is this thought that knowledge alone will not cause a person to act, but that they must be willing to act (Panchal et al., 2016). Further research is needed in the area of bystander CPR training that is underpinned with behavioral change theory in order to see if this impacts willingness to perform bystander CPR training.

Other gaps in knowledge noted during this review included which training methods to utilize. Should laypersons be trained in BLS courses that require certified AHA instructors or are self-taught methods that are shorter and easier to disperse in large quantities a better route? This IR has shown that bystander CPR training is an effective way to overcome barriers to the initiation of bystander CPR and improve willingness to perform bystander CPR and yet there is a lack of high-quality research to support this (Bhanji et al., 2015). Future research needs to be conducted in order to understand the best methods to implement bystander CPR training, as well as where these training courses should take place (Bhanji et al., 2015; Cartledge et al., 2017; Fratta et al., 2019; Gonzalez-Salvado et al., 2018).

## **Dissemination**

Approximately 350,000 people die annually from OHCA even though there are modifiable factors such as the initiation of bystander CPR that could greatly reduce this number (AHA, 2018). Recommending bystander CPR training is not enough and attention must be directed to the need of instituting bystander CPR courses into the community in order to

overcome perceived barriers to the initiation of bystander CPR and improve willingness of laypersons to initiate bystander CPR in the case of witnessed OHCA. This is why dissemination of this project will occur on the micro, meso and macro levels.

First, this integrative review will be presented to a local acute care organization in order to assist in the creation of a bystander CPR training course within the local community. In addition, this integrative review will be submitted for peer-reviewed publication. Once the integrative review is published, the VA Board of Medicine and VA Board of Nursing will be contacted encouraging them to review the integrative review. This evidence will encourage the institution of policy change that supports further funding and research in the area of bystander CPR training for laypersons by the healthcare community.

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## Appendix A

Evidence Table

| Article Title, Author, etc. (Current APA Format)  | Study Purpose   | Sample  | Methods   | Study Results  | Melnyk's Level of Evidence | Study Strengths & Limitations  |
|---|---|---|---|--|----------------------------|--|
| <p>Bhanji, F., Finn, J., Lockey, A., Monsieurs, K., Frengley, R., Iwami, T., ... Lang, E. (2015). International consensus on cardiopulmonary resuscitation and emergency cardiovascular care science with treatment recommendations. <i>American Heart Association</i>, 132(1), S242-S268.<br/>doi:10.1161/CIR.0000000000000277</p> | <p>To offer recommendations for basic life support training to caregivers of high-risk patients for out of hospital sudden cardiac arrest</p> | <p>A systematic review of articles based on recommendations of the Institute of Medicine of the National Academies.</p> | <p>Review of 3 randomized controlled trials and 8 qualitative studies</p> | <p>Findings brought forth the recommendation of compression-only training to laypersons as this may improve willingness to perform bystander CPR. In addition, they recommend caregivers of those at high risk for</p> | <p>Level 1</p>             | <p><u>Strengths:</u><br/>Highest level of evidence that supports the training of laypersons and caregivers in bystander CPR</p> <p><u>Limitations:</u><br/>; There is need for higher-quality research</p> |

|   |  |  |  |   |  |   |
|---|--|--|--|---|--|---|
|   |  |  |  | SCA be trained in BLS due to low risk of harm and high potential benefit. This is a strong recommendation with low-quality evidence.  |  | due to the inclusion of studies with a lower level of evidence  |
| Fratta, K. A., Bouland, A. J., Lawner, B. J., Comer, A. C., Halliday, M. H., Levy, M. J., & Seaman, K. G. (2019). Barriers to bystander CPR: Evaluating socio-economic and cultural factors influencing students attending community CPR training. <i>The American Journal of Emergency Medicine</i> , 37(1), 159-161. doi:10.1016/j.ajem.2018.05.022 | To understand if there are social and educational factors that influence barriers to bystander CPR | 267 survey responders with a mean age of 47 and 57% who were female. Approximately 71% had a college education and there was a mean income of \$100,252 annually | Prospective surveys were completed both prior to and post compression only CPR classes in Howard County, Maryland. | Prior to CPR training, the median confidence level for performing CPR was 4 and median likelihood of performing CPR on a stranger was 5. After CPR training, confidence median increased to | Level 3: Controlled trial (no randomization) | <u>Strengths:</u> Supports the need to train caregivers in bystander CPR and shows that targeted training helps to improve willingness to perform CPR and overcome common barriers. |

