**Background**

Heart disease is the leading cause of death for both men and women in the United States.1 To reduce and prevent the prevalence of this disease, this community program will integrate education and exercise to promote a heart healthy lifestyle. This program targets the individual level of the socio-ecological model with individual education sessions. Education sessions will include exercise, nutrition, smoking cessation, limiting alcohol consumption, and management of stress. Part of the education will also be derived from the health belief model. The therapist will work with the patient to identify perceived threats, barriers, and benefits of changing their behavior to promote a healthier lifestyle. This program will also target the interpersonal level of the socio-ecological model with exercise involving the patient and their family, friends, and co-workers.

Individual education has been shown to be an effective intervention to promote management and health behavior changes in heart disease.2 Education on the benefits of exercise in patients with heart disease has resulted in compliance and adherence to a new exercise program.2 This intervention is important to address with this program because educating patients on the importance of exercise can help patients comply with their recommended physical activity. Educating patients on risk factors of heart disease, healthy food options, and the recommended guidelines for fruit and vegetable intake can help patients improve their nutrition and diet.3 Providing patients heart healthy recipes and instructions on healthy cooking methods allows them to make healthier food options and be independent with providing themselves a healthy meal.3 Other health education topics that are important to address include smoking cessation, limiting alcohol consumption, blood pressure reduction, and managing stress.4 Education on these topics can make a big impact on cardiac health by reducing risks of cardiac mortality and myocardial infarctions.4 Education on these topics also helps with long term compliance. This is important because the goal of this program is to help promote health and wellness in the community by not only providing interventions to treat heart disease but also by reducing the prevalence of this chronic disease.

Along with education, therapists will work with patients to ensure the program is effective and results in a long term behavior change. By using the health belief model this can be achieved. The health belief model looks at patient beliefs and assumes they determine the health action the patient will take.5 If a disease is seen as threatening and a change in behavior is believed to reduce the threat, then the patient will likely change their behavior to reduce the threat of the disease.5 On the other side, if a patient perceives several barriers to a behavior change, they are less likely to make that change.5 A therapist's ability to recognize their patient's beliefs and barriers can help them work with the patient to overcome these barriers and to have more success in initiating the behavior change. The more a patient understands the severity of heart disease, the more they will adhere to a behavior change.5 For this program, education about the severity of heart disease is important because it can help patients have a better understanding of why this disease is so serious, which will motivate them to change their current behavior. Often, patients who face more barriers have a lower level of attendance with wellness programs while patients who attend more sessions often perceive the rehabilitation program as beneficial and often face less barriers.6 Health care professionals should implement this information and address barriers that patients identify, to try and find solutions to ensure the best compliance with a health care program. The use of the health belief model can also predict compliance with an exercise program in patients with heart disease by helping patients find solutions to their barriers and enabling them to continue their exercise program.7 Implementation of the model during education sessions can help patients further understand the benefits of this program and can help with their compliance to exercise and an overall health behavior transformation.

The final intervention in this program is the use of exercise to help promote physical activity and reduce symptoms of heart disease, such as high blood pressure, high body mass index, and high cholesterol. Patients with heart disease who participate in regular physical activity have a reduced risk of cardiovascular mortality.8 Aerobic exercise and resistance training are the greatest benefits to overall health for this population and reduces the risk factors for cardiovascular problems in varying heart diseases.8,9 Exercise in cardiac rehabilitation can also reduce cardiovascular mortality and hospital admissions.10 Aerobic exercise has direct benefits to the heart, as it helps with myocardial oxygen demand and development of coronary collateral vessels.10 For the most benefits, exercise should involve aerobic and resistance training to improve patients’ endurance and their muscular strength.11 Strengthening should incorporate all of the major muscle groups to improve their function and help reduce risk factors of heart disease.12 This evidence shows that exercise can help reduce cardiac related mortality and reduce the risk factors of heart disease. The implementation of exercise can also help improve the quality of life of patients with heart disease and reduce the prevalence of heart disease in the community.

