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Anticoagulation Adherence in Atrial Fibrillation Patients with a Scheduled Cardioversion

A DNP Project

Presented to the Faculty of the

Department of Nursing

West Chester University

West Chester, Pennsylvania

In Partial Fulfillment of the Requirements for

the Degree of

Doctor of Nursing Practice

By

Caitlin Naimo MSN, RN, CCRN

May 2023

Dedication

This project is dedicated to my husband, mother, and patients battling chronic or acute disease processes. While medicine is not perfect, it is continually evolving, and we try to understand and make positive changes in practice. We care, I care.

Acknowledgements

West Chester University has been a part of my life for almost 10 years, and the faculty in the nursing department provided support from my Master's through Doctorate program. It is going to be an adjustment knowing I will not have another semester engaging with the staff and faculty at West Chester University. I want to thank my mentors, Dr. Veronica Wilbur and Dr. Schlamb who have been a major part of my experience at West Chester University. You both have shaped me ways beyond formal education.

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Lastly, my family I thank you for the extra support at home; my husband, son, mother, and brother. I would have struggled without you. Everything I do, I do it for you. Thank you.

Abstract

Atrial fibrillation is a chronic disease managed through rate control, rhythm control, and anticoagulation. Anticoagulation compliance must be verified when a patient needs a cardioversion to convert to normal sinus rhythm. If a patient has missed a dose within the last four weeks, a Transesophageal Echocardiogram (TEE) is required to confirm that a clot has not formed in the heart. Medication noncompliance plagues the healthcare industry, costing millions of preventable healthcare dollars. The literature review shows that educational and behavioral interventions effectively increased medication compliance. Educational material was created, and a verified medication compliance survey was utilized to evaluate anticoagulation compliance. A qualitative data analysis and retrospective chart review from 31 patients was conducted on atrial fibrillation patients who were scheduled for a cardioversion during a three-month time period. Patients were emailed an educational packet and a medication compliance survey. The TEE rates were also tracked pre-and post-intervention. Results: Questions from the survey identifying purposeful or consciously choosing not to take medication was 100% compliance. Questions identifying carelessness or forgetfulness showed between 93% and 99% compliance. TEE results could not be analyzed due to the inability to extract cardioversion data.

Keywords: cardioversion, anticoagulation, atrial fibrillation

Table of Contents

List of Tables	iv
List of Figures	v
Chapter 1: Introduction & Background	1
Background	1
Significance	2
Clinical Question/PICOT	2
Goals of Project	2
Introduction of Change Theory	3
Summary of Chapter	3
Chapter 2: Literature Review	4
Introduction	4
Terms, Concepts & Definitions	4
Gaps in Literature	9
Summary of Chapter	10
Chapter 3: Methodology	12
Introduction	12
Design/Evidence Based Framework	12
Setting	13
Population/Sample	14
Instrument	14
Data Collection & Resources	15
Protection of Human Subjects/IRB	16

Summary of Chapter	16
Chapter 4: Results	17
Introduction	17
Data Collection	17
Statistical Results	18
Conclusion.....	19
Chapter 5: Discussion	21
Review of the problem	21
Results Analysis	21
Limitations of the project	22
Implications for Nursing Practice, Education, and Research	23
Conclusion.....	25
References.....	26
Appendices.....	32
A. Cardioversion Education Packet	32
B. Hill-Bone Medication Adherence Survey	47
C. West Chester Institutional Review Board Approval Letter	48
D. Penn Medicine Institutional Review Board Approval Letter	49

List of Tables

1. Descriptive Analysis SPSS Hill-Bone Medication Adherence Survey	50
2. Reliability from SPSS	51

List of Figures

1. Hill-Bone Medication Adherence Survey Results with Percentages.....	52
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Chapter 1. Introduction

Background

Medication adherence is a public health priority in the United States, as one in five new prescriptions are not filled. Of the prescriptions that are filled, about 50% of the medications are taken correctly. Medication nonadherence costs the United States health system over \$100 billion annually in preventable economic and healthcare burden (Neiman et al., 2017). The World Health Organization (WHO) stated, "...adherence is the single most important modifiable factor that compromises treatments outcome. The best treatment can be rendered ineffective by poor adherence" (World Health Organization, 2003, p. 157).

Medication adherence entails a behavioral process involving five factors: socioeconomic, factors relating to the healthcare team or system, disease-related factors, treatment-related factors, and patient-related factors. Some patient-related factors include a knowledge deficit of disease processes, lack of involvement in the decision-making process, and decreased health literacy, all contributing to medication adherence rates (Etminani et al., 2020).

Medication nonadherence is a current complication healthcare providers struggle with to make effective treatment plans. For patients diagnosed with Atrial Fibrillation (AF), prophylactic oral anticoagulants (OACs) are prescribed to reduce the risk of stroke. There are two classifications of OACs. First is vitamin K antagonists (VKAs) such as Warfarin, which requires patients to have blood monitoring of international normalized ratio (INR) levels for the therapeutic window. Second, direct oral anticoagulants (DOACs) do not require blood

monitoring. Unfortunately, while the DOACs are more convenient for the patient, due to a lack of monitoring, there is only a 75% adherence rate (Kjekshus & Schuster, 2020).

Significance

The current standards to treat AF, include: rate, rhythm, and anticoagulation, which are usually maintained through medication. When a patient experiences breakthrough AF, electrical cardioversion is the gold standard. In hemodynamically stable patients with AF onset greater than 48 hours, patients need to have four weeks of uninterrupted DOAC therapy, or four weeks of weekly therapeutic INRs, or a Transesophageal Echocardiogram (TEE) immediately prior to the cardioversion to rule out a clot. Utilizing TEE has procedural risks to the patient, requires extra anesthesia, needs coordination of additional healthcare specialists, and increases the burden on healthcare systems (Schaeffer et al., 2018). Patients who are noncompliant with anticoagulation treatment regimens are at an increased risk for stroke, procedural complications, procedural time, and the possibility of cancellation due to TEE availability.

Clinical Question

In atrial fibrillation patients with a scheduled cardioversion, how does nurse-patient education, compared to current instructions, influence anticoagulation adherence?

Goal

This evidence-based quality improvement project aims to evaluate the effectiveness of education on medication adherence rates of AF patients who are scheduled for a cardioversion within a large healthcare system.

Introduction of Change Theory

Utilizing quality improvement (QI) frameworks help to guide and structure clinical inquiries. The conceptual framework that will be utilized for this QI project to increase anticoagulation adherence is Roger's Diffusion of Innovation Theory. Roger's categorizes the adaption of new technology into three phases: initiation, decision, and implementation. Roger's Diffusion of Innovation Theory best fits with this QI project as it identifies a problem, creates a solution, and incorporates the solution into everyday practices, thus changing the culture (Doyle et al., 2014).

Summary of Chapter

As the current standards control AF include: rate, rhythm, and anticoagulation, increasing anticoagulation adherence is paramount in patient safety. Medication adherence is a modifiable patient factor that can render treatment plans ineffective. The proposed patient education intervention will be measured through TEE rates and self-reported medication adherence surveys. Roger's Diffusion of Innovation Theory guides the clinical question: "In atrial fibrillation patients with a scheduled cardioversion, how does nurse-patient education, compared to current instructions, influence anticoagulation adherence." The next chapter will detail the literature reviewed for this QI project.

Chapter 2. Literature Review

Introduction

This chapter focuses on an overview of anticoagulation adherence. The literature review aims to answer the research question: In atrial fibrillation patients with a scheduled cardioversion, how does nurse-patient education, compared to current instructions, influence anticoagulation adherence? Grey literature was explored by searching the World Health Organization (WHO), the Centers for Disease Control (CDC), the U.S. Department of Health and Human Services (HHS), and the Office of Disease Prevention and Health Promotion. Medication adherence was listed on all websites, but there was a lack of information regarding anticoagulation. As a public health priority, healthcare workers must understand medication adherence and the reasoning behind the complex behavior of nonadherence (Neiman et al., 2017). The literature review provided evidence on barriers to medication adherence and mixed interventions for a multifaceted problem.

