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Evaluating the Effectiveness of an Exercise Program for Persons with Multiple Sclerosis

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Dedication

To those who know the daily challenges of living with multiple sclerosis, may your days be filled with love, laughter, and improved mobility.

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Abstract

Multiple sclerosis (MS) is a chronic, degenerative condition of the central nervous system that leaves patients with a wide variety of symptoms and disability. Symptoms include decreases in energy levels, muscle strength, bone strength, vision, sensation, coordination, cognition, hearing, balance, and quality of life. Exercise has been well supported as a way to reduce symptoms and slow the disease progression of MS. Outpatient exercise programs have also been shown effective in providing patients with the necessary tools to perform appropriate exercises at home. Yet, few programs are available that are appropriate for patients with MS. This project aimed to, first, assist clinic staff in the improvement of a pre-existing exercise program individualized for patients with MS; second, evaluate the effectiveness of the marketing and recruitment strategies by determining the number of patients receiving class information before and after interventions, as well as by measuring class attendance; and third, to evaluate the effectiveness of the program by measuring mobility improvements of participants and patient perceptions of improvement. The intervention took place at an urban community hospital with a neuroscience center devoted to caring for MS patients. Information distribution was increased by 357%. Attendance rates remained low, however consistency in attendance improved. Perceived improvements in knowledge, frequency of exercise, mobility and quality of life were noted. Improvements in physical measures were noted, as one participant had a 63% decrease in the timed 25-foot walk test. Valuable lessons were learned regarding implementing a project of this type. This paper discusses the background information, problem statement, intervention, evaluation methods, outcomes, sustainability, and dissemination methods related to the project.

Keywords: multiple sclerosis, exercise, exercise programs, program evaluation

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Executive Summary

Multiple sclerosis (MS) is a chronic, degenerative condition of the central nervous system (CNS) that leaves individuals with varying degrees of disability, affecting an estimated 2.3 million people worldwide (Multiple Sclerosis, n.d.; Pilutti & Hicks, 2011). Symptoms are highly individualized and may include a marked decrease in energy levels, muscle strength, bone strength, vision, sensation, coordination, cognition, hearing, and quality of life (Asano, Duquette, Andersen, Lapierre & Mayo, 2013; Gibson & Summers, 2011). The symptoms and disease progression vary from case to case.

These symptoms all contribute to decreased physical activity following diagnosis with MS (Asano et al., 2013; Hartley, 2009). Due to both a decrease in physical activity and the physiological process and treatment of MS, patients are at a three-to-six times greater risk of developing osteoporosis, putting them at heightened risk for injury from falls (Dobson, Yarnall, Noyce, & Giovanni, 2013; Gibson & Summers, 2011; Marrie, Cutter, Tyry, & Vollmer, 2009; Moen, Celius, Sandvik, Nordsletten, Eriksen, & Holmoy, 2011). However, research has shown exercise to be a beneficial intervention in combating some of the symptoms of MS, as well as slowing the progression of MS (Giacobbi et al., 2012; Martinez & Kravitz, 2013; Pilutti & Hicks, 2011). Exercise interventions have taken many forms through options such as aerobics, progressive resistance training, yoga, aquatics, breathing techniques, walking, balance work, stretching, relaxation, and cardiovascular training (Dlugonski, Motl, & McAuley, 2011; Garrett & Coote, 2009; Giacobbi, Dietrich, Larson & White, 2012; Harltey, 2009; Huisinga, Filipi, & Stergiou, 2011; Pilutti & Hicks, 2011). Following a four-month progressive resistance training program, participants saw an increase in mobility of up to 24% compared to their pre-intervention testing, with an average increase of 13%; they also reported improvements in

standing, walking, balance, endurance, strength, daily tasks, social lives, energy, emotional responses, and confidence following the exercise intervention (Giacobbi et al., 2012). Outpatient exercise programs have shown to be beneficial for patients suffering from many neurological conditions (Ploughman et al., 2014). However, few outpatient exercise programs dedicated to persons with MS exist, and few insurance plans cover full courses of physical therapy (PT), creating a gap in healthcare for these patients.

The purpose of this project was to assist the clinical staff with the improvement of a piloted exercise group tailored to patients with MS and to evaluate the outcomes. The objectives were, one, to assist clinic staff in the improvement of a piloted exercise program individualized for patients with MS; two, to evaluate the effectiveness of the marketing and recruitment strategies; and, three, to evaluate the effectiveness of the program on participant perceptions and mobility.

Increasing awareness throughout the clinic and participant recruitment was the first step. A query of all MS patients in the electronic health record (EHR) was generated. Utilizing the report, a total of 207 additional email addresses were provided to the IT specialist who sent out email blasts containing information related to the class (Appendix A). This created a 357% increase in information distribution. Flyers were placed in examination rooms within the MS clinic and were also handed out at monthly MS support groups. Information about the class was also provided to the National Multiple Sclerosis Society (NMSS) so persons with MS seeking local care could be informed of the class through the society.

Despite numerous recruitment attempts, class attendance did not increase as expected. The first class had one participant, and all classes after that had two participants. At the first class participants attended, they filled out a perceptions survey (Appendix B) and completed a timed

25-foot walk test. These tests were repeated four weeks into the program (Appendix C). Improvements in participant perceptions were noted as participants felt they gained knowledge on appropriate exercises, exercised more frequently, and had improved mobility and quality of life. Improvements in the timed 25-foot walk test were noted, as one participant did experience a 63% decrease in her timed 25-foot walk test.

Many barriers were encountered throughout the project. However, many lessons were learned. When working with a specific population, common demographics and barriers specific to the population need to be considered in project planning. Continued time and efforts to increase awareness may lead to a successful exercise class for persons with MS.

Introduction and Background

Multiple sclerosis (MS) is a chronic, degenerative condition of the central nervous system (CNS) that leaves individuals with varying degrees of disability, affecting an estimated 2.3 million people worldwide (Multiple Sclerosis, n.d.; Pilutti & Hicks, 2011). There are more than 400,000 cases in the United States (U.S.), and prevalence is twice as high in the northern half of the U.S. compared to the southern half (Pietrangelo & Higuera, 2015). Symptoms are highly individualized and may include a marked decrease in energy levels, muscle strength, bone strength, vision, sensation, coordination, cognition, hearing, balance, and quality of life (Asano et al., 2013; Gibson & Summers, 2011). The symptoms and disease progression vary from case to case.

Loss of muscle strength, decreased mobility (or one's ability to move or be moved freely and easily), heat intolerance, and fatigue all contribute to decreased physical activity following diagnosis with MS (Asano et al., 2013; Hartley, 2009). Due to both a decrease in physical activity and the physiological process and treatment of MS, patients are at a three-to-six times greater risk of developing osteoporosis, putting them at heightened risk for injury from falls (Dobson et al., 2013; Gibson & Summers, 2011; Marrie et al., 2009; Moen et al., 2011). MS was ranked the second most costly chronic disease, following congestive heart failure, costing an estimated $8,528 - $54,244 per patient, per year (Pietrangelo & Higuera, 2015). However, research has shown exercise to be a beneficial intervention in combating some of the symptoms of MS, as well as slowing the progression of the disease (Giacobbi et al., 2012; Martinez & Kravitz, 2013; Pilutti & Hicks, 2011).

Recent research supports the many benefits of exercise in populations with MS. Exercise interventions have taken many forms through options such as aerobics, progressive resistance

training, yoga, aquatics, breathing techniques, walking, balance work, stretching, relaxation, and cardiovascular training (Dlugonski et al., 2011; Garrett & Coote, 2009; Giacobbi et al., 2012; Harltey, 2009; Huisinga et al., 2011; Pilutti & Hicks, 2011). Outpatient exercise programs have shown to be beneficial for patients suffering from many neurological conditions including MS, stroke, Parkinson's disease, traumatic brain injury, and hereditary neurological conditions (Ploughman et al., 2014). However, few outpatient exercise programs dedicated to persons with MS exist, and few insurance plans cover full courses of physical therapy (PT), creating a gap in healthcare for these patients. At this organization, the average PT session costs patients between $70 and $120, plus a copay between $10 and $45. Centers for Medicare and Medicaid (CMS) cap PT and speech language pathology (SLP) costs combined at $1,960 per year (CMS.gov, 2016). The importance of exercise in MS is well documented in the current research literature and is necessary to protect the mobility and safety of MS patients. Through this practice dissertation, a recently added exercise support group was evaluated for effectiveness at a local, urban community hospital in an attempt to provide the patients with evidence-based exercise techniques to help improve their physical outcomes.

Problem Statement

Patients with MS face many challenges due to physical limitations, however research supports the effectiveness of exercise in combating many of these challenges (Giacobbi et al., 2012; Martinez & Kravitz, 2013; Pilutti & Hicks, 2011). Yet, many outpatient specialty centers do not offer specific programs to assist patients in obtaining exercise education specific to their disease. The purpose of this project is to improve and evaluate an existing evidence-based exercise group specific to the needs of patients with MS. This project was designed to fit the goals and needs of the organization. There was not only previous interest by the organization in

pursuing such a group, but the resources needed, such as certified and specialized neurology PTs, communication experts, and the required patient population, were readily available in this organization. This created an atmosphere that promoted the success and sustainability of this project.

Evidence-Based Initiative

Gaps in Healthcare

Adding to the already increased risk of poor bone health, preventative care aimed at protecting one's bone health is not where it should be for MS patients. Patients with MS had bone loss rates threefold to sixfold higher than control subjects, yet one study concluded that of the 220 women with MS who were surveyed, 85% of participants had never had a bone density test, 50% were not taking calcium supplements, and 71% were not taking vitamin D (Gibson & Summers, 2011; Shabas &Weinreb, 2000). The women surveyed ranged in age from 23 to 81 years, which may account for some of the lack of screening; however, all persons with MS should be appropriately screened and preventatively treated as necessary. Decreased bone density was related to high dose corticosteroid use and lower vitamin D levels (Dobson et al. 2013). Osteopenia and osteoporosis were also more common in the femoral neck and lumbar spine in MS patients, with bone loss occurring early in the disease (Dobson et al., 2013). Osteoporosis was found in 50.5% of newly diagnosed MS patients, a rate 13.4% higher than the age-, sex-, and ethnicity-matched comparison subjects (Moen et al., 2011).

Fall and fracture risks are greatly increased in persons with MS, due to their poor bone health and mobility. It is estimated that 64% of MS patients reported a fall twice within 1 year of the survey, and 60% reported falls in the past 6 months, 60% of which resulted in injury (Dobson et al., 2013; Gibson & Summers, 2011). Within a two-year period, fracture rates as high as 22%

in MS patients have been reported, compared to just 2% in the control population (Cosman et al., 1998). However, more recent data suggests the lifetime risk for osteoporosis-related fractures for the general population is 40% (Facts and statistics, 2015). One study stated 15% of study participants reported fracture, with 46% of those having experienced multiple fractures (Marrie et al., 2009). Risk factors for fracture included impaired mobility, previous fall, family history of osteoporosis, sedentary lifestyle, low bone mass, previous fracture, current smoker status, steroid use, and menopause status (Marrie et al., 2009). Fifteen percent of participants had one risk factor for fracture, 25% had two risk factors, and 57.7% had three risk factors, emphasizing how crucial preventative bone health care is in this population (Marrie et al., 2009). These patients are clearly at an increased risk of fall and injury, and gaps in the healthcare system are prevalent when it comes to preventative bone health care (Gibson & Summers, 2011; Shabas &Weinreb, 2000). Exercise provides many benefits to help bridge these gaps and reduce risk factors for patients with MS.

Benefits of Exercise

Research supports the many benefits of exercise in populations with MS and suggest exercising 30-60 minutes two-to-three times per week (Latimer-Cheung et al., 2013; Padgett & Kasser, 2013). Exercise interventions have taken many forms through options such as aerobics, progressive resistance training, yoga, aquatics, breathing techniques, walking, balance work, stretching, relaxation, and cardiovascular training (Dlugonski et al., 2011; Garrett & Coote, 2009; Giacobbi et al., 2012; Harltey, 2009; Huisinga et al., 2011; Pilutti & Hicks, 2011). Trials examining the effects of exercise most often conclude there are significant improvements in cardiorespiratory fitness, muscular strength, flexibility, mobility, and balance (Pilutti & Hicks,

2011). There is less conclusive evidence for the benefits of exercise regarding fatigue, quality of life, and cognition, although some research support is available (Pilutti & Hicks, 2011).

Recent research reported that in persons with MS, maintaining lower extremity function was the most important bodily function (Bethoux, 2010). Sixty-four percent of respondents reported ambulation limitations severe enough to impact their daily activities (Bethoux, 2010). These limitations are caused by weakness of the lower extremities, poor coordination, balance issues, and spasticity (Bethoux, 2010). Stretching has been shown effective to improve flexibility, stride length, stride speed, and pain associated with spasticity (Elshafey, Abd-Alaziem, & Gouda, 2014; Holland & Stockwell, 2014).

