# Wearable Cardioverter Defibrillator Use in Patients at High Risk for Sudden Cardiac Death

By

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has been approved

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## Abstract

The American Heart Association guidelines support the use of a wearable cardioverter defibrillator for protection against sudden cardiac death in patients meeting criteria, but a gap in practice was identified regarding the decision-making process in considering this therapy in clinical practice. The goal of this project was to create and utilize a decisional tool that would increase provider awareness and aid in the appropriately identifying patients at risk for sudden cardiac death. Subsequently, this should elicit an improvement in the rate of wearable cardioverter defibrillator prescriptions in patients who qualify for this therapy. The cardiac inpatient unit at the facility in which the project took place, does not currently have a standard protocol or decisional process for identifying patients who may be appropriate candidates for this treatment option. The providers' knowledge and perceptions were assessed before and after implementation. Completion of a pre and post surveys were requested to evaluate the success and potential barriers of the project initiative, in terms of proper education and increased awareness of the American Heart Association guidelines. A visual tool to increase awareness and standardize patient identification of this population, was also created and displayed over the 90-day project implementation.

Table of Contents

List of Figures

Wearable Cardioverter Defibrillator Use in Patients at High Risk for Sudden Cardiac Death

## Chapter I

Modern medicine and technology have come so far, yet there are still so many barriers to providing and receiving health care. Sudden and unexpected cardiac death is identified as the most common cause of mortality, accounting for 17 million deaths yearly, with sudden cardiac death accounting for up to 25 percent of these tragic deaths (Srinivasan et al., 2018). Although an ICD is the mainstay treatment for the prevention of sudden cardiac death, these patients generally have to wait 40-90 days after a cardiac event to be considered for re-evaluation and possible ICD placement, with insurance coverage. Therefore, patients at risk may likely benefit from temporary therapy and protection against sudden cardiac death with a wearable cardioverter defibrillator (Chung et al., 2010).

The purpose of this quality improvement project is to improve healthcare providers' identification of patients at high risk for sudden cardiac death, through increasing the awareness of the population at risk and implementing the use of a streamlined decisional/resource tool in practice. Subsequently, the project aim was to increase the rate of use of wearable cardioverter defibrillators (WCD) in those who qualify for this temporary therapy, among those identified to be at high risk for sudden cardiac death (SCD).

The wearable cardioverter defibrillator is an option for temporary therapy that has the potential to protect vulnerable patients by aborting lethal cardiac arrhythmias, preventing sudden cardiac death, and decreasing mortality rates. Although there are barriers to overcome, increasing awareness and promoting consistent identification of those at high risk may increase the use of this life-saving therapy, decrease the current gap in care, and improve clinical decision making.

**Background and Significance**

Sudden cardiac death (SCD) is a challenge in cardiac patient populations and remains a serious public health concern. SCD accounts for 20% of total mortality in the industrialized world today, and over 300,000 deaths annually in the United States (Piccini et al., 2016; Wellens et al., 2014). Sudden cardiac death is tragic, but through adequate prevention measures, a reduction in these events may be possible with appropriate patient risk identification, diagnosis, and treatment. More specifically, lethal arrhythmias that may lead to SCD, could be deterred by an implantable cardioverter defibrillator (ICD) or the use of a wearable cardioverter defibrillator (WCD).

Placement of an implantable cardioverter-defibrillator (ICD) is generally the mainstay treatment to prevent sudden cardiac death for both primary and secondary prevention in patients who are at high risk for SCD (Erath, Vamos, Sirat, & Hohnloser, 2016; Reek et al., 2017; Srinivasan et al., 2018). When determining a patient's severity of risk and possible appropriate treatment options, it is important to consider the wide variety of influencing factors associated with the condition. Risk stratification is not always possible immediately, and in some cases, the high risk for SCD may only be temporary. In this type of case, the client could benefit from short term wearable cardioverter defibrillator therapy (WCD), rather than having a permanent implant placed (Reek et al., 2017). According to Chung et al. (2010), survival of patients using a WCD was comparable to those treated with implantable cardioverter defibrillators during the study. Therefore, whether the patient at high risk for SCD temporarily, or if the risk persists and ICD implantation is eventually recommended, WCD therapy may be a safe and efficacious temporary option (Chung et al., 2010). It's important to keep in mind that although a patient may be a potential future candidate for ICD placement, American Heart Association guidelines

recommend waiting a period of 40 to 90 days, while using optimal medication therapy before re-assessment and implantation. During this 40 to 90 day period after the cardiac event, while determining eligibility and verifying insurance coverage, the patient may be at continued risk of sudden cardiac death. In these cases, when a patient's condition warrants protection from potentially lethal arrhythmias, a WCD may be a considerable temporary option (Srinivasan et al., 2018). Patients meeting qualifications for the use of a WCD would generally be in the transition from an acute care facility and would begin WCD therapy at home upon discharge.

The only current FDA-approved wearable cardioverter defibrillator is the LifeVest, created by ZOLL Manufacturing. This protective device is designed to terminate life-threatening arrhythmias, and therefore has the potential to reduce the risk of sudden cardiac death in high risk patients (Zoll Medical Corporation, 2017). This WCD is a vest garment that is adjusted to the patient's chest circumference and worn under clothing, with a battery-powered defibrillator pack and monitor that is secured onto a belt or shoulder strap (Barakat, 2018). The patient is instructed to keep the vest on 24/7, only to temporarily remove while bathing. There are four dry electrodes contained in the vest belt, which rest directly onto the patient's skin and continuously monitor the heart rhythm. If a life-threatening arrhythmia is detected, the portable defibrillator will warn the patient with strong vibration and a loud siren, before delivering electric shock therapy to restore a normal heart rhythm (Barakat, 2018).

Patients that are identified to be at high risk for sudden cardiac death due to an associated condition and/or having an ejection fraction of less than 35%, may be candidates for this therapy. The qualifying associated diagnoses include an ejection fraction of $\leq 35\%$, recent myocardial infarction (MI), non-ischemic cardiomyopathy, dilated cardiomyopathy, before or after coronary artery bypass graft or percutaneous transluminal coronary angioplasty, listed for cardiac

transplant, class IV heart failure, terminal disease with life expectancy of less than one year, post implantable cardioverter defibrillator (ICD) removal, ICD candidate that must wait 40-90 days before implantation is recommended according to current American Heart Association (AHA) guidelines, those with a history of ventricular fibrillation (VF) or ventricular tachycardia (VT) arrest, or significant family history of SCD (ZOLL Medical Corporation, 2017). If a provider finds that a patient meets the guidelines for wearable cardioverter defibrillator, this potential therapy should be considered and discussed with the patient to make a shared decision regarding their plan of care (Al-Khatib et al., 2018). This discussion should include patient education regarding the identified risk for SCD, as well as the recommended options that align with AHA guidelines. If the shared decision results in the desire to initiate WCD therapy upon discharge, the provider would send a referral to the unit care coordinator, to obtain this medical device immediately upon discharge from the hospital.

**Needs Assessment**

At an 800-bed tertiary academic healthcare facility, the inpatient cardiac unit is comprised of 48-beds, with a multi-disciplinary team to treat patients in need of cardiac care and intervention. From data evaluated September 1st, 2017 to September 1st, 2018, there were 84 patients discharged from the cardiac unit who were prescribed WCD therapy and registered in the LifeVest database as users of this medical device. These 84 patients were estimated as only 32% of the patient population that would have likely qualified for consideration of WCD therapy, based upon discharge diagnoses. At an alarmingly high rate, approximately 68% of patients at risk for SCD during that same time period, were not prescribed this life saving interventional therapy upon leaving the hospital. As stated, this data was based upon patient discharge codes, without use of a consistent risk identification process. The presenting issue lies

in the inconsistent use of wearable cardioverter defibrillator therapy, as a result of the lack of awareness and a streamlined decisional process for identifying high risk patients. The lack of consistent identification has created a gap, which has supported the need for intervention at this facility to improve the quality care and safety of the patients in this high risk population. Developing and implementing a project to improve the awareness of patient identification could aid providers in clinical decision making, leading to consideration of this device as a therapy option and potentially increase the use of this therapy. Increasing awareness and streamlining the process to identify this population, will increase the understanding and possibly the use of this therapy and subsequently could aid in reducing risk of sudden cardiac death.