This chapter examined terms and definitions of anticoagulation, such as means to measure adherence. Following adherence measurements are the interventions that affect adherence rates, education, and behavioral interventions. Lastly, AF patient population and quality of life were also researched.

Terms and Definitions

The literature review consisted of querying PubMed, the Cochrane Review Library, and CINAHL. The keywords utilized in the search were “anticoagulation adherence”, “anticoagulation compliance”, “atrial fibrillation”, “stroke prevention”, and “barriers to medication adherence”. The terms compliance and adherence are used interchangeably to mean taking medication as prescribed. Boolean connectors were utilized in all searches.

Query limits included articles published between 2017-2022 and scholarly or peer review journal articles. Articles relating anticoagulation adherence with cardioversion were not found in the literature review. The articles selected for the literature review were mixed between systematic reviews, randomized controlled trials, prospective observational studies, cross-sectional studies, controlled cohort studies, and one pilot study.

The above search terms resulted in a range of 62 to 892 articles. Articles were excluded if they were not written in English and did not compare medication compliance to outcomes. The final narrowed-down search resulted in 15 articles to be utilized in this literature review. Selections were chosen based on careful review of outcomes relating to medication compliance or identified barriers to compliance. The Melnyk Pyramid Levels of Evidence was used to determine hierarchy of evidence for the selected published articles. A wide range of evidence was provided for this literature review. Level one consisted of systematic reviews. Level two provided Randomized Controlled Trials (RCTs) and level three comprised of controlled trials without randomization. Level four are cohort studies such as cross-sectional studies. Level five included systematic reviews of qualitative studies and finally level six involved a single descriptive study such as a pilot study (Melnik & Fineout-Overholt, 2015). The wide range of evidence levels supports the need to utilize nurse lead interventions with atrial fibrillation patients to promote medication adherence.

Most studies utilized validated self-reporting surveys such as the Morisky, Green, Levine Medication Adherence Scale (MGLS) (Moriskyscale.com, 2022). Another validated survey is the 9-item Hill-Bone medication adherence scale which can be utilized in diverse populations to capture compliance rates (Kim et al., 2000). One study utilized a device that

monitors medication adherence through a pill box which measures medication dispensing (Marquez-Contreras et al., 2018).

Adherence Measurements

As previously stated, medication adherence was measured through self-reported surveys such as the MGLS, the Medication Adherence Rating Scale (MARS), the Basel Assessment of Adherence to Immunosuppressive Medication Scale (BAASIS), or a compliance survey (Hsieh et al., 2021; Moudallel et al., 2021; Obamiro et al., 2018; Pacleb et al., 2020; Palmer et al., 2021; Shankari et al., 2020; Song et al., 2021; Taylor et al., 2020; Zhu et al., 2021). Again, only one study measured compliance through an electronic pill box, thus verifying at least the medication was dispensed (Marquez-Contreras et al., 2018). Other measurements included monitoring laboratory values such as INR, blood pressure, and cholesterol levels to collaborate medication adherence (Clarkesmith et al., 2019; Palmer et al., 2021). Another measurement utilized was knowledge surveys, which measured patients' comprehension of a specific medication, such as the Atrial Fibrillation (AF) Knowledge scale and the Anticoagulation Knowledge Tool (AKT) (Moudallel et al., 2021; Obamiro et al., 2018; Pacleb et al., 2020). Knowledge and educational levels will not be collected for this QI project. Beliefs on medication also impacted adherence which was measured through questionnaires such as the Health-Related Quality of Life (HRQoL), EuroQol-5 Dimensions (EQ-5D), EuroQol-Visual Analog Scale (EQ-VAS), and the Short-Form 36-item Health Survey (SF-36) (Cross et al., 2020; Hsieh et al., 2021; Moudallel et al., 2021; Palmer et al., 2021). While many different surveys can be utilized to measure medication adherence, valid and reliable questionnaires are important to ensure accurate and replicable results.

Education

Education was a significant component of the literature review by measuring either knowledge or comparing educational levels with medication adherence. Education levels were measured in either years of formal schooling, self-efficacy questionnaires, health literacy questionnaires, or specific disease process knowledge assessments, such as the Atrial Fibrillation Knowledge questionnaire. The studies which compared educational level to medication adherence had mixed results in adherence rates. Multiple studies showed that increased educational levels correlated with increased medication compliance (Cabellos-Garcia et al., 2021; Pacleb et al., 2020; Shankari et al., 2020; Song et al., 2021; Taylor et al., 2020; Zhu et al., 2021). On the contrary, other studies showed the opposite: increased educational levels decreased medication adherence (Moudallel et al., 2021; Tiili et al., 2021).

Cross et al. (2020) and Clarkesmith et al. (2017) showed mixed results on educational interventions, as there were significant variations. An inability to standardize educational interventions showed a lack of validity in the research, causing a research gap. In addition, some educational interventions were unmeasured through interview style qualitative research, thus making the research more difficult to replicate and generalize to a larger population. While the literature review shows that increased educational levels significantly impact medication adherence (Cabellos-Garcia et al., 2021; Pacleb et al., 2020; Shankari et al., 2020; Song et al., 2021; Taylor et al., 2020; Zhu et al., 2021), the mixed results or even opposing research should also be considered to have robust reliable and valid educational interventions that can be measured to help with the research gap.

Behavior or Habit

During the literature review, barriers to medication compliance were investigated, and behavior or habit interventions were identified as significant (Anderson et al., 2020). Behavior or habit interventions were identified as setting reminders or monitoring systems, pill organizers, packaging, or the ease of use of the medications, simplifying dosing schedules, and mobile phone interventions. Behavior interventions were more easily measured and validated, showing a higher level of significance on medication compliance compared to educational interventions alone, thus making the research more generalizable to other patient populations (Anderson et al., 2020; Cross et al., 2020; Marquez-Contreras et al., 2018; Palmer et al., 2020). However, none of the studies consisted of only behavioral interventions as they were compared to educational outcomes as well.

Age

Atrial fibrillation is considered an epidemic that plagues the new millennium. As the population ages, there will also be an increase in morbidities. AF is one of the most prevalent morbidity in patients over 60 years old (Vasan et al., 2019). Age was also measured in many studies, and was found to be significant in three studies (Pacleb et al., 2020; Shankari et al., 2020; Tiili et al., 2021). As a person ages, they can experience increased forgetfulness and decreased cognition, which impacts the patient's ability for medication compliance (Pacleb et al., 2020; Shankari et al., 2020; Tiili et al., 2021). Compounding the mental decline includes complex disease processes, which can increase the number of medications and complicate drug regimens (Song et al., 2021).

Quality of Life

AF patients can experience a decreased quality of life due to symptom burden, which impacts physical ability, impaired mental capabilities, and emotional wellness (Vest et al., 2022). Quality of life, beliefs on medications or treatment plans, anxiety or depression, concern about medication and possible side effects, and overall feelings significantly impacted medication adherence rates. Providing education and utilizing shared decision tools increased medication adherence as patients felt they were valued in healthcare decisions (Hsieh et al., 2021; Moudallel et al., 2021; Obamiro et al., 2018; Palmer et al., 2021; Shankari et al., 2020; Taylor et al., 2020). Behavioral interventions alone did not significantly impact quality of life, thus supporting a mixed intervention approach.

Literature Gaps

There is extensive research on education and behavioral interventions relating to medication compliance. However, some research gaps were discovered during the literature review. First, is the lack of validity in educational interventions. Not all studies utilized a valid and reliable questionnaire, making the results more challenging to define educational outcomes. Utilizing a well-established questionnaire is important to prevent inconsistencies (Clarksmith et al., 2017; Cross et al., 2020).

Another research gap is the lack of consistency in educational interventions. Variations included one-on-one instructions, videos, reading material, and demonstrations. However, with the considerable variation it is difficult to conclude which intervention is most effective (Cross et al., 2020). Healthcare systems could be utilizing a less effective intervention based on the patient's learning preference. The reading material may also be

above the patient's reading level, making it difficult for the patient to comprehend, thus affecting educational outcomes and medication compliance (Sheele et al., 2019).