|   |   |  |   |  |   |   |
|---|---|--|---|--|---|---|
|   |   |  |   | 10 and likelihood of performing CPR on a stranger increased to 10.   |   | <u>Limitations</u><br>: Small sample size and limited to one setting  |
| Brown, L., Bottinor, W., Carroll, T., & Hirsch, G. (2016). CPR at the state fair: A 10-minute training session is effective in teaching bystander CPR to members of at-risk communities. <i>Journal of the American College of Cardiology</i> , 67(13), 2355. doi:10.1016/s0735-1097(16)32356-7 | To assess if a ten-minute CPR course would help close the gap of differences in bystander CPR rates in Jefferson County, Kentucky | There were 152 adults aged 18-76 with 77% being female | A one-day CPR training course was provided at the Kentucky State Fair. Participants were asked to watch a short training video and then receive verbal coaching while performing chest compressions. They completed | Study showed prior to CPR training only 44% of participants had knowledge of how to perform CPR and 65% were willing to perform CPR if needed. After training, CPR knowledge increased to 96% and willingness to perform | Level 3: Controlled trial, no randomization | <u>Strengths</u> : Supports the teaching of bystander CPR to general public. Showed that focused training improved quality of CPR, willingness to perform CPR, and helps to overcome barriers that prevent bystander CPR. |

|   |   |  |  |   |   |  |
|---|---|--|--|---|---|--|
|   |   |  | a survey on willingness to perform CPR and then returned an hour later for a CPR challenge.  | bystander CPR increased to 95%.   |   | <u>Limitations</u><br>: One setting and small sample size  |
| González-Salvado, V., Abelairas-Gómez, C., Peña-Gil, C., Neiro-Rey, C., Barcala-Furelos, R., González-Juanatey, J. R., & Rodríguez-Núñez, A. (2018). Basic life support training into cardiac rehabilitation programs: A chance to give back. A community intervention controlled manikin study. <i>Resuscitation</i> , 127, 14-20. <a href="https://doi.org/10.1016/j.resuscitation.2018.03.018">https://doi.org/10.1016/j.resuscitation.2018.03.018</a> | To institute 2 different bystander CPR training methods into a cardiac rehab program and assess if it improves confidence level and skills to perform bystander CPR | 108 patients at a cardiac rehabilitation program completed the study | Two groups both underwent baseline assessment of BLS skills and then underwent a 20-minute BLS instructional review the first week of cardiac rehab. At weeks 7 & 8, one | Both groups showed poor performance at baseline. The standard BLS group improved greatly with response time but the compression-only group had better overall skill retention. Both groups were 100% for initiating | Level 3: non-randomized, quasi-experimental | <u>Strengths</u> : Confidence and self-perceived skills improved from 15% to 80% after implementation of CPR training.<br><br><u>Weaknesses</u> : Studied included a small sample size and took place at |

|   |   |  |   |   |                                      |  |
|---|---|--|---|---|--------------------------------------|--|
|   |   |  | group had a BLS refresher course and the other had compression only training.   | CPR when appropriate  |                                      | one rehab center.  |
| Kragholm, K., Wissenberg, M., Mortensen, R., Hansen, S., Hansen, C., Thorsteinsson, K., ... Rajan, S. (2017). Bystander efforts and 1-Year outcomes in out-of-hospital cardiac arrest. <i>The New England Journal of Medicine</i> , 376, 1737-1747. doi:10.1056/NEJMoa1601891 | To study the effects of bystander CPR training interventions and long-term effects on survival of out-of-hospital cardiac arrests | The sample included 2855 patients from Denmark with at least a 30-day survival of OHCA | Linked nationwide data of OHCA to the functional outcome data and reported the one-year risks of death, anoxic injury and bystander CPR rates | After widespread mandatory and voluntary training of bystander CPR and other national initiatives, bystander CPR rates increased from 66.7% to 80.6% in witnessed OHCA events | Level 4 case-control or cohort study | <u>Strengths:</u> This study has a large population and shows that bystander CPR training does improve bystander CPR rates therefore helping to overcome barriers that inhibit the initiation of bystander CPR |