At this facility, there is not a protocol in place for identifying potential candidates for a wearable cardioverter defibrillator. Some cardiac providers choose this therapy for patients, other providers choose not to utilize this therapy. There is not a standard decisional tool or consistent patient identification process set for providers to use, which has led to a gap in practice, and the need for intervention.

**Problem Statement**

The presenting issue lies in the inconsistent use of WCD therapy, as a result of the lack of awareness to consistently identify these patients at high risk. Once this population is identified, having readily available information to streamline the process to educate and offer this therapy to those who may qualify, could significantly improve the rates of WCD prescriptions. Developing and implementing this project to improve the identification process aimed to aid providers in clinical decision making, to consider this device as a therapy option and potentially increase the use of this therapy. Due to the lack of a prior consistent identification process for the providers,

the patients were not routinely offered the opportunity for this therapy through decision-making conversations with patients who may qualify for this treatment.

**Project Aim**

The aim was to create and utilize a decisional tool that would increase provider awareness and aid in appropriately identifying patients at risk for sudden cardiac death, those who met the guidelines for consideration of wearable cardioverter defibrillator therapy. In doing so, the program aimed to streamline the process for providers to more efficiently and consistently prescribe this product when appropriate, and potentially decrease mortality in this patient population. This process required educating the providers about WCD therapy and developing a decisional tool to use for consistent patient identification, to increase the use of this device and decrease mortality rates. Adequate education and guidance regarding the benefits of use in practice is vital to achieve consensus and increase rates of usage of this medical device in the clinical area. In advanced nursing practice, it is vital to ensure that we are up to date in current technology and treatment needs based on evidence in the literature, which assists in delivering the best quality of care to our patients. Providers within the healthcare team can work together to make a significant difference. Through the consistent use of the patient identification decisional tool, and by expanding knowledge of this life saving medical device, providers may better advocate for and serve their patients.

**Clinical Question**

In patients at risk for sudden cardiac death, how does the implementation of a program to increase awareness of appropriately identifying this population, compared to current practice, effect the rate of wearable cardioverter defibrillators prescribed upon hospital discharge?

## Congruence with Organizational Strategic Plan

The aims of this quality improvement project aligned well with the strategic plan of the healthcare organization at which the project took place. This initiative involved utilizing evidence-based literature and team-based collaboration, to promote excellent patient outcomes, which is directly in line with the current organizational plan (University of Iowa, 2017). Another component of the organization's strategic plan outlines the importance of establishing clear criteria and decision-making processes that support the focus of priorities. These elements of the healthcare organization's strategic plan are congruent with the project plan, as the utilization of a set identification protocol for patients at high risk for SCD should improve consistency and provide clarity when evaluating criteria and through clinical decision-making (University of Iowa, 2017).

## Search Strategy

In the search process and evaluation of evidence, I found 32 research articles. Keywords included wearable cardioverter defibrillator, wearable cardioverter defibrillator studies, high risk patients, sudden cardiac death, LifeVest, LifeVest therapy, high risk for sudden cardiac death, risk stratification, and patient identification. Databases searched included CINAHL, U.S. National Library of Medicine, Medline, and Google Scholar. 12 of the abstracts reviewed were not analyzed, due to the lack of relevance with the aim of this project. The remaining 20 articles were analyzed leading to this synthesis of evidence.

## Synthesis of Evidence

I analyzed 20 studies regarding identifying patients at risk for sudden cardiac death, as well as the use of the wearable cardioverter defibrillator. Contemporary guidelines recommend that SCD risk is thoroughly assessed by evaluating all clinical factors that indicate the level of

severity and the possible cause of underlying heart disease, as these risk factors are used as a guide for clinical decision making (Goldberger et al., 2014; O'Mahony et al., 2014). According to Goldberger et al. (2008), there are many interventions that improve survival of patients at risk for sudden cardiac death, including the elements of the "chain of survival" promoted by the American Heart Association. This consists of early access to medical care, early defibrillation and cardiopulmonary resuscitation, and early advanced care. Even with the use of these interventions, the rates of mortality associated with SCD remain high, which supports the need for an appropriate risk stratification tool and effective interventions that may prevent or at least abort these events (Goldberger et al., 2008).

WCD as bridge therapy. Research supports the use of this WCD as a bridge therapy for temporary use in a variety of cases, including while waiting a period of time before ICD implantation, or while waiting for a possible heart transplant (Epstein et al., 2013; Opreanu et al., 2015). The referred waiting period is based upon current American Heart Association guidelines, which recommends utilizing optimal medical therapy for 90 days post-revascularization and/or 40 days post-MI, prior to re-assessing the patient and determining the need for permanent ICD placement (Al-Khatib et al., 2018). Epstein et al. (2013), conducted a study to explore the usage of the WCD during this 40 to 90 day waiting period after a myocardial infarction, for patients that were identified as high risk for sudden cardiac arrest. The data collected and analyzed aims to assess the risk of sudden cardiac death after a recent MI, to determine if the WCD therapy was beneficial for this vulnerable population. During the 40 day and three-month waiting periods in patients post-MI, the WCD successfully treated sudden cardiac arrest in 1.4% of the patient population. The risk of sudden cardiac death was also found to be the highest within the first

month of WCD use. Therefore, the WCD would likely greatly benefit patients who are identified as high risk of sudden cardiac arrest early after a heart attack (Epstein et al., 2013).

WCD as temporary therapy. Some patients may not require an implantable cardioverter defibrillator, if they are only identified to be at high risk for sudden cardiac arrest for a short period of time. After wearing the device for three months, a repeat echocardiogram is done to evaluate the patient's ejection fraction. If the patient's cardiac function has improved with time and/or medication, these results may eliminate the need for a permanent ICD. For instance, a patient suffering from peripartum or postpartum cardiomyopathy may only be at high risk for a short period of time, in which cases the wearable cardioverter defibrillator may be appropriate (Duncker et al., 2014). The WCD itself does not improve the EF, but can play a role in protecting the patients at risk during the early phase after revascularization, by allowing time for recovery of the ventricular function (Al-Khatib et al., 2018). The data from a study conducted by Kutyifa et al. (2015), showed an ejection fraction (EF) improvement in 47% of participants after 90 days of WCD use. Likewise, 41.5% of the 82 patients in another supporting study also had improved conditions upon recheck, and an ICD was no longer indicated after the three-month study period (Kao et al., 2012). Additionally, the results from the study by Quast, Van Dijk, Wilde, Knops, and Boersma (2017), also show quite significant increases in EF after WCD use and allowing time for ventricular function improvement. A total of 24 out of the 79 participants no longer required WCD use or ICD implantation due to improvement in EF (Quast et al., 2017). Two arrhythmic events were detected during this study, both of which were successfully treated with a shock to terminate the episode. One inappropriate shock was also delivered, but no patient harm resulted. Once again, the results from this study suggests that the patients were not only

protected from life threatening arrhythmias during this therapy, but the rates of necessity of an ICD after WCD use were also effectively decreased (Quast et al., 2017).

WCD survival rates. Results from a study by Kutyifa et al. (2015), showed that 120 ventricular tachycardia/fibrillation (VT/VF) events occurred in 41 patients during the 90-day period. Of these patients, all who required shock delivery had their VT/VF event terminated successfully after the first shock. Singh et al. (2015), conducted a retrospective study among 525 participants between June 2004 and May 2015 to evaluate the risks and benefits of LifeVest use in patients with newly diagnosed non-ischemic cardiomyopathy (NICM) or ischemic cardiomyopathy (ICM), who had an EF of ≤ 35%. Of the 254 patients diagnosed with NICM, zero received an appropriate shock, but 3 patients received an inappropriate shock. Between the 271 patients who were newly diagnosed with ICM, 6 patients received an appropriate shock to terminate their arrhythmia, and 2 patients received an inappropriate shock. Of the 6 patients who received appropriate shocks, 5 survived the episode. According to Singh et al. (2015), although there is a slight risk of an inappropriate shock with use, the WCD was consistently successful in terminating a cardiac arrhythmia when needed, in every case but one. In the work by Zishiri et al. (2013), a retrospective, observational cohort study was completed to determine the risk of mortality in post-revascularization patients with an EF of ≤ 35%, and whether survival rates are different in patients who were discharged with or without a wearable cardioverter defibrillator after coronary artery bypass graft or percutaneous coronary intervention. Results from the Kaplan-Meier survival analysis showed significantly better survival rates in the group who wore a WCD. Survival analysis curves showed that within the first 90 days, survival rates were better in the “WCD” group with a 2% mortality rate, compared to the “no WCD” group which had a

7% mortality rate. The Cox proportional hazards analysis demonstrated that use of the WCD was associated with a 38.6% lower risk of long-term mortality (Zishiri et al., 2013).