Finally, there is a gap in research relating to best practices for anticoagulation adherence to cardioversion complications. While there is research on best practices with interventions of anticoagulation misses doses, such as obtaining a TEE to assess for clot formation, there is no research on how to best prevent the missed doses from reoccurring (Kjekshus et al., 2020). Current research include rates or risk factors of non-compliance after cardioversion. However, there is no documented intervention to prevent increased stroke risks to patients and increased healthcare burden from occurring in the first place.

Summary of Chapter

The original research question started with "In atrial fibrillation patients who have a scheduled cardioversion, how does nurse-patient education, compared to standard instructions, influence anticoagulation adherence?" However, after a review of the literature, a mix of educational and behavioral interventions may be more appropriate. Education alone had mixed results on anticoagulation compliance due to the variation in education interventions as well as measured outcomes. Utilizing valid and reliable questionnaires is essential to ensure accurate and replicable results. Behavior and habit interventions were also seen as significant interventions on medication adherence due to the complex nature of why patients are non-compliant. Providing multiple interventions proved to have the most significant impact on adherence.

As previously stated, medication adherence is a modifiable patient factor that dramatically impacts patient outcomes and healthcare costs. Nurses interact with patients more frequently than other healthcare providers. Therefore, bedside nurses should be able to

provide basic medication education and reinforce medication compliance (Song et al., 2021). When a patient is found to be non-compliant, the nurse should provide effective identified interventions to prevent further nonadherence and avoid poor patient outcomes.

Chapter 3. Methodology

Introduction

This QI project utilized a pre- and post-intervention assessment through a retrospective chart review of TEEs rates, as well as self-reported medication adherence surveys to evaluate anticoagulation adherence. Unfortunately, there are no physiological tests to validate DOAC adherence, but Warfarin can be validated through INRs. TEEs are physiological means to validate anticoagulation adherence, as the need for a TEE indicates missed doses of anticoagulation, thus indirectly measuring anticoagulation nonadherence. Since there is no direct way to measure adherence, the rates of TEEs pre- and post-intervention, plus the self-reported surveys, will be utilized as adherence rates for this QI project. Utilizing self-reported medication adherence surveys provide additional data for those who do not require a TEE through a Patient Reported Outcome (Sadan, 2017). This design allowed for a comparison of pre-and post-intervention while incorporating Patient Reported Outcomes. This chapter will focus on the evidence-based framework, setting, population, instruments, data collection and analysis, protection of human subjects, and resources for this quality improvement project.

Evidence-Based Framework

The conceptual framework that will be utilized to increase anticoagulation adherence is Roger's Diffusion of Innovation Theory. Roger's categorizes the adaption of new technology into three phases: initiation, decision, and implementation. The initiation phase identifies the need for improvement, and a gap was identified in patient care resulting in decreased anticoagulation adherence. For the initiation phase to progress onto the decision phase, both agenda setting and matching need to be completed. Agenda setting requires

support from key stakeholders, such as management, patients, and physicians. Matching is finding the best possible or reasonable solution to resolve the problem (Doyle et al., 2014). As part of the anticoagulation adherence, physicians and nursing management have agreed that an intervention is needed, and multiple interventions were examined.

The decision phase is short-lived in that it is the defining moment when stakeholders agree to utilize a specific intervention (Doyle et al., 2014). The decision was made to move forward with providing patients education prior to the scheduled cardioversion. Educational material was created (Appendix A) and agreed upon by physicians and nursing management. The educational material was digitized for patients to access via or email.

The implementation phase is broken down into three parts: redefining, clarifying, and becoming part of the routine. Redefining involves modifying the intervention to fit the needs of the patient further. Clarifying involves progressively making the intervention part of the culture of the department or organization. For example, providing educational material available to patients prior to a scheduled procedure, will help to prepare patients on treatment plans and positively impact patient outcomes. Becoming part of a routine involves making the intervention part of the departments or organization's daily tasks (Doyle et al., 2014). Automating the educational intervention will help make the educational intervention part of the daily routine.

Setting

The setting for this QI project is at a major inner-city Magnet-designated hospital in the inpatient Cardiac Electrophysiology department in southeastern Pennsylvania. The hospital has over 800 inpatient beds and is part of a more extensive healthcare system. The Cardiac Electrophysiology department is part of a robust Arrhythmia program providing

innovative treatments through extensive research and clinical trials. This QI project is supported by the health system's administration, nursing management, physicians, and advanced practice providers.

Population

AF patients who are scheduled for a cardioversion is this QI project's patient population. The inclusion criteria include all cardioversion patients scheduled the week before the procedure. Patients are excluded for the following: add-on or emergent cardioversions and patients who do not have access to email. The PI performed no active recruitment, and no incentive is offered.

Instruments

This QI project utilized Epic's electronic charting system to collect data on the TEE rates through a retrospective chart review and the self-reported medication adherence survey. The primary intention of the retrospective chart review is to determine if education impacted anticoagulation adherence compared to current instructions patients receive. As previously stated, the rates of TEEs indirectly correlate to anticoagulation adherence. Therefore, Epic was analyzed for the rates of TEEs before and after the intervention, looking for adherence rates.

The self-reported medication adherence survey was utilized to capture additional data for patients who do not need a TEE during the data collection, providing additional information. Patients who comply with their anticoagulation and do not miss doses do not need a TEE. The 9-item Hill-Bone medication adherence scale is a commonly used self-reported survey (Appendix B) (Kim et al., 2000). Due to licensing fees and copywriting issues regarding the MGLS, the Hill-Bone Medication Adherence Scale will be utilized in

this QI project (Tesfaye, & Peterson, 2022). The 9-item Hill-Bone medication adherence scale is a short, validated survey in diverse populations of nine questions that can be completed within a few minutes. The medication adherence scale has a Cronbach's $\alpha = 0.74$ to 0.84 (Kim et al., 2000).

Data Collection and Resources

Data collection consists of two parts, a retrospective chart review from Epic to determine if there is a correlation between education and rates of TEEs. In addition, a request for analytics from information technology was submitted for the TEE rates. Access to the cardioversion schedule is through a shared drive, thus making the patient population easy to identify.

The second part of data collection is from the self-reported medication adherence survey, which will be provided via email. A basic Excel worksheet will be utilized for data review and cleansing. Data analysis includes both descriptive and gap analysis. Descriptive analysis will provide the number of patients responding to each question providing central tendencies of mean, median, and mode. The purpose of central tendency is to identify the most common responses from the survey (Stommel & Dontje, 2014). A gap analysis provides a comprehensive process to identify and bridge the gaps in either service delivery or nursing practice by gathering information and finding sustainable solutions in a structured process. Gap analyses are ideal for joining desired outcomes to real-world factors that influence healthcare quality (Davis-Ajami et al., 2014). For example, the gap analysis may show if the nurse-led education intervention affected the anticoagulation adherence rates.

Protection of Human Subjects

Before collecting data, approval was obtained through West Chester University (Appendix C) and the Hospital of the University of Pennsylvania Internal Review Boards (IRB) (Appendix D) to protect human subjects. Data from the self-reported survey will be de-identified and given a unique number to protect patient information and in accordance with the Health Insurance Portability and Accountability Act (HIPPA). The primary investigator will be the only person with access to the results on a password-protected computer. Only the primary investigator access the computer, and all information utilized will be destroyed after three years of the project completion.

Summary of Chapter

Roger's Diffusion of Innovation Theory helps provide guidance and structure in research inquiries. Through initiation, decision, and implementation phases, new technology can become part of a department's culture (Doyle et al., 2014). AF patients will receive education, which is the new technology attempting to become part of Electrophysiology's culture. Measuring if the new technology impacts AF patients' anticoagulation adherence will be done through TEE rates and a self-reported medication adherence survey. The next chapter will discuss the results of the proposed clinical question.

Chapter 4. Results

Introduction

This chapter will focus on the results and data analysis of the QI project. The two-step data collection consisted of a retrospective chart review from Epic and collecting medication adherence rates through self-reported surveys. The QI project aimed to see if patient education affected rates of TEEs and medication adherence through self-reported surveys.

Data Collection

Data collection for the self-reported surveys occurred between December 5, 2022, and February 1, 2023. The surveys were compiled, and no identifiable patient-related data was collected. The primary investigator received formatted reports of surveys that did not include patient identifiers. The Epic analytic team provided a retrospective chart review for the TEE numbers during the previously mentioned time period. The numbers were provided in numerical form based on the month.