Following a four-month progressive resistance training program, participants achieved an increase in mobility of up to 24% compared to their pre-intervention testing, with an average increase of 13%; they also reported improvements in standing, walking, balance, endurance, strength, daily tasks, social lives, energy, emotional responses, and confidence following the exercise intervention (Giacobbi et al., 2012). Overall, the three areas of quality of life assessed in this study, subjective well-being, achievements, and utility, were all improved (Giacobbi et al., 2012). Research support for improved fatigue and quality of life have also been shown following an exercise intervention (Hartley, 2009; Huisinga et al., 2011). In addition to the physical and mental benefits of exercise, the benefits of peer and social support formed throughout the exercise interventions were noted to have a positive influence on MS patients (Giacobbi et al., 2012).

Marketing and Recruitment

Marketing and patient recruitment is important for the program to be successful. Several marketing strategies have been identified as effective in similar projects. These include posters,

banners, and flyers, as well as physician recruitment and mailing information to the home (Rice, Thombs, Leach, & Rhem, 2008; Withall, Jago, & Fox 2012). While these methods were effective early on in project recruitment, word of mouth was found to be a successful recruitment tactic after the program had been established (Withall et al., 2012). Branding is also an important consideration, as wording on any marketing tool should be fun, inviting, and appear to be inclusive of all levels of ability (Withall et al., 2012).

Measurement Tools

Finally, programs must be evaluated for effectiveness. Literature suggests using the Fracture Risk Assessment Tool (FRAX) scores and bone density testing (DXA) to measure bone loss (Dobson et al., 2013; Gibson & Summers, 2011; Moen et al., 2011). While this is not feasible for the project due to expense and the anticipated timeframe, such measurement tools should be utilized in practice. Improvements in physical functioning, i.e. strength, coordination, gait, and flexibility, can be noted by tests such as the timed 25-foot walk test, timed 100-foot walk test, and the six-minute walk test (Giacobbi et al., 2012; Hansen et al., 2013). The timed 10-meter walk has also been used to assess physical improvements using a pre-test/post-test design (Garrett & Coote, 2009; Hartley, 2009). Longer walking assessments, such as the two-minute walk and six-minute walk tests are good measures of improvements in endurance (Bethoux, 2014). These tests assess walking speeds to determine mobility improvements. Patient interviews and questionnaires have also been used effectively to inquire about improved ability to stand, balance, and complete daily tasks (Giacobbi et al., 2012).

Conceptual Models

Conceptual models are useful for both exploring a phenomenon of interest, and guiding the implementation of a project. For this project, Pender's Health Promotion Model (HPM) was

used with permission (Appendix D) and assisted in the exploration of patient perspectives and drove the data collection based on patient needs, while the Conceptual Model of Program Evaluation directed how the program was evaluated. Both models will be described in further detail in relation to the project.

Health Promotion Model

The Health Promotion Model (HPM) is a nursing model created by Nola Pender in the 1980s for use in exploring the processes that motivate individuals to engage in behaviors that enhance health (Pender, Murdaugh & Parsons, 2010). The concepts of the original HPM included prior related behavior, personal factors (biological, psychological, socio-cultural), perceived benefits of action, perceived barriers to action, perceived self-efficacy, interpersonal influences (family, peers, providers), situational influences, and health promoting behavior. Pender's (1996) update added activity-related affect, commitment to a plan of action, and immediate competing demands and preferences as concepts. A diagram of the revised (1990) model is available in Appendix E. Interpreting the project through the views of the concepts provided influence and interventions that may have not otherwise been addressed.

The first concept of the model, prior related behavior, likely influenced the outcomes of this project (Pender et al., 2010). Pender stated that prior related behavior is often the best indicator of future behavior (Pender et al., 2010). Patients who were active and valued physical activity and overall health and wellbeing prior to diagnosis were more likely to be interested and more committed to an exercise program following diagnosis, as exercise habits influence adherence (Verplanken & Melkevik, 2007). Whereas individuals who did not see the benefit of physical activity prior to diagnosis may have been less likely to participate in this program.

Participants in this program responded that they were already exercising fairly frequently, showing consistency between prior related behaviors and those who chose to attend the class.

The second concept, personal factors, includes one's biological, psychological, and socio-economic factors (Pender et al., 2010). These characteristics include one's age, personality structure, race, ethnicity, and socioeconomic status (Pender, 2011). One's age and personal attributes may have directly influenced his or her interest in participating in the program. Often, age affects mobility and energy levels, and with most MS patients being diagnosed between the ages of 20 and 50 years, their enthusiasm for participation may be curbed as work and family demands may take precedence. However, personal attributes may have also influenced that factor, as their previous beliefs about exercise may be dependent upon their attributes, as well as their feelings about age and its impact on activity levels. Race and ethnicity, or one's culture may have impacted their outlook on physical activity, as well as disease processes. Jang et al. (2015) discussed how many Latinos do not see exercise as a fitting activity for older adults, and that many Asian, Indian, Chinese, and Latino cultures view older age as a time to relax and rest. Chinese cultures also view good health as a concept of "luck" and do not see benefit in attempting to change these processes through exercise (Jang et al., 2015). This concept highlights the need for understanding cultural differences, marketing programs to appropriate audiences, and providing culturally appropriate programs. In this program, both participants were Caucasian with an average age of 65.5 years, suggesting that older age was not a factor in choosing to participate. Lastly, one's socioeconomic status may have impacted the success of a program, as potential participants may have lacked transportation to and from classes, or may have found the $3/class fee a barrier to participation.

The next concepts of perceived benefits and barriers certainly may have influenced participation in an exercise program. As touched on previously, prior behaviors, culture, and socioeconomic status may all influence one's position regarding whether or not an exercise class is beneficial. Participants' psychological states may have also influence perceived benefits, as fatigue and depression about their diagnosis may influence their exercise patterns (Ertekin, Ozakbas, Cinar, Algun, & Idiman, 2013; Patten, 2010). Potential participants may have also perceived many barriers to participating in a class, including the time and location of the class, available transportation, financial burdens, level of disability, and available social support.

Perceived self-efficacy, or "confidence in one's ability to engage in exercise" (Kroll, Khen, Ho, & Groah, 2007, para. 1) was a critical factor to consider in this population. MS progresses differently in each individual; therefore, disability levels may vary greatly among potential participants. Understanding that not all patients will feel comfortable or able to participate in exercise is a key to both structuring the program and advertising for it. Making it clear who the program was best suited for, but also making it known that the exercises provided can be modified were important factors that were addressed in the planning of the project.

Interpersonal factors including family, peers, and providers play a critical role in the sustainability of this project. Advertising made it clear that family and friends were welcome to come to the class, as this would provide support to the patient. Through educating his or her support system, one is more likely to continue with the training in his or her home setting, and for some patients, assistance may be needed to complete some of the exercises. In this project, family members did not attend. Situational influences, or the perception of the compatibility with life contexts is also critical to consider (Pender, 2011). Making it clear that the program was intended to train participants in appropriate exercises that can be continued at home, and that

coming to class is not a lifelong commitment, may have aided in enhancing its compatibility with each individual's life circumstances.

Finally, commitment to a plan of action and health promoting behaviors can be done through goal setting (Pender, 2011). Discovering what the participants hope to obtain through participation, and what their long-term goals are is important; however, it was not included in this project. Helping them set long-term goals may have increased the effectiveness and sustainability of the program.

Utilization of the HPM assisted in identifying potential barriers perceived by participants, and also guided the set up and advertisement for the program. Considering one's age, personal attributes, prior behaviors, cultural attributes, functional and logistical barriers, and available support groups assisted in creating a beneficial, sustainable program. Next, the Conceptual Model of Program Evaluation helped guide how the program was evaluated.

Conceptual Model of Program Evaluation

Musick (2006) explains the conceptual model of program evaluation in a five-step manner to evaluate outcomes in the context of evaluating graduate medical education. The core concept of the model is to recognize the steps involved in planning and carrying out various types of evaluation (Musick, 2006). The initial stage evaluates the need and focus of a program to determine why the evaluation should be done and what or who to evaluate (Musick, 2006). Evaluation methodology establishes procedures for how to collect evaluation data (Musick, 2006). Finally, the results stage describes how the data will be presented to stakeholders (Musick, 2006). This model in intended for use in project planning, as well as organizing existing data into rational evaluation framework (Musick, 2006).

Musick (2006) provides a step-wise approach for program evaluation, as well as targeted questions to aid in the process, and was used with permission for the evaluation of this program (Appendix F). Step one determines the evaluation need by asking "Why is the evaluation being undertaken and for whom?" (Musick, 2006, p. 760). In this case, the evaluation was undertaken for a specific project, to improve the piloted exercise program. Step two was to determine the evaluation focus, and asks the question "What entity is to be evaluated?" (Musick, 2006, p. 760). In this program, multiple entities were evaluated, including the participants and marketing strategies of the organization. A thorough organization assessment was conducted to determine the needs and feasibility of the organization, related to available resources and sustainability. Step three asked four questions to determine the evaluation methodology: "When is the evaluation procedure to be undertaken?" "Where are evaluation data to be collected?" "How are evaluation data to be collected?" and "What type of data analyses will be needed?" (Musick, 2006, p. 760). This project evaluated measures prior to, and after completion of the class; evaluation occurred in the clinic and during class sessions; data was collected using tools and methodologies supported by research such as perception surveys and a timed 25-foot walk test; and analysis included differences in attendance rates, and total numbers of patients on mailing lists. More detailed information regarding evaluation is provided in the project plan.

Step four focuses the evaluation on the presentation of results by asking "Who are the key stakeholders who must review the results?" and "When should results be presented?" (Musick, 2006, p. 760). For this project, results were reviewed by project chairs, committee members, clinic personnel, and potentially participants and were presented in an oral presentation during a public session. The final step of the program addresses documentation by asking "How are evaluation results documented and used for program improvement?" (Musick,

2006, p. 760). Results were documented in a written format and were shared with clinic staff to enhance interest and sustainability of the program.

Following the model presented by Musick (2006) provided a thorough framework in which to evaluate the project. It not only addressed the needs early on to assist in planning the program, but was also used to organize data once it was collected. As this project contained many elements to assess, considering the questions posed by Musick (2006) provided a systematic and thorough approach to project planning, execution, and evaluation. A formal model is not available for this theory; however, the step-wise list is available in Appendix G.

Need and Feasibility Assessment of the Organization

The project took place within an outpatient neuroscience clinic associated with an urban hospital in the Midwest. The hospital is comprised of 356 beds and is nationally ranked in several adult specialties (Mercy Health, 2015). The Neuroscience clinic is comprised of 19 clinics devoted to various neurology subspecialties, and also includes specialized therapists, social workers, pharmacists, case managers, and support staff. This project heavily depended upon interprofessional collaboration among physical therapists (PTs), registered nurses (RNs), medical assistants (MAs), physicians, clinic managers, and information technology experts (IT). It also depended on hospital support staff for collecting patient email addresses, scheduling, and reservations.

Other subspecialty clinics within the neuroscience center have functioning exercise groups devoted to particular neurological conditions. A Parkinson's exercise group is offered twice weekly for one hour and draws over 30 participants at each class, supporting the feasibility of this type of project for patients with other neurological conditions. One strength of this organization included having a PT department that is trained and well versed in the needs of MS

patients and is dedicated to caring for and seeing progress in patients with this condition. The availability of and access to hundreds of patients with MS also assisted in making this project feasible at this site. Additionally, there was minimal cost involved in implementation. Clinic staff members are not paid additional wages to teach classes such as this; however, the cost of their salary is a consideration. The hospital foundation, which supports efforts within the hospital that enhance the health of the local community (About, 2015), offers financial and staffing supports to send mailers to patients, eliminating advertising costs for the department. The hospital foundation also provides funding to cover wages related to philanthropic work, such as this program. Finally, there were no additional room fees involved as conference rooms are owned by the organization. Parking was available close to the building, as was free valet parking, decreasing a mobility barrier that may have otherwise been present for this patient population. Aside from operational costs, there were no other costs associated with this project.

There were many professional assets available to assist with this project (PT, IT, OT, RNs, MDs, MAs, clinic managers). However, a lack of communication between the groups created a barrier to the success of project implementation. For example, the IT specialist sends patient reminders via email, yet those in the clinic did not know how patients became part of the email list; additionally, a similar MS exercise group is available through a rehab facility with connections to the hospital, yet few people in the neuroscience center were aware this group existed. However, using the available resources and connecting with the appropriate personnel helped decrease barriers related to communication, and further detail will be included in the project plan.