**Methods & Conceptual Framework**

The Iowa Model of evidence-based practice served as a guideline for implementing and evaluating the project process and results. The Iowa Model is an evidence-based practice model, serving as a systematic framework to apply evidence to practice. The steps of the Iowa Model consist of identifying triggers associated with an issue in clinical practice; determining organizational priority; forming the working team; critiquing and synthesizing literature; piloting a change in practice; adopting practice; and monitoring and analyzing the structure, process, and outcomes throughout the project initiative. (Titler et al., 2001).

# Chapter II: Methodology

## Project Design

I, with the guidance of my project mentor, initiated a quality improvement program to improve the identification of patients at high risk for SCD in the inpatient cardiovascular setting with the aim to increase rates of WCD for patients who may benefit from this temporary protection from SCD. Provider education was provided at the initiation of the project, to reinforce the American Heart Association guidelines for identifying patients at risk for SCD and how to identify potential candidates for WCD therapy. A decisional tool flowchart was given to all providers on the unit and posted in the providers' working office area for reference. This project was intended to increase awareness of risk identification of this patient population, to subsequently improve consistency in prescribing the WCD when appropriate. Efforts to increase awareness were initiated through a similar program that was trialed at Mayo Clinic, as explained in the study by Beinborn, Webster, and Acker (2009). According to Beinborn et al. (2009), reduced left ventricular ejection fraction (LVEF) remains as the single most important factor associated with sudden cardiac arrest and mortality, therefore patients with an EF of <35% were identified as high risk for SCD. For project data and evaluation, my project mentor used the electronic medical record software system to run a query to identify patients with an EF of <35%. The determination of patient EF may be from an echocardiogram, nuclear stress test, or heart catheterization (Beinborn et al., 2009). The query involved extracting only de-identified data regarding patient diagnosis, EF results, and whether or not the patient has a current implanted defibrillator device. This data was used at the end after the three-month project duration, for evaluation of the results.

**Setting**

The implementation of this project took place on the stepdown cardiac unit of an 800-bed academic medical center. This tertiary referral hospital has a 48-bed stepdown cardiology unit, and a general daily census of about 36 patients. The cardiology inpatients are cared for by an attending directed hospitalist team, working with a cardiology consult. In this unit, a multi-disciplinary team treats patients in need of cardiac care and intervention. There were a total of 11 physicians and four advanced practice providers within this team. The project mentor is involved in leadership at this facility, as a supervisor of the advanced practice providers and co-leader of the group with a physician colleague. Although this is an academic institution, there were no students on the cardiology team. As an organization, quality improvement initiatives and research projects are supported by the organization.

**Participants**

This project did not involve patients as subjects, however, the de-identified data were evaluated at the completion of the project initiative, included general statistical information from the population of patients admitted to the inpatient cardiovascular hospitalist service. This patient population data included those with an EF of $\leq 35\%$. From this data, another query included a limited data set of the primary diagnosis, presence or lack of a current implanted defibrillation device, and whether or not the patient was discharged with a WCD prescription. This information assisted with identifying those who were at high risk for SCD, as well as the rate of subsequent prescriptions for a wearable cardioverter defibrillator before hospital discharge. Inclusion criteria of the possible candidates for this device are indicated on the decisional tool flowchart, and are based from recommendations of the American Heart Association guidelines for consideration of wearable cardioverter defibrillator use (Al-Khatib et al., 2018). This therapy

may be recommendation in patients at an increased risk of SCD but are not ineligible for an ICD, in such conditions as EF of 35% or less and are within 40 days post-MI or 90 days post-revascularization, awaiting cardiac transplant, newly diagnosed non-ischemic cardiomyopathy, myocarditis or systemic infection (Al-Khatib et al., 2018).

No direct patients were included in this quality improvement project, as the project aim was to create and share a decisional process for the health care providers on the cardiology unit in a hospital, to subsequently improve the identification of patients at high risk for sudden cardiac death. Therefore, the participants involved in the quality improvement project included providers employed at this health institution, who work on the cardiology unit. The cardiology inpatients are cared for by an attending directed hospitalist team, working with a cardiology consult. The 11 physicians and the four advanced practice providers were offered education and involvement in the project intervention. There were no specific recruitment methods, and no compensation offered for participation. Participation was not required and there was no penalty for those who chose not to participate, as this is not mandated in the job description of the providers employed at this facility.

**Tools and Instruments**

The limited data set collected during the project initiative included ejection fraction, and primary diagnosis of the patients in the specific population. Additional data included the presence or lack of a current implanted defibrillation device, and whether or not the patient was discharged with a WCD prescription. The pre and post interventional data was extracted through a query done within the software system called EPIC, the electronic medical record system used at the medical facility. The extracted data were entered into an excel file by the project mentor and hospital employee before project use. Excel data spreadsheets were utilized to collect and

organize information from the EPIC query results, to compare between pre and post intervention data. To reiterate, this data included ejection fraction, primary diagnosis, presence or lack of current implanted device, and rate of prescriptions for WCD. This de-identified data was evaluated when the project implementation was complete, without having access to any protected health information.

A printed visual flowchart using AHA guidelines (see Appendix A), was utilized as an educational tool that served two main purposes. This tool was used, with intentions to increase awareness of sudden cardiac death risk to improve the identification of this patient population, as well as streamlining the decisional process regarding the appropriate use of WCD therapy, to improve the consistency in offering and/or prescribing this therapy for those who qualify. This educational tool was provided to all hospitalist providers working on the cardiac unit and was displayed in the working office for providers.

We also utilized a pre-post survey (see Appendix B), which was to be completed by providers working in the unit, before and after initiation of the DNP project, to assess and evaluate the knowledge, perceptions, and attitudes of staff involved. The pre-intervention survey, data were collected at the beginning of the project, to collect information before the project implementation was initiated. After the 90-day project duration was complete, the providers were asked to complete post-intervention surveys, to evaluate success of the educational measures of the project intervention.

**Project Plan**

The first step of the project was to review initial data regarding the rate of WCD prescriptions for those who were identified to be at high risk for sudden cardiac death, with an ejection fraction (EF) of $\leq 35\%$. The cardiac inpatient providers were then requested to complete

an anonymous survey to assess initial data regarding knowledge, attitudes, and perceptions (see Appendix B). The providers were notified about the program initiative to increase awareness of SCD risk and were provided with education and materials to begin the implementation of the decisional tool provided. These materials align with the AHA guidelines. The decisional flowchart was also displayed in the providers' working office area for easy access of information, serving as a frequent visual reminder of the importance of detecting those at risk for SCD. This tool aimed to aid in identifying potential patients in need for intervention, which included the temporary protection from SCD through a WCD upon discharge from the hospital, if a patient was deemed a potential candidate. The decisional tool was also placed to encourage providers to involve patients in shared decision making, through the discussion of sudden cardiac death risks and all potential treatment options (Beinborn et al., 2009). If the patient is a potential candidate for WCD use according to AHA guidelines, this therapy option would be routinely recommended. I attended meetings with the project mentor and unit providers at this facility, to discuss any barriers and to provide guidance regarding the use of this tool. This process continued over a consecutive three-month period. The project team mentor also incorporated this discussion of this tool and discussed findings of potential candidates for WCD into morning rounds during the project, to further increase awareness.

After three months of this intervention, the limited data was extracted by the project mentor, for evaluation and determination for significance. The final outcomes were measured, and data analyzed against the initial findings. The success of project implementation was measured by comparing the rate of patients with EF $\leq$ 35% who were prescribed a WCD, compared to those with EF $\leq$ 35% who were not prescribed a WCD, pre and post implementation of the program to increase awareness and improve risk identification. Post-surveys were given to

providers for completion after the three-month project implementation was complete. A part of evaluating the project implementation also involved reassessing awareness and improvement in knowledge and perceptions of the cardiac providers. See Appendix C for Project Timeline information.