|  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|
|  |  |  |  |  |  | <p><u>Limitations</u><br/>:<br/>Information on duration of cardiac arrest was not obtained, but witnessed status was included. Other interventions were initiated that could have improved bystander CPR rates such as increased AEDs within the community and increased dispatcher assisted CPR rates</p> |
|--|--|--|--|--|--|--|

|  |  |  |  |  |                                     |  |
|--|--|--|--|--|-------------------------------------|--|
| <p>Lund-Kordahl, I., Mathiassen, M., Melau, J., Olasveengen, T. M., Sunde, K., &amp; Fredriksen, K. (2019). Relationship between level of CPR training, self-reported skills, and actual manikin test performance—an observational study. <i>International Journal of Emergency Medicine</i>, 12(1). doi:10.1186/s12245-018-0220-9</p> | <p>To assess if higher levels of training in CPR correlates with higher quality of CPR</p> | <p>Two hundred thirty-seven people were split into three groups based on level of CPR training</p> | <p>Case-controlled/observational study</p> | <p>Those with minimal training performed lower quality of CPR with proper hand placement (66.4%), compression depth (40.6%) and effective ventilation (16%), than those with advanced training who had correct hand placement (89.4%), compression depth (82.1%), and effective ventilation (85.7%).</p> | <p>Level 4:<br/>Case-Controlled</p> | <p><u>Strengths:</u><br/>Supports the belief that CPR training overcomes barriers such as quality of CPR and confidence in performing CPR.</p> <p><u>Limitations</u><br/>: This was not a randomized sample and is a small-scale study. Sample population accounts their own past CPR training and may have bias or be unreliable in recall of</p> |
|--|--|--|--|--|-------------------------------------|--|

|   |   |   |  |  |                                 |  |
|---|---|---|--|--|---------------------------------|--|
| <p>Bray, J. E., Straney, L., Smith, K., Cartledge, S., Case, R., Bernard, S., &amp; Finn, J. (2017). Regions with low rates of bystander cardiopulmonary resuscitation (CPR) have lower rates of CPR training in Victoria, Australia. <i>Journal of the American Heart Association</i>, 6(6). <a href="https://doi.org/10.1161/jaha.117.005972">https://doi.org/10.1161/jaha.117.005972</a></p> | <p>To discover if there is an association with CPR training and bystander CPR rates</p> | <p>Sample population was from Victoria, Australia and bystander CPR rates were taken from the Victorian Ambulance Cardiac Arrest Registry</p> | <p>Each postal code in Victoria was rated as low or high bystander CPR region. These regions were then surveyed on CPR training, knowledge of CPR and willingness to perform CPR</p> | <p>The areas with lower CPR training had lower bystander CPR rates and survival rates from OHCA. However, there was no correlation between willingness to perform CPR and bystander CPR training</p> | <p>Level 6:<br/>Qualitative</p> | <p>past training.<br/><u>Strengths:</u><br/>Shows that bystander CPR training does correlate with increased bystander CPR rates showing that CPR training does overcome barriers to the initiation of bystander CPR<br/><u>Weakness:</u><br/>Limited to one area of Australia and bystander CPR rates for witnessed OHCA</p> |
|---|---|---|--|--|---------------------------------|--|

|  |  |  |  |  |   |   |
|--|--|--|--|--|---|---|
|  |  |  |  |  |   | were presume cardiac in nature. Therefore, it does not account for all forms of OHCA.   |
| <p>Cartledge, S., Feldman, S., Bray, J., Stub, D., &amp; Finn, J. (2017). Education experiences of patients and spouses post an acute cardiac event- Can we add cardiopulmonary resuscitation training? A qualitative study. <i>Heart, Lung and Circulation</i>, 26, S318.<br/>doi:10.1016/j.hlc.2017.06.639</p> | <p>To gain a comprehensive perspective from patient or spouse in regard to education after the acute cardiac event</p> | <p>Purposively sampled from the cardiac unit including 12 patient-spouse pairs</p> | <p>A qualitative , interview study</p> | <p>11/12 patients and caregivers felt that the more information they were given, the more they felt in control of their condition. One spousal pair was against CPR training and it was found that they were the eldest (75 years of age).</p> | <p>Level 6 single qualitative study</p> | <p><u>Strengths:</u><br/>This study supports the educating of caregivers in bystander CPR based on overcoming perceived barriers and empowering them to have the tools they need to provide CPR when necessary.</p> |

