The Impact of Health Partner Participation in Cardiac Rehabilitation on Health Partner Knowledge of Cardiac Disease Risk Factors

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Abstract

Background: Cardiac disease remains the top cause of mortality and morbidity in the United States. In order to achieve optimal long-term outcomes, people who have experienced an acute cardiac event must undergo several lifestyle and behavioral changes. With the importance of social support on health, it is equally important for a person's identified health partner to learn the recommended lifestyle changes that promote good health in post-acute cardiac patients. Many of these behaviors can be learned through participation in a cardiac rehabilitation program, but few studies have been performed on the benefits that a spouse receives from attending cardiac rehabilitation programs.

Objective: The purpose of this investigation was to determine if spousal participation in a cardiac rehabilitation program increased knowledge of cardiac disease risk factors and lifestyle changes required in post-acute cardiac patients.

Methods: A quasi-experimental investigation utilizing a pre-test/post-test design was used to assess health partner knowledge of cardiac recommendations. The Heart Disease Fact Questionnaire was used for both pre-test and post-test. It is theorized that health partners who attend cardiac rehabilitation will have increased knowledge of cardiac disease risk factors and lifestyle changes required for post-acute cardiac patients.

Results: Due to a smaller than anticipated sample size, no statistical analysis was able to be performed. The single participant in the project did have a 35% increase in their post-test score after 12 sessions of cardiac rehabilitation

Conclusions: While few conclusions can be drawn from this project, there is some evidence that indicates further investigations into this subject is warranted.

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"The Impact of Health Partner Participation in Cardiac Rehabilitation on Health Partner Knowledge of Cardiac Disease Risk Factors"

Cardiac disease remains one of the top causes of morbidity and mortality in the United States. It is estimated that there will be over 1,000,000 myocardial infarctions and over 200,000 open-heart surgeries performed each year [CITATION Bri13 \l 1033]. A major part of the plan of care for these patients is a cardiac rehabilitation, programs designed to incorporate exercise and education in order to promote healthy lifestyle changes. Cardiac rehabilitation programs are medically sponsored and include several core goals designed to aid in recovery after an acute cardiac event and prevent further health issues stemming from cardiac disease; these goals include tobacco cessation, weight loss, and gradual increase in exercise capability (Sandersara, et al., 2015). Cardiac rehabilitation also includes education regarding proper dietary habits, stress management, and medications. Research has consistently shown that cardiac rehabilitation is one of the most cost effective methods of improving long-term patient outcomes though improving cardiac health and fostering a healthier lifestyle [CITATION Goe11 \l 1033].

Despite the benefits that a rehabilitation program offers to post-acute cardiac patients, completion rates of these programs remain sub-par across the nation, with an estimated average 50% patient early dropout rate (Briffa, et al., 2013) The problem that clinicians now face is how to increase the completion rates of these programs. With a strong support system being identified as a major aspect to health and wellbeing, it is essential that health partners be included in the plan of care for these patients. Research

has shown a strong, positive link between a patient's social environment and health behaviors for a variety of diseases [CITATION Mau10 \l 1033]. However, there are several recommendations for lifestyle and behavioral changes that may not be self-evident to a patient's support system.

It is possible that a health partner's participation in a cardiac rehabilitation program alongside a patient may increase the knowledge base of the health partner regarding these necessary changes. This increase in knowledge can allow for better support once the patient's rehabilitation program has ended, further increasing the chance of positive long-term outcomes. In order to better determine the impact of a health partner's participation in a cardiac rehabilitation program on both their own knowledge gains and on completion rates by patients, this project sought to better understand the dynamics between a health partner's participation in a cardiac rehabilitation program and a patient's likelihood to complete the program, as well as the knowledge gained by the health partner to better care and provide proper support once the program has been completed.

The target population of this project was the health partners of patients who have experienced an acute cardiac event. A health partner is someone that a patient has identified as a trusted source of help and support, and may often be present during education or healthcare interventions. While they are typically a significant other, they may also be a family member or a close friend. Patients, particularly those who have experienced a life altering event, will often require support from their health partners as they work to create the necessary changes in their lives to promote good health. These health partners are a key stakeholder in this project; if there is an expectation that they be

able to provide the extra support acute cardiac patients require, it is imperative that they are provided the knowledge and tools that are necessary in order to provide this support.

By assessing the knowledge they gain through participation in a cardiac rehabilitation program, it is possible to determine how effective the program is at imparting this knowledge, ensuring that the health partner is receiving the necessary information to allow them to care for and support an acute cardiac patient after they have graduated from the rehabilitation program. Other stakeholders in this project are the patients, the staff of the cardiac rehabilitation program, and the administration at the facility in which the project was implemented. As people who have experienced an acute cardiac event are often faced with making several major changes in their lifestyle, having a well informed and adequately prepared health partner can enable the patient to make the correct changes in dietary, exercise, and other lifestyle behaviors in order to promote good health and prevent the recurrence of acute cardiac events. Assessing the knowledge a health partner has gained after completing a cardiac rehabilitation program not only ensures that the patient will have adequate support after they leave the program, but it provides feedback to the rehabilitation staff as well.

This feedback can be invaluable to the staff and the program, as it allows them to determine the effectiveness of their education. Without a method of determining how effective the education that is provided to health partners is, changes, if necessary, can be made to the program to more adequately meet the needs of the population it is serving. This feedback is also important to administration, as it provides data that can be used to continue to develop the program, and the other rehabilitation services that are offered by the facility.

Purpose

The purpose of this project was to determine how a health partner's participation in the program influences their knowledge in how to support and care for a patient after an acute cardiac event.

Clinical question

In health partners participating in a cardiac rehabilitation program alongside a patient, does health partner participation in the program increase knowledge of post-acute cardiac event recommendations and cardiac disease risk factors?

Outcomes

The outcome measured for this investigation was health partner knowledge on cardiac disease risk factors and recommended health behaviors for post-acute cardiac patients. Knowledge of post-acute cardiac health recommendations was assessed through the use of a pre-test and post-test designed for previous research involving cardiac disease risk factors and lifestyle modification. Health partner knowledge of recommendations for post-acute cardiac patients was measured in number of questions answered correctly. Both pre-test and post-test contained 25 multiple choice items designed to assess knowledge of dietary choices, exercise, and risk factors for future episodes of cardiac disease. Possible scores range from 0 to 25 points, with higher scores indicating increased knowledge of cardiovascular risk factors.