**Data Analysis**

My team and I have evaluated the de-identified data, after the three-month project implementation. The original data source is the de-identified data, obtained through an EPIC query from patient records by project mentor and faculty sponsor. A simple chi-square statistical analysis was utilized to examine the relationship between the use of the identification process of patients at high risk for SCD, and the prescription rate of WCDs. Statistical significance will be determined if *p*-value is less 0.05, which set as the significance level for chi-square data analysis. To successfully evaluate this information, the number of patients prescribed a WCD were compared to those with no WCD prescription, before and after implementation of the identification process, to determine the statistical significance of the initiative. Additionally, we have collected data from the pre/post surveys to assess the providers' knowledge, attitudes, and perceptions to assess any potential barriers, as supplemental evidence for reviewing project progress and success of the intervention.

**Institutional Review Board/Ethical issues**

During project implementation, the data that I analyzed did not include individually identifiable information, therefore the project implementation will not involve human subjects. This limited data set will be extracted through EPIC, to evaluate the number of wearable cardioverter defibrillators prescribed over the duration of the project initiative. This data

included ejection fraction, primary diagnosis, presence or lack of a current implanted defibrillation device, as well as the rate of WCD prescriptions within this patient population.

After a recent study by Olgin (2018), there have been some resistance in prescribing the wearable cardioverter defibrillator, as the results stated that among patients with a recent MI and an EF of 35% or less, the WCD did not lead to a significantly lower rate of the primary outcome of arrhythmic death than the control group. Through analyzing this study, it was clear that the overall outcome was not specific in considering other factors affecting the results, such as compliance and other causes of death during this therapy. The results of those who wore the device as instructed, reflected positive outcomes and reduced mortality, compared to the control group. The overall results of this recent study may lead some providers to question the efficacy of WCD use, which could have created a barrier during the project implementation. Although some providers may hesitate to use this therapy as a result of the Olgin (2018) study report, there is sufficient data and valid explanation to overcome this potential barrier, using previous evidence-based literature.

If a patient is identified to be at high risk for sudden cardiac death but is unable to have an ICD placed immediately, the patient deserves the opportunity to have a shared discussion regarding the option of a wearable cardioverter defibrillator. The likelihood of a developing a life-threatening arrhythmia may not be significant, but if it does occur while the patient is using the WCD therapy, the automatic defibrillation will occur and increases probability of survival. Patients in this population have a right to be educated about all potential treatment options, and providers should feel confident in consistently identifying and treating these patients, by offering this protective therapy to those who may qualify.

This is a quality improvement project of which the need for written consent has been waived, as indicated by the approval from the Bradley University Committee on the Use of Human Subjects in Research (CUHSR), and approval from the healthcare facility where the DNP project took place. This project had no more than minimal risk. Additionally, the data set contained only de-identified aggregate data used to determine success of the project. Hospital quality improvement projects commonly use this type data to determine success.

All data was protected, and confidentiality maintained, as the information was not identifiable. The project mentor screened information to de-identify the data before I had access to view and evaluate it. Data was kept on securely and encrypted to ensure the privacy of all information. Confidentiality was maintained throughout the project intervention. No individual data regarding providers was obtained.

As explained, project data collected included patients' ejection fraction, primary diagnosis, presence or lack of current implanted device, and rate of prescriptions for WCD. No demographic information was associated with this data, as it remained de-identified. Data will be collected for project evaluation, which will include anonymous data from a pre/post survey completed by the cardiac unit providers, to assess the knowledge, attitudes, and perceptions of the staff involved.

## Chapter III: Organizational Assessment and Cost Effectiveness

The nursing administration of the organization gave approval for project implementation, and there was an expressed readiness for change and improvement among those working on the cardiac unit. We anticipated compliance with many providers, as this is an academic facility, and quality improvement projects are generally welcomed or at least tolerated well in the clinical practice environment. We expected to experience some resistance with the project participation, from the working providers. Overall, the organization is generally one with a history of promoting research, quality improvement, and innovation.

The cost needs for the implementation of this project were minimal, as the project mentor created and ran the data query in EPIC, to retrieve data for project use. The estimated cost of the project mentor's time working on the project was $58.65/hour. Estimate working time each week at about three hours per week, for a total of about $175 weekly. Printed educational material for use, was estimated at five dollars total (See Appendix D). There was no direct compensation for provider participation in this quality improvement project.

We did not expect to generate any direct revenue, but we anticipate long term benefits and cost reduction through the increased awareness and identification of the patients at risk. For example, cost avoidance may include lowering re-admission rates, increases in patient satisfaction, and the ability to monitor patients' cardiac function continuously via the use of the WCD. WCD use may also increase efficacy of patient treatment and improve medication titration while receiving outpatient care.

Resources available for the project included the use of the EPIC software system, as well as the hospital information technology team who were available, when needed. Project data evaluation using a chi-square analysis was also possible without need for a statistician.

# Chapter IV: Results

## Analysis of Implementation Process

The implementation for the DNP project took place between July 26th, 2019 and October 24th, 2019. Project implementation first began with obtaining initial data through the EPIC query to evaluate the current rate of wearable cardioverter defibrillators for the patients with an ejection fraction of ≤ 35 %. Data included the primary diagnosis, EF results, and whether or not the patient had an implanted defibrillator device in place. This query was utilized to collect project data upon project initiation, and again after the three-month project intervention was complete. Pre and post intervention surveys were provided to the unit providers at the beginning of the project implementation and again after the intervention was complete. Requests and reminders were sent to all cardiac providers working on the inpatient unit to return completed surveys.

## Analysis of Project Outcome Data

The DNP Project results consist of two major categories of data, including the rate of wearable cardioverter defibrillator prescriptions and information from pre and post intervention provider surveys. Altogether, this information is a representation of the progress of the project implementation and reveals opportunity for further expansion of this area of practice in the future.

*Pre-intervention WCD data.* Data were collected at the start of project implementation and included information from the previous three months before initiation of the project intervention. Figure 1 depicts the pre-intervention data, including a total of 36 patients with EF ≤ 35%. 12 patients (33.3%) already had a current ICD in place, 14 patients (38.9%) were prescribed a WCD, and 10 (27.8%) of these patients were discharged without an ICD and without an order for a WCD.

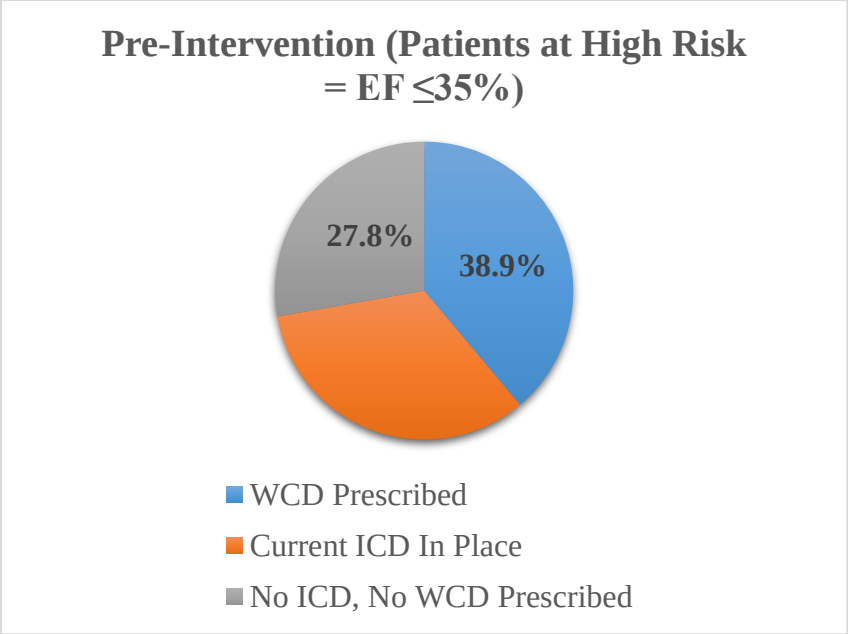


*Figure 1.* Pre-Intervention Data (Patients with ≤ 35%)

*Post-intervention WCD data*. Figure 2 displays the post-intervention data, which shows the total population of 43 patients. 20 patients (46.5%) already had a current ICD in place, 15 patients (34.9%) were prescribed a WCD, and 8 (18.6%) of these patients were discharged without an ICD and without an order for a WCD.