|  |   |   |   |  |                                   |  |
|--|---|---|---|--|-----------------------------------|--|
|  |   |   |   |  |                                   | <p><u>Limitations</u><br/>: This was a qualitative study and therefore is not statistical and cannot be verified. There was a small sample size only included English speaking patients so future research needed for varying cultures</p> |
| <p>Lu, C., Jin, Y., Shi, X., Ma, W., Wang, Y., Wang, W., &amp; Zhang, Y. (2017). Factors influencing Chinese university students' willingness to performing bystander cardiopulmonary resuscitation. <i>International Emergency Nursing</i>, 32, 3-8.<br/>doi:10.1016/j.ienj.2016.04.001</p> | <p>To understand factors influencing attitudes towards performing bystander CPR</p> | <p>Eighteen universities across three metropolises in China were sent questionnaires which totaled 2,934 and had an</p> | <p>A Non-experimental qualitative study</p> | <p>Those who had previously performed CPR or felt that they were prepared to do so had a higher rate</p> | <p>Level 6: Qualitative study</p> | <p><u>Strengths:</u><br/>Supports training of bystander CPR due to results that increased confidence in CPR knowledge</p>  |

|  |  |  |  |  |                                  |  |
|--|--|--|--|--|----------------------------------|--|
|  |  | 81.5% response rate  |  | of willingness to perform CPR  |                                  | and CPR skills directly correspond with willingness to perform bystander CPR.<br><br><u>Limitations</u><br>; This is a qualitative study and therefore is non-statistical and unable to be verified. |
| Dobbie, F., MacKintosh, A. M., Clegg, G., Stirzaker, R., & Bauld, L. (2018). Attitudes towards bystander cardiopulmonary resuscitation: Results from a cross-sectional general population survey. <i>PLOS ONE</i> , 13(3), e0193391. <a href="https://doi.org/10.1371/journal.pone.0193391">https://doi.org/10.1371/journal.pone.0193391</a> | To gain a comprehensive perspective of public attitudes, awareness, and perception of bystander CPR to assist in understanding | Random sampling of households of 1027 adults across Scotland | A qualitative, cross-sectional population survey | Only 52% of adults had been trained in CPR with 44% of these having been trained greater than five years prior. Of those 65+, only 35% | Level 6 single qualitative study | <u>Strengths:</u> Shows that there is a need to train laypersons in bystander CPR due to lack of recognition of the need for CPR,  |

|  |   |   |                                 |  |                            |   |
|--|---|---|---------------------------------|--|----------------------------|---|
|  | g modifiable factors that prevent the initiation of bystander CPR |   |                                 | had been trained in CPR. Those trained in CPR were 4x more likely to perform bystander CPR |                            | skills in performing CPR, and confidence in performing CPR<br><br><u>Limitations</u><br>:<br>This is a lower level of evidence study. In addition, answer choices were pre-coded and may not have captured additional influencers for their willingness to perform bystander CPR. |
| Yoon, W., Ro, Y. S., & Cho, S. (2019). A mediation analysis of the effect of practical training on the relationship between demographic factors, and bystanders' self- | To understand if there is a relationship                          | 149,444 Koreans who participated in the | Data was obtained from the KCHS | Self-efficacy or ability to perform  | Level 6: Qualitative Study | <u>Strengths:</u><br>Practical CPR training   |

|   |   |                                       |  |   |  |
|---|---|---------------------------------------|--|---|--|
| <p>efficacy in CPR performance. <i>PLOS ONE</i>, 14(4), e0215432. <a href="https://doi.org/10.1371/journal.pone.0215432">https://doi.org/10.1371/journal.pone.0215432</a></p> | <p>between CPR training and bystander CPR self-efficacy</p> | <p>Korean Community Health Survey</p> | <p>that is a nationwide, cross-sectional interview conducted annually by the Korea CDC</p> | <p>CPR if needed was higher in the group who received prior practical CPR training. Practical CPR training also helped overcome demographic challenges in self-efficacy</p> | <p>improves self-efficacy in bystander CPR and overcomes demographic barriers to bystander CPR<br/> <u>Weaknesses:</u> CPR training was the only mediator studied to overcome demographic barriers to CPR self-efficacy and there may be additional factors that influence this. Self-efficacy is subjective and</p> |
|---|---|---------------------------------------|--|---|--|