To examine the effectiveness of this program three outcome measures will be utilized: the six-minute walk test, grip strength with a hand dynamometer, and the MacNew heart disease health-related quality of life questionnaire. The six-minute walk test (6MWT) is one of the most validated outcome measures for patients with heart disease and is able to assess exercise capacity and measure changes in endurance after cardiac rehabilitation.13 The minimum clinically important difference (MCID) for the 6MWT is 25 meters.13 An improvement in this distance, or more, would indicate improvements in endurance and functional capacity.

Decreased hand grip strength has been associated with increased risk of cardiovascular mortality.14 Hand grip strength is representative of muscular strength, fitness, nutritional status, and mortality.15 Higher muscular strength is associated with lower blood pressure and lower cholesterol, which are risk factors for heart disease, so improvements in grip strength would represent improvements in overall muscular strength and reductions in heart disease risk factors.15 An increase of grip strength of 6.2 kilograms is the MCID to show a change in muscular strength.16

The MacNew heart disease health related quality of life questionnaire (MacNew) examines emotional, physical, and social domains and how they impact the quality of life of a patient.17 It is a valid and reliable outcome measure that has been used in patients with heart disease.17 The MacNew is able to show improvements in patients with heart disease after participation in an education and exercise program to determine if the program had an impact on the patient.18 The MCID for the MacNew is 0.5 points and an improvement in the score by this amount would represent an improvement in the quality of life of a patient.19

After completion of this wellness program, patients should see improvements in their muscular strength, endurance, and their overall quality of life. Education and interventions to help patients overcome barriers that they face will allow patients to comply with this health behavior change and manage their chronic disease. This program will also help them maintain this behavior change in the future.

**Program Goals**

The goals of the program are as follows:

* Participants will increase their walking distance by 25 or more meters on the 6 Minute Walk Test in 12 weeks.
* Participants will increase their hand grip strength on a hand dynamometer by 6.2 kilograms or more in 12 weeks.
* Participants will increase their score by 0.5 points or more on the MacNew Heart Disease Health Quality of Life Questionnaire in 12 weeks.
* Participants will maintain 80% of their lifestyle changes 3 months after completion of the program, as evidence by a custom survey asking for patient reported lifestyle habits.

The first three goals are based on the minimum clinically important difference from the outcome measures utilized in this program. The last goal focuses on the difference the program has on participants in the long term. The goal of the program is to not only see changes in participants during the program, but also after completion. The program wants to encompass a lifestyle change through promotion of health and wellness and to do that, the behavior changes need to be long-lasting.

**Methods**

This heart healthy program will begin in Hertford, North Carolina, targeting the community of Perquimans County. Perquimans County is a small rural community, without a local gym and very limited health resources, so this program can be very effective at promoting health and wellness. The program will be located at Perquimans County High School, which is situated in the middle of the county, near places of business and local neighborhoods. The high school has the equipment needed for the program, providing a classroom for education sessions, a gym and gym equipment for strength and aerobic exercises, and four small kitchens in the “Teen Living” classroom, to allow participants to practice cooking heart healthy meals. Having a program at the high school can also provide the high school students an easier opportunity to volunteer with the program.

This free program will enroll twelve participants who are eighteen years of age or older and either have heart disease or have been identified at risk for heart disease by their physician. The program will be advertised and discussed with the local doctor’s office, health department, and extension agency. Advertisements will be placed around the community at pharmacies, doctor’s offices, local churches, the grocery store, and the local recreation department. Referrals from physicians will be given top priority followed by personal interest. All participants will need a medical clearance form from their doctor to participate in the program. If the program is a success, and depending on the interest, future programs may increase the number of participants, but for now the program will have a maximum capacity of 12, to ensure individualized time and supervision of participants from the staff.

The program will begin on January 22, 2019 and last for twelve weeks, meeting twice a week on Tuesdays and Thursdays from 5:30 pm to 7:00 pm. Some participants may be asked to arrive early or stay late to allow for individualized discussion with the program leaders. Meeting at 5:30 pm allows the participants who work a chance to get off work and to the school and that will also ensure the basketball teams are finished with practice so the gym will be available.