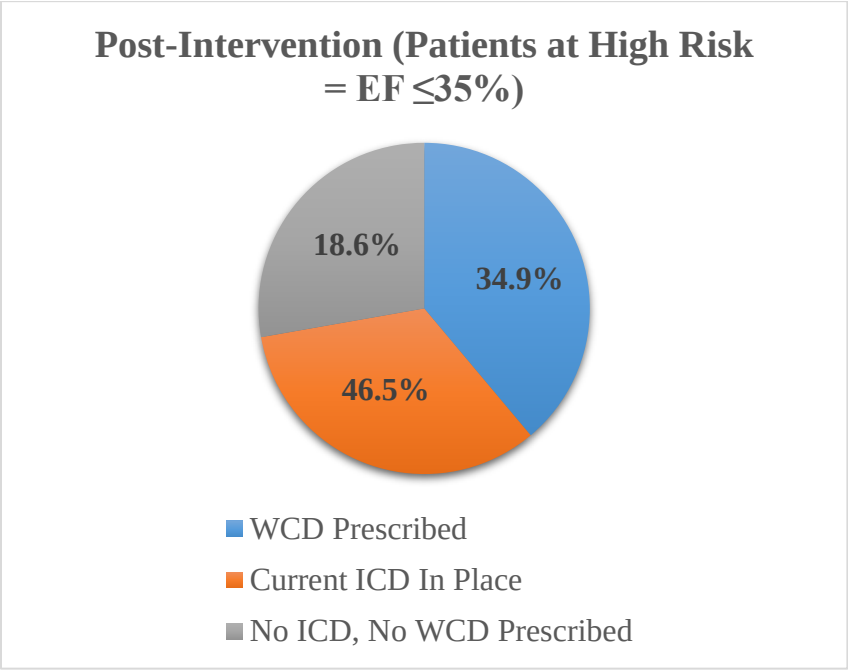


*Figure 2. Post-Intervention Data (Patients with ≤ 35%)*

*Summary of WCD Prescription Data.* The Chi-Square analysis was completed to evaluation the relationship between the rates of WCD prescriptions and the project intervention. The population for this calculation included the total number of patients who were prescribed the WCD, compared with the number of patients who were likely eligible for WCD therapy but did not have WCD prescribed before hospital discharge. These two groups were identified within the pre-intervention data and post-intervention data and utilized to evaluate for statistical significance between this relationship. The patients with an ICD in place were withheld from this population, as this excludes a patient from being a candidate for WCD therapy. After excluding those who did not qualify, the number of potential WCD candidates who were prescribed WCD was compared to the number of patients who were not prescribed this therapy. See figure 3 for a visual display of the number of patients in each stated category, which were the data utilized to determine statistical significance in relation to the project intervention. The *p*-value is .62745, therefore not significant at $p < .05$.

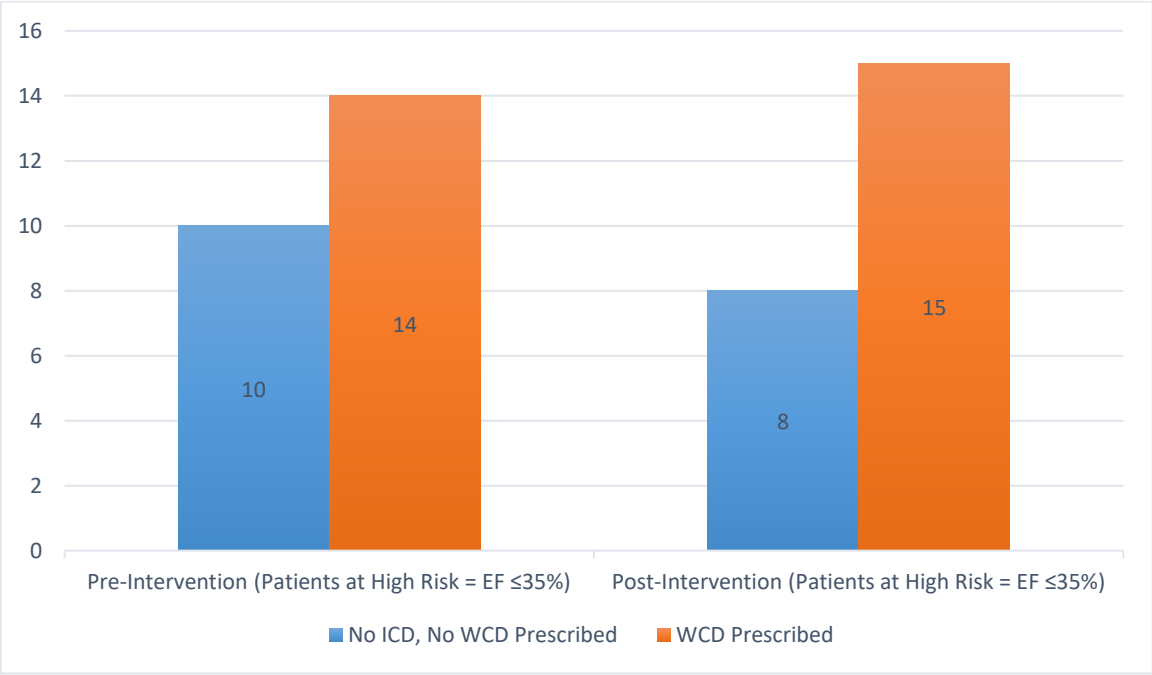


*Figure 3.* WCD Summary Data Pre and Post Intervention

**Pre and post- intervention provider surveys.** The data collected through the pre and post intervention surveys revealed evidence supporting the positive impact of the project implementation. Nine cardiac providers participated to complete both the pre and post surveys. The detailed data results of the surveys are indicated in Figure 4. The data reveal clinical significance, through the improvement in knowledge, perceptions, and attitudes regarding the identification of patients at high risk for sudden cardiac death. Although the statistical data of WCD prescription rates do not confidently show a specific relationship between the project intervention and WCD use, the formative survey data is reassuring.

**Clinician Pre/Post Questionnaire**

SECTION I: Knowledge assessment

**INSTRUCTIONS:** Please select the ONE best answer for each question.

| | Pre / **Post** | |
|---|---|---|
| 1. Which of the following may be potential options for patients identified at high risk for sudden cardiac death? | 0% / **11%** | a. Consideration of future ICD placement |
| | 0% / **0%** | b. Use of a wearable cardioverter defibrillator |
| | 0% / **0%** | c. Optimal medication therapy |
| | 89% / **89%** | d. All of the above |
| | 11% / **0%** | e. Both A & C |
| 2. According to the American Heart Association, a WCD may be an appropriate consideration in of which of the following situations? | 11% / **0%** | a. EF ≤ 45% |
| | 45% / **33%** | b. Within 60 days post-MI |
| | 33% / **56%** | c. Within 90 days post-revascularization |
| | 11% / **11%** | d. Patients with current ICD, awaiting removal |
| 3. What are the barriers to offering and/or prescribing WCD therapy to those who qualify? | 0% / **11%** | a. Ordering process is difficult or time consuming |
| | 0% / **33%** | b. I often forget about the WCD as an option |
| | 11% / **0%** | c. I don't believe the WCD is effective |
| | 89% / **56%** | d. Other: _____ |

SECTION II: Perception or attitude assessment

**INSTRUCTIONS:** Please indicate the number that best describes your perception or attitude about sudden cardiac death risk identification, and use of a wearable cardioverter defibrillator.