Statistical Results

TEE Results

The number of TEEs reported in the Electrophysiology Department was reported numerically. For the month before the intervention the TEE numbers totaled $n=161$ outpatients and $n=182$ inpatients from July 2022 through September 2022. After the education intervention, the TEE numbers reported totaled $n=85$ outpatients and $n=123$ inpatients from December 2022 through January 2023. Unfortunately, the TEE data analysis could not be completed as there was difficulty extracting only cardioversion patients. In addition, the numbers reported were for the entire department; thus statistical analysis was not performed.

Survey Results

A descriptive and qualitative analysis of the patient-reported survey was conducted for the survey results. The data was entered into SPSS 24 (2016) for statistical analysis (Table 1). The sample size was small ($N=31$) (Table 1). The survey consisted of nine questions with Likert scale responses. Points were assigned to each category and included: all of the time, most of the time, some of the time, and none of the time. The answers for all of the time received one point. The responses for most of the time received two points. The responses for some of the time and none of the time received three and four points, respectively. The mode and the mean were 100% and 98%, respectively, for overall medication adherence. The overall standard deviation (SD) for anticoagulation medication adherence was 3%. The lowest score was 89%, and the highest was 100 %. The Cronbach α was 0.67 calculated from SPSS for the anticoagulation questionnaire (Table 2).

Forgetfulness

Forgetfulness and carelessness were addressed in questions one, three, five, and nine, which led to medication nonadherence. All of those questions had responses ranging from forgetting to take anticoagulation medication all of the time to none of the time. The first question: How often do you forget to take your anticoagulation medication, had an average score of 93%, a mean score of 3.7, and $SD=0.79$ (Table 1 and Figure 1). One person skipped this question; thus missing data. Out of the thirty responses, five forget to take their anticoagulation medication, which is a sixth of the responses.

Question three: How often do you forget to get prescriptions filled had a score of 94%, a mean score of 3.9, and $SD=0.25$ (Table 1 and Figure 1). A total of two responses out of thirty-one forget to refill their anticoagulation prescription. The fifth question: How

often do you skip your anticoagulation medication before going to the doctor had a score of 97%, a mean score of 4.0, and $SD= 0.18$ (Table 1 and Figure 1). One response for skipping a dose of medication prior to a doctor's visit. Finally, question nine: How often do you miss taking your anticoagulation pills when you are careless had a score of 90%, a mean score of 3.9, and $SD = 0.30$ (Table 1 and Figure 1). Three responses out of thirty-one responded to being careless with anticoagulation medication.

Thoughtful

Questions two, four, six, seven, and eight address a purposeful decision to take or not take their medication. In all of the questions addressing a purposeful decision, all patients responded they are compliant all of the time. Meaning patients are not thoughtfully deciding to be adherent but rather simply forgetting. The score for questions two, four, six, seven, and eight was 100%, the mean was 100% and the $SD= 0.00$ (Table 1 and Figure 1). Question two was: how often do you decide not to take your anticoagulation medication? Question four was: how often do you run out of anticoagulation pills? Question six was: How often do you miss taking your anticoagulation pills when you feel better? Question seven was: How often do you miss taking your anticoagulation medication when you feel sick? Question eight was how often do you take someone else's anticoagulation pills?

Conclusion

While the statistical analysis could not be performed for the TEE portion, the survey results revealed data on anticoagulation nonadherence. Questions that addressed the thoughtful decisions to be nonadherent with anticoagulation showed 100% compliance. Which means patients are choosing to be compliant. Questions addressing forgetfulness or carelessness showed that patients experience times of nonadherence due to simply forgetting

to take the medication. The discussion section will explore interventions based on the data and future research on anticoagulation medication compliance.

Chapter 5. Discussion

Review of the Problem

As previously stated, medication adherence is a modifiable public health priority in the United States (Neiman et al., 2017). Atrial fibrillation patients who miss doses of their anticoagulant are at an increased risk of stroke due to clot development (Schaeffer et al., 2018). As a review, the PICOT was “In atrial fibrillation patients with a scheduled cardioversion, how does nurse-patient education, compared to current instructions, influence anticoagulation compliance?” The primary outcome of the QI project was to increase anticoagulation adherence rates in AF patients.

Results Analysis

First, patients are forgetful or careless with anticoagulation medications but are not deliberately choosing to be non-adherent. This is evidenced by responses from questions one, three, five, and nine (Table 1) for forgetfulness versus responses from questions two, four, six, seven, and eight, which involved a thoughtful decision on non-adherence. Secondly, patients are not running out of anticoagulation medication, as evidenced by question four, but do forget to refill the prescription. Based on the results, interventions such as pill organizers, setting alarm reminders to take medications, and pharmacies that call with prescription refill reminders would benefit our AF patient populations.

The Cronbach α measures reliability and internal consistency; generally, values above 0.7 are considered reliable (Bannon, 2013). The Cronbach α was a little below the reliability threshold at 0.67 (Table 2), which could be explained by two reasons. First, the missing data from the first question could account for a lower Cronbach value; one person

skipped the first question. Secondly, the low amount of responses $n=31$ could also lower the Cronbach number.

Limitations

This QI project had limitations. Patients received an email with the educational material and survey only a couple of days, or even just one day, before the cardioversion. If the patient had already missed a dose of medication in the previous four weeks prior, the educational intervention had no impact as the intervention was late. Providing patients with education upon medication initiation could be beneficial in preventing missed doses. Thus the TEE rates could be more reflective of the educational intervention.

The TEE rates could not be analyzed for statistical analysis due to institutional challenges. Initially, the TEE rates were to be extracted to include only scheduled cardioversion patients. However, the rates were reported for the entire department due to difficulty extracting data from Epic. Thus, a higher TEE rate is reported than the number of scheduled cardioversion patients.

Another limitation is email and technology. Patients needed to check their email prior to cardioversion. Patients who did not have an email listed in Epic were excluded from the study. Access to technology can cause a further widening of health equity seen in communities across the United States (Anderson & Olson, 2016). The technology for this QI project was basic, providing patients with a PDF and completing the attached survey within the email. The educational PDF was lengthy and could be information overload. A platform that provides information gradually, through a step-wise fashion, could be more beneficial without information overload. Preventing information overload may impact medication adherence rates.

Implication for Nursing Practice, Education, and Research

Quality improvement is a cyclical process of identifying a problem, benchmarking, planning the process, collecting data, identifying strategies for improvement, disseminating, and implementing findings. After findings are applied to practice, the cyclical process starts again with problem identification (Baker, 2017). Medication adherence is a dynamic problem that evolves with the continual healthcare system changes. This section will address implications for nursing practice, education, and research.

Nursing Practice

Medication adherence education must be provided to patients at the right time and place to prevent information overload. Internet-based or mobile-based education programs are an alternative to reach large volumes of patients while preventing information overload. For example, in this QI project patients were emailed a fifteen-page PDF file, which can be overwhelming, and patients may only view some of the packet. A program or platform that allows patients to view material sections at a time with a combination of reading, videos, and podcasts has increased patients' knowledge on disease processes and their ability to provide self-management of their disease (Palmer et al., 2021).

Education

Song et al. 2021, emphasizes that bedside nurses should be able to provide basic medication education and strategies to encourage medication adherence, such as pill organizers. While medication adherence is a patient-related factor, nurses need to educate patients to make an informed decision on how adherence can impact their health outcomes and quality of life. The educational material must be available for the inpatient and outpatient settings, as some patients are diagnosed as inpatients. Again, this QI project

provided the educational material via email in PDF form, which was not accessible to bedside nurses. Nurses need a bank of educational materials to provide patients with their preferred learning styles. For example, if a patient states they learn best by watching a video, then nurses need access to a video for patients to view. Patient education on anticoagulation medication and cardioversion was nonexistent and was created for this project.