Assessment of organization

The health system in which this project was implemented shows readiness to change. There have been numerous changes to policies over the past several years, many of which were developed using evidence-based practices in order to promote better

patient outcomes. For example, this includes the creation of the blood conservation program when research indicated that it was best for patients, and its discontinuation when the literature began to indicate it made little to no difference in long-term patient outcomes. The use of alcohol caps on invasive lines to prevent infections is another example of policy change rooted in best practice, as is the changes in the end-of-shift reporting method to improve patient satisfaction and safety. The organization has shown willingness to change provided there is evidence of better patient outcomes, increased patient safety, and cost-effectiveness.

Several facilitators to change have been demonstrated within the organization. There is a large degree of support for improving completion rates of patients enrolled in the cardiac rehabilitation program, including support from physicians, the rehabilitation staff, and hospital administration. Physicians who work with post-acute cardiac patients have expressed an interest in exploring different methods to encourage patients to complete cardiac rehabilitation programs in order to improve long-term outcomes [CITATION Har16 \l 1033].

Two separate physicians' groups practice at the health system and their involvement could play a major role in facilitating changes to the program. As one of the main stakeholders in regards to policy change, it is vital that adequate information regarding any benefits of including health partners in the plan of care be provided to the executives in order to promote policy change.

Review of the literature

Social support and healthy behaviors often go hand in hand. A strong link has been established between development and maintenance of health behaviors and social

environments. People with strong support systems often have much better outcomes as compared to patients with lower amounts of support. It is thought that these disparities in outcomes are due to a number of factors, including poor coping and decreased compliance with medical recommendations. However, people with larger support systems often have increased levels of coping ability, as well as having stronger encouragement to take the steps necessary to care for themselves in a healthier fashion [CITATION Mau10 \l 1033].

In order to better understand this phenomenon, this review of literature focuses on the impact of social support on patient compliance with medical recommendations. The databases used for this literature search were CINAHL Plus with Full-Text Database, Academic Search Elite, PubMed database and Google Scholar. These databases were searched from the date of January 1, 2000 to the end of June, 2016. The Boolean/phrase method of searching was used in the following search string: cardiac rehabilitation OR cardiac rehab OR acute cardiac event OR dietary OR physical exercise AND compliance OR adherence OR noncompliance OR non-adherence OR uptake AND health partner participation OR significant other participation OR family participation (Figure 1).

All articles were initially screened by reading the title and abstract. Promising articles were noted and placed aside for further review. After the initial screening, each article was read in-depth to determine eligibility for inclusion in the review. Inclusion criteria included randomized controlled trials (RCT), published after January 1st, 2000, and if the study placed impact on health partner participation in at least one aspect of cardiac rehabilitation. The reference lists of the articles of this review were also utilized in identifying further resources.

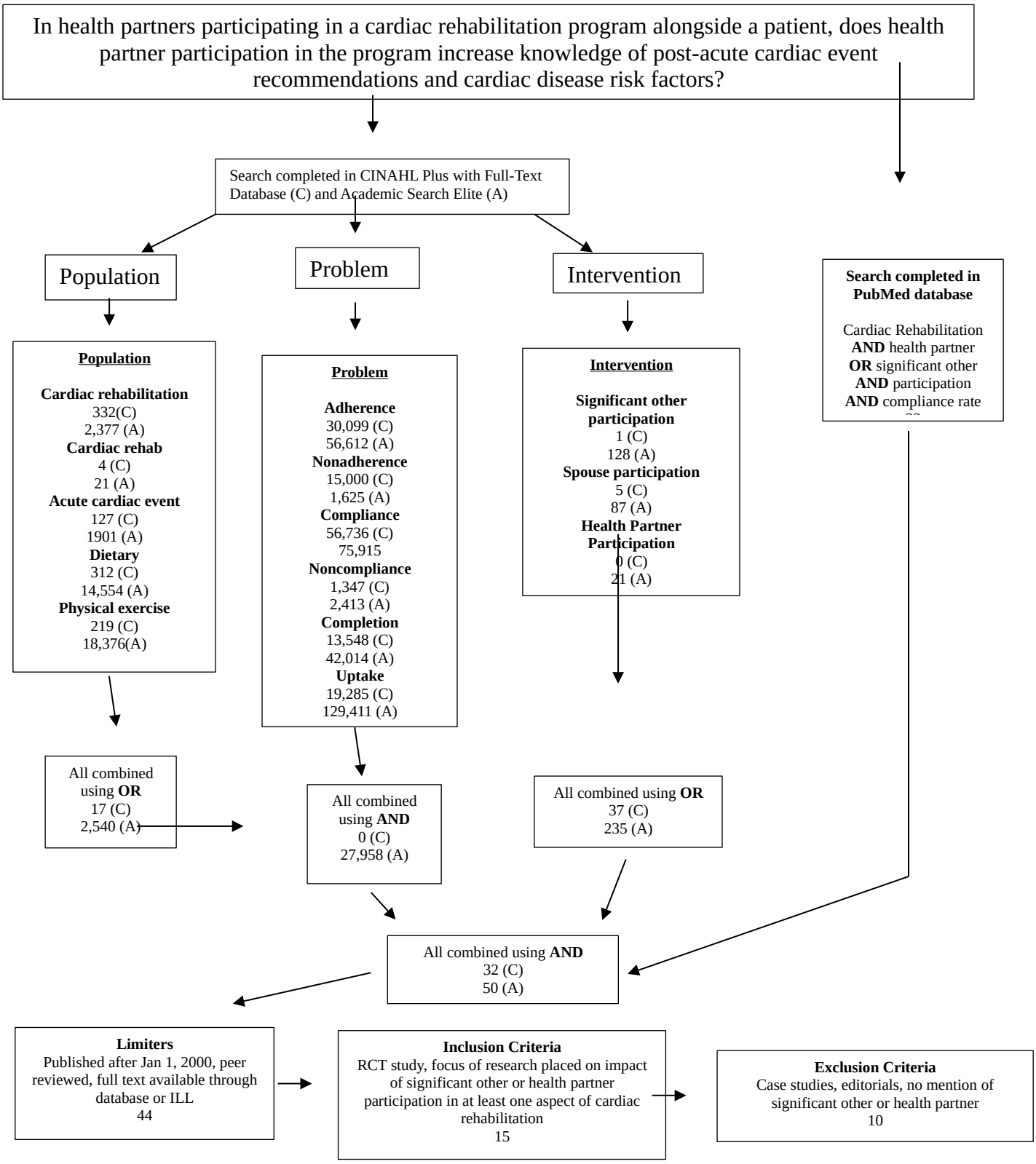

Figure 1. Literature review search trail

Research has shown that dietary habits can be heavily influenced by a strong support system that is actively involved in a patient's plan of care. Chung, Lennie, Mudd-Martin, & Moser (2015) found that patients who lived with a family member and were instructed to follow a cardiac diet were significantly more likely to remain compliant with their dietary choices as long as the family member also followed a low sodium diet. Patients that shared a low sodium diet plan with a significant other were up to 1.6 times more likely to remain compliant as compared to patients who either live alone or did not share a diet plan with a health partner, while patients who lived with a family member that shared their diet were 2.3 times more likely to adhere to low sodium food choices. No increase in dietary compliance was found in cardiac patients who lived with a spouse or family member that partook in the low sodium diet, indicating that adherence to the prescribed diet can be highly dependent on a family member's participation.