| | Strongly Disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|---|
| 1. I am able to identify which patients are at high risk for sudden cardiac death (SCD). | Pre: 0% **Post: 0%** | Pre 0% **Post 0%** | Pre 67% **Post 56%** | Pre 33% **Post 44%** |
| 2. Using American Heart Association guidelines enhances the ability to consistently identify patients at high risk for SCD. | Pre: 0% **Post: 0%** | Pre: 0% **Post: 0%** | Pre: 56% **Post: 33%** | Pre: 44% **Post: 67%** |
| 3. I feel that increasing awareness of identifying those at risk for SCD, could improve patient outcomes. | Pre: 0% **Post: 0%** | Pre: 0% **Post: 0%** | Pre: 44% **Post: 22%** | Pre: 56% **Post: 78%** |
| 4. I feel knowledgeable about when it is appropriate to offer wearable cardioverter defibrillator (WCD) therapy. | Pre: 0% **Post: 0%** | Pre: 22% **Post: 0%** | Pre: 56% **Post: 56%** | Pre: 22% **Post: 44%** |
| 5. I am completely aware of the American Heart Association recommendations regarding WCD use. | Pre: 0% **Post: 0%** | Pre: 45% **Post: 11%** | Pre: 33% **Post: 44.5%** | Pre: 22% **Post: 44.5%** |
| 6. I consistently offer WCD therapy for all patients who qualify for use of the device. | Pre: 0% **Post: 0%** | Pre: 11% **Post: 11%** | Pre: 67% **Post: 56%** | Pre: 22% **Post: 33%** |
| 7. Engaging in shared decision making with patients and families to discuss potential treatment options, improves patient understanding & compliance. | Pre: 0% **Post: 0%** | Pre: 0% **Post: 0%** | Pre: 33% **Post: 44%** | Pre: 67% **Post: 56%** |
| 8. In qualifying patients, WCD can aid in temporary prevention and reduction of SCD risk. | Pre: 0% **Post: 0%** | Pre: 11% **Post: 0%** | Pre: 44.5% **Post: 56%** | Pre: 44.5% **Post: 44%** |
| 9. I always document when I recommend & offer WCD therapy to my patients (whether they refuse or accept). | Pre: 0% **Post: 11%** | Pre: 22% **Post: 11%** | Pre: 33% **Post: 45%** | Pre: 45% **Post: 33%** |
| 10. I have easy access to the resources needed to order a wearable cardioverter defibrillator. | Pre: 0% **Post: 0%** | Pre: 0% **Post: 0%** | Pre: 33% **Post: 22%** | Pre: 67% **Post: 78%** |

*Figure 4*. Pre/Post Survey Result Data.

# Chapter V: Discussion

## Findings

The aim of this quality improvement project was designed to answer and evaluate results from the previously stated PICOT question: In patients at risk for sudden cardiac death, how does the implementation of a program to increase awareness of appropriately identifying this population, compared to current practice, effect the rate of wearable cardioverter defibrillators prescribed upon hospital discharge?

The pre and post intervention survey data shows clinical significance of the project intervention through a variety of survey categories, particularly those addressing the knowledge and perceptions of WCD therapy and the general use of American Heart Association guidelines to identify patients at high risk for sudden cardiac death.

Although the resulted project does not demonstrate statistical significance within improved rates of WCD prescriptions ($p < 0.05$), the results are clinically significant and do show positive change and success of the implementation intervention. The post-intervention data show an increased number of patients at high risk for sudden cardiac death, who were treated appropriately with either a WCD or an ICD before hospital discharge. The limitations of the project likely led to the lack of significance among the post-intervention data set.

## Limitations

Various limitations were presented throughout the development of the project plan, intervention, and while evaluating results. The results from the statistical analysis must be interpreted with the acknowledgment of the respective limitations. The sample size was quite small, which may have created a challenge with finding significance between the relationships of the project intervention and final results. Participation in project implementation was not

required for unit providers, which may have affected the rate of participation. A potential project design flaw should also be considered, as there was inconsistency with the providers present during meetings, which could have led to variability in the education and communication with the unit providers.

Other potential factors may have affected the overall data results when analyzing the relationship between WCD prescriptions and the project intervention, such as the limited measurable outcomes for this project plan and evaluation. Particularly, the project team has discussed a potential barrier in the results, without the consideration of more detailed inclusion and exclusion criteria for those deemed to be potential candidates for this therapy. The assumption of the result that the patients with EF ≤ 35% are all potential candidates for an ICD or a WCD, does not account for many variations and potential factors that may have deterred the prescription of this therapy. For example, patients who have chosen hospice or comfort care could have been excluded from the category of potential WCD candidates, as they would not be offered this therapy, as respect for their wishes. Due to the factors measured and data extraction techniques utilized, these exclusions were not accounted for during this study. If these detailed exclusions are considered in future studies, there is great potential for more specific results, in which may likely lean favorably to reveal significance between the use of the WCD decisional tool to identify patients at high risk for SCD, and the rate of WCD prescriptions.

**Challenges**

Although much of the previous research revealed positive results regarding the efficacy of WCD therapy, there was a large randomized controlled trial published recently which contradicted prior studies. This study, which was discussed within the synthesis of evidence, did not show statistical significance in the reduction of sudden cardiac death among patients at high

risk, over the 90-day study period (Olgin et al., 2018). The project implementation was likely affected as a result. Many providers were initially reluctant, as the project aimed to increase awareness of proper identification for a therapy that cardiologists were not 100% committed to, due to the lack of supportive evidence through the recent randomized controlled trial.

Another challenging factor was the expectation and attempt to have all unit providers complete the pre and post surveys, as we were unable to achieve complete participation with this. This could have been related to survey fatigue among the providers at this institution. According to O'Reilly-Shah (2017), survey fatigue, also known as respondent fatigue, is a common issue while collecting survey data. In any healthcare facility, especially an academic institution, providers may feel more reluctant to participate due to the frequency of survey requests. Other factors that may affect survey fatigue may include the survey topic, length, complexity, and overall time spent filling out the survey responses (O'Reilly-Shah, 2017). The project team felt that limited compliance and provider participation may have been the greatest challenge, as this likely affecting the number of surveys completed and possibly the utilization of the WCD decisional tool provided during the project intervention.

## Implications

**Practice.** The overall aim to implement a quality improvement project to improve standardization in identification and treatment of patients at high risk for sudden cardiac death has a significant clinical impact on nursing practice, especially for Advanced Practice Providers. Increasing awareness and encouraging consistency in following recommended guidelines for patient identification and treatment for patients within this population will continue to refine patient care and will likely lead to better patient health outcomes.

**Future research**. This quality improvement project created a pathway for future research and interdisciplinary collaboration to expand on this area of practice. Specifically, future research inquiries may benefit from the findings of this project implementation, by utilizing these results as a baseline. Future research may continue to strengthen the observed need for intervention, for continued work to narrow the gap in practice to identify and treat this high risk patient population consistently. The idea for this project intervention originally stemmed from the project team's plan to manually screen data, identify patients at high risk for sudden cardiac death, and communication in real-time with the attending or cardiac provider to recommend appropriate treatment, including WCD therapy if the patient was an ideal candidate. Additional research is needed to support these efforts to increase consistent, safe, efficient practice through the use of a streamlined decisional tool, to appropriately identify and treat patients at high risk for sudden cardiac death. Once there is sufficient evidence to prove the positive impact of having a standard tool to use in practice, perhaps these efforts may be taken a step further, to decrease the possibility for any gaps in identifying these high risk patients through building a best practice advisory in Epic. Of course, this would take significant time and would require sufficient evidence to warrant such changes within the electronic health record system. Ideally, this DNP project work and resulted data is just the first step of many, to serve as a building block for future research that may continue to uncover layers of evidence that support the improvement of quality in practice, through this increased awareness. I anticipate that with added support of future research, there will be significant change in improving the identification of patients at high risk for sudden cardiac death, increased rates of patients' treated with an ICD or WCD as appropriate, and subsequently reduced mortality associated with sudden cardiac death among those identified to be at risk.

**Nursing.** In order to continue forward and positive change, it is imperative to work endlessly towards eliminating the areas of practice in which could result in errors or negative patient outcomes. Clarifying practice guidelines and enforcing the need to follow these meticulously, will aid in removing the challenges that many providers face in practice, when there is a lack of consistency and/or policy to outline the practice guidelines.

**Health policy**. Throughout the project planning and while preparing for implementation, the realization of difficulties in securing access and approval for project implementation was quite evident. There was a learning curve in this area for me, as this was my first experience with a quality improvement project. Approval was necessary through the graduate school, as well as the healthcare organization in which the project implementation took place. Approval was received, with the ability to move forward with the trial of my quality improvement project. Although this went smoothly upon obtaining approval, I anticipate greater challenges in the future with the creation or changes of a policy in practice, especially at a large institution such as my project setting.