Research

Future medication or treatment compliance research is essential for patients and healthcare systems. Barriers to treatment and medication compliance need to be identified in order to improve patient outcomes and decrease healthcare spending on preventable and modifiable patient-related factors (Neiman et al., 2017). This QI study focused solely on AF patients with a scheduled cardioversion, which is a narrowed patient population and specific education. The literature review states; that patients' feelings or beliefs about treatment plans also impact adherence rates. Therefore, research needs to identify barriers to adherence with targeted patient populations and interventions. While there are patient-related factors that influence nonadherence, there are also treatment or therapy-related factors that impact adherence. For example, utilizing an anticoagulant with a once-a-day regime versus twice-a-day could increase adherence rates (Cross et al., 2020; Hsieh et al., 2021; Moudallel et al., 2021; Palmer et al., 2021).

Conclusion

Medication adherence is a healthcare priority in the United States. This QI project sought to increase patient safety by answering the question: “In atrial fibrillation patients with a scheduled cardioversion, how does nurse-patient education, compared to current instructions, influence anticoagulation compliance?”. Patients who miss doses of anticoagulation are at increased risk for stroke and procedures such as TEE. While the TEE rates could not to be evaluated for effectiveness, patient surveys provided valuable information. In addition, patients miss doses of anticoagulation unintentionally; thus interventions can be made to help increase adherence. Such interventions include pill organizers, automatic pharmacy reminders, and setting alarms.

Further research into educational platforms, availability of quality educational material, and other barriers not addressed in this QI will help identify specific medication adherence. As noted previously, medication adherence entails a behavioral process involving five factors: socioeconomic, factors relating to the healthcare team or system, disease-related factors, treatment-related factors, and patient-related factors (Etminani et al., 2020). This QI project was narrow in spectrum, focusing on a patient-related factor of education in a small patient population of atrial fibrillation patients scheduled for a cardioversion, understanding how to broaden the spectrum to include larger patient populations with different disease processes needs to be further investigated for more significant impact.

References

- Anderson, K. M, & Olsen, S. (2016). *The promises and perils of digital strategies in achieving health equity: workshop summary*. The National Academies Press.
- Anderson, L. J., Nuckols, T. K., Coles, C., Le, M. M., Schnipper, J. L., Shane, R., Jackevicius, C., Lee, J., Pevnick, J. M., & Group, M. of the P-D. (2020). A systematic overview of the systematic reviews evaluating medication adherence interventions. *American Journal of Health-System Pharmacy*, 77(2), 138-147.
<https://doi.org/10.1093/ajhp/zxz284>.
- Baker, J. D. (2017). Nursing research, quality improvement, and evidence-based practice: The key to perioperative nursing practice. *AORN Journal*, 105(1), 3-5.
<http://doi.org/10.1016/j.aorn.2016.11.020>.
- Bannon, W. (2013). *The 7 Steps of Data Analysis: A Manual for Conducting a Quantitative Research Study*. Stats Whisperer Press.
- Clarkesmith, D. E., Pattison, H. M., Khaing, P. H., & Lane, D. A. (2017). Educational and behavioral interventions for anticoagulant therapy in patients with atrial fibrillation. *The Cochrane Database of Systematic Reviews*, 4, CD008600.
<https://doi.org/10.1002/14651858.CD008600.pub3>.
- Cross, A. J., Elliott, R. A., Petrie, K., Kuruvilla, L., & George, J. (2020). Interventions for improving medication-taking ability and adherence in older adults prescribed multiple medications. *The Cochrane Database of Systematic Reviews*, 5, CD012419.
<https://doi.org/10.1002/14651858.CD012419.pub2>
- Davis-Ajami, M. L., Costa, L., & Kulik, S. (2014). Gap analysis: Synergies and opportunities for effective nursing leadership. *Nursing Economic\$*, 32(1), 17-25.

- Doyle, G. J., Garrett, B., & Currie, L. M. (2014). Integrating mobile devices into nursing curricula: Opportunities for implementation using Rogers' Diffusion of Innovation Model. *Nurse Education today*, 34(5), 775-782.
<https://doi.org/10.1016/j.nedt.2013.10.021>.
- Etminani, K., Tao, Engstrom, A., Goransson, C., Sant'Anna, A., & Nowaczek, S., (2020, April 9). How behavior change strategies are used to design digital interventions to improve medication adherence and blood pressure among patients with hypertension: systematic review. *Journal of Medical Internet Research*, 22(4), e17201.
<https://doi.org/10.2196/17201>.
- Hsieh, H.-L., Koa, C.-W., Cheng, S.-M., & Chang, Y.C. (2021). A web-based integrated management program for improving medication adherence and quality of life, and reducing readmission in patient with atrial fibrillation: Randomized control trial. *Journal of Medical Internet Research*, 23(9), e30107. <https://doi.org/10.2196/30107>.
- Kim, M. T., Hill, M. N., Bone, L. R., & Levine, D. M. (2000). Development and testing of the Hill-Bone Compliance to High Blood Pressure Therapy Scale. *Progress in Cardiovascular Nursing*, 15(3), 90-96. <https://doi.org/10.1111/j.1751-7117.2000.tb00211.x>.
- Kjekshus, V. H. R., & Schuster, P. (2020). Adherence to oral anticoagulant treatment and risk factor assessment six month after DC-conversion of atrial fibrillation. *Scandinavian Cardiovascular Journal*, 54(3), 179-185.
- Marquez-Contreras, E., Martell-Claros, N., Marquez-Rivero, S., Herminda-Campa, E., Garcia-Diez, C., Sanchez-Lopez, E., Gil-Guilen, V., & Compliance and Inertia Working Group. (2018). Strategies for improving dabigatran adherence for stroke

- prevention in patients with non-valvular atrial fibrillation: Education and drug intake reminders (FACILITA study). *Current Medical Research & Opinion*, 34(7), 1301-1308. <https://doi.org/10.1080/03007995.2018.1435519>.
- Melnyk, B. M., & Fineout-Overholt, E. (2015). Evidence-Based Practice in Nursing and Healthcare (3rd ed.). Philadelphia, PA; Lippincott Williams & Wilkins.
- Moudallel, S., Van Den Bemt, B. J. F., Zwikker, H., de Veer, A., Rydant, S., Van Dijk, L., & Steurbaut, S. (2021). Association of conflicting information from healthcare providers and poor shared decision making with suboptimal adherence in direct oral anticoagulant treatment: A cross-sectional study in patients with atrial fibrillation. *Patient Education and Counseling*, 104(1), 155-162. <https://doi.org/10.1016/j.pec.2020.06.016>.
- Moriskyscale.com (2022). Retrieved from, <http://www.moriskyscale.com/#/>.
- Neiman, A. B., Ruppar, T., Ho, M., Garber, L., Weidle, P. J., Hong, Y., George, M. G & Thorpe, P. G. (2017). CDC Grand Rounds: Improving medication adherence for chronic disease management- innovations and opportunities. *Morbidity and Mortality Weekly Report*, 66(45), 1248-1251.
- Obamiro, K. O., Chalmers, L., Lee, K., Bereznicki, B. J., & Bereznicki, L. R. E. (2018). Anticoagulation knowledge in patients with atrial fibrillation: An Australian survey. *International Journal of Clinical Practice*, 72(3), 1. <https://doi.org/10.1111/ijcp.13072>.
- Pacleb, A., Lowres, N., Randall, S., Neubeck, L., & Gallagher, R. (2020). Adherence to cardiac medications in patients with atrial fibrillation: A pilot study. *Heart, Lung, and Circulation*, 29(7), e131-e139. <https://doi.org/10.1016/j.hlc.2019.11.012>.