A study published in 2014 focusing on dietary and exercise patterns found that families that participated in a weight loss and dietary education program together made better dietary choices and exercised on a more routine basis. The children in the study had significantly slower weight gain as compared to the children in the control group. The weight that was gained was found to be at a healthier rate for normal growth and development. Family groups were also much less likely to have higher intakes of high calorie, low nutrient food, and were significantly less likely to eat sweetened foods in the morning or evenings. A pre-test/post-test found that the families in the intervention group had much higher nutritional knowledge as compared to the control group (Berry, et al., 2014).

Health partner support can also play a large role in increasing physical activity levels. One study was performed on 141 patients with osteoarthritis of the knee, and the effects of their spouse's physical activity on the patient's physical activity. The results of the study indicated that patients with knee osteoarthritis were much more likely to exercise the recommended amount of time if their spouse exercised alongside them. Strong support of the recommended amount of exercise on the part of the spouse also resulted in increased activity levels by the patient. Patients that reported higher amounts of support for exercise had an average of 373 more steps per day as compared to patients with low support. Patients who had spouses that regularly exercised also had an average of 15 more minutes of physical exercise per day as compared to patients without a spouse that regularly exercised. However, a small group of patients were found to have decreased activity levels even with a high degree of spousal support, which may have been due to the patient feeling pressured [CITATION Mar13 \l 1033]. The results from this study aid in illustrating there is a fine line between providing support and providing pressure. The difference between a patient feeling pressured versus feeling supported could have an impact on a patient's compliance with their plan of care.

In addition to increased activity levels and improved dietary habits, social support has also been shown to be effective in encouraging the development of other healthy behaviors. A study performed in Greece in 2014 found that patients who entered a tobacco cessation group with a health partner were much more likely to be successful in quitting smoking. Of the 25 couples who participated in the study, 58% successfully underwent smoking cessation as compared to 38% of the individual participants. While each participant in the study had the same counseling and pharmacotherapy, having a

partner in the cessation process allowed for a higher degree of support and accountability, resulting in a higher success rate for the couples group. The couples that participated in the study were also much more likely to successfully quit in a quicker timeframe than the individual participants [CITATION Tso14 \l 1033].

Having a health partner act as a caregiver has also been shown to be an effective method of improving medical compliance. In a secondary analysis of data of 374 patients, those with informal caregivers, such as a family member or a significant other, were more likely to remain compliant with their medications. For antihypertensive medications, 81% of patients with informal caregivers routinely took their prescribed medications compared to 68% without an informal caregiver. Use of long-acting beta agonists was also increased, with 80% compliance rates in the informal caregiver group as compared to 60% of the non-caregiver group. Patients whose caregiver was also their spouse were also significantly more likely to have quit smoking or smoked fewer cigarettes per day than the no caregiver group [CITATION Tri12 \l 1033].

Previous research conducted in the area of cardiac rehabilitation and social support has also indicated that compliance can be improved through a couple's approach to risk reduction. Sher et al. (2014) found that the Partners in Health Together (PaTH) intervention was successful in reducing risky behaviors that may lead to new onset or an exacerbation of cardiac disease. Utilizing a couple's approach to behavioral modification, including dietary education and physical exercise, the authors of the study found that participants that were in the intervention group had a significant increase in physical activity, with the amount of physical activity increasing over time. Conversely, the control group had a much higher initial amount of physical activity, but a large

decrease in total exercise over the same time period. While dietary habits between the two groups were not found to be significantly different, medication compliance with the control group was 9% lower as compared to the participants in the PaTH intervention group.

A similar study performed in 2016 found that post-coronary artery bypass graft (CABG) patients were much more likely to increase healthy dietary choices when the patient attended nutrition education classes with a spouse as compared to post-CABG patients who attended these classes alone. The intervention group had improved fiber intake and decreased dietary cholesterol and saturated fat intake, with a decrease in cholesterol levels that corresponded with the healthier dietary patterns. The couples in the PaTH intervention group were also more likely to report continued improvements at the 6 month mark, which has historically been the tipping point in which post-CABG patients begin to become less compliant with dietary recommendations [CITATION Yat15 \l 1033].

Qualitative research has also helped to demonstrate the importance of spousal support on cardiac rehabilitation. Jackson, McKinstry, & Gregory (2011) found that significant others that actively encouraged patients who had experienced an acute cardiac episode were influential in a patient's decision to complete their prescribed rehabilitation program. This support came in several forms, whether it was simply the health partner encouraging the patient, attending meetings with the patient, or driving the patient to their scheduled appointments. However, the study also found that patients who felt that their support system could provide adequate care at home were much less likely to complete

their program. Other factors that influenced the decision to attend cardiac rehabilitation were perceived obligations at home, excessive costs, or the time required by the program.

Another qualitative study that focused on women that had had myocardial infarctions found that higher amounts of practical and emotional support from significant others played a large role in attendance and eventual completion of cardiac rehabilitation programs. Common themes identified in the study were that patients whose partners were more understanding about the time involved as well as the benefits of cardiac rehabilitation were more likely to buy in to the program completely. However, other themes that prevented patients from completing their program included poor coping due to small social support systems and higher degrees of concern of the impact of the program on their family members, including the time the program took to complete. While support from family members was more likely to influence a patient into completing their program, a lack of support from spouses and family members resulted in a lower completion rate [CITATION She111 \l 1033].

A systematic review of 90 qualitative studies found that non-attendance to cardiac rehabilitation programs is due to a number of complex factors. Long distances to services, lack of support from family, work constraints, financial costs, and domestic/family demands were commonly found to be preventative factors for attendance to cardiac rehabilitation. Factors that influenced attendance positively were supportive family members and significant others and more vocal support from healthcare partners. Education was also found to play an important role, as patients who received more education regarding the benefits of cardiac rehabilitation were more likely to fully commit to a program. Significant others also reported increased support for completion

of cardiac rehabilitation programs if both the patient and the significant other were allowed to attend the education segments together. While adherence to a programs interventions depended heavily on several physical factors, including general health and physical ability, factors that influenced nonadherence were more likely to be psychosocial, including limited social support systems and limited funds [CITATION Cla122 \l 1033].