The program will have an education lesson on Tuesdays for 60 minutes followed by aerobic exercise for 30 minutes to conclude the session. On Thursdays, aerobic exercise will start the session for 30 minutes and resistance training will take place for the last hour. The leaders will be two physical therapists, but they could be any health care provider in the county. While the two therapists are the primary leaders for the program, there will be local community members who come and lead some of the education sessions.

The participants will meet individually with the two leaders either before or after sessions on Tuesdays or Thursdays to discuss personal and individual matters. These private meeting times will be assigned to the participants so they will consistently have one time per week to check in with the leaders and to report their progress or discuss challenges and barriers they are facing using the Health Belief Model. An example of a week of the program is demonstrated in the following table:

|  |  |  |
| --- | --- | --- |
| **Day:** | **Time:** | **Individual Meetings and Sessions:** |
| Tuesday | 5:15-5:30 | Leaders meet with participants 1 and 2 |
| Tuesday | 5:30-6:30 | Education |
| Tuesday | 6:30-7:00 | Aerobic Exercise |
| Tuesday | 7:00-7:15 | Leaders meet with participants 3 and 4 |
| Tuesday | 7:15-7:30 | Leaders meet with participants 5 and 6 |
| Thursday | 5:15-5:30 | Leaders meet with participants 7 and 8 |
| Thursday | 5:30-6:00 | Aerobic exercise |
| Thursday | 6:00-7:00 | Resistance exercise |
| Thursday | 7:00-7:15 | Leaders meet with participants 9 and 10 |
| Thursday | 7:15-7:30 | Leaders meet with participants 11 and 12 |

The weekly lessons are outlined in the table below:

|  |  |  |
| --- | --- | --- |
| **Week:** | **Topic:** | **Guest Speakers:** |
| 1 | Baseline measurements- Introduction to Heart Disease, Facts and Figures |  |
| 2 | Heart Disease Risk Factors | Local Nurse/Physician |
| 3 | Importance of Exercise |  |
| 4 | Nutrition and Heart Healthy Recipes (practice cooking in the kitchen) | Dietician/Nutritionist |
| 5 | Smoking Cessation |  |
| 6 | Midterm Measurements- Blood Pressure Reduction | Nurse |
| 7 | Stress Management | Psychologist |
| 8 | Limiting Alcohol Consumption |  |
| 9 | Group Chosen Topic- whatever the group wants to learn more about | Specialist depending on the group selected topic |
| 10 | How to continue this behavior change once this program ends |  |
| 11 | Family/Friends Week- family members will join the participants and practice cooking in the kitchen and also exercise with them. Family members are able to join in the individual conversations that week if they would like. | Dietician/Nutritionist |
| 12 | Final Measurements- Personal Reflections and Group Discussion of the Program |  |

High school students or local community members who are willing to volunteer would be helpful during the exercise portion of this program, to allow for more supervision. The exercise component will consist of various aerobic activities including walking on the treadmill, riding a stationary bike, walking around the gym, walking outside the high school, and using the elliptical.11 A local Zumba instructor may come in one night for participants to partake in a class. Zumba allows participants to engage in aerobic activity while dancing and moving in ways that are not conventional aerobic exercise.20 This gives participants the opportunity to take part in various forms of activity to help them identify a form they enjoy and could continue to participate in at the end of the program. Participants could also engage in other activities since it will be in the high school gym, allowing access to basketball goals, volleyball nets, and an open area for other competitive physical activities. These decisions will be made after assessing participant interest.

For strengthening, participants will perform 8-12 reps and 2-3 sets of the following exercises: bicep curls, leg presses, leg extensions, push-ups, squats, crunches, shoulder presses, rows, tricep extensions, and calf raises.11 These activities will start with body weight or a light resistance and progress throughout the program as the participants continue to build their strength. The goal is to use dumbbells or resistant bands to allow participants the ability to practice these exercises at home with Theraband or other easily accessible options. Participants will have an individual folder that they will use to record their individual progress. This will allow them to see how they did the previous week and to challenge them to do more repetitions or more weights. This will also allow them to track their progress through the course of the program.