- Palmer, M. J., Machiyama, K., Woodd, S., Gubijev, A., Barnard, S., Russell, S., Perel, P., & Free, C. (2021). Mobile phone-based interventions for improving adherence to medication prescribed for the primary prevention of cardiovascular disease in adults. *The Cochrane database of Systematic Reviews*, 3CD012675.
<https://doi.org/10.1002/14651858.pub3>.
- Sadan, V. (2017). Data collection methods in quantitative research. *Indian Journal of Continuing Nursing Education*, 18(2), 58-63.
- Schaeffer, B., Ruden, L., Salzbrunn, T., Pinnschmidt, H. L., Akbulak, R. O., Moser, J. M., Jularic, M., Meyer, C., Eickholt, C., Sultan, A., Luker, J., Steven D., Willems, S., & Hoffmann, B. A. (2018). Incidence of intracardiac thrombus formation prior to electrical cardioversion in respect to the mode of oral anticoagulation. *Journal of Cardiovascular Electrophysiology*, 29(4), 537-547.
<https://doi.org/10.1111/jce.13447>.
- Shankari, G., Ng., S. C., Goh, S. Y., Woon, F. P., Doshi, K., Wong, P. S., Fan, Q., Tan, I. F., Narasimhalu, K., & DeSilva, D. A. (2020). Modifiable factors associated with non-adherence to secondary ischaemic stroke prevention strategies. *Journal of Stroke and Cerebrovascular Diseases*, 29(12).
<https://doi.org/10.1016/j.strokecerebrovasds.2020.105395>.
- Sheele, J. M., Bhangu, J., Wilson, A., & Mandac, E. (2019). Patient preference for medical information in the emergency department: Post-Test survey of random allocation intervention. *Journal of Emergency Nursing*, 45(5), 517-522.
<https://doi.org/10.1016/j.jen.2019.05.009>

- Song, T., Sin, X., Cui, P., Zong, M., & Li, X. (2021). Factors associated with anticoagulation adherence in Chinese patients with non-valvular atrial fibrillation. *Patient Preference & Adherence*, 15, 493-500. <https://doi.org/10.2147/PPA.S285020>.
- Stommel, M., & Dontje, K. J. (2014). *Statistics for Advanced Practice Nurses and Health Professionals*. (1st ed.).
- Taylor, E. C., O'Neill, M., Hughes, L. D., Bennett, P., & Moss-Morris, R. (2020). Examining adherence to medication in patients with atrial fibrillation: The role of medication beliefs, attitudes, and depression. *Journal of Cardiovascular Nursing*, 35(4), 337-346. <https://doi.org/10.1097/JCN.0000000000000650>.
- Tesfaye, W., & Peterson, G. (2022). Self-reported medication adherence measurement tools: Some options to avoid legal minefield. *Journal of Clinical Pharmacy & Therapeutics*, 47(3), 363-368. <https://doi.org/10.1111/jcpt.13515>.
- Tiili P., Leventis, I., Kinnunen, J., Svedjeback, I., Lehto, M., Karagkiozi, E., Sagris, D., Ntaios, G., & Putaala, J. (2021). Adherence to oral anticoagulation in ischemic stroke patients with atrial fibrillation. *Annals of Medicine*, 53(1), 1613-1620. <https://doi.org/10.1080/07853890.2021.1968031>.
- World Health Organization. (2003). Retrieved from, https://www.who.int/chp/knowledge/publications/adherence_annexes.pdf.
- Vasan, R. S., Zuo, Y., & Kalesan, B. (2019). Divergent temporal trend in morbidity and mortality related to heart failure and atrial fibrillation: age, sex, race, and geographic differences in the United States, 1995-2015. *Journal of the American Heart Association*, 8(8), e010756. <https://doi.org/10.1161/JAHA.118.010756>.

- Vest, B. M., Quigley, B. M., Lillvis, D. F., Horrigan-Maurer, C., Firth, R. S., Curtis, A. B., & Lackner, J. M. (2022). Comparing patient and provider experiences with atrial fibrillation to highlight gaps and opportunities for improving care. *Journal of General Internal Medicine*, 1-9. <https://doi.org/10.1007/s11606-021-07303-5>.
- Zhu, L., Zhang, X., & Yang, J. (2021). Analysis of influencing factors of compliance with non-vitamin K antagonist oral anticoagulant in patients with nonvalvular atrial fibrillation and correlation with the severity of ischemic stroke. *Evidence-Based Complementary & Alternative Medicine, (ECAM)*, 1-7. <https://doi.org/10.1155/2021/1021127>.

Appendix A

Cardioversion Education Packet

Cardioversion



Penn Medicine

Table of Contents

I. GETTING STARTED

Welcome To Your Cardioversion Journey	3
Navigating Resources at Penn	3

II. UNDERSTANDING A CARDIOVERSION PROCEDURE

What Is Atrial Fibrillation?	4
Treatments for an Irregular Heartbeat	5
What Is Cardioversion?	6
Why Do I Need Cardioversion?	7

III. PREPARING FOR YOUR PROCEDURE

Reducing Blood Clot Risk	8
The Night Before	9

IV. ON THE DAY OF YOUR PROCEDURE

When You Arrive	10
What To Expect	10
Your Short-Term Recovery	11
Possible Complications	12

V. YOUR NEXT STEPS

Recovery at Home	13
Focus on A Healthy Lifestyle	13
When To Call the Doctor	14
Follow-Up Appointments	15

I. GETTING STARTED

Welcome To Your Cardioversion Journey

Welcome!

Your cardiology team at Penn Medicine has created this Journey to help you better understand cardioversion, prepare for your procedure, and know what to expect throughout the process—including early recovery and next steps.

Using this Journey as a guide will help you feel more informed, comfortable, and supported.

Let's get started.

Navigating Resources at Penn



Your care team at Penn

As experts in cardiac care, your team at Penn Medicine is prepared to meet all your medical and emotional needs. They will work closely with you before, during, and after your procedure to ensure everything goes smoothly and that you receive the best care possible at each step.

You'll have a comprehensive care team meeting all of your needs including:

- Cardiac Electrophysiologist
- Nurse Practitioners and Physician's Assistants
- Anesthesiologists and Certified Registered Nurse Anesthetists

- Electrophysiology Nurses
- Electrophysiology Technicians
- Certified Nurse Assistants
- Administrative Assistants and Receptionists

The comprehensive services offered by Penn Medicine are always available to you. Your care team can answer any questions you have along the way. They can also help direct you toward the right resources.

Your patient portal: MyPennMedicine

Non-urgent questions can be handled through [MyPennMedicine](#), Penn Medicine's patient portal, where you can:

- Message members of your care team
- Schedule visits and check in online
- Access and share your health information
- Get test results and notes from your doctor
- Pay your bill online

Calling your care team

You can reach the care team directly with any questions or concerns. It's important to contact your electrophysiologist's office for the right number for your plan of care.

You can also send a message through [MyPennMedicine](#).

II. UNDERSTANDING A CARDIOVERSION PROCEDURE

What Is Atrial Fibrillation?

Video: [Atrial Fibrillation: Causes & Symptoms](#)

Atrial fibrillation—or A-fib—is a type of irregular heartbeat that often causes problems with normal blood flow within the heart.

While some people do not have any symptoms, many will experience symptoms including:

- A feeling of a rapid heartbeat
- Palpitations
- Shortness of breath
- Fatigue or weakness
- Shortness of breath

And early intervention is very important. While symptoms sometimes might not seem troublesome, treating A-fib as quickly as you can after diagnosis is the best way to optimize your heart health and prevent damaging cardiac events.

Treatments for an Irregular Heartbeat



If you've been diagnosed with an irregular heartbeat—an arrhythmia—there are multiple treatments your doctor will discuss with you.

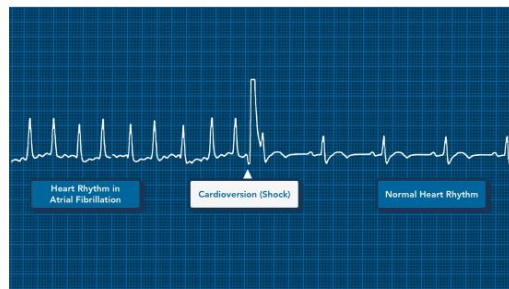
Your treatment will depend on whether your heartbeat is too fast (tachycardia) or too slow (bradycardia), as well as other factors. Depending on your symptoms and medical history, your treatment might include:

- **Medication** to reduce your risk of stroke and help control your heart rhythm
- **Cardioversion**, which delivers electrical stimulation to the heart to correct an abnormal rhythm
- **Surgery**, using cardiac catheters or devices to normalize the rhythm

For most people, cardioversion is a very effective non-surgical step to correct an irregular heartbeat or a heart that's beating too fast.

Cardioversion is a frequent first (and sometimes only) step needed to solve the problem, but sometimes surgery may be required later.

What Is Cardioversion?