The project fit with the mission, vision, and promise of the organization. The mission of the organization states that “We serve together in the spirit of the Gospel as a compassionate and

transforming healing presence within our communities;" while the organization's vision statement promises they "will transform the communities we serve. Our faith-based team will continuously innovate to deliver high quality care that is comprehensive, coordinated, accessible and personalized." The organization also has the promise to "be accessible, to listen intently, and to provide expert guidance that empowers you to take an active role in your health care decisions" (Our Mission, 2015). The project aligned with the mission, vision, and promise of the organization by providing better access within the community, delivering access that is personalized, and allowed participants to take an active role in their health.

The opportunities in this organization were endless for a program like this to be successful. The resources were readily available, including staffing needs, space needs, and the overall desire to help patients with MS. The patient population was also readily available due to this being one of the best MS clinics in the state. This provided a very large pool of patients to reach out to. There was also a great opportunity to act as a liaison between the different departments to enhance communication and program and patient outcomes.

This project occurred at an ideal time. The organization had resources readily available, and the costs were minimal. The stakeholders – patients, patient families, clinic staff, PTs, MDs – were supportive, as the idea for such a project was already in the works and the benefit to patients was evident. There was great need, great support, and great feasibility for this project to be effective.

Project Plan

The previous sections highlighted the need and feasibility of implementing the project in the described setting. In this section, further detail will be provided on how this intervention was carried out. It was done so considering the contexts of the conceptual models.

Purpose of Project with Objectives

Research has shown exercise and outpatient exercise programs to be beneficial in reducing symptoms and disease progression in MS (Giacobbi et al., 2012; Martinez & Kravitz, 2013; Pilutti & Hicks, 2011; Ploughman et al., 2014). Stakeholders at the organization piloted an exercise class specific for persons with MS from June 2015 through October 2015; however, attendance rates were low and there was little commitment from participants. Therefore, the purpose of the project was to improve the piloted program to increase attendance and improve participant outcomes. The objectives were one, to assist clinic staff in improvement of an exercise program individualized for patients with MS; two, to evaluate the effectiveness of the marketing and recruitment strategies; and, three, to evaluate the effectiveness of the program on participant perceptions and physical mobility.

Type of Project and Ethical Considerations

Health Resources and Services Administration (HRSA) defines quality improvement (QI) as "systematic and continuous actions that lead to measurable improvement in health care services and the health status of targeted patient groups" (Quality Improvement, n.d., para. 1). HRSA describes the principles of QI as: a process that is patient focused, utilizes collaboration with a healthcare team and the patient, and uses evidence as the foundation (Quality Improvement, n.d.).

This project targeted persons with MS and aimed to create measurable differences in their physical functioning by providing additional exercise education that was outside of what could be obtained in a routine office visit. Exercises were taught by a trained professional with extensive knowledge in the needs of MS patients and were presented in individualized ways to protect the participants from injury. Patients provided a medical release form with the signature

of their primary care provider or neurologist clearing them for exercise (Appendix H). A policy and procedure was created for the event of an emergency.

This project was proposed to the Grand Valley State University Human Research and Review Committee (GVSU HRRC) and the organization's Institutional Review Board (IRB) to determine whether there were any ethical concerns for program participants. The GVSU HRRC determined it was a quality improvement project (Appendix I). This project was undertaken as a clinical QI initiative at the organization and, as such, was not formally supervised by the organization Institutional Review board per their policies (Appendix J).

Setting and Resources Utilized

This project occurred in an outpatient neuroscience center affiliated with a local hospital. The most essential resource for this project was a team comprised of members from various areas within the organization. It included front office staff, as well as a clinic manager, neurology-dedicated IT specialist, MA, RN, MD, and nurse practitioner (NP) from the MS clinic, and a neurology-trained physical therapist. The resources will be discussed based on the role of the individuals involved in the order in which they were involved.

Front Office/Check-in Staff

The front office/check-in staff was essential to both the availability of the needed information for this project, as well as the continued sustainability of the project. Their role was to collect email addresses as patients checked in. This was not only the foundation of the query generated later in the project, but with the new electronic health record system, email addresses will continue to be collected in the future. Patient queries based on International Classification Data (ICD) can be used to generate a report of MS patients with mailing and email addresses for

further marketing. Utilizing a detailed process for collecting email addresses helped to avoid missing data in this project.

Clinic Manager

The neuroscience clinic manager is a bachelor's prepared RN who oversees the various subspecialty clinics within the neuroscience department, and is in charge of the day-to-day operations of the department, as well as managing special needs as they arise. The clinic manager was able to request a query of all MS patients based on ICD codes. This report included patient name, mailing address, email address, telephone number, and other information. This report was used to increase the number of persons who receive email information, and could be used in the future to mail information to patient homes, or call patients with information related to the MS exercise class. The clinic manager electronically sent the report to the IT specialist, who then added the patient emails to her email database. The impact of this action is discussed next.

Neurology Dedicated IT Specialist

The IT specialist played a significant role in the implementation of this project. The general role of the IT specialist is to be in communication with the neurology patients, informing them of events, classes, and general happenings and updates within the neurology department. In this project, the specialist was able to utilize the MS patient query provided to her by the clinic manager, and add email addresses to her database, which is used for all electronic forms of communication. The timeframe of the original plan was not followed exactly. Originally the plan included sending a survey through the monthly email blast to MS patients with a survey to determine day and time preferences to hold the class. Following the results of the survey, the IT specialist was to send the decided-upon information to the MS group at large weeks in advance

to the first class. However, Table 1 below shows the way information was distributed in chronological order. The actual events did not follow the anticipated plan or timeline.

Ultimately, the IT specialist was utilized to electronically send: a survey to determine day and time preferences and collect survey results; information regarding the class, including a flyer with information and a medical clearance form; and weekly reminders for the class on Mondays. The specialist also attended a MS support group where flyers were provided to attendants. Using her talents provided a cost-effective way to distribute information to large groups of patients.

Table 1

Chronological Order of Information Distribution by IT Personnel in Relation to Class Schedule

Material	**Date Sent**
Added MS patient email addresses to database	Feb 18, 2016
Preferences Survey	Feb 25, 2016
Preferences Survey Results Preliminary Report	Feb 25, 2016
Email blast announcing MS exercise class informational flyers would be handed out at support group on March 24, 2016. No class day/time information provided.	March 23, 2016
First MS exercise class	March 30, 2016
Email blast with MS exercise class information	April 5, 2016
Second MS exercise class	April 6, 2016
Email blast weekly reminder	April 11, 2016
Third MS exercise class	April 13, 2016
Email blast weekly reminder	April 20, 2016
Fourth MS exercise class	April 20, 2016
Results of preferences survey (detailed results)	April 20, 2016

MA, RN, NP, and MD Role

In order to disseminate class information further, the MA, RN, NP, and MD placed informational flyers in the MS clinic patient examination rooms. They worked to ensure patients were aware of the opportunity and had access to the flyers with attached medical release forms. Additionally, the MD would sign the medical clearance forms returned by the patients.

Physical Therapist

The role of the physical therapist was twofold. With the assistance of the doctor of nursing practice (DNP) student, evidence-based information was provided to the PT. Using that information, she developed a weekly plan for the class beginning in June 2015. Throughout the course of the project, the PT was utilized to proof and modify any information that was distributed to MS patients. Finally, the largest role of the PT was to teach the weekly exercise class. During the class her expertise was used to modify exercises as needed, and ensure participants were being safe in their movements. She provided constructive criticism and encouragement to participants throughout each class.

Additional Resources

Additional resources utilized included space to hold the class, and equipment for participants to use. The class was held in a conference room in a building attached to the clinic. The PT department supplied yoga mats and resistance bands. Audio/visual equipment and computers already available in the rooms were used to play music during the classes. The minimal amount of resources needed for this project helped make it more sustainable.

Design for the Evidence-Based Initiative

The first step in implementation was patient recruitment. Front office staff at the neuroscience center collects email addresses as patients check in. These email addresses are

attached to the patient profile. The clinic manager requested a query of all MS patients in the electronic health record system (EHR) based on ICD codes. This report provided patient names, email addresses, phone numbers and mailing address and was stored in a locked cabinet in the clinic manager's office. These email addresses were provided to the IT specialist who added them to the email database used to send information to patients related to the exercise program. This list was destroyed at the completion of the project to protect personal health information. Being able to pull email addresses by diagnosis allowed the clinic to increase the number of patients receiving the emails, as prior to the intervention, the only patients on the email list were patients who had previously attended the support group and provided email addresses. Now, all MS patients who were seen in the clinic and provided email addresses receive email information.

Once the population of patients on the email list had grown, the student created and provided a survey to the IT specialist (Appendix K). The surveys requested information about their preferences for class times, and the likelihood of them attending. The survey was sent to patients via an organization-approved system, Constant Contact®. Patient confidentiality is protected because the system does not collect IP addresses when sent in mass, and no identifiable information was collected through these surveys. The non-identifiable information was stored within Constant Contact and required a secure user ID and password to access. This information provided in the survey responses allowed the student and physical therapist to schedule the classes in a way the met the needs of the greatest number of patients and removed some of the perceived barriers by the patients. These barriers were identified through the guidance of the HPM (Pender et al., 2010).

Based on the returned surveys preliminary data, classes were scheduled for Wednesdays from 4:00-5:00 pm. The DNP student created an informational flyer, and flyers were placed in

patient rooms within the MS clinic as well as handed out at MS support groups (see Appendix L). Following the framework of the HPM, advertisements made it clear that the class was inclusive for all abilities and loved ones were allowed to attend, in order to help reduce barriers and address interpersonal support needs; Additionally, flyers advertised that the cost was minimal, taking personal and socioeconomic factors into consideration. The RN worked to ensure MS patients seen in the clinic were aware of the opportunity to attend an exercise class.

A fee of $3/class was charged in an attempt to offset some of the costs of the therapist's wages and return some funds to the hospital foundation, which covered the therapist's time. At the first class, participants were asked to fill out a form providing the memorable birthdate of a loved one for use in coding the surveys while maintaining anonymity (Appendix M). Surveys and timed 25-foot walk tests were conducted on the participants' first day. This provided information to use as baseline measurements regarding physical functioning as well as patient perceptions. The class curriculum was modified based on assessment of participants and the expertise of the physical therapy staff. At the fourth class, the timed 25-foot walk test and a modified perceptions survey were conducted again. The participants' scores were recorded on the same data collection sheet as their scores at the first class, using the code for identification again.

Participants

Participants came from the population of MS patients using the neuroscience center for their MS care. The average age of the two participants was 65.5 years, and the average length of disease duration was 6.5 years. The ratio of male to female participants was 1:1. All participants were Caucasian and English speaking. None of the participants brought family members with them, as their disability levels did not require the additional support.

Measurement

Following Musick's (2006) recommendation, determining how data will be evaluated is important. Data should be measured in a way that will show meaningful outcomes and will reflect what was accomplished during the program. The measurements chosen directly reflect the objectives of the project. Items used to assess the outcome of this group included the number of persons receiving email information, and the number of participants, a timed-foot walk test, and feedback received by participants.

The first objective was originally to assist the clinic staff in development of an exercise program tailored to the needs of MS patients, and was going to be evaluated based on whether the class came to fruition. However, because the program was piloted and significant areas for improvement were noted, the first objective changed to include improving the program. Measuring whether the class improved is somewhat difficult; however, in this case it was considered to be improved if the class format changed to one that was more patient-friendly and met the needs and desires of the patients. This was evaluated by determining if the new class time reflected the survey responses sent to the MS clinic patients.

The second objective, evaluating the effectiveness of the marketing and recruitment strategies, was accomplished by addressing whether the number of persons receiving information had increased, and whether class attendance increased. To evaluate this, baseline measures of the number of persons receiving information and attendance rates were determined. The student communicated with the IT specialist regarding the number of patients receiving the email blasts pre-and-post intervention. Prior to the intervention only 58 people were receiving the email blasts, with 51% of them opening the emails. A discussion of post-intervention measures is discussed in project outcomes.

Related to objective three, evaluating the effectiveness of the class on participant perceptions and physical mobility, perceptions surveys and timed 25-foot walk test were used. Two perceptions surveys were created by the student and differed slightly pre-and-post class. Both surveys addressed participant knowledge regarding exercise and disease progression, appropriate exercises, frequency of exercising, and symptoms following exercise. The pre-class survey also included questions related to their interest in learning more about exercise, and how frequently they might exercise if they had knowledge of appropriate exercises. The post-class survey, completed in week four of the class, included questions addressing if exercise frequency had increased since beginning the class, and if perceptions of mobility and quality of life had changed.