|  |  |                      |  |   |                            |  |
|--|--|----------------------|--|---|----------------------------|--|
|  |  |                      |  |   |                            | therefore may include bias.  |
| Jarrah, S., Judeh, M., & AbuRuz, M. E. (2018). Evaluation of public awareness, knowledge and attitudes towards basic life support: A cross-sectional study. <i>BMC Emergency Medicine</i> , 18(1). <a href="https://doi.org/10.1186/s12873-018-0190-5">https://doi.org/10.1186/s12873-018-0190-5</a> | To evaluate public awareness, knowledge, and attitudes towards CPR in Jordan | 256 Jordanian adults | Sample population completed a survey that included demographics, prior CPR training, signs of cardiac arrest, attitude towards CPR, and concerns regarding CPR | 29% of population had prior CPR training. 23% had witnessed a SCA but only 10% performed bystander CPR. Those with prior CPR training had greater knowledge or proper CPR skills than those who did not have prior training | Level 6: Qualitative Study | <p><u>Strengths:</u> Shows that those with CPR training have greater knowledge and skills than those without prior training.</p> <p><u>Weaknesses:</u> Cross-sectional design with convenience sampling. Survey is subjective and at risk for bias</p> |

|   |   |            |  |   |                                |   |
|---|---|------------|--|---|--------------------------------|---|
| <p>Panchal, A. R., Fishman, J., Camp-Rogers, T., Starodub, R., &amp; Merchant, R. M. (2015). An “intention-focused” paradigm for improving bystander CPR performance. <i>Resuscitation</i>, <i>88</i>, 48-51. <a href="https://doi.org/10.1016/j.resuscitation.2014.12.006">https://doi.org/10.1016/j.resuscitation.2014.12.006</a></p> | <p>To discuss the utilization of an intention-focused model of bystander CPR training that is based off of behavioral theory that will strengthen the bystander’s intention or willingness to perform CPR when needed</p> | <p>n/a</p> | <p>Utilize a well-validated theory model such as The Theory of Planned Behavior or Theory of Reasoned Action. Before teaching CPR skills, discuss with the participants their intention or willingness to perform CPR. They must evaluate their own beliefs, fears</p> | <p>Intentions or CPR skills alone will not create a person who is prepared and willing to perform CPR when necessary. CPR training must incorporate theory that promotes a change in behavior in order to improve bystander CPR rates</p> | <p>Level 7: Expert opinion</p> | <p><u>Strengths:</u><br/>Discusses willingness to perform CPR or intention that must be present if a person is to initiate bystander CPR. However, they must have the skills to perform CPR effectively in order to reduce mortality.</p> <p><u>Weaknesses:</u> Is the lowest level of evidence. Will need further study to support</p> |
|---|---|------------|--|---|--------------------------------|---|

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|  |  |  | (perceived barriers) and self-efficacy because skills themselves will not make them perform CPR when necessary. |  |  |  |
|--|--|--|---|--|--|--|

## Appendix B

**IRB Exemption Notification**

IRB, IRB

Wed 7/8/2020 4:30 PM

To: Scott, Ragan (Nursing)

Cayuse-How-Tos.pdf

964 KB

Good Afternoon Ragan,

If you are now only conducting an integrative/literature review, you do not need to submit anything else to the IRB.

However, if your program wants an updated IRB letter to reflect your new study title, you would need to submit a modification request in Cayuse. We would then promptly review the request and issue a new letter. Instructions for submitting a modification are provided in the attached document.

Best,

Research Coordinator  
Research Ethics Office

*Liberty University | Training Champions for Christ since 1971*

## Appendix C

**Citi Training**

This is to certify that:

**Ragan Scott**

Has completed the following Citi Program course:

**Biomedical Research - Basic/Refresher** (Curriculum Group)

**Biomedical&HealthScienceResearchers** (CourseLearnerGroup) **1 - Basic Course** (Stage)

Under requirements set by:

**Liberty University**

Completion Date Expiration Date Record ID

31-Aug-2019 30-Aug-2022 33030982



Collaborative Institutional Training Initiative

Verify at [www.citiprogram.org/verify/?w48842abb-5e02-44d6-9e96-52c2ac0ab5e0-330309](http://www.citiprogram.org/verify/?w48842abb-5e02-44d6-9e96-52c2ac0ab5e0-330309)