Ample evidence exists that suggests that social support in the form of spouse encouragement and participation plays a significant role in patient adherence to medical recommendations, including completion of a cardiac rehabilitation program. While previous studies have focused on the benefits of health partner participation in rehabilitation programs on decreasing cardiac risk factors over periods of time, few have focused on the impact of a health partner's participation on the completion rates of these programs and on the value that these programs offer to the health partners themselves in terms of knowledge gained on supporting post-acute cardiac patients. In order to build on the body of literature that is available on this topic, a project into an existing partnership program in terms of completion and knowledge gained by a health partner regarding the recommendations could provide valuable insight.

Theoretical framework

The self-efficacy framework (Figure 2) was used as a guide in the development of this project. This theory has long been considered to be an accurate predictor of the adoption and maintenance of new health behaviors in adults. The goals of cardiac rehabilitation include not only helping patients in the short term after their hospitalization, as well as helping them to implement and maintain healthier behaviors

upon graduation of the program. Due to these goals, self-efficacy is a vital concept to aiding patients in developing and maintaining these long-term behaviors. Rooted in the belief that a person has the capabilities to organize and undergo the actions required to produce healthy behaviors, this framework has long been considered a predictor of a person's adoption and maintenance of new health behaviors in adults. The self-efficacy framework has been used in the development of numerous interventions to promote healthy behavior, including tobacco cessation programs, alcohol cessation programs, and programs designed to increase physical activity. Self-efficacy is also a vital construct of numerous other health and psychology theories, such as social cognitive theory, the trans-theoretical model of change, and the theory of planned behavior [CITATION Wil11 \l 1033].

This framework posits that development of self-efficacy comes from four different sources. The four sources are enactive master, or performance outcomes, vicarious experiences, verbal persuasion, and physiological feedback. Enactive mastery is a person's past experiences with performing a task. If a person has previously performed well, they are more likely to perform a similar task equally as well. Vicarious experiences come from observing another person's performance, allowing the person to gain knowledge secondhand through watching their actions. Verbal persuasion stems from feedback, either negative or positive, provided by a third party. Lastly, physiological feedback occurs when a person experiences sensations from their body, and influences self-efficacy based on their emotional reaction to these sensations. Each of these four sources impact self-efficacy, either in a positive fashion or in a negative fashion [CITATION Ban77 \l 1033].

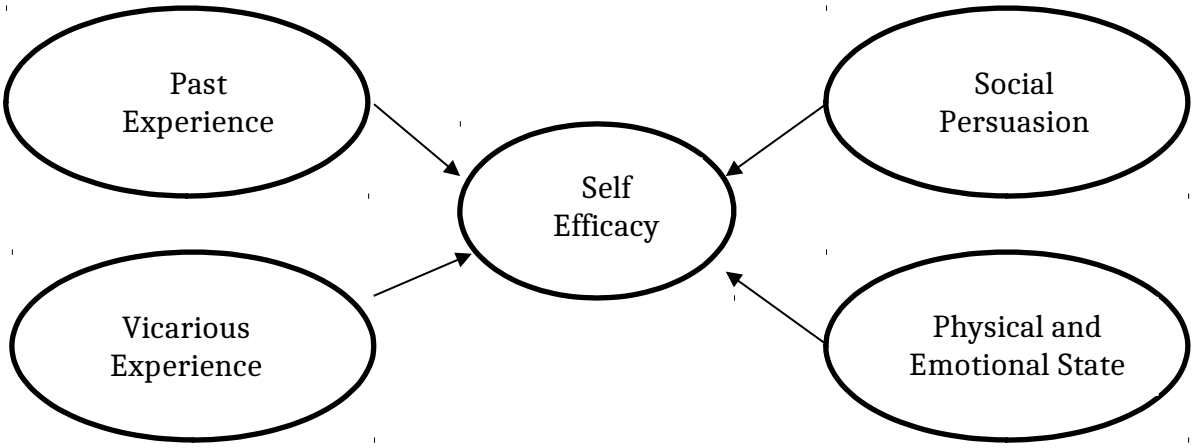

Figure 2. Self-Efficacy Framework. Adapted from Bandura, 1977.

Methodology

Sample

A convenience sample was used for the participants of this project, with potential participants being identified by the inpatient cardiac rehabilitation nurse. Participants included the health partners who had opted to participate in the cardiac rehabilitation program with patients who had undergone an acute cardiac event. For this project, health partner was defined as any friend, family member, or significant other that the patient has identified as their health partner. Acute cardiac event was defined as a myocardial infarction (MI), CABG surgery, or any heart valve replacement surgery. There are approximately 300 patients that enroll in the cardiac rehabilitation program in a year at the facility in which this project was implemented. On average, 10% of these patients will have a health partner that enrolls in the program alongside them, or 30 total health partners per year (D. Lienen, personal communication, July 21, 2016). With a confidence level of 90%, margin of error of 10%, and a total population size of 30, the sample size

necessary to determine a significant difference was determined to be 20 participants. A total of two health partners were identified as potential participants. Of this number, none were initially excluded from the project. One health partner declined to participate in this project. A total of one health partner agreed to participate in this project. The sole participant finished the project. In total, this project had a final count of one health partner. Inclusion and exclusion criteria for health partner participants were developed using previous research on cardiac rehabilitation and guided by state laws for adulthood and maximizing participant safety. Health partners that participate in the cardiac rehabilitation program were screened in the same method as patients prior to starting the rehabilitation program in order to ensure safety throughout the program. The inclusion and exclusion criteria for this project have been developed using the guidelines of the rehabilitation program in order to ensure participant safety.

Participant inclusion criteria

- 19 years or older
- Enrollment in cardiac rehabilitation program at the Midwestern hospital as a patient's health partner
- Low to moderate risk for occurrence of cardiac event during exercise as defined by program's definition

Participant exclusion criteria

- History of cardiac arrest
- Resting systolic blood pressure (BP) greater than 180, resting diastolic BP greater than 100
- Diagnosis of congestive heart failure with ejection fraction of less than 35

Setting

The setting for this project was an outpatient cardiac rehabilitation program at a Midwestern hospital. This program was selected as it utilizes a partnership program in which significant others are able to fully participate in the rehabilitation program for a small monthly fee. During the program, both patients and their health partners undergo physical exercises designed to re-condition the heart after an acute event, including use of an elliptical machine, a recumbent bicycle, and treadmills. Each exercise machine is used in intervals. The initial intensity of the workout, such as speed and incline grade, are based off of a patient's starting physical ability. The intensity of each exercise is increased on a weekly basis dependent on the patient's increase in exercise ability. Each exercise session is ended by a group stretching session to promote flexibility and provide a cool down period.