The timed 25-foot walk test was useful in determining the changes in physical function pre-and-post-intervention, and reflected the benefits of conditioning and stretching on gait (Bethoux, 2014; Elshafey et al., 2014; Giacobbi et al., 2012; Hansen et al., 2013). It also provided more precise information about ambulation in MS patients than other measures (Giacobbi et al., 2012). The timed 25-foot walk test is currently used by the neurologists as baseline mobility measures, and is also used to qualify for certain medications.

All measures were developed considering the recommendations of Musick's (2006) program evaluation theory, and were also developed to directly reflect the impact of the project objectives. Further discussion of the measurement outcomes is provided in project outcomes.

Steps for Implementation of the Project, Including Timeline

Steps for the implementation of this project have already been defined in the resources and design of the evidence-based initiative section. A timeline is provided in Table 2 for the actual timeframe of implementation.

Table 2

Implementation Timeline

Phase	Milestones	Timeframe	Dates
HRRC Application	Submit application Obtain approval from both committees	8.5 weeks	12/22/15-2/19/16
I: Patient Recruitment/Determine Preferences	Collected email addresses Generate report with patient emails Provided report to IT specialist Sent survey regarding patient preferences for class days/times Created flyers Distributed flyers in patient rooms Sent email information and reminders	6.5 weeks	2/19/16-3/30/16 (See Table 1 for detailed date information)
II. Implementation and Initial Evaluation	Conduct timed 25-foot walk test at first class Obtained pre-class perceptions survey Conduct Class	4 weeks	3/30/16-4/20/16
III: Final Evaluation	Conduct timed 25-foot walk test at fourth class Obtained post-class perceptions survey	1 day	4/20/16

Budget Reconciliation

This project had very little financial burden. Table 3 provides a detailed cost explanation, as well as where sustainable funds may come from to assist with the cost. Physical therapists at the organization are salaried, therefore no additional wages were paid to teach this class; however, employees may count this time towards their weekly work hour requirements. Taking time outside of their typical workload may have resulted in lower productivity outcomes and generated income for the hospital. The equipment needs as well as the PT's wages and costs of $5,200 for one-year coverage of the class were covered by the hospital foundation MS-specific

funds. While $5,200 is a significant amount, that same amount was saved in wages and benefits from the physical therapy cost center through the hospital. Ultimately, the $5,200 cost was reallocated from hospital funds to foundation funds. Foundation funds are provided through donors. The foundation looks for ways to fund philanthropic work, and according to hospital stakeholders, the funds specifically allocated for use in the MS clinic had not been used in several years. There were significant amounts of funding available for use in the MS population; therefore, these funds were willingly given.

Additionally, participants paid $3/class; that money was returned to the hospital foundation for a total of $21.00 being returned to the fund during the four-week period. This money will continue to be returned to the hospital foundation as long as the program is sustained, and will grow if attendance improves. It is difficult to estimate the amount that will be returned to the foundation in a one-year period, as it is attendance-based. Outside of operational costs, i.e. utilities, there were no costs associated with renting rooms to hold the class in, and the physical therapy department was already in possession of all necessary equipment (yoga mats and resistance bands). There were costs associated with the initial purchase of the equipment and keeping it up to date, but no additional equipment was purchased for this project.

The National Multiple Sclerosis Society (NMSS) had funds available up to $100/person to help cover attending wellness activities (S. Arnot, personal communication, January 25, 2016). A one-page application process is required to receive the funds, but money could be used for class or transportation fees. The participants were provided information regarding these funds if they participated in the preferences survey. All of the recruitment was done via email and in-office flyers, so there were limited printing costs associated with the flyers. This project has very little financial burden on the organization, making it more feasible and sustainable.

In summary, the program cost approximately $5,200 in therapist wages and equipment needs for one year, or $400 for the duration of this project. Since this amount was covered by the hospital foundation, which is funded through donors, the physical therapy department would save approximately $5,200 in one year, or $400 for the duration of the project. Based on the average reimbursement for a 60 minute visit with a Medicare patient, loss in productivity for the four weeks the project occurred totaled approximately $480; however, reimbursement is difficult to estimate, as billing is different based on insurance type and the procedures performed.

Table 3

Detailed Itemized Budget (Parentheses represent financial savings)

	PT Wages	**Loss in productivity (per Medicare patient)**	**Patient Cost (per patient)**	**Total Financial Impact (1 year)**
Per Class	$100	$120	$3	-
Per Program (4 weeks)	$400	$480	$12	-
Per 1 year	$5,200	$6,240	$156	-
Impact on Hospital (1 year)	($5,200)	$6,240	$0	$1,040
Impact on Foundation (1 year)	-$5,200	$0	($156)	-

Although the PT department saved approximately $400 in PT wages during the four-week project period, a net loss of approximately $80 occurred due to loss in productivity. Again, this number is difficult to accurately estimate due to differences in reimbursement rates and procedures. If participation in the program grows, the hospital fund will recoup some of the money spent. Further, funding to aid in covering therapists' wages is available through the

NMSS and should be considered for sustainability. Additionally, if the class time was held after typical work hours, and at a time that was fitting for more people, the physical therapy department would not experience a lost in productivity.

Project Outcomes

The neuroscience center supports a number of community benefit programs in the neurosciences. The stakeholder piloted an exercise program tailored to the needs of patients with MS from June 2015 through October 2015; however, attendance rates were poor. Attendance rates ranged from zero to six participants throughout the pilot, and attendance was sporadic and inconsistent. Despite good opportunity, participants did not gain as much knowledge regarding the importance of exercise or appropriate exercises to perform with MS with limited meeting times and variable attendance. Therefore, the aim of this project was to improve the piloted class to increase attendance rates and improve participant outcomes.

Based on Musick's (2006) recommendations, determining when data should be collected and how data should be collected are essential in the evaluation of a program. For this project, data were collected during the fourth week of the class, as the physical therapists reevaluate therapy needs after four weeks of PT. Additionally, based on the objectives, data collection included what changes were made to the class and how it was improved, the number of participants receiving class information and attendance, and finally, participant perceptions and physical measures. The following section will be organized following the project objectives: first, to assist clinic staff in improvement of an exercise program individualized for patients with MS; second, to evaluate the effectiveness of the marketing and recruitment strategies; and third, to evaluate the effectiveness of the program on participant perceptions and physical mobility.

Objective One: Program Improvement

Due to the extensive planning that occurred prior to the pilot class, only minor changes were made to the original class. In the pilot class, all exercises included were evidence based, and this did not change; however, the formatting of the information was altered slightly. Pilot classes occurred once per month, and were designed to include a variety of exercises in each session, including strength and conditioning, balance and coordination, and light cardiovascular exercises. The same exercises were repeated at each monthly session during the pilot class. Repeating the same exercises did not provide as much opportunity for continued learning and growth, or aid in participants finding different exercises to meet their specific needs.

During the implementation of this project, the class format was changed to a weekly meeting, based on survey results of preferred days and times of MS patients within the clinic. The weekly class sessions allowed participants to experience a more fluid program. Taking into consideration the HPM's concept of commitment to a plan of action, the weekly format may have added a level of commitment, and added ease to forming a routine or habit (Pender, 2011). Gardner, Lally, and Wardle (2012) discuss five steps that contribute to developing a new habit. These include setting a goal, planning where one can practice the goal, practicing a simple step related to the habit every day, and often after 10 weeks, new habits are formed (Gardner et al., 2012). Within the context of the class, having a time and place where individuals can practice and learn exercises, then applying simple exercises daily at home, such as balance challenges while brushing teeth, one may develop a new routine of exercising daily after 10 class sessions. Applying Pender's concept of goal setting would be appropriate and aid in the new habit formation and commitment to the class. As participants experience progress towards reaching their goals, they may be more committed and enthusiastic about the program.

All weekly classes included a variety of exercise types that were evidence-based and appropriate for MS patients [strength and conditioning, resistance, balance and coordination, light cardiovascular exercises] (Dlugonski et al., 2011; Garrett & Coote, 2009; Giacobbi et al., 2012; Harltey, 2009; Huisinga et al., 2011; Pilutti & Hicks, 2011). However, each class session incorporated new exercises for each category of exercise listed above. This allowed participants to learn a variety of exercises that could be applied at home, based on his or her specific need. For example, one participant struggled with getting in and out of her vehicle. One of the exercises taught in the third week of class targeted the hip flexor, which was her weakest muscle and biggest barrier to mobility with entering a vehicle. She was able to apply this exercise at home with hopes of increasing her strength and mobility by specifically targeting her hip flexor. The HPM suggests the use of goal setting for individuals (Pender, 2011). This concept was not formally incorporated into the project; however, it was talked about casually during the exercises. This patient demonstrated personal goal setting by stating she would like to continue practicing this exercise to improve her ability to transfer in and out of vehicles.

The minor changes made from the pilot class had several impacts that improved the class. Changing the class format to a weekly, versus monthly, meeting, allowed participants to experience a more fluid learning format and improve knowledge retention. Through the weekly format, previously-learned exercises were reinforced and practiced, and new exercises were taught more frequently than the pilot format. It provided participants the opportunity to participate in safe, supervised exercise more frequently, which may have greater impacts on their health. Bailey and Brook-Wavell (2009) found that post-menopausal women who performed mild weight-bearing exercises daily had statistically significant increases in bone mineral density, compared to those who exercised less frequently, or did not exercise at all. This finding

supports that more frequent exercises classes may significantly impact bone health, as well as help foster new habits (Bailey & Brooke-Wavell, 2009; Gardner et al., 2012).

The weekly class format also encouraged a greater sense of commitment and also appeared to foster deeper, more consistent relationships between the participants and therapist. Pender (2011) discusses the importance of interpersonal factors, including family and peer support; stating that support from others contributes to better health habits. Continuing a weekly format is preferred in order to maintain and improve the growth of participant knowledge related to exercise, and continue strengthening the relationships, as social support has been well documented in relation to overall wellbeing and quality of life (Cheifetz et al., 2014; Giacobbi et al., 2012).

Objective Two: Evaluation and Effectiveness of Marketing and Recruitment Strategies

Based on the organizational assessment, it was essential to increase awareness of the exercise program. In order to do so, the clinic manager generated a query of all patients in the EHR with MS. There were over 600 MS patients in total. The list was provided to the IT specialist who was able to add 207 valid email addresses to the list of email recipients. Doing this increased the number of recipients from 58 to 265, which represents a 357% increase. However, 21 of the emails were not delivered due to invalid email addresses. Of the 244 emails that were delivered, 62 people opened them, or 25.4% of the recipients.

Following the increase of persons who receive electronic information, a survey was sent regarding preferred days and times for the class to meet. These surveys were delivered to 244 persons on the email list, and 15 persons responded (6.1%) stating preferred day and time for the class. There was not a clear majority preference. Wednesday afternoons and Thursday evenings were the overall preferred days, as 40% of respondents preferred Wednesdays and 33.3%

preferred Thursdays. Comparing the other days, 13% preferred Tuesdays from 6:00-7:00pm, 2% preferred Thursday from 9:00-10:00am, and 12% were unavailable for all of the options. Eighty-six point seven percent of respondents were willing to pay $3 per class, and 13% were willing to pay $1 per class. However, of the 40% who preferred to meet on Wednesdays from 4:00-5:00pm, 75% were only willing to pay $1 per class. One person (6.2%) was not willing to pay any monetary fee for the class. Of the 15 respondents, all of them were 'somewhat interested' or 'very interested' in the class, 33.3% and 60%, respectively, and one person did not complete that question. Flyers and information was provided to participants of the MS support group. During this session, five people filled out medical clearance forms and planned on attending the first class. Additionally, flyers were placed in the examination rooms of the MS clinic, and the RN, MD, MA, and NP worked to ensure patients were aware of the class by distributing the flyers.

The recruitment technique of generating a query of all MS patients in the EHR and adding them to the email recipient list was highly effective in increasing information distribution. Despite these efforts, class attendance did not increase as expected. The first class session had one attendant, and one other had emailed stating she did not have the energy on that particular day, but hoped to attend other classes. All following classes had a total of two participants. Again, considering the concepts of the HPM, as well as the demographics of the MS population, many barriers may have been present. Pender describes competing demands, age, and race and ethnicity as potential barriers (Pender, 2011). Those diagnosed with MS are often between the ages of 20 and 50 years; this may increase the immediate competing demands as work and family commitments may take precedence. Additionally, the organization serves a racially and ethnically diverse population of patients. As previously discussed, many racial and ethnic groups have differing views on exercise (Jang et al., 2015), which may have contributed to poorer

attendance. Unfortunately, the class attendance rates did not improve; however, the participants did attend consistently, unlike the attendance during the pilot class in which attendance was sporadic. Consistent attendance is an improvement and may have longer lasting positive effects on the health of participants, as demonstrated by Bailey and Brooke-Wavell (2009), and enhance sustainability.