Cardioversion is a procedure that restores a normal rhythm to your heart. Most non-emergency cardioversions are done to treat atrial fibrillation (the most common type of irregular heartbeat). The name indicates that the rhythm disturbance begins in the upper chambers (atria) of the heart.

Electrical cardioversion (also known as direct-current or DC cardioversion) delivers a coordinated electrical shock directly to the heart. In this procedure, performed under anesthesia, special electrodes or paddles are placed on your chest and back to deliver an electrical current, which interrupts the abnormal electrical rhythm—without damaging the heart—and restores a normal heartbeat.

Why Do I Need Cardioversion?



A cardioversion procedure uses monitored electric shocks to correct a heart that is beating too fast (tachycardia) or irregularly (fibrillation or flutter).

Electrical signals are regularly sent to your heart's "pacemaker" cells to keep it beating normally. Each time these cells are stimulated (usually 1-2 times per second) they send an organized electrical signal to the upper chambers (atria) of your heart, providing a coordinated, rhythmic heartbeat.

When these electrical signals are somehow interrupted, your atria start to quiver (fibrillate or flutter) because of chaotic electrical currents circulating through them.

When the rhythm is out of sync, there's often difficulty in pumping blood efficiently in and out of the heart. And while some patients have no symptoms, others may feel their heart is beating too fast, a sense of "skipping a beat," shortness of breath, or fatigue.

Cardioversion is usually a scheduled procedure. For an emergency, defibrillation, which also provides electrical shocks to the heart (but much stronger ones), is used.

III. PREPARING FOR YOUR PROCEDURE

Reducing Blood Clot Risk

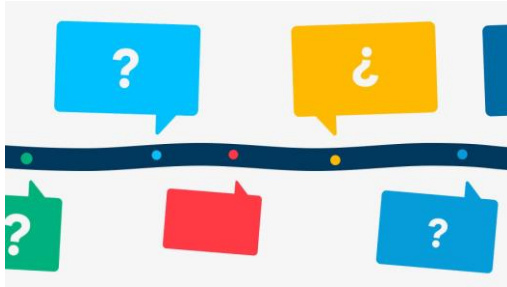


Before performing a cardioversion, your doctor will make sure that your risk of blood clot formation—and thus of stroke or heart attack—is very low. To do this, you will need to have stayed on your prescribed blood thinner medication for 3 to 4 weeks before the procedure.

If you've had your heart rhythm problem for less than 48 hours, it is safe to do a cardioversion without blood-thinning medication. That's because it takes a while for blood clots to develop, meaning the risk is low.

Occasionally, your doctor may recommend a special ultrasound of the heart (called a transesophageal echocardiogram or TEE) that can directly visualize the atria to make sure there are no blood clots, and that it is safe to proceed with the cardioversion.

The Night Before



You should not have anything to eat or drink after midnight the night before the procedure (and nothing in the morning of your procedure). This includes chewing gum, mints, or hard candies (even sugarless).

Take your regularly scheduled medications the morning of the procedure unless your care team has told you otherwise. Please take any medications with the smallest amount of water to get the tablets down. If you are diabetic, you should discuss your insulin or other diabetes medication dosing with your care team ahead of time. And bring a list of your medications with you.

While it's okay to shower or take a bath, do not apply any lotions or ointments to your chest or back, as this may interfere with the adhesiveness of the shocking pads.

Make sure to arrange your transportation for the day. You won't be able to drive yourself home. Once you get home, you'll still be recovering from the effects of anesthesia and should not drive, operate any machinery, or make any important decisions for the rest of the day.

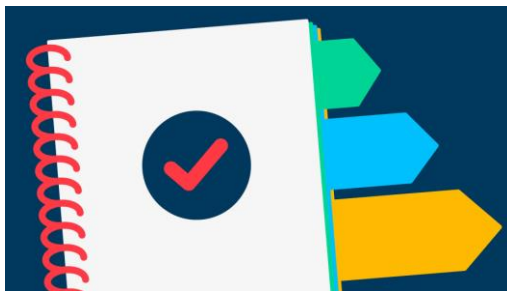
IV. ON THE DAY OF YOUR PROCEDURE

When You Arrive



Make sure you know where to check in at the facility. Ask your care team ahead of time about pre-registration options. After check-in, you will be taken back to prepare for the procedure. If you have a friend or family member with you, ask where they should wait to find out how you're doing, and where they should meet you following the procedure.

What To Expect



While you will be sedated for the cardioversion procedure itself, you'll be awake for the setup. You'll be resting in bed and comfortable. Here's what will happen:

- You will be asked to sign a consent for treatment for the cardioversion and anesthesia.
- You will be placed on a monitor and connected to an electrocardiogram (EKG). Large adhesive electrode pads will be placed on your chest and back. You might need some areas of your chest shaved to get them to stick.
- You will have an intravenous (IV) line placed to administer the anesthesia.

- If you already have a pacemaker or a defibrillator, a programmer will be used to collect information from your device.
- You will be given anesthesia. When you are fully sedated, the procedure will be performed.
- Using the cardioversion machine, a shock is sent to your heart. This should return your heart to a normal rhythm.
- The care team will closely monitor your heart rhythm and watch for any signs of complications.
- This procedure only takes a few minutes. When it is done, your anesthesia will be stopped, and you will be monitored as you awaken.

Your Short-Term Recovery



You'll remain in the same room for your entire procedure. As your anesthesia starts to wear off, you will become more aware of your surroundings. Here's what to expect next:

- You will not remember the procedure, because anesthesia causes amnesia.
- Your care team will closely monitor you and make sure that the anesthesia has worn off.
- When you're more fully awake, you'll receive post-procedure instructions and be discharged from the facility.
- After you get home, you may have some redness or soreness on your chest that lasts for a few days.

Possible Complications



Every procedure has some possible complications. However, your care team will do their very best to reduce your risk. Here's what to be aware of:

Dislodged blood clots

Some people with irregular heartbeats already have some blood clots in their hearts. Electric cardioversion can cause these blood clots to move to other parts of your body. This can cause life-threatening complications, such as a stroke or a blood clot traveling to your lungs.

Abnormal heart rhythms

Some people undergoing cardioversion develop other heart rhythm problems during or after the procedure. This is a rare complication. If it happens, it will likely appear within minutes of your procedure. Your doctor can give you medications or additional shocks to correct the problem.

Skin Burns

While rare, some people may have minor burns on their skin where the electrodes were placed.

V. YOUR NEXT STEPS

Recovery at Home

Video: [Recovering From a Heart Procedure](#)

Make sure you understand all your home care instructions—and call the office if you're not sure. Everyone's recovery is different, and you want to gradually regain your strength and stamina.

Remember to take your medications exactly as prescribed by your doctor. And be aware of any changes in dose or type of medicine that were made after your procedure. It's a good idea to have a list of your medications handy. Also, avoid vitamins or dietary supplements until your care team has given you the OK to take them.

When you get your doctor's OK, begin increasing your daily activity with some walking. Listen to your body and take a break when you need to. As you get stronger, you'll be able to walk longer and build up your stamina.

And as you're feeling more like yourself, check in with your care team for the OK to drive or return to work.

Focus on A Healthy Lifestyle

Video: [After Surgery: Your New Lifestyle](#)

While living a "healthy lifestyle" can sometimes sound vague and leave you unsure of the specifics, there are several steps that science shows will help both your heart and overall health.

And it's never too late to start! If you're newer to this idea, start small and choose one or two activities to focus on and build from there.

Keeping up with a healthy lifestyle isn't so easy! Reach out to your care team if you need some help. They can refer you to registered dietitians, social workers, exercise physiologists, and other lifestyle professionals available at Penn Medicine.

Here are some top tips to consider:

- Limit or avoid caffeine and alcohol
- Eat heart-healthy foods ([check out the DASH diet](#))
- Use less salt (limit or avoid processed foods)
- Increase your physical activity (start with walking)
- Maintain a healthy weight
- [Quit smoking](#)
- Try to limit or manage stress and anger

If you're already on track and following these tips—keep it up! Good health is its own reward!

When To Call the Doctor

Video: [When To Seek Help After a Heart Procedure](#)

Always call your care team if you feel dizzy, lightheaded, or like you might faint. Also reach out if you sense that your heart is beating too fast or irregularly. And even without a specific symptom, it's important to call your doctor if you just “don't feel like yourself.”