Participants will also be instructed to try and incorporate these activities into their daily lives, including going on walks, eating healthy, and doing some of the strengthening activities on their own. Discussing how to incorporate these activities into their lives will be discussed during the private meetings. Transitioning into participating in these activities independently will help participants transition to independent care once the program ends.

The outcome measures (6MWT, grip strength, and MacNew Questionnaire) will be taken the first week, week six, and again at week twelve. Along with these measures, blood pressure, heart rate, and weight (which will be used to calculate BMI) will be taken at these times. These measures will be used to track the progress of the participants. Hopefully changes will be seen at the midterm, and these changes can be used to reinforce the progress the participants are making. Heart rate, blood pressure, and rate of perceived exertion will be taken during all exercise activities throughout the program. The rate of perceived exertion (RPE) is often used in patients with heart disease because of the effect their medications may have on their heart rate and blood pressure.21 Using RPE can also help patients understand their exertion levels and when they should take a break. The use of RPE has been shown to be as effective in a supervised clinical setting as it has at a home setting, so learning how to gauge this factor of exertion can be very beneficial as patients transition to independent exercise after completion of the program.21

**Program Evaluation**

The Centers for Disease Control and Prevention (CDC) report that a community based program’s evaluation should be a “systematic collection of information about the activities, characteristics, and outcomes of programs to make judgments about the program, improve program effectiveness, and/or inform decision about future program development.”22 With this definition, the program should not only be evaluated for its effectiveness, but also for how the program was implemented. The program’s effectiveness is typically what is analyzed in an evaluation, but analyzing if the program was implemented how it was intended, can also effect the evaluation of the program. Reflecting over the sessions of the program and analyzing if they followed the pre-set plan can show how the program was implemented. This program allows room for some patient preferences to be added into the program, but it should still follow the structure laid out in the methods section. If there is more than a minor deviance from the program, then it was not implemented how it was originally intended.

To evaluate the effectiveness of this program, 75% of the goals are expected to be met for the program to be a success. 75% would represent nine out of the twelve participants meeting their goals. There will also be a survey for participants on the last day of the program. This survey will ask the participants to evaluate how effective they found the program to be and it will also ask for recommendations on ways to improve the program in the future. The participants will be sent another survey after their three month post-program follow-up to analyze their compliance with lifestyle changes and to again analyze how effective the program was for making the long term lifestyle change. The program will be considered successful for participant satisfaction if 75% of the participants report the program was beneficial and helped them make and maintain a lifestyle change. In summary, the program will be considered successful if it is implemented according to the preset design, 75% of the participants meet the program goals, and 75% of the participants report the program to be beneficial and helpful in their lifestyle change.

From this information, the program can be altered for future sessions and changes can be made to ensure a heart healthy program that provides the best opportunities for patients to succeed and make lifestyle changes. After every implementation of this program, it should be evaluated and adjusted accordingly.

**Conclusion**

Heart disease is the leading cause of death for both men and women in the United States, making it an important aspect of health and wellness to target and try to change its prevalence in the community.1 This program provides health education which has been proven to reduce cardiac mortality and the risk factors associated with heart disease.2,4 The program will also use the Health Behavior Model which has been shown to increase the adherence to an exercise program and cardiac rehabilitation.5,6 Exercise has also been shown to reduce cardiac related mortality and be the most effective intervention to reducing risk factors for heart disease.8,9

Not only does the evidence behind the program make it effective, but the aspects of the community it targets will help the program improve the lives of those with heart disease or at risk for it in Perquimans County. This small town is an excellent place to implement this program, as the residents are above the state average for adult obesity, food insecurity, and smoking prevalence.23 Along with these risk factors for heart disease, only 56% of the population have adequate access to exercise opportunities.23 While these characteristics of the population make it a good target for the program, the effects of a small community are also important because a few people changing their lifestyle can spark more of the community to follow their example. The goal is to not only help the twelve participants, but to help the whole community in making a lifelong health change.

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