# Chapter VI: Conclusion

## Value of the Project

Although the project results did not reveal a statistically significant relationship between the intervention and increase in rates of prescriptions of WCD's, the intervention and formative data revealed clinical significance to the organization and cardiac unit in which the project took place. This DNP project intervention has further identified an area of interest in which further research may be performed.

## DNP Essentials

In order to achieve success through my DNP project and wholly as a doctoral student, I have grown to understand that all eight DNP Essentials are equally vital in my professional development as an advanced practice provider with a degree as a Doctor of Nursing Practice. When I initially performed a self-assessment using the DNP Essentials, I felt great areas of weakness in areas of which I haven't previously had much experience with. Through the process of planning, implementing, and evaluating this DNP project, I have strengthened my skills to align with many DNP Essential competencies.

This quality improvement project directly relates to *DNP Essential I: Scientific Underpinnings for Practice*, through the development and evaluation of new practice approaches based upon nursing research and theories (American Association of Colleges of Nursing, 2006). A substantial amount of research was utilized in gathering and building support for the project implementation, which directed the development of the quality improvement program.

The DNP project involved using advanced skills to communication and lead this quality improvement project, to promote safety and effective patient care. The implementation work aligned well with *DNP Essential II: Organizational and Systems Leadership for Quality*

*Improvement and Systems Thinking* and *Essential III: Clinical Scholarship and Analytical Methods for Evidence-Based Practice,* as a vast amount of research studies were analyzed to aid in supporting and designing the project intervention plan.

The planning, implementation, and evaluation involved with the DNP project required extensive interprofessional collaboration with the project team and all participating members of the healthcare team involved. The competencies incorporated within *DNP Essential VI: Interprofessional Collaboration for Improving Patient and Population Health Outcomes,* were met through these efforts, and strengthened significantly over time.

Finally, *DNP Essential VIII: Advanced Nursing Practice,* has been met within project work as advanced levels of clinical judgement and systems thinking was demonstrated through the design, delivery, and evaluation of the project implementation and data evaluation.

Although the DNP Essentials discussed were the most evident through the project planning and implementation, all eight DNP Essentials have been a pivotal guideline for my advanced practice education. Altogether these combined elements have encouraged my interest and exposure to all pertinent areas of professional growth. As the DNP program and project dissemination is nearing completion, I have reflected on my education and experiences, and feel confident in my development as a DNP student. Through enhancing my knowledge and leadership skills, I have worked to meet and achieve success in the categories of advanced competencies outlined in the DNP Essentials. Subsequently, I have grown educationally and professionally, as I have learned the importance of appreciating opportunity for growth while continuing to strengthen my skills and knowledge.

**Plan for Dissemination**

The dissemination of the DNP project will be multifaceted. One element of project dissemination at Bradley University will include an oral presentation of the material during a live meeting with multiple attendees, followed by a period of time for the viewers to any questions. The final project will also be submitted to the Doctor of Nursing Practice Repository. Finally, I will develop a poster for presentation to the providers on the unit where the project took place, to discuss and visually present the project work and evaluation.

**Attainment of Personal and Professional Goals**

My professional goals for this project included to finish the project and see successful results, but more importantly, to experience all that is involved with developing the plan, initiating a change in practice, and evaluating the results. Through these efforts, I intended to make an impact in clinical practice that would ultimately improve the quality of care and improve patient health outcomes. I feel that I have achieved my professional goals for this project, as the implementation is complete and the results were favorable, although not statistically significant. Regardless, the project intervention has great potential to encourage continued increased awareness to improve identification and treatment of this vulnerable population, and the results may serve as baseline data for many areas of further research for risk identification and potential therapies.

My DNP education has not only motivated me to explore and challenge myself in my areas of weakness, but has also aided in raising my standards and expectations of myself personally, as well as continued professional growth, education, and success in leadership. It is through the experiences within the process of successfully completing this quality improvement project, that have truly created a feeling of accomplishment and fulfillment. At times, there were

significant challenges that felt like impossible barriers to overcome but were merely stepping stones along the way to achieve the ultimate goals that I set for myself, personally and professionally. I am grateful for the personal and professional strength and resilience I have gained through the project and my DNP program. I feel prepared and greatly look forward to utilizing my Doctor of Nursing Practice degree in clinical practice post-graduation.

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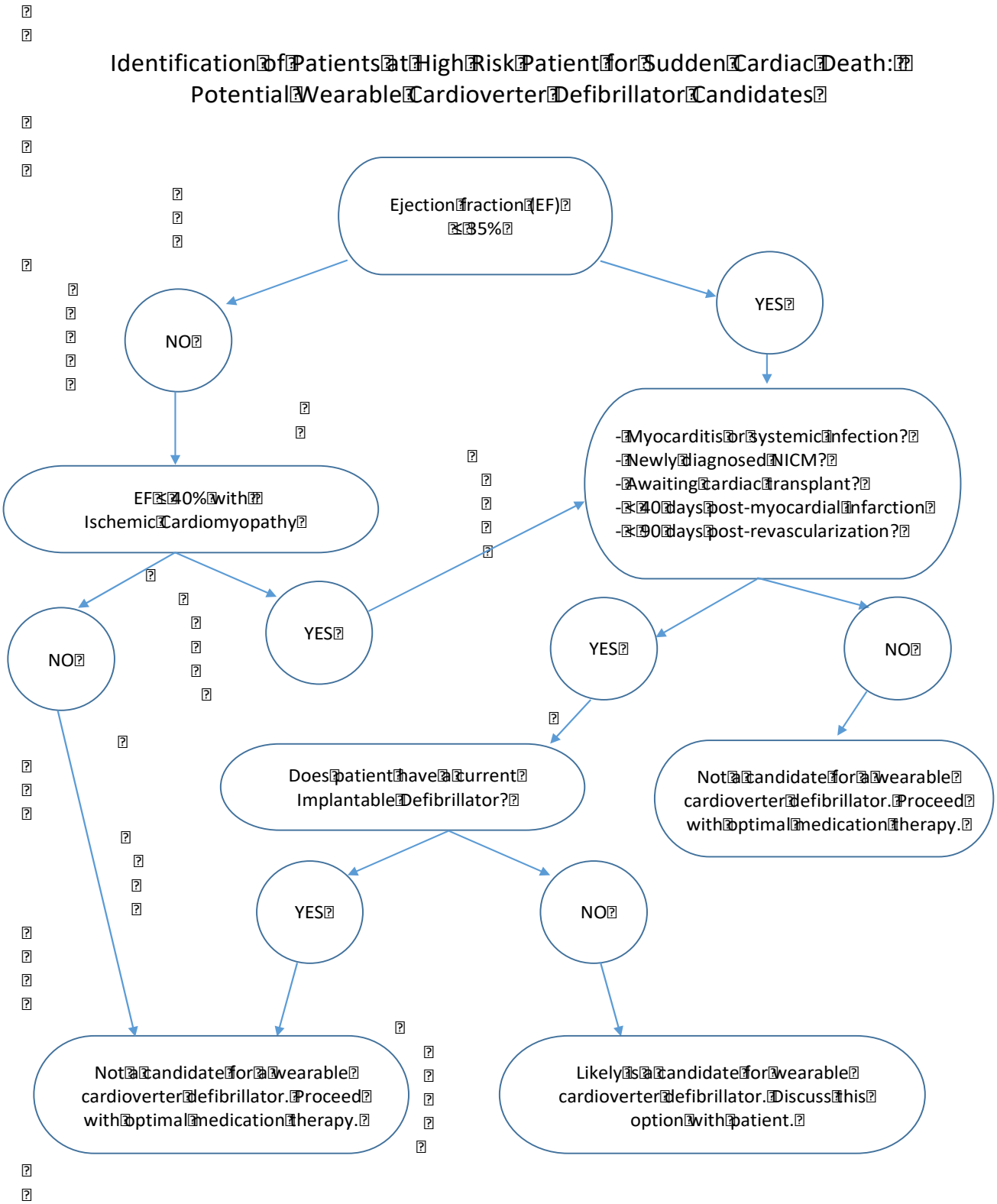
Appendix A


Identification of Patients at High Risk Patient for Sudden Cardiac Death: Potential Wearable Cardioverter Defibrillator Candidates
Ejection fraction (EF) ≤ 35%
NO
YES
EF ≤ 40% with Ischemic Cardiomyopathy
-Myocarditis or systemic infection?
-Newly diagnosed NICM?
-Awaiting cardiac transplant?
-≤ 40 days post-myocardial infarction
-≤ 90 days post-revascularization?
NO
YES
YES
NO
Does patient have a current Implantable Defibrillator?
Not a candidate for a wearable cardioverter defibrillator. Proceed with optimal medication therapy.
YES
NO
Not a candidate for a wearable cardioverter defibrillator. Proceed with optimal medication therapy.
Likely is a candidate for wearable cardioverter defibrillator. Discuss this option with patient.