Reach out for emergency care (call 911 or go to the nearest emergency room) if you:

- Pass out (lose consciousness)
- Have chest pain or pressure
- Pain spreading along your chest, shoulders, or neck
- Have symptoms of a stroke
 - slurred speech
 - sudden vision changes
 - sudden weakness/numbness in arms or legs
 - sudden confusion

Follow-Up Appointments



Short term follow-up

Before you leave the facility, check with the care team to see if you need any further appointments—there is no specific follow-up appointment after your cardioversion. But make sure to call the office if you're experiencing any A-fib symptoms to schedule a follow up appointment.

Long term follow-up

Everyone is different and a long term plan needs to be personalized for you. It's important to talk with your electrophysiology doctor about what's best for you.

Call the office or send a message through [MyPennMedicine](#).

Labs & testing

Continue taking your anticoagulant medication. If you're taking Coumadin, continue to get your INR checked regularly to make sure your blood clotting function is healthy and normal. There are no other tests needed after cardioversion.

Appendix B

Hill-Bone Medication Adherence Survey

No.	Item	Response: 1. All of the Time 2. Most of the Time 3. Some of the Time 4. None of the Time
1.	How often do you forget to take your anticoagulation medication?	
2.	How often do you decide NOT to take your anticoagulation medication?	
3.	How often do you forget to get prescriptions filled?	
4.	How often do you run out of your anticoagulation pills?	
5.	How often do you skip your anticoagulation medication before you go to the doctor?	
6.	How often do you miss taking you anticoagulation pills when you feel better?	
7.	How often do you miss taking your anticoagulation pills when you feel sick?	
8.	How often do you take someone else's anticoagulation pills?	
9.	How often do you miss taking your anticoagulation pills when you are careless?	

Appendix C

West Chester University Institutional Review Board Approval Letter

From: do-not-reply@cayuse.com

Subject: IRB-FY2023-70 - Initial: Initial - Exempt

Date: November 16, 2022 at 10:14 AM

To: Naimo, Caitlin CN869720@wcupa.edu, Wilbur, Veronica F VWILBUR@wcupa.edu



Office of Research and Sponsored Programs | West Chester University | Ehinger Annex
West Chester, PA 19383 | 610-436-3557 | www.wcupa.edu

Nov 16, 2022 10:14:05 AM EST

To: Caitlin Naimo

Department: School of Nursing, Nursing

Re: Exempt - Initial - IRB-FY2023-70 Anticoagulation Adherence

Dear Caitlin Naimo:

Thank you for your submitted application to the West Chester University Institutional Review Board. We have had the opportunity to review your application and have rendered the decision below for Anticoagulation Adherence.

Decision: Exempt

Selected Category: Category 4. Secondary research for which consent is not required: Secondary research uses of identifiable private information or identifiable biospecimens, if at least one of the following criteria is met:

- (i) The identifiable private information or identifiable biospecimens are publicly available;
- (ii) Information, which may include information about biospecimens, is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained directly or through identifiers linked to the subjects, the investigator does not contact the subjects, and the investigator will not re-identify subjects;
- (iii) The research involves only information collection and analysis involving the investigator's use of identifiable health information when that use is regulated under 45 CFR parts 160 and 164, subparts A and E, for the purposes of "health care operations" or "research" as those terms are defined at 45 CFR 164.501 or for "public health activities and purposes" as described under 45 CFR 164.512(b); or
- (iv) The research is conducted by, or on behalf of, a Federal department or agency using government-generated or government-collected information obtained for nonresearch activities, if the research generates identifiable private information that is or will be maintained on information technology that is subject to and in compliance with section 208(b) of the E-Government Act of 2002, 44 U.S.C. 3501 note, if all of the identifiable private information collected, used, or generated as part of the activity will be maintained in systems of records subject to the Privacy Act of 1974, 5 U.S.C. 552a, and, if applicable, the information used in the research was collected subject to the Paperwork Reduction Act of 1995, 44 U.S.C. 3501 et seq.

If there are any questions, please don't hesitate to reach out to irb@wcupa.edu

Sincerely,

West Chester University Institutional Review Board

IORG#: IORG0004242

Appendix D

Penn Medicine Institutional Review Board Approval Letter

RE: IRB application review

IRB Quality Initiative <PROVOST-IRB-QUALITY@pobox.upenn.edu>

Mon 8/15/2022 1:16 PM

To: Naimo, Caitlin <Caitlin.Naimo@pennmedicine.upenn.edu>; IRB Quality Initiative
<PROVOST-IRB-QUALITY@pobox.upenn.edu>

Hello Caitlin,

It was determined that this project as a quality improvement initiative that does not meet the definition of human subjects' research. Hence, further IRB review is not required.

This email should suffice as your documentation. Please save a copy of it for your records.

NOTE: Changes to the purpose, methods, or design of this project may alter the QI status and require re-review.

Thank you,

Human Research Protections Program
Office of the Institutional Review Board University of Pennsylvania 3600 Civic Center
Boulevard, 9th floor
Philadelphia, PA 19104
www.upenn.edu/IRB

Table 1*Descriptive Statistics SPSS Results from Bone-Hill Medication Adherence Survey*

	N	Minimum	Maximum	Mean	Std. Deviation
Forget	30	1.00	4.00	3.7000	.79438
Decide not	31	4.00	4.00	4.0000	.00000
Forget prescription	31	3.00	4.00	3.9355	.24973
Out of pills	31	4.00	4.00	4.0000	.00000
Skip doctor	31	3.00	4.00	3.9677	.17961
Feel better	31	4.00	4.00	4.0000	.00000
Feel sick	31	4.00	4.00	4.0000	.00000
Others pills	31	4.00	4.00	4.0000	.00000
Careless	31	3.00	4.00	3.9032	.30054
Valid N (listwise)	30				

Table 2

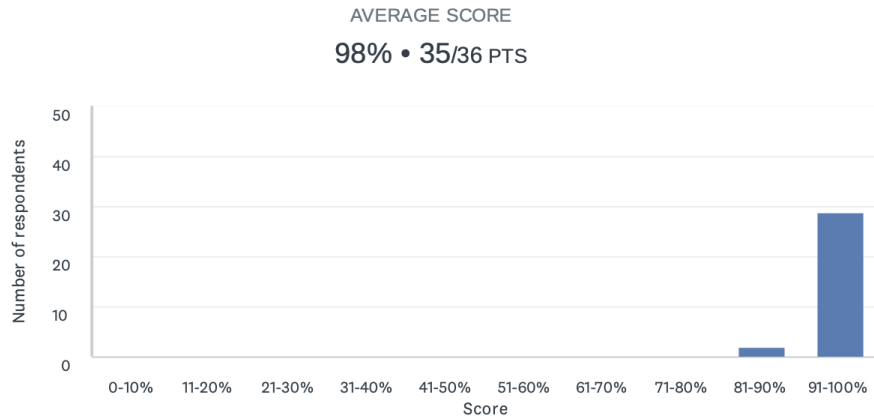
Reliability Statistics from SPSS

Cronbach's Alpha	N of Items
.674	9

Note. Survey results from N=9 item questions.

Figure 1

Hill-Bone Medication Adherence survey results with score percentages.



STATISTICS

Lowest Score	Median	Highest Score
89%	100%	100%
Mean: 98%		
Standard Deviation: 3%		

Question Ranking

QUESTIONS (9)	DIFFICULTY	AVERAGE SCORE
Q1 How often do you forget to take your anticoagulation medication?	1	93%
Q9 How often do you miss taking your anticoagulation pills when you are careless?	2	98%
Q3 How often do you forget to get prescriptions filled?	3	98%
Q5 How often do you skip your anticoagulation medicine before you go to the doctor?	4	99%
Q7 How often do you miss taking your anticoagulation medication pills when you feel sick?	5	100%
Q2 How often do you decide to NOT take your anticoagulation medication?	5	100%
Q8 How often do you take someone else's anticoagulation pills?	5	100%
Q4 How often do you run out of anticoagulation pills?	5	100%
Q6 How often do you miss taking your anticoagulation pills when you feel better?	5	100%