Many factors may have contributed to the continued poor attendance rates. As previously discussed, there was not a clear day or time preference among participants of when to hold the class. Additionally, details of the survey, including results of willingness to pay for the class, were unavailable when the class time was chosen. Increased communication from the IT department may have remedied this barrier and led to a different class time when more persons were willing to pay the $3 fee. Further, class information regarding the chosen class day and time was not disseminated via email prior to the first class day (Table 1). This information was only disseminated to those who attended the MS support group. Class information was distributed via email one day prior to the second class, but participants had short notice and may have felt they were behind if they missed the first class, and may have chosen not to attend. McLean et al. (2014) studied the timing of reminders and found that information being sent simply to 'jog one's memory' should be sent two to three days prior to the appointment or meeting for best attendance. This study supports the timing of the weekly email reminders that were sent two days prior to the event. However, other information should be sent one to seven days prior to the event, allowing time for participants to make arrangements (McLean et al., 2014).

Also, as discussed further in the limitations section, information was only distributed to those who have internet access, regularly check email, and can read English. Flyers were also only available to patients who had appointments in the clinic during the six-and-a-half weeks the

flyers were available prior to the start of the class. In addition to the logistical barriers, the HPM concepts of immediate competing demands, such as work and family, age, race, and ethnicity may have also contributed to poorer attendance (Pender, 2011). McLean et al. (2014) support the use of text messaging as an effective method to send reminders. Although such systems are costly to invest in, they could be used for patient reminders for clinic appointments and other events as well, reducing the costs of missed appointments. Sustainability may be increased if marketing strategies extend into mailing or texting information to home addresses and providing it in multiple languages.

Objective Three: Evaluation of the Effectiveness of the Program on Participant Perceptions and Physical Mobility

At the first session for each participant, the perceptions survey and timed 25-foot walk test were conducted. Demographic information was also collected. Class participants had an average age of 65.5 years and average disease duration of 6.5 years. The male to female ratio was 1:1. As described previously, two perceptions surveys were created by the student and differed slightly pre-and-post class (see appendix B and C). Both surveys addressed participant knowledge regarding exercise and disease progression, appropriate exercises, frequency of exercising, and symptoms following exercise. The pre-class survey also included questions related to their interest in learning more about exercise, and how frequently they might exercise if they had knowledge of appropriate exercises. The post-class survey, completed in week four of the class, included questions addressing if exercise frequency had increased since beginning the class, and if perceptions of mobility and quality of life had changed.

There was an improvement in patient perceptions of their knowledge and activity levels from the first class session to the last class session. Participants gained knowledge that exercise

can slow the progression of MS, and also gained knowledge regarding exercises that are appropriate for those with MS. Participants strongly agreed that this class increased their frequency of exercising and that their symptoms following exercise were somewhat better or much better. Most importantly, both participants agreed that their mobility and quality of life had improved since exercising more. In previous exercise-related research in persons with MS, some reports noted a slight improvement in quality of life (Cheifetz et al., 2014; Garrett & Coote, 2009; Hartley, 2009; Ploughman et al., 2014); however, some reports lacked data or did not report improvement (Hale et al., 2013). While many research studies that addressed quality of life had intervention timeframes much longer than this project, it is encouraging to see pronounced improvements after only four weeks. This may be attributed to the weekly meeting format with small class sizes that fostered positive relationships, as well as increased frequency of exercise, which improves health and mood (Ertekin et al., 2013; Gardner et al., 2012; Patten, 2010). Improvements of quality of life in this project were encouraging and may help support sustainability.

Perceived benefit, as evidenced in the outcomes, likely increase the commitment not only to the exercise program, but to exercise in general, and may decrease the perceived barriers (Pender, 2010). Word of mouth has been reported as the most effective marketing tool (Withall et al, 2012). As the class participants were also heavily involved in the MS support group, word of mouth may spread and increase attendance at the exercise program as they report their improvements and perceived improvement in quality of life.

Following Musick's (2006) recommendations for evaluation, determining how data should be analyzed is important to evaluating the outcomes. Improvement in the timed 25-foot walk test was noted. For healthy individuals, the average timed 25-foot walk score is 3.7

seconds; for those with MS, the average timed 25-foot walk test score is 4.4 seconds (Phan-Ba et al., 2011). During the first class session, one participant had a 25-foot walk time of 11 seconds. Reassessment during the fourth class showed an improvement to a 25-foot walk time of four seconds, or a 63.6% decrease in her average walk time. The improvement displayed through this four-week program was higher than average in other research. One study, mentioned previously, noted a 24% increase in mobility following a four-month progressive resistance-training program, with an average improvement of 13% (Giacobbi et al., 2012). Interestingly, the participant in this program did not attend the first class, so repeat measures were taken after only three class sessions. This is a significant improvement and may have many implications for this individual. An improvement of 63.6% after only three sessions was encouraging for the participant and provides hope for continued improvement. The participant had reported increase in activity level due to class attendance, applying the learned exercises at home, and improved weather since the beginning of the class that allowed her to exercise outdoors more frequently.

The improvements noted on both participant perception of knowledge, mobility, and quality of life, as well as physical measures, address the core of what this project aimed to do. Despite having lower attendance rates than originally hoped for, improving the quality of life and mobility for a few individuals is meaningful. Participants valued the class enough that they anticipated continuing to attend the class, which may only enhance the improvements noted. Future class instructors may want to incorporate a presentation of the benefits of exercise to further educate MS patients, as details of that association are often overlooked during short, routine visits with a neurologist.

Discussion

Overall, there was a noteworthy increase in the volume of persons receiving class information. This increase in information distribution may be very beneficial to the patients, as they will now also receive information related to all events within the MS clinic. However, the number of persons opening the emails post-intervention was lower than the number pre-intervention (25% open rate, compared to 51% open rate, respectively). However, by significantly increasing the number of email recipients, matching or exceeding the previous open rate is much more challenging. The 25% open rate reflects and slightly exceeds current statistics that show, on average, 22.8% of recipients open emails (Return Path, 2015). Ultimately, more recipients were opening the emails post-intervention than the number of persons even receiving information pre-intervention. This improvement in the number of persons receiving information is very valuable, as more individuals will have knowledge of all events happening within the MS clinic.

Perceptions and physical outcomes were both improved after four weeks of class. Participants felt more knowledgeable about the relationship between exercise and the disease process, as well as exercises that are appropriate for persons with MS. They also felt their exercise frequency had increased and that their perceived mobility and quality of life had improved. Improvements in the timed 25-foot walk were noted, as one participant had experienced a seven second decrease in her score, or a 63.6% decrease. Pender's Health Promotion Model suggests that prior related behaviors are predictive in future habits (Pender et al., 2010). While the participants were both already quite physically active prior to the class, both stated their frequency of exercise had increased. The greatest outcome was hearing a participant state "between this beautiful weather letting me out more and this exercise class, I've been

feeling so good I left my cane at home tonight." Feedback such as this provides meaning to the project and displays the individual impact participants' experience. Additionally, positive outcomes may enhance the sustainability of this program, as word of mouth is the most effective marketing strategy, as previously noted (Withall et al., 2012). Further discussion of how these findings can be applied in practice is provided below.

Implications for Practice

Several successes occurred, despite numerous difficulties, and many recommendations can be gleaned for future purposes. A discussion of both strengths and weaknesses related to each objective is provided, followed by a summary of the project strengths and successes, as well as difficulties and weaknesses. A plan for sustainability is offered.

Objective One: Program Improvement

The goal of objective one was to improve the class from the piloted version. The details of how this was done have been described in project outcomes. The pilot class already had many strengths; however, improvement included changing the class format to a weekly meeting, rather than a monthly meeting, and creating more variety among the exercises that were taught. Further discussion of the strengths and weaknesses is provided.

Strengths and Successes

During the pilot class, attendance was very sporadic and rarely did the same persons attend class more than once or twice. Changing the format of the class from a monthly meeting to a weekly meeting increased the commitment to the program and provided a more fluid learning style for participants. The weekly format aids in the development of forming new habits that can be carried on. The weekly format not only reinforces the material that is taught, but also provides a safe outlet where participants can practice and perform the exercises more frequently,

ultimately bettering their health and bone strength (Bailey & Brook-Wavell, 2009). Also, changing the format from a monthly meeting to a weekly meeting will provide opportunity for greater physical, mental, and social benefit to those who do attend. Peer and social support has been cited as beneficial in health and health-related outcomes (Cheifetz et al., 2014; Giacobbi et al., 2012).

Another strength of changing the class format included adding a greater variety of exercises. Adding variety to an exercise routine allows participants to build new muscles, prevents boredom, and can positively impact individual's brain health and cognition, as the body is forced to learn a new movement (Wadyka, 2012). Adding cognitive challenges, such as counting backwards while balancing, to the newly added exercises may be beneficial, as many with MS experience cognitive declines (Pilutti & Hicks, 2011). Both the pilot program and the program implemented for the project included exercises that enhanced strength and conditioning, stretching, balance and coordination, and light cardiovascular exercises. However, the pilot class repeated the same exercises every month, whereas the new format allowed for new exercises within each category to be taught. During the course of the program, participants experienced exercises they did not enjoy doing, and likely did not practice at home; however, as new exercises were taught, they discovered different exercises that targeted the same muscle groups, but were more tolerable based on their individual limitations and needs. One participant discussed how she now includes certain exercises learned in the class into her morning routine and other daily tasks, such as the balance exercises while brushing her teeth.

Weaknesses and Difficulties

In meeting this objective, several weaknesses and difficulties were encountered. As the main goal of this objective was to change the format of the class, a survey was sent to all MS

patients who had provided valid email addresses. The survey included questions on preferred days and times for a class to meet. As previously mentioned, a lack of consensus among survey participants created difficulty in choosing a class time that was fitting for a variety of schedules. The chosen time accommodated a large percentage of survey participants and also worked best for the therapist's schedule. Choosing to hold the class on Wednesdays from 4:00-5:00 pm may have limited the number of interested parties. However, of the 40% who preferred to meet on Wednesdays from 4:00-5:00pm, 75% were only willing to pay $1 per class.

Socioeconomic factors and competing demands are strong predictors of participation of activities (Pender, 2011). This may have greatly limited their ability to participate, despite having funds available through the NMSS. The details of the survey responses were unavailable at the time the class day was chosen and only preferred day information was available (see Table 1). This information may have significantly impacted the decision to hold the class at the chosen time and charge the chosen amount. In order to decrease this barrier for future programs, decisions on when to hold a program should not be made until all detailed information is available.

The original plan included having the participants RSVP for a four-week session, as this would potentially increase the commitment from participants without requiring a long-term financial or time commitment in an attempt to decrease interpersonal barriers discussed by Pender (Pender, 2011). However, stakeholders within the organization preferred an ongoing class format without requiring an RSVP, as they felt it would provide a more sustainable program. This may have decreased the perception of commitment among participants and increased the perception of financial obligation. However, an increased level of commitment was demonstrated with the weekly format, compared to the monthly format. Adding a survey

question on whether participants prefer on ongoing class format, or a sessions format may provide greater insight and help program leaders determine the best format to maximize commitment and impact. This question should be added for future replications of this project.

Objective Two: Evaluation and Effectiveness of Marketing and Recruitment Strategies

The goal of objective two was to increase the number of persons receiving class information to increase attendance. The strengths and weaknesses encountered during this phase are discussed. Further recommendations for sustainability are provided in the sustainability plan.

Strengths and Successes

One of the greatest successes of the project was a 357% increase in the number of persons who are now able to receive email information. Not only is there the potential for them to keep receiving information related to the MS exercise class, but they now receive information about all activities and updates related to the MS clinic. This may provide them with many other resources to help ease the challenges they face in living with MS, such as MS support groups, MS-related speaker events, NMMS events, clinical drug trials, and more. Simple changes, such as generating queries of patient groups, can create significant improvement in the lives of those living with disease through providing additional information and resources. It is recommended that organizations assess how and to whom information is being distributed, and consider simple ways to increase the volume of persons receiving information.

Communication is the most important aspect of getting a program started and maintaining it. Evaluating how, when, and to whom current information is being distributed is key in identifying where changes should be made. With modern technology and current electronic health records, generating queries is easier than ever. Simply by creating a report of current MS clinic patients, data can easily be imported into the mailing list. Increasing the distribution of

information electronically was an excellent and simple way to start; however, more can be done and is discussed in the sustainability plan.