After the exercise portion of the class, a short educational session is held. The education provided is designed to promote and build healthy lifestyle choices and behaviors for patients who have experienced an acute cardiac event. This education includes issues such as heart-healthy diets at home and when dining out, methods to reduce stress, proper ways on how to exercise at home, tobacco cessation, medication education, and cholesterol management. Classes occur at each session and are taught by staff members of the organization for each respective topic. For example, a dietician will teach about healthy eating habits and methods to control cholesterol intake. Each class is ended with patients having time to ask questions about the topic at hand, and to further discuss what education has been provided. Ten education modules exist for the rehabilitation program, resulting in some weeks having repeated classes. Patients are

allowed to either attend the classes a second time for reinforcement of education, or to skip them as they have previously received the education. The length of each program is dependent on the patient's insurance, and lasts between six and twelve weeks. Three rehabilitations sessions are scheduled each week, resulting in a patient attending either 18 or 36 sessions total.

Design

A quasi-experimental approach incorporating a pre-test/post-test design was used to better understand what value health partner participation in a cardiac rehabilitation program offers. The project focused on a single group that included the health partners of patients enrolled in a cardiac rehabilitation program. The focus of this project was to assess the knowledge the health partner gained regarding the necessary behavioral changes to prevent further cardiac problems and to increase positive long-term outcomes. In order to assess any gains in knowledge, a pre-test/post-test design was used. The Heart Disease Fact Questionnaire was used for both the pre-test and the post-test (Appendix A).

Data collection

The Heart Disease Fact Questionnaire was used for both the pre-test and post-test in this project. Developed by Wagner, Lacey, Chyun, and Abbot (2005), the Heart Disease Fact Questionnaire is a 25 item tool designed to assess the general knowledge regarding cardiovascular risk factors. The risk factors covered by this tool include age, gender, smoking, family history, cholesterol, physical activity, weight, and blood pressure. The responses to each item are "True, "False", and "I don't know". Correct responses are scored 1 point, and incorrect responses or a response of "I don't know" are scored 0 points. Possible scores range from 0 to 25 points, with higher scores indicating

increased knowledge of cardiovascular risk factors. The Heart Disease Fact Questionnaire has been reported as having good content, good criterion-related validity, and an acceptable level of internal consistency reliability with a Kuder-Richardson-20 score of 0.77 and a test-retest reliability of 0.89 (Wagner, et al., 2005).

On the participants first day of cardiac rehabilitation, the health partner was asked to take the Heart Disease Fact Questionnaire. After pre-test completion, the health partner participated in the rehabilitation program. The health partner received education from the staff of the cardiac rehabilitation program during each scheduled rehabilitation session. After being in the program for four weeks, the health partner took the post-test, which contained the same constructs as the pre-test. The primary investigator provided the post-test at the end of the 12th rehabilitation session. As no analysis could be performed, scores of both the pre-test and post-test have been provided (Figure 3).

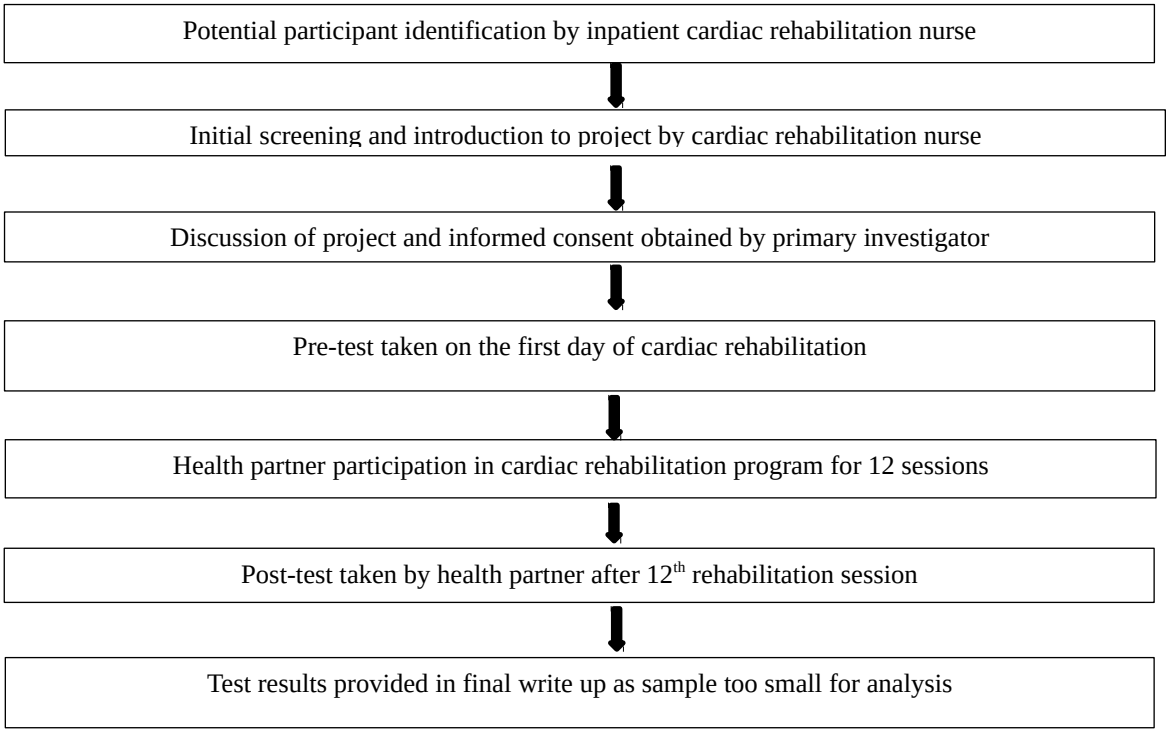

Figure 3. Methodology schematics

Ethical

The primary investigator was an employee of the cardiac unit of the organization at the time the project was implemented. However, there was no financial or non-financial affiliation between the primary investigator and the cardiac rehabilitation program at the organization. No employment, payments, or grants were provided by the primary project site for this project. In order to manage any potential conflict of interest, the role of the staff was minimalized to notifying the primary investigator of potential new participants and providing the education to the patients and partners. With previous experience in implementing research study protocols, the current staff was well versed on preventing the contamination of results through staff member influence. The staff members of the cardiac rehabilitation program were instructed to provide only the education that is normally given in the rehabilitation program and to provide for a quiet and isolated area for the pre-test and post-test to be taken by the partner. In order to access the patients and health partners, an authorization of HIPAA waiver was filed with the facility. This waiver allowed the inpatient cardiac rehabilitation nurse to notify the primary investigator of the room number that the patient and health partner were located. The rehabilitation nurse obtained explicit verbal consent for this information to be provided to the primary investigator. After this verbal permission was given, the nurse then made a notation in the patient's electronic medical record that permission was given by the patient to have their information relayed to the primary investigator. A recruitment flyer was provided to the health partner by the cardiac rehabilitation nurse (Appendix B). At the initial meeting, consent from the health partner to participate in the investigation (Appendix C).