American Heart Association Recommended Guidelines (2017)

**Recommendations for Wearable Cardioverter-Defibrillator**

**References that support the recommendations are summarized in Online Data Supplement 56.**

| COR | LOE | Recommendations |
|---|---|---|
| IIa | B-NR | 1. In patients with an ICD and a history of SCA or sustained VA in whom removal of the ICD is required (as with infection), the wearable cardioverter-defibrillator is reasonable for the prevention of SCD.[S11.2-1–S11.2-4] |
| IIb | B-NR | 2. In patients at an increased risk of SCD but who are not ineligible for an ICD, such as awaiting cardiac transplant, having an LVEF of 35% or less and are within 40 days from an MI, or have newly diagnosed NICM, revascularization within the past 90 days, myocarditis or secondary cardiomyopathy or a systemic infection, the wearable cardioverter-defibrillator may be reasonable.[S11.2-1–S11.2-5] |

Al-Khatib, S. M., Stevenson, W. G., Ackerman, M. J., Bryant, W. J., Callans, D. J., Curtis, A. B., … Page, R. L. (2018). 2017 AHA/ACC/HRS Guideline for management of patients with ventricular arrhythmias and the prevention of sudden cardiac death: A report of the American College of Cardiology/American Heart Association task force on clinical practice guidelines and the Heart Rhythm Society. *Circulation, 138*(13), e272-e391. doi:10.1161/CIR.0000000000000549

## Resources

***Ordering Process:***

1) Complete Medical Order Form (Available on Unit)
2) Supporting documents needed:
   - Patient's face sheet
   - Documentation of indication (On H&P or Progress Note)
   - Documentation of EF ≤ 35%
3) Fax information to 1-866-567-7615

***Who can be contacted with questions or assistance with ordering?***

**Social Work Team:**
Name: Lori Crosser
Pager #: 5252

Name: Catherine VanderZee
Pager #: 8100

Name: Stephanie Rauckhorst
Pager #: 4487

**Zoll Representative:**
Name: Mark Ulrich
Phone: (319) 491-4563

# Appendix B

## Pre-Post Project Survey

### Clinician Pre/Post Questionnaire

**Unit/clinic:** _____ **Date:** _____

**INSTRUCTIONS:** Please take a few minutes to provide valuable feedback related to sudden cardiac death risk, and use of a wearable cardioverter defibrillator. Your responses are anonymous and will be used to improve care for cardiac patients.

**SECTION I: Knowledge assessment**

**INSTRUCTIONS:** Please select the ONE best answer for each question.

| | |
|---|---|
| 1. Which of the following may be potential options for patients identified at high risk for sudden cardiac death? | ☐ a. Consideration of future ICD placement<br>☐ b. Use of a wearable cardioverter defibrillator<br>☐ c. Optimal medication therapy<br>☐ d. All of the above<br>☐ e. Both A & C |
| 2. According to the American Heart Association, a WCD may be an appropriate consideration in of which of the following situations? | ☐ a. EF ≤ 45%<br>☐ b. Within 60 days post-MI<br>☐ c. Within 90 days post-revascularization<br>☐ d. Patients with current ICD, awaiting removal |
| 3. What are the barriers to offering and/or prescribing WCD therapy to those who qualify? | ☐ a. Ordering process is difficult or time consuming<br>☐ b. I often forget about the WCD as an option<br>☐ c. I don't believe the WCD is effective<br>☐ d. Other: _____ |

**SECTION II: Perception or attitude assessment**

**INSTRUCTIONS:** Please indicate the number that best describes your perception or attitude about sudden cardiac death risk identification, and use of a wearable cardioverter defibrillator.

| | Strongly Disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|---|
| 1. I am able to identify which patients are at high risk for sudden cardiac death (SCD). | 1 | 2 | 3 | 4 |
| 2. Using American Heart Association guidelines enhances the ability to consistently identify patients at high risk for SCD. | 1 | 2 | 3 | 4 |
| 3. I feel that increasing awareness of identifying those at risk for SCD, could improve patient outcomes. | 1 | 2 | 3 | 4 |
| 4. I feel knowledgeable about when it is appropriate to offer wearable cardioverter defibrillator (WCD) therapy. | 1 | 2 | 3 | 4 |
| 5. I am completely aware of the American Heart Association recommendations regarding WCD use. | 1 | 2 | 3 | 4 |



### Tool 9.4 Clinician Questionnaire (Continued)

**SECTION II: Perception or attitude assessment**

*continues*

Cullen, L., Hanrahan, K., Farrington, M., DeBerg, J., Tucker, S., & Kleiber, C. (2018). *Evidence-based practice in action: Comprehensive strategies, tools, and tips from the University of Iowa Hospitals and Clinics*. Indianapolis, IN: Sigma Theta Tau International.

| | Strongly Disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|---|
| 6. I consistently offer WCD therapy for all patients who qualify for use of the device. | 1 | 2 | 3 | 4 |
| 7. Engaging in shared decision making with patients and families to discuss potential treatment options, improves patient understanding & compliance. | 1 | 2 | 3 | 4 |
| 8. In qualifying patients, WCD can aid in temporary prevention and reduction of SCD risk. | 1 | 2 | 3 | 4 |
| 9. I always document when I recommend & offer WCD therapy to my patients (whether they refuse or accept). | 1 | 2 | 3 | 4 |
| 10. I have easy access to the resources needed to order a wearable cardioverter defibrillator. | 1 | 2 | 3 | 4 |

# Appendix C

## Project Timeline

Step 1: NRC Project Approval - 7/3/19

Project approval from the healthcare facility where the DNP project took place.

Step 2: CUHSR Project Approval - 7/20/19

Project approval from Bradley University Committee on the Use of Human Subjects in Research (CUHSR).

Step 3: Project Initiation - 7/26/2019

Providers on the Cardiac unit requested to complete an anonymous survey to assess the knowledge, attitudes, and perceptions of the staff involved. (See Appendix B). Epic query to assess pre-intervention data for WCD prescription rates.

Step 4: 7/26/2019 – 8/2/2019 - Project Implementation Work

A printed Decisional tool provided to all cardiac providers working on the inpatient unit. They will be educated regarding the use of the tool, and the imperative need for intervention to increase awareness of identifying patients at risk. (See Appendix A).

Step 3: 7/26/2019 – 10/24/2019: 90 day Project Duration

Regular check-in meetings with mentor and providers, to discuss use of decisional tool, reinforce importance of identifying patients at high risk for sudden cardiac death American Heart Association guidelines, and to answer any questions.

Step 5: 10/25/2019 - 11/1/2019: Evaluation

Project team will collect and evaluate de-identified data, 90 days after implementation. (See Step 3). The number of patients with potential qualifying diagnoses will be compared with the number of patients who were prescribed to evaluate success of program implementation. Post-intervention surveys provided to providers, completion of surveys requested.

Appendix D

Project Budget Table & Cost Factors

| Project Budget and Cost Factors<br>(Project duration = 3 months) | | |
|---|---|---|
| Expenses | Weekly Cost<br>(In U.S. dollars) | Total 3 Month Cost<br>(In U.S. dollars) |
| Project Team Mentor<br>$58.33/hr | $175.68 weekly<br>(Estimated 3 hrs/week) | $2,108.16 |
| Project Team Leader<br>(Graduate Student) In kind = $0 | $0 | $0 |
| Printed Educational Materials | N/A | $5 |
| | | Total Cost = $2,113.16 |