Difficulties and Weaknesses

Despite increasing the number of persons receiving the information and choosing a time to hold the class that seemed to be more fitting to individual's schedules, information was often not sent via email to the patients, or was sent the day before or the day of classes being held, providing very little time for participants to plan for the class. Although 15 responses to the preferences survey were received, none of those respondents received information electronically regarding when the class had been scheduled prior to the first class day (see Table 1). Some of those who should have received electronic information attended the support group where the information was shared; however, not all of the survey respondents were in attendance. Reminds to jog individual's memories should be sent two to three days prior to the event (McLean et al., 2014). Weekly reminders were scheduled to be sent on Mondays, two days prior to class, however, the delivery was not consistent (see Table 1).

The lack of consistency in communication presented a huge barrier. Often, control of the communication may be out of the hands of program leaders. Program leaders should schedule regular meetings with the IT personnel, or handle communication on their own if possible. Setting up a clear schedule of what should be sent and exact dates may help reduce the barriers encountered during this project. Sending out the preferred days and times survey more than once may generate a greater response. Additionally, research suggests that sending short message service (SMS) reminders, better known as text-messages, significantly increases the likelihood of patients attending appointments (Guy, Hocking, Wand, Stott, Ali, & Kaldor, 2012; McLean et al., 2014). Using a SMS reminder may target a wider population of persons and generate more

interest. However, bearing in mind alert-fatigue, is important not to overwhelm participants. Numerous studies report the reality of alert-fatigue, or disregarding information that individuals are constantly alerted of (Baseman, Revere, Painter, Toyoji, Thiede, & Duchin, 2013; Footracer , 2015; Schleyer & Thyvalikakath, 2012); however, email-fatigue has less conclusive evidence as older reports show email-fatigue to be more of a problem than more recent reports (North America, 2010; Return Path, 2015). Overwhelming recipients with too much information or continual reminders may cause them to stop reading the information and hinder attendance.

Objective Three: Evaluation of the Effectiveness of the Program on Participant Perceptions and Physical Mobility

The final objective of the program was to evaluate the effectiveness of the program on participants' perceptions and physical mobility. This is where some of the most profound successes were encountered, as previously discussed in the program outcomes. Further discussion of strengths and successes as well as difficulties and weaknesses are provided.

Strengths and Successes

Another great success of the project is the increased perception of knowledge, frequency of exercising, and improved symptom control, mobility, and quality of life among the participants. Often, perceived health has a greater impact on individuals' physical health (Milani, Ashktorab, Saeedi & Majd 2012). Noting an increase in perceived knowledge as well as quality of life and mobility may have significant impacts on the participants' daily activities, as they may now feel more inclined to continue exercising and participate in routines. Additionally, noting a significant improvement in the timed 25-foot walk may also encourage continued participation in the class and an overall greater sense of wellbeing. The fact that one participant

decreased her time by seven seconds and felt that it was unnecessary for her to use her cane on the last class day was a huge success for this individual.

Many factors likely contributed to the improvements seen in both perceptions and physical mobility measures. The timing of the class fell when weather was improving. This allowed participants to take their knowledge and apply it outdoors, if desired. Six to 14% of the United States population experiences some severity of weather-related depression (Targum & Rosenthal, 2008). As the weather improved during the course of the program, participants may have experienced elevated moods and a greater desire to be active. This may have contributed to the improvements experienced by the participants. Further recommendations for improvement are discussed in program sustainability.

Difficulties and Weaknesses

Very few difficulties were encountered during implementation of the third objective, as participants were very willing to complete the surveys and timed 25-foot walk test. Consistent attendance by both also aided in the ease of collecting this information. However, weaknesses in the collection were present.

The greatest weakness was the timeframe chosen to reassess. Data collection was done at the fourth week of the class. However, one of the participants had not attended the first class, and data on this individual was collected after only three sessions. All research reviewed had much longer implementation times, often three to four months. Little information was available on physical improvements after four weeks. Allowing more time for the participants to learn and participate in exercises may have led to even greater improvements and should be implemented in future projects. Ongoing data collection from the physical therapist may provide further insight to the continued progress of the participants. Other measures could also be used to

address progress, such as the Timed Up and Go (TUG) test, six-minute walk test, or 10 meter timed walk (Negahban et al., 2013). Assessing progress using different tests may provide new and additional insights.

Finally, the pilot class included a brief presentation on the benefits of exercise in MS. This presentation was not included during the program, mainly due to time constraints. Including this presentation may have created a greater improvement in perceived knowledge and perceived benefit of the class. Additionally, having few participants in the class limited the richness of the data and made it difficult to analyze the true effectiveness of the class. Further recommendations for improvement are included in the sustainability plan.

Summary of Project Strengths and Successes and Additional Considerations

The project experienced much success. The class format was improved, additional exercises were incorporated, and greater commitment to the class was observed. Additionally, improvements in patient perceptions of knowledge, frequency of exercise, symptom control, mobility and quality of life were noted. Further, physical measures were improved after only three weeks. All of these successes reflect what was hoped for when planning the class and will continue to have lasting impacts on the participants.

An additional success of the project was increasing awareness and support from clinic personnel in many areas. This included support from the MS clinic RN and MD, the PT and PT department supervisor, the neuroscience clinic manager, the IT personnel, and the director of neurology. By enhancing their awareness of the benefits of exercise, they may each influence MS patients in positive ways.

Summary of Difficulties and Weaknesses and Additional Considerations

This project encountered both many successes and difficulties. Throughout the entirety of the project, a lack of communication was the single biggest difficulty and barrier to the success of the project. Timeframe was also a weakness in this project. Had more time been given to allow the patients to respond and plan for the class, better attendance may have been achieved. Finally, this is a difficult population to target. The Parkinson's Disease exercise class is highly successful, but targets a population much different than the MS population. Many in the Parkinson's class are retired and have strong spousal support (R. Bischoff, personal communication, March 29, 2016). Many individuals with MS are of working age and are physically and mentally capable of working, limiting their time and energy to participate in an exercise program. Despite planning the MS class in a very similar format, the population differences between MS patients and Parkinson's patients may account for the remarkable difference in participation.

Recommendations for Sustainability

Based on the above-described strengths and weaknesses, successes and difficulties of the project, there is much potential for sustainability. The director of physical therapy plans to sustain the class for a minimum of six months. However, many recommendations can be made to improve the process. An organizational assessment needs to occur. This type of evaluation highlights what needs are present, as well as any competing demands, breakdowns in communication, and potential barriers to the success of a project. Using models such as Musick's (2006) can aid in this process. Consider what needs to be evaluated: resources - both physical and personnel, funding, stakeholders, commitment from necessary personnel, and who the target population is and the demographics of the target population. Once demographics are identified,

Pender's HPM easily helps identify concepts to consider in planning. This assessment must occur prior to setting objectives. Further recommendations for sustainability will be presented based on the objectives identified in this project.

Objective One: Program Improvement

Before beginning program improvement, evaluating the current state of a program is necessary in order to identify where improvements need to be made. Factors to consider assessing include: how information is being distributed, to whom is the information being distributed, what information is being distributed, when the program is meeting, frequency of meetings, who is in charge of each aspect of the program (teaching, information distribution, data collection, etc.), what is going to be measured, and how it is going to be measured. Refer to Musick's (2006) theory list 1 in appendix G. This process can be repeated throughout the course of the program to enhance sustainability.

In order to sustain the program, the class meeting times should be re-evaluated as needed. Prior to implementing the class, the day and time preferences survey should be distributed more than once, bearing in mind alert fatigue (Baseman et al., 2013; Footracer , 2015; Schleyer & Thyvalikakath, 2012). This may generate a greater response rate than experienced in this project. Reevaluating meeting times periodically may be beneficial as schedules may change during the summer months. Sustainability may also be increased if reassessment of preferred days and times includes a question on preferred format of the class, such as an ongoing weekly, "drop-in" format or a "class" format. Promoting information related to the funding that is available for participants through the NMSS may help reduce the financial barriers and increase sustainability, and ultimately returned profit to the hospital foundation. Further, the NMSS has some funding

available to cover the wages of therapists. Receiving funding from the NMSS would eliminate any financial burden on the organization.

Additional measures that may enhance sustainability include keeping up to date on current evidence-based exercises. This will allow for a greater variety in exercises to be taught and enhanced health for participants. Allowing the therapist time during the day every month or every few months may promote further research on appropriate exercises, although, it may not be cost-effective for the organization.

Objective Two: Evaluation and Effectiveness of Marketing and Recruitment Strategies

Many recommendations can be made to enhance the sustainability of the program related to marketing and recruitment strategies. Currently all marketing was done through electronic information and flyer distribution in patient examination rooms. Expanding the marketing efforts via mailings to home addresses may increase sustainability. Additionally, the use of SMS reminders may increase attendance and expand the target population (Guy et al., 2012; McLean et al., 2014). Limitations related to the marketing efforts used are discussed further in the limitations section.

Early on, flyers, posters and banners create the greatest recruitment impact (Withall et al., 2012). However, according to Withall et al. (2012) word of mouth is often the best marketing and recruitment tool later in the recruitment process. Encouraging current participants to urge their friends with MS to attend may improve attendance. Allowing additional time to spread the word may provide enough attendance to maintain the class for a longer period of time. Physician-based recruitment has also been shown effective (Rice et al., 2008). Currently physicians are aware of the class and flyers are placed in their examination rooms. However,

scripting the physicians or being more proactive with their recommendations may be beneficial to the sustainability of the program (Rice et al., 2008).

Objective Three: Evaluation of the Effectiveness of the Program on Participant Perceptions and Physical Mobility

Finally, there is room for improvement in the sustainability of objective three. Considering the concept of goal setting in relation to the HPM, goal setting could be a greater focus in the class. A question could be added to the pre-class perceptions survey regarding individual's goals. Goal setting could also be discussed during the first class period to make goal setting a more intentional part of the program. Goals could be reassessed throughout the program. As participants see they are reaching their goals, continued commitment to the class may be observed (Pender, 2011).

Including a presentation in the first class regarding the benefits of exercise related to MS may increase their knowledge and encourage continued attendance. This presentation was incorporated during the pilot class, but not during the program due to time limitations of class sessions. Planning for a 5-10 minute presentation would be beneficial for the first class, if a "class" format is continued. An informational pamphlet may be more beneficial if a "drop-in" format is preferred. If time restraints remain an issue, informational pamphlets could be handed out. Also, re-evaluating physical measures every four-to-six weeks may help encourage participation as greater physical improvements are noted, thus helping to sustain the class.

Overall, working with the interprofessional team and having intentional meetings may increase sustainability. Creating agreed-upon timelines of what and when information should be sent may reduce some of the barriers that were experienced during the project. Expanding the advertising methods to include more than electronic means, while keeping the literature easy to

read and fun in appearance may help sustainability of the program (Guy et al., 2012; McLean et al., 2014; Withall et al., 2012). This program did not impose significant financial burden on the organization; however, the hospital foundation contributed a significant cost to sustain the program for one year. Funds are available through the NMSS to assist in covering therapists' wages. Receiving funds through an outside organization would eliminate nearly all costs for the organization. Further, holding the class at a time that does not interfere with the workday would decrease loss of productivity costs. The project has a lot of potential for sustainability. Achieving successful community groups like this project take time. The PT and IT staff are willing to continue working to improve and maintain the class as long as there is interest from patients and community members.

Limitations

There were many limitations within this project. Limitations occurred in marketing and recruitment techniques, written communication, meeting times, considerations of population demographics, sample size, and timeframes. Further discussion of each is provided.

Limitations in Marketing and Recruitment

There were many logistical limitations related to marketing and recruitment. Limitations included only sending electronic information to those who had provided email addresses and had ongoing access to the internet. This may have limited the awareness of the program as well as the number of attendants. Recommendations were made to address this limitation, including sending mailings to home addresses and considering the use of SMS messages. A further related limitation is that patients who provide email addresses must 'opt-in' in order to receive email information. When an email address is added to the database, an email is sent requesting the individual 'opt-in' or 'opt-out' of receiving emails from the organization. If an individual

chooses to ‘opt-out,’ no further email communication can occur with this individual. This limits the number of persons to whom emails can be sent and prevents the organization from targeting the group at large electronically. Unfortunately, this is a policy issue that is not easily fixed. Policies may be changed in order to remove this barrier; however, the Health Insurance Portability and Accountability Act (HIPAA) greatly restricts the available options in reducing this barrier.

Limitations in Written Communication

The organization serves a diverse population of patients. Kent County, Michigan statistics indicate that 82.4% of residents are White, 9.8% are Hispanic, and 9.6% are African American (2015 Community Health, 2015). Additionally, as of 2013 over 570 refugees from 14 different countries moved to Kent County (2015 Community Health, 2015). While the county has a higher than average rate of residents with a post-secondary education, it also has a higher rate of high school dropouts (12.3%) than state average (2015 Community Health, 2015). Approximately 15.5% of county residents live in poverty (2015 Community Health, 2015). Taking the demographics of the population into consideration is important when planning communication techniques.