In order to ensure confidentiality, no patient names, medical record numbers, or financial identification numbers were used on any paper or electronic copy of the data collection tool. The participant was assigned a code using the letter A and the date of their final rehabilitation session. To ensure the participants data was correctly matched to their code, a master key for the code was created and accessible solely by the primary investigator. This code and all other research materials were kept on a password protected laptop that was accessible only by the primary investigator. Data was collected onsite at the facility and immediately entered into a password protected laptop computer. All paper copies of data gathering materials was placed in a HIPAA compliant recycling bin prior to leaving the facility.

Data analysis

Due to the low sample size, no statistical analysis was able to be performed. The initial plan was to analyze knowledge gained during cardiac rehabilitation regarding proper dietary habits, stress management, and exercise to determine if a significant difference in knowledge was gained after the duration of the cardiac rehabilitation program. With a larger sample size, a paired two sample *t*-test with significance set at $p < 0.10$ could have been performed using SPSS version 22.0. In lieu of any statistical analysis, descriptive statistics for the sole participant was performed, including the scores for both the pre-test and the post-test (Table 1).

Table 1

Test Scores

Participant	Pre-Test	Post-Test
1	17	23

Demographic data consisting of race, gender, age, and the type of health partner was also collected (Table 2).

Table 2

Participant Demographics

Participant	Race	Gender	Age	Health Partner
1	Caucasian	Female	67	Spouse

Results

For the single participant in this project, there was a 6 point difference between the pre-test and the post-test. The pre-test score was 17 points and the post-test score was 23 points, resulting in a 35% increase in points on the post-test after 12 sessions of cardiac rehabilitation. These results met the outcome of the project, indicating that a health partner participating in cardiac rehabilitation increases knowledge of cardiac disease risk factors and lifestyle modifications required to prevent the occurrence of cardiac disease or the exacerbation of existing cardiac disease. All the answers that were correct on the pre-test were also correct on the post test. Interestingly, the largest amount of questions answered incorrectly on the pre-test but answered correctly on the post-test were regarding diabetes and cholesterol. This suggests that the health partner did gain knowledge regarding risk factors for the onset or continuation of cardiac diseases, as well as gaining knowledge regarding the importance of dietary lifestyle changes after an acute cardiac event. On the pre-test, many of the correct answers were from questions that could be considered “common knowledge” for cardiac disease risks including items on family history, smoking, blood pressure, and exercise, while the incorrect answers were

concerning the role of cholesterol and diabetes in heart disease. The two incorrect answers on the post-test were concerning diabetes.

Discussion

Summary of results

After attending cardiac rehabilitation for 12 sessions, the health partner in this project exhibited a 35% improvement on their post-test. This improvement indicates that the health partner did gain new knowledge about the risk factors of cardiac disease and lifestyle changes required to prevent the occurrence of cardiac disease or to prevent existing cardiac disease from worsening.

Clinical implications of results

Due to the small sample size and the lack of statistical analysis, few clinical implications can be drawn from this project. While the single participant did show an improvement in scores between the pre-test and post-test, without a larger pool of data it is difficult to conclude with any certainty that cardiac rehabilitation can positively impact knowledge regarding cardiac disease risk factors and lifestyle changes. However, despite this project's inability to draw any significant conclusions, it has provided some evidence that a health partner's knowledge can be improved through cardiac rehabilitation. While this project did not meet the goals set at its onset, it does provide evidence and a framework for future investigations into the effects of cardiac rehabilitation on health partner knowledge increases.

Limitations and suggestions for improvement

There were several limitations to this investigation, notably the duration of the investigation, the final sample size, and the scope of the investigation. Initially, the planned timeframe for the investigation was three to four months. The Internal Review Board process at the facility took longer than anticipated, due to a number of reasons. The original plan for gathering participants through the inpatient cardiac rehabilitation nurse was initially rejected due to concerns of HIPAA violations, as confidential patient information would be provided to the primary investigator, who was considered an outside party. Subsequently, the primary investigator had to meet with the facility's research mentor to discuss other potential options for gathering participants.

After meeting with the research mentor and speaking with the legal counsel for the facility, it was decided that with an authorization to wave HIPAA requirements would be necessary to include in the request to perform the project at the facility. After the paperwork was completed, it was subsequently rejected by the IRB board member due to a lack of specificity in how the project would be performed. The paperwork required several revisions in order to meet the criteria of the facility's IRB. The investigation was unable to undergo an expedited review due to the necessity of the HIPAA waiver, instead requiring a full IRB review. As the IRB of the facility only met once a month, the investigation was then prolonged until the IRB meeting occurred.

This longer than anticipated IRB process resulted in an investigation duration of only two months, as opposed to the planned three to four months. In addition to being limited by the shorter time frame, a smaller than expected sample size was also used for the investigation. There were several reasons for the smaller sample size. During the project's timeframe, the two cardiothoracic surgeons at the facility took consecutive

vacations, resulting in two two-week periods in which there was only one surgeon available. Fewer surgeries than the facility's average were performed due to these vacations, resulting in fewer potential participants. During the project, approximately half of the surgeries performed were on patients from out of town, namely from Iowa and western Nebraska. As there are other cardiac rehabilitation programs that were significantly closer to these patients, they did not enroll in the facility's rehabilitation program. Several other patients were unable to name a designated health partner that would be attending cardiac rehabilitation with them.

There were also issues with poor communication between the primary investigator and the staff responsible for recruiting participants. One health partner agreed to participate in the program, but the primary investigator was not notified until after the health partner had been in the rehabilitation process for four sessions. Poor communication resulted in the staff member believing that the primary investigator was unable to meet with the health partner during their patient's hospitalization, and expected that they meet with the health partner at the first rehabilitation session. The primary investigator met with the staff member to better explain the recruitment process to avoid further misunderstandings. This could have been improved by meeting with the recruiter again in the immediate period prior to the project's start in order to discuss the recruitment strategy again in order to solidify the recruitment plan.