## Appendix D

## Applicability Table

| <b>Citation</b>   | <b>Does the training of laypersons or caregivers of those at highest risk for OHCA improve willingness to perform bystander CPR in the case of witnessed OHCA?</b> | <b>Does the training of laypersons or caregivers of those at highest risk for OHCA help to overcome perceived barriers to initiating bystander CPR in the case of witnessed OHCA?</b> | <b>Discussion</b>  |
|---|--|---|--|
| Bhanji, F., Finn, J., Lockey, A., Monsieurs, K., Frengley, R., Iwami, T., ... Lang, E. (2015). International consensus on cardiopulmonary resuscitation and emergency cardiovascular care science with treatment recommendations. <i>American Heart Association</i> , 132(1), S242-S268. doi:10.1161/CIR.0000000000000277 | Recommends compression only CPR training to laypersons and BLS training to caregivers of those at high-risk for  | Recommended that communities train bystanders in compression-only CPR as an alternative to conventional CPR to  | Recommendations are based on low-quality of evidence but high potential benefit. There is a need for higher-quality of research in this topic. |

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|   | OHCA in order to improve willingness to perform bystander CPR   | overcome barriers seen in the initiation of bystander CPR                             |  |
| Fratta, K. A., Bouland, A. J., Lawner, B. J., Comer, A. C., Halliday, M. H., Levy, M. J., & Seaman, K. G. (2019). Barriers to bystander CPR: Evaluating socio-economic and cultural factors influencing students attending community CPR training. <i>The American Journal of Emergency Medicine</i> , 37(1), 159-161. doi:10.1016/j.ajem.2018.05.022   | Showed that prior to training women were less willing to perform CPR, but overcame this with CPR training | Lack of education and prior training showed a higher likelihood of perceived barriers |  |
| Brown, L., Bottinor, W., Carroll, T., & Hirsch, G. (2016). CPR at the state fair: A 10-minute training session is effective in teaching bystander CPR to members of at-risk communities. <i>Journal of the American College of Cardiology</i> , 67(13), 2355. doi:10.1016/s0735-1097(16)32356-7   | Bystander CPR training improved willingness to perform CPR from 65% to 95%                                | Knowledge of CPR skills improved from 44% to 96% after focused CPR training           | Shows that CPR training improves willingness to perform CPR and overcome barriers preventing initiation of bystander CPR |
| Gonzalez-Salvado, V., Abelairas-Gomez, C., Pena-Gil, C., Neuro-Rey, C., Barcala-Furelos, R., Gonzalez-Juanatey, J. R., & Rodriguez-Nunez, A. (2018). Basic life support training into cardiac rehabilitation programs: A change to give back. A community intervention controlled manikin study. <i>Resuscitation</i> , 127, 14-20. <a href="https://doi.org/10.1016/j.resuscitation.2018.03.018">https://doi.org/10.1016/j.resuscitation.2018.03.018</a> |   | Improved self-efficacy and skills after implementation of CPR training                | Encourages further study on BLS versus compression only training methods   |