Unfortunately, all written information was only provided in English, which may have limited the population of participants. Providing the information in both English and Spanish may increase the number of participants. Doing so would not increase the cost if additional information was sent via electronic means. However, mailing double-sided (English/Spanish) advertisements may increase printing costs, as there is not room on the mailers to include both languages on the same side. The current PT staff does not include Spanish-speaking therapists; However, translators are available upon request, addressing potential language barriers.

Limitations in Meeting Times

Although it was a preferred class time for those who responded to the survey, classes held from 4:00-5:00 pm may have reduced the population of individuals who work during those hours or who would need caregivers for children. This may have eliminated up to 40% or more of the MS population (Julian, Vella, Vollmer, Hadjimichael, & Mohr, 2008). In a population that requires expensive medical treatment and likely have children and families at home, the competing demands of work and family time may have created a barrier. For participants, ideally, this class would meet on Saturdays when work is less of a conflict for individuals, although extracurricular activities may take precedence on the weekends. However, this may be less cost-effective for the clinic, as additional therapist wages would need to be paid for weekend work. An existing Saturday morning MS exercise class offered through a partner organization may provide an opportunity for collaboration. Further, offering the class later in the evenings, after typical work hours, may help reduce barriers. As previously mentioned, this population is often of working and child-rearing age. Offering the class on a weekend may eliminate barriers created from work and family schedules.

Limitations based on Socioeconomic Status

Finally, requiring a fee of $3/class may have limited the participants to those with a higher disposable income. As was previously noted, the poverty rate within the county served is approximately 15.5% (2015 Community Health, 2015). It was hoped that providing them information on how they could receive funding from the NMSS might help reduce that barrier; however, it may have still impacted a participant's decision to participate. Distributing this financial information through email or mailings may have increased awareness. Rather, this information was only distributed to those who completed the preferred days and times survey.

Performing these classes in a session format and having participants register for a session of four classes may have reduced the financial barrier for some, as they would not feel it was an ongoing financial commitment.

Limitations in Participation

Having only two participants greatly limits the strength of the data. Due to the nature of quality improvement projects, data collection and analysis is less driven by the size of the data set. Research aims to generate new knowledge and is heavily influenced through sample sizes that meet power analysis requirements (Connor, 2014). Instead, quality improvement projects focus more on pre-existing data that is used to improve a process or outcome, and is less dependent upon sample sizes to interpret outcomes (Connor, 2014). Had the group been larger, perhaps there would be more ability to draw meaningful inference on the effectiveness of the class on participant perceptions and physical mobility. It would also help prevent the biases of participants having a 'good' or 'bad' day when completing the physical measures. Additional perspectives and measures are needed before statistical analyses can occur with enough power.

Limitations in Timeframes of Measurement

Further, measuring the outcomes in perceptions and physical measures after only four weeks may have been a limitation as well. Physical changes may not be measurable after such a short time frame, especially if participants are not also including the exercises in their daily routines at home. As previously discussed, the literature supports an average of 10-12 weeks to develop meaningful behavior change (Gardner et al., 2012). A longer time frame before reassessment may have provided richer data. The literature provides little information regarding reassessment after four weeks.

Summary of Limitations

Communication about clinic events should be sent in a timely fashion and in multiple languages, if feasible. All communication should reflect the target population. It should also be provided via many routes, such as mailing it to patient homes or sending SMS messages. This may increase the number of persons receiving information as most clinic patients have provided mailing addresses and phone numbers, but not all have provided valid email addresses, or have internet access. Choosing days and times that work for a wide variety of individuals, as well as taking monetary concerns into consideration is also important when planning a program. Doing so may increase the number of individuals who are able to attend. Further, frequent reassessment of physical progression, as well as the use of various physical measurements may increase the strength of the data. Despite the numerous limitations, many lessons were learned.

Lessons Learned

Determining how the project results can be used for improvement and sustainability is an important step to creating successful programs (Musick, 2006). While this project may not have achieved all of the intended outcomes, it provides a good lesson for organizations that are looking to implement similar programs. Many of the lessons learned led to the recommendations provided above.

Despite thorough planning, projects will encounter obstacles. In this situation, many challenges were encountered during the communication of the program. Putting a clear, detailed plan in place may help reduce that barrier. Providing all of the information to the IT specialist, or the individual who is in charge of information distribution, may eliminate this barrier. Information should be provided far in advance with pre-selected dates to send information, and

details regarding who should receive information. Agreeing upon these dates with all parties involved may be beneficial as well.

Knowing the organization and preferences of key stakeholders is vital to project implementation. Details of the project plan were discussed with several stakeholders months prior to implementation. However, throughout the course of the project issues arose. For example, it had been agreed upon that the class session would occur over the course of four weeks and participants would RSVP for each session, hoping to increase commitment and decrease the perception of financial burden. However, stakeholders chose to conduct an ongoing class style and eliminate the need for participants to RSVP. While that had many benefits, including enhanced peer support and continuous funds being returned to the hospital foundation, it also may have created barriers related to concerns of financial commitments. Including a question on formatting the class in sessions or ongoing should be included in the preferences survey.

Also, knowing the common demographics of the patient population may help organizations address barriers for the select population and plan accordingly. The Parkinson's Disease exercise class is highly successful. However, the demographics of that patient population are vastly different from those with MS, as many Parkinson's class participants are retired and have a strong support system (R. Bischoff, personal communication, March 29, 2016). All participants in the MS exercise class were retired, suggesting the working population may have been eliminated based on the chosen time.

In summary, having a clear plan in place that is approved by and agreed upon by all members of the team would be an improvement to the process. Setting a clear schedule regarding when information should be sent out, exactly what information will be sent, and to whom it will

be sent would be beneficial. Increasing the amount of recipients can be done in simple ways, such as generating a report of patients within a clinic. Considering using recruiting and advertising methods outside of electronic forms may be beneficial to program success, as it would target a larger population. Finally, programs of this nature take time to gain a following. Allowing adequate time to advertise and grow the patient following is important in the success and sustainability.

Relation to other Evidence and Healthcare Trends

This project did not have all of the anticipated outcomes that had been desired or expected. Information distribution increased by 357%; however, response rates were less than anticipated. According to Fryrear (2015), the expected survey response rate for external survey dissemination is between 10%-15%; in this project there was only a 6.1% response rate. Incorporating some of the suggestions above, such as mailing letters or using SMS messages, may help future surveys reach the anticipated response rates. However, the 25.4% rate of people opening emails was higher than other reported average measures of 22.8% (Return Path, 2015). The higher than average open rate has potential to increase the following of the class.

Attendance rates did not increase as hoped for, either. Comparing attendance in this program to an average attendance rate of an outpatient program is difficult, as very little evidence is available for other quality improvement projects, and research studies recruit participants until the target sample size is reached. One study compared a control group to email reminders and letter reminders to increase point-of-care testing in primary care, and found both email and letter reminders to be more effective than no reminder (Siersma, Kousgaard, Reventlow, Ertmann, Felding, & Waldorff, 2015). Another study reported that letter reminders increased attendance of an outpatient psychiatric clinic by 23% and text messages increased

attendance by 8%, both of which were statistically significant (Kunigiri, Gajebasia, & Sallah, 2014). Research has shown that word of mouth and physician-directed recruitment are most effective later in recruitment efforts (Rice et al., 2008; Withall et al., 2012). The further advertisements and recruitment strategies of letters, texts, and word of mouth may benefit the sustainability of the class.

Patient perceptions did improve over the course of the program. Historically, outpatient exercise programs have shown improvements in health related quality of life and exercise safety (Cheifetz et al., 2014; Ploughman et al, 2014). Improvements in physical measures were noted, as one participant did experience a 63% decrease in her timed 25-foot walk test. Giacobbi et al. (2012) noted that participants who completed a four-month progressive resistance training program saw an average increase in mobility of 13%. There is little research available on the benefits of exercise after four weeks. Most studies report findings after a 12-16 week intervention, and do report improvements in physical measures (Dlugonski et al., 2011; Garrett & Coote, 2009; Giacobbi et al., 2012; Harltey, 2009; Huisinga et al., 2011; Pilutti & Hicks, 2011). Measurements may reveal greater improvement if reassessed after consistent attendance for a longer period of time. These are important considerations when planning future exercise-related interventions.

Reflection on Enactment of DNP Essentials Competencies

The American Association of Colleges of Nursing (AACN, 2006) recommends that DNP scholarly projects contain the eight *Essentials* associated with DNP education. These essentials include: scientific underpinnings for practice; organizational and systems leadership for quality improvement and systems thinking; clinical scholarship and analytical methods for evidence-based practice. Additionally, they include: information systems/technology and patient care

technology for the improvement and transformation of health care; as well as health care policy for advocacy in health care; interprofessional collaboration for improving patient and population health outcomes; and finally, clinical prevention and population health for improving the nation's health, and advanced nursing practice (AACN, 2006).

Scientific Underpinnings

This project reflected nearly all of the *Essentials*. The needs and significance of health, and determining the strategies that can be done to improve and restructure health is the foundation of scientific underpinnings (AACN, 2006). Scientific underpinnings were applied throughout the entirety of the project. Assessment occurred to determine the significance of exercise on the health of those with MS, as well as to determine how the current program could be restructured to improve the delivery system. A base of scientific knowledge was needed and utilized when appraising the researched information, incorporating the conceptual models, and determining the significance of the problem addressed through the project. All aspects required high-level thought, organization, and consideration prior to and during the project implementation.

Organizational and Systems Leadership

Organizational and systems leadership was displayed through conducting an organizational assessment and determining if the project was consistent with the needs and the mission of the organization. Through the organizational assessment, leadership was practiced through conducting interviews with stakeholders of various levels within the organization. Project implementation was proposed to the stakeholders through various meetings, as well as advocating for the needs of MS patients. It also often included educating these stakeholders on the working details, as breakdowns in communication between the stakeholders were often

present. Acting as a liaison between departments was critical to the success of the project. Evaluation of the care delivery approaches was an integral part of planning and implementing the program (AACN, 2006).

Clinical Scholarship and Analytical Methods

Clinical scholarship and analytical methods were reflected by critically appraising each research article that gave the project its foundation. This evidence was utilized in developing the class to incorporate appropriate exercises, determine appropriate marketing and recruitment strategies, determining how to measure outcomes, and interpretation of the outcome measures. Ultimately, the findings were used to promote safe, effective, efficient, and patient-centered care through utilizing evidence-based exercises that directly meet the needs of MS patients (AACN, 2006). Using faulty information could have led to participant injury. This appraisal also gave way to further recommendations for screening and preventative care in this patient population.

Information Systems Technology

Information systems technology was directly used to increase the awareness of the class and obtain needed information. Working closely with IT specialists not only provided new information on how organizations utilize IT to communicate, but allowed the student to offer suggestions and problem solve alongside the IT specialist. Experience was gained specifically in the areas of how to securely send mass communication, how to set up surveys, and what tactics can be used for setting up program RSVP systems. Additionally, knowing how to generate or obtain a patient report is useful in all areas of healthcare and can be used for many purposes to improve population health. At the time the report was generated for this program, a request was sent to another department that is responsible for generating such reports. During the project implementation, the organization began using a new EHR system which allows individuals to

create reports. Learning this skill would have been a greater benefit than simply learning who to contact for reports, and suggests an area for learning improvement.

Advocacy for Health Care Policy

Advocating for health care policy was not directly incorporated into the project very strongly. There is much room for growth in this area. However, through much research, there are clear areas where healthcare policy could be changed to better the health of individuals living with MS. As outlined in the literature review, many MS patients do not receive appropriate healthcare screening. Advocating either nationally, or within organizations, for screening and preventative treatments to be more frequently utilized and covered by insurance may be beneficial in reducing the risk of injury for MS patients. Further, the current CMS cap for PT and SLP coverage do not allow patients to reap the full benefit PT has to offer. Creating policy change to raise the financial limit on such therapies may have greater impacts on those faced with the daily challenges of MS. Greater policy implications were learned during the process of completing the organizational assessment, and include creating policies to re-open infusion centers critical for MS patients where patients are monitored by neurology-trained nurses, rather than oncology-trained nurses.

Interprofessional Collaboration

Interprofessional collaboration was the foundation of this project. Daily work was conducted with the PT and IT specialist, as well as with the clinic manager, RNs, MDs, and clerical/support staff. Skills were obtained, not only in working with other disciplines, but in learning how valuable each role is. As a provider, the need for therapy was highlighted and future patients will be directed to obtain therapy early in a diagnosis. New skills obtained in working with IT specialists may open doors for greater communication with patients, as well as

with generating reports that may assist with medical management. Without constant collaboration, this project would not have progressed.