With all of these factors in play, the sample size of the investigation was much smaller than originally planned. While the goal of the investigation was at least 20 participants, only one health partner was enrolled. This smaller sample size also resulted in an inadequate representation of the facility's cardiac rehabilitation population, with the

only demographic represented being a Caucasian female. As the investigation did not meet its goal of 20 participants, and without an adequate population representation, no significant conclusions were able to be drawn.

The findings of this investigation were also limited by its design and the method of data collection. While the participant took both the pretest and the post-test at the correct time, no method was implemented to determine the attendance rate of participants other than the rehabilitation sessions that they took the pre-test and post-test. Without knowing how many sessions they actually attended, it is difficult to determine if it was the education from the rehabilitation program that influenced any increase in knowledge versus knowledge gained in their own time through their own research or meetings with physicians.

Suggestions for future clinical projects or research

While this project did not meet its stated goals, the effect of cardiac rehabilitation on health partner's knowledge is a worthwhile area of research. Despite not being able to develop significant results that indicate whether a health partner learns about the risk factors of cardiac disease or the lifestyle changes required after an acute cardiac event, future projects focused on this area may have more success. In order to fully explore the effects of cardiac rehabilitation on a health partner's knowledge, an extended project timeline will be required. A longer project timeframe would allow for more participant recruitment, meeting the minimum number of participants required to draw statistically significant conclusions. With the inherently unpredictable number of MIs and CABGs in a given period, a longer timeframe would allow future projects an increased chance of having an adequate number of health partners from different age groups and ethnicities;

in addition to an overall increased sample size, larger numbers from different demographics would allow for a stronger project and better results.

Future projects in this area may also be strengthened by using an alternative design. Using a true experimental approach using a control group and an intervention group would allow for stronger conclusions to be drawn regarding the efficacy of cardiac rehabilitation and health partner knowledge of cardiac risk factors. A design that incorporates a method of tracking how many sessions of rehabilitation a health partner attends would also be helpful in fully exploring the benefits these programs offer to health partners. Designs including qualitative data gathering may also shed light on the impact that cardiac rehabilitation has on a health partner. Some qualitative aspects that could potentially be explored would include the level of confidence a health partner has in helping a cardiac patient after they have been discharged from the hospital, as well as how the patient themselves feel about having a health partner undergo the same therapies they have experienced.

A different approach to recruiting participants may also prove to be beneficial for future projects. While this project had limited time to gather participants, the results of the recruitment process were unsuccessful. This lack of success may be due to the limited timeframe of the project, but it could also have been a result of the approach that was taken. The population that this project focused on may benefit from alternative methods of recruitment, including direct investigator contact as opposed to recruitment via proxy.

Future projects seeking to understand the relationship between health and health partners may also be well suited to explore other facets of cardiac rehabilitation,

including the physical benefits that a program offers health partners. Additionally, the effect on health partner participation on a patient's likelihood to complete the program may also result in valuable information on how a health partner can impact a patient's health after an acute cardiac event. Incorporating a qualitative approach to this project's design may also reveal important information. By investigating how much more prepared a health partner may feel after attending cardiac rehabilitation, or if a patient feels more comfortable being cared for by a health partner who has undergone the same therapy that they have, the gaps in the literature on cardiac rehabilitation may continue to be filled.

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Appendix A: Heart Disease Fact Questionnaire

These questions ask about heart disease. Please circle true or false; if you are unsure about the correct answer, you may circle “I don’t know”.

1. A person always knows when they have heart disease:
    a. True b. False c. I don't know

2. If you have a family history of heart disease you are at risk for developing heart disease:
    a. True b. False c. I don't know

3. The older a person is, the greater their risk of having heart disease:
    a. True b. False c. I don't know

4. Smoking is a risk factor for heart disease:
    a. True b. False c. I don't know

5. A person who stops smoking will lower their risk of developing heart disease:
    a. True b. False c. I don't know

6. High blood pressure is a risk factor for heart disease:
    a. True b. False c. I don't know

7. Keeping blood pressure under control will reduce a person's risk for developing heart disease:
    a. True b. False c. I don't know

8. High cholesterol is a risk factor for developing heart disease:
    a. True b. False c. I don't know

9. Eating fatty foods does not affect blood cholesterol levels:
    a. True b. False c. I don't know

10. If your "good" cholesterol (HDL) is high you are at risk for heart disease:
    a. True b. False c. I don't know

11. If your "bad" cholesterol (LDL) is high you are at risk factor for heart disease:
    a. True b. False c. I don't know

12. Being overweight increases a person's risk for heart disease:
    a. True b. False c. I don't know

13. Regular physical activity will lower a person's chance of getting heart disease:
    a. True b. False c. I don't know

14. Only exercising at a gym or in an exercise class will help lower a person's chance of developing heart disease:
    a. True b. False c. I don't know

15. Walking and gardening are considered exercise that will help lower a person's chance of developing heart disease:
a. True b. False c. I don’t know

16. Diabetes is a risk factor for developing heart disease:
a. True b. False c. I don’t know

17. High blood sugar puts a strain on the heart:
a. True b. False c. I don’t know

18. If your blood sugar is high over several months it can cause your cholesterol level to go up and increase your risk of heart disease:
a. True b. False c. I don’t know

19. A person who has diabetes can reduce their risk of developing heart disease if they keep their blood sugar levels under control:
a. True b. False c. I don’t know

20. People with diabetes rarely have high cholesterol:
a. True b. False c. I don’t know

21. If a person has diabetes, keeping their cholesterol under control will help to lower their chance of developing heart disease:
a. True b. False c. I don’t know

22. People with diabetes tend to have low HDL (good) cholesterol:
a. True b. False c. I don’t know

23. A person who has diabetes can reduce their risk of developing heart disease if they keep their blood pressure under control:
a. True b. False c. I don’t know

24. A person who has diabetes can reduce their risk of developing heart disease if they keep their weight under control:
a. True b. False c. I don’t know

25. Men with diabetes have a higher risk of heart disease than women with diabetes:
a. True b. False c. I don’t know

Appendix B: Participant recruitment flyer

NEBRASKA METHODIST COLLEGE
THE JOSIE HARPER CAMPUS

Are You Interested in Cardiac Rehabilitation?

We are currently seeking volunteers to take part in a research project. If you are a health partner of a current cardiac patient and are considering joining the cardiac rehabilitation program, you may be eligible for a research project. This research will help to examine what benefits cardiac rehabilitation offers health partners.

As a participant in this study, you will be asked to:

1) Take a short test on your first day of rehabilitation
2) Take a short test after your 12th rehabilitation session

To learn more about this research project, please call 402-661-9481, email Nathan.Shank@nmhs.org, or let your cardiac rehabilitation nurse know in the next 24 hours. A researcher will meet with you prior to discharge to discuss the project more in depth.