|   |  |  |   |
|---|--|--|---|
| <p>Kragholm, K., Wissenberg, M., Mortensen, R., Hansen, S., Hansen, C., Thorsteinsson, K., ... Rajan, S. (2017). Bystander efforts and 1-Year outcomes in out-of-hospital cardiac arrest. <i>The New England Journal of Medicine</i>, 376, 1737-1747. doi:10.1056/NEJMoa1601891</p>   | <p>After training the public in bystander CPR, bystander CPR rates increased from 66.7% to 80.6%</p>   | <p>After training the public in bystander CPR, bystander CPR rates increased from 66.7% to 80.6%</p> | <p>Instituting a public bystander CPR training course showed that people were more willing to perform CPR and survival rates improved</p> |
| <p>Lund-Kordahl, I., Mathiassen, M., Melau, J., Olasveengen, T. M., Sunde, K., &amp; Fredriksen, K. (2019). Relationship between level of CPR training, self-reported skills, and actual manikin test performance—an observational study. <i>International Journal of Emergency Medicine</i>, 12(1). doi:10.1186/s12245-018-0220-9</p>  |  | <p>CPR training improves quality of CPR and confidence in performing CPR</p>                         |   |
| <p>Bray, J. E., Straney, L., Smith, K., Cartledge, S., Case, R., Bernard, S., &amp; Finn, J. (2017). Regions with low rates of bystander cardiopulmonary resuscitation (CPR) have lower rates of CPR training in Victoria, Australia. <i>Journal of the American Heart Association</i>, 6(6). <a href="https://doi.org/10.1161/jaha.117.005972">https://doi.org/10.1161/jaha.117.005972</a></p> | <p>Did not show a correlation between willingness to perform CPR and former bystander CPR training</p> | <p>Areas with lower CPR training rates had lower bystander CPR rates</p>                             | <p>Localized to one region and results may not be transferrable to other regions</p>  |
| <p>Cartledge, S., Feldman, S., Bray, J., Stub, D., &amp; Finn, J. (2017). Education experiences of patients and spouses post an acute cardiac event- Can we add cardiopulmonary resuscitation training? A qualitative study. <i>Heart, Lung and Circulation</i>, 26, S318. doi:10.1016/j.hlc.2017.06.639</p>  |  | <p>Cardiac caregivers felt that CPR training would help them overcome barriers to</p>                |   |



|   |   |   |   |
|---|---|---|---|
|   |   | initiate bystander CPR and felt more in control of disease  |   |
| Lu, C., Jin, Y., Shi, X., Ma, W., Wang, Y., Wang, W., & Zhang, Y. (2017). Factors influencing Chinese university students' willingness to performing bystander cardiopulmonary resuscitation. <i>International Emergency Nursing</i> , 32, 3-8. doi:10.1016/j.ienj.2016.04.001  | Those formally trained in CPR rated a higher willingness to perform bystander CPR               | Those formally trained in CPR scored higher in knowledge and confidence level in performing bystander CPR | Supports that training laypersons in bystander CPR will improve willingness and overcome perceived barriers |
| Dobbie, F., MacKintosh, A. M., Clegg, G., Stirzaker, R., & Bauld, L. (2018). Attitudes towards bystander cardiopulmonary resuscitation: Results from a cross-sectional general population survey. <i>PLOS ONE</i> , 13(3), e0193391. <a href="https://doi.org/10.1371/journal.pone.0193391">https://doi.org/10.1371/journal.pone.0193391</a>  | Shows that those with prior CPR training were 4x more likely to perform bystander CPR if needed |   |   |
| Yoon, W., Ro, Y. S., & Cho, S. (2019). A mediation analysis of the effect of practical training on the relationship between demographic factors, and bystanders' self-efficacy in CPR performance. <i>PLOS ONE</i> , 14(4), e0215432. <a href="https://doi.org/10.1371/journal.pone.0215432">https://doi.org/10.1371/journal.pone.0215432</a> |   | Self-efficacy and CPR knowledge was higher in those who had prior practical CPR training                  |   |
| Jarrah, S., Judeh, M., & AbuRuz, M. E. (2018). Evaluation of public awareness, knowledge and attitudes  |   | Those with prior CPR  | Only 10% of those who   |

|   |  |   |   |
|---|--|---|---|
| <p>towards basic life support: A cross-sectional study. <i>BMC Emergency Medicine</i>, 18(1).<br/> <a href="https://doi.org/10.1186/s12873-018-0190-5">https://doi.org/10.1186/s12873-018-0190-5</a></p>  |  | <p>training had greater knowledge and skills to perform CPR if needed</p> | <p>witnessed OHCA performed CPR. It would be interesting to see if those who did not perform bystander CPR had prior CPR training or not.</p> |
| <p>Panchal, A. R., Fishman, J., Camp-Rogers, T., Starodub, R., &amp; Merchant, R. M. (2015). An “intention-focused” paradigm for improving bystander CPR performance. <i>Resuscitation</i>, 88, 48-51.<br/> <a href="https://doi.org/10.1016/j.resuscitation.2014.12.006">https://doi.org/10.1016/j.resuscitation.2014.12.006</a></p> | <p>Discusses need to base CPR training on validated theory focusing on behavioral change. Supports thought that skills alone are not enough to improve willingness to perform bystander CPR when needed.</p> |   | <p>Further research should be performed that incorporates behavioral change theory into bystander CPR training</p>                            |