This project is being performed by a Doctorate of Nursing Practice student from Methodist College as a part of their education. Participation in this project is completely voluntary, and any information gathered during the project will be kept completely confidential.

Appendix C: Informed consent form

Informed Consent

Title of Evidence Based Practice or Research Study:

The Impact of Health Partner Participation in Cardiac Rehabilitation on Health Partner Knowledge of Cardiac Disease Risk Factors

Why are you being asked to be in this study?

You have been invited to participate in this study because you have expressed an interest in entering the cardiac rehabilitation program

Why are we doing this study?

This study is being performed in order to better understand the benefits that cardiac rehabilitation offers health partners. Specifically, this study is designed to determine how much a cardiac rehabilitation program increases your knowledge about cardiac disease risk factors and lifestyle changes necessary after an acute cardiac event.

What will be done during the study?

On the first day of the cardiac rehabilitation program, you will be asked to take a 25 item multiple choice test. At the beginning of your 10^{th} session, you will be asked to take the same multiple choice test a second time. The scores of these two tests will be compared against each other to determine how much you have learned about cardiac disease risk factors.

What are the possible risks of being in this research study?

A major risk of this study is a potential breach of confidentiality or disclosure of protected health information. There is a minimal risk of such a breach of confidentiality from occurring. To prevent any disclosure or loss of confidentiality, no personal identifiers will be used on any of the data collection tools. All data will remain secure on a password protected laptop. If you choose to participate in the exercise portions of the program, risks of cardiac rehabilitation include muscle strains, sprains, cardiac arrhythmias, fatigue, and generalized pain. Staff of the rehabilitation program are trained to monitor participants to ensure safety at all times.

What are the possible benefits to you?

There are no direct benefits to yourself. However, completion of this study will increase the amount of research available on the benefits of cardiac rehabilitation to health partners, as well as provide feedback to the rehabilitation program as to how they are performing.

What are the alternatives to being in this research study?

You may enter the cardiac rehabilitation program as a health partner without participating in this study. You are under no obligation to join this study, and you may withdraw at any time.

What will being in this research study cost you?
There are no additional costs associated with participating in this research study.

Will you be paid for being in this research study?
No compensation will be offered for participating in this study.

How will health information about you be protected?
All of the information gathered during this study will remain confidential. No names will be used during the study; an alphanumeric code will be assigned to each participant to ensure confidentiality. The only person who will know which code corresponds to each participant will be the primary investigator. All participant information and any data gathered during the study will be kept securely under lock and key, with only the primary investigator having access.

What will happen if you decide not to be in this research study?
If you decide to not participate in this study, you still will receive the same treatment as any other cardiac rehabilitation patient. Participation in this study is completely voluntary, and you are under no obligation to join.

What will happen if you decide to stop participating once you start the study?
You have the right to withdraw from the project at any time during its duration. If you chose to withdraw, you will be able to remain in the cardiac rehabilitation program and continue to participate in the exercise and/or education portions of the program.

Documentation of informed consent: You are freely making a decision whether to be in this research study. Signing this form means that:

- You have had the consent form explained to you.
- You have read and understand this consent form.
- You have had your questions answered.
- You have voluntarily decided to participate in this research study.
- If you have questions, you have talked with or been directed to talk to one of the investigators listed below on this consent form.
- You will be given a dated and signed copy of this consent form to keep.

If at any time you have questions concerning your rights as a research subject or about this study, you may call the Methodist Hospital Institutional Review Board (IRB) at 402-354-4035.
I acknowledge that I have received a personal dated and signed copy of this consent form.

Copy received: ____ **(Initials)**

_____ _____

Signature of Subject Date

_____ _____

Signature of Investigator obtaining consent Date

Primary Investigator: _____ Date: _____

This consent form is 3 pages

Appendix D: IRB approval letters

[redacted]

METHODIST HOSPITAL
An Affiliate of Methodist Health System
8303 Dodge Street
Omaha, NE 68114
(402) 354-4000

March 28, 2017

Nathan Shank, BSN
206 Kings Drive
Bellevue, NE 68005

Dear Mr. Shank,

The Nebraska Methodist Hospital Institutional Review Board granted approval to the following minimal risk study:

The Impact of Health Partner Participation in Cardiac Rehabilitation on Health Partner Knowledge of Cardiac Disease Risk Factors

Approved: Waiver Requested of HIPAA Authorization

Date of Action: ***March 27, 2017***

Expires: ***March 27, 2018***

Type of review: ***Expedited Review*** ***x***

The Nebraska Methodist Hospital IRB operates in compliance with federal laws and regulations governing institutional review boards, including the federal Common Rule and FDA regulations. The Methodist IRB operates under the following federal-wide assurance number: FWA 00003377

Implementation/continuation of this study is subject to the requirements and standards set forth in the *Nebraska Methodist Hospital Handbook for IRB Members and Investigators*. You should particularly note the statements of Ethical Principles under Tab II of the *Handbook*, and the Investigator Responsibilities and Standards under Tab VI.

Should you have any questions please do not hesitate to contact the Chairman of the Institutional Review Board or the Medical Staff Office at 354-4038.

Sincerely,

[redacted]

William Lydiatt, M.D.
Chairman, Institutional Review Board
[redacted] – phone
[redacted] – fax

NEBRASKA METHODIST COLLEGE
THE JOSIE HARPER CAMPUS

January 6, 2017

Nathan Shank, RN, *DNP student*
Tara Whitmire, DNP, APRN-NP
720 N. 87th Street
Omaha, Nebraska 68114

Dear Mr. Shank and Dr Whitmire,

This letter is to formally notify you that your research study, "*Impact of Health Partner Participation in Cardiac Rehabilitation on Health Partner Knowledge of Cardiac Disease Risk Factors,*" IRB # **NMC2016_#8** has been approved and given expedited status authorized by 45 CFR §46.110. Your IRB reviewers were Dr. Lindsay Snipes and Dr. Dorothy Sansom.

You are authorized to begin this study on January 1, 2017. This approval is valid until December 31, 2017. If it should continue beyond that period, you will need to seek continuing review and update the IRB on the research project. You must also advise the IRB in writing when the project is completed or discontinued. If any unanticipated risks to the participants occur, these should be reported to IRB. Any changes in protocol will require that you submit a new IRB document.

If you have any questions, please contact April Horstman Reser, IRB chair at 354-7046, or e-mail at april.horstmanreser@methodistcollege.edu.

Sincerely,

April Horstman Reser, Ph.D.
IRB Chair