Population Health and Clinical Prevention

Population health and clinical prevention were also foundational elements to this project. Opportunities were present to work with a select population of patients and directly provide preventative care to them through the form of exercise. It not only highlighted the benefits that alternative therapies can have on overall health and wellbeing, but emphasized the need for appropriate screening in this patient population. Although not utilized, it also highlighted the need to be very specific and intentional in caring for any patient population, taking into consideration the very specific prevention, treatment, and management needs each group presents.

Advanced Nursing Practice

Finally, on a small scale advanced nursing practice was utilized. This work was mostly done through researching appropriate exercises for this population, as well as screening tools and other preventative measures that should always be considered for this population of patients. More knowledge could be obtained regarding specific medicinal therapies specific to this population. Similarly to population health, being thoughtful and thorough from the advanced practice registered nurse (APRN) perspective with the specific needs is important with each patient, regardless of diagnosis. Through disseminating this information, other healthcare providers may gain new insight into appropriate preventative and clinical care for patients with MS. All of the DNP essentials were truly foundational throughout this project.

Dissemination of Outcomes

Musick's (2006) final stage of program evaluation is determining who the stakeholders are and how the information will be presented and distributed. The outcomes of this project will be presented through an oral presentation at Grand Valley State University in front of the student's committee members, as well as other integral project team members, university faculty, and fellow DNP students. The project has already been disseminated orally to the 2016 DNP cohort as well as a few members of other DNP cohorts. Opportunities exist to provide the project outcomes to the stakeholders of the organization through written communication. A summary sheet of project outcomes was distributed to key stakeholders via electronic dissemination (Appendix N).

Conclusion

A quality improvement project was conducted in order to improve a piloted exercise program at an outpatient neuroscience facility associated with a Midwestern hospital. The objectives included increasing the number of persons receiving electronic information, increasing attendance rates, and improving perceived and measured physical outcomes. Project outcomes included increasing information distribution recipients by 357%, as 264 persons now receive information related to the MS clinic events, compared to just 58 persons before the intervention. This increase will likely have positive long-term impacts as this patient population will receive electronic information about all of the events within the MS clinic. Due to many barriers and limitations within the project, attendance rates were not improved. Pilot classes had attendance rates from zero to six persons. After the project interventions, two participants attended the program, and attendance was consistent. The consistency in attendance demonstrated by both participants was an improvement from the pilot class, where attendance

was sporadic. Although data only reflects the outcomes of two persons, improvements in patient perceptions were noted, specifically regarding knowledge of the relationship between disease process and exercise, knowledge of appropriate exercises for persons with MS, frequency of exercise, symptom control, and overall perceived mobility and quality of life. Physical measures improved for one participant, as she experienced a 63% decrease in the timed 25-foot walk test. Given enough time and appropriately utilized resources, this exercise program has the potential to be successful and sustainable and show great benefits for participants.

Appendices

Appendix A- Organization E-Blast

Multiple Sclerosis Physical Wellness Program

Class Reminder
Wednesday, April 6 - 4:00 pm to 5:00 pm

Looking forward to seeing you tomorrow night at the Wellness Class.

All classes located at:

Lower Level Rooms 7 & 9

Questions? - Please call the Patient Support Hotline
Weather related cancellations are posted to our website.

Appendix B- Multiple Sclerosis Exercise Questionnaire – Pre-Class

1) Exercise is important in MS
    1) Strongly agree
    2) Somewhat agree
    3) Somewhat disagree
    4) Strongly disagree

2) Exercise helps slow the progression of the disease
    1) Strongly agree
    2) Somewhat agree
    3) Somewhat disagree
    4) Strongly disagree

3) I know what kind of exercises benefit people with MS

    1) Strongly agree
    2) Somewhat agree
    3) Somewhat disagree
    4) Strongly disagree

4) On average for the past 2 months, I exercise

    1) More than 2-3 times per week
    2) 2-8 times per month
    3) Less than 1 time per month
    4) Never

5) When I finish exercising my MS symptoms are:

    1) Much better
    2) Somewhat better
    3) Somewhat worse
    4) Much worse
    5) N/A

6) I am interested in learning more about exercise in MS

    1) Strongly agree
    2) Somewhat agree
    3) Somewhat disagree
    4) Strongly disagree

7) If I knew more about the right kind of exercises for MS, and was taught methods I would exercise more frequently

    1) Strongly agree
    2) Somewhat agree
    3) Somewhat disagree
    4) Strongly disagree

Appendix C- Multiple Sclerosis Exercise Questionnaire – Post-Class

1) Exercise is important in MS
    1) Strongly agree
    2) Somewhat agree
    3) Somewhat disagree
    4) Strongly disagree

2) Exercise helps slow the progression of the disease
    1) Strongly agree
    2) Somewhat agree
    3) Somewhat disagree
    4) Strongly disagree

3) I know what kind of exercises benefit people with MS
    1) Strongly agree
    2) Somewhat agree
    3) Somewhat disagree
    4) Strongly disagree

4) This class increased my frequency of exercising
    1) Strongly agree
    2) Somewhat agree
    3) Somewhat disagree
    4) Strongly disagree

5) Within the last month, I exercised
    1) More than 2-3 times per week
    2) 2-8 times per month
    3) Less than 1 time per month
    4) Never

6) When I finish exercising my MS symptoms are:
    1) Much better
    2) Somewhat better
    3) Somewhat worse
    4) Much worse
    5) N/A

7) Overall, I feel my mobility and quality of life have improved since exercising more
    1) Strongly agree
    2) Somewhat agree
    3) Somewhat disagree
    4) Strongly disagree

Comments:

Appendix D - Health Promotion Model Permission

From: Nola Pender <npender@umich.edu>
Date: Wed, Apr 20, 2016 at 11:26 AM
Subject: Health Promotion Model Permission
To: Tiffany Kuipers <kuiperti@mail.gvsu.edu>

Dear Tiffany:

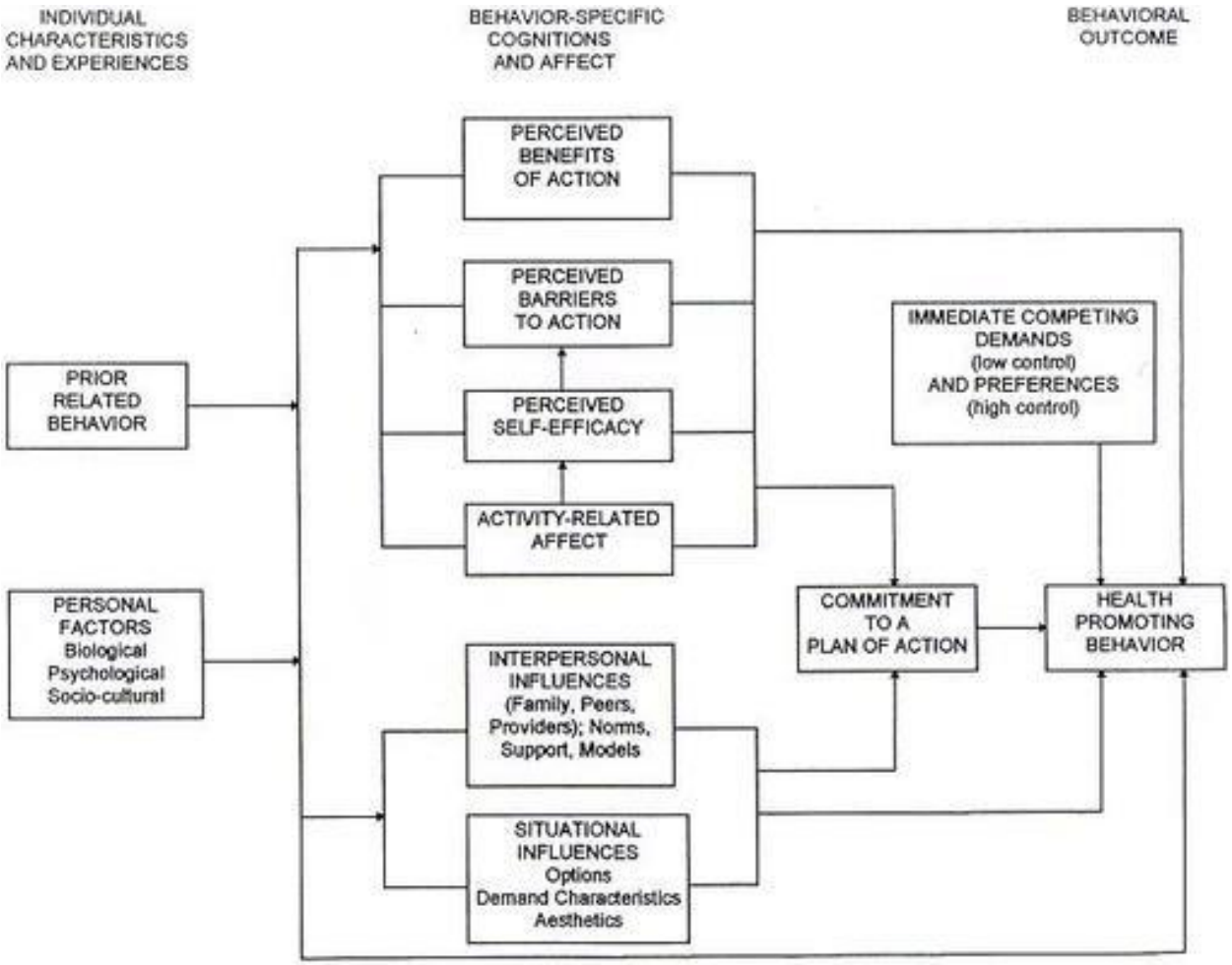
You have my permission to reprint the Health Promotion Model in your DNP Scholarly Project.

Wishing you good health,

Nola Pender

Appendix E - Health Promotion Model

Pender, N., Murdaugh, C., & Parsons, M. (2010). *Health promotion in nursing practice* (6th ed.).



Upper Saddle River, NJ: Prentice Hall

Appendix F- Conceptual Model of Program Evaluation Permission and License

From: Tiffany Kuipers <kuiperti@mail.gvsu.edu>
Date: Tue, Apr 19, 2016 at 6:20 PM
Subject: Conceptual Model of Program Evaluation Permission
To: <dwmusick@carilionicclinic.org>

Hi Dr. Musick,

I was wondering if you would give me permission to use your conceptual model of program evaluation for my DNP scholarly project. I would like to put 'List 1 – Task Oriented Conceptual Model of Program Evaluation in Graduate Medical Education' in my appendix and did not want to infringe on any copyrights.

Thanks,
Tiffany

From: Musick, David W < dwmusick@carilionicclinic.org>
Date: Tue, April 19, 2016 at 8:22 PM
Subject: Conceptual Model of Program Evaluation Permission
To: Tiffany Kuipers <kuiperti@mail.gvsu.edu>

Hi Tiffany:

Certainly! Thanks for asking.

D. Musick

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May 16, 2016

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Licensed Content Author	Musick, David; MA, PhD
Licensed Content Date	Jan 1, 2006
Licensed Content Volume Number	81
Licensed Content Issue Number	8
Type of Use	Dissertation/Thesis
Requestor type	Individual
Portion	Figures/table/illustration
Number of figures/tables/illustrations	1
Figures/tables/illustrations used	List 1- Task-Oriented Conceptual Model of Program Evaluation in Graduate Medical Education
Author of this Wolters Kluwer article	No
Title of your thesis / dissertation	Evaluating the Effectiveness of an Exercise Program for Persons with Multiple Sclerosis
Expected completion date	May 2016
Estimated size(pages)	98

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Appendix G- Conceptual Model for Program Evaluation

List 1

Task-Oriented Conceptual Model of Program Evaluation in Graduate Medical Education

Step One: Determine evaluation need

WHY is the evaluation being undertaken and for whom? (Accreditation requirement; institutional requirement; specific project; research)

Step Two: Determine evaluation focus

WHAT entity is to be evaluated? (Overall training program, clinical rotation, didactic event, teaching faculty, residents/fellows)

Step Three: Determine evaluation methodology

WHEN is the evaluation procedure to be undertaken? (Planned clinical observation, end of rotation, end of year, after graduation)

WHERE are evaluation data to be collected? (Normal patient care settings, classrooms, other)

HOW are evaluation data to be collected? (Ratings of performance, written/oral examinations, attendance sheets, rotation objectives checklists, surveys, clinical skill examinations)

WHAT types of data analyses will be needed? (Reporting formats, data properties/psychometrics)

Step Four: Present evaluation results

WHO are the key stakeholders who must review the results? (Department chair, teaching faculty, institutional GME personnel, residents)

WHEN should results be presented? (Regular agenda item for faculty meetings; annual program evaluation meeting and/or educational retreat; education committee meetings)

Step Five: Document evaluation results

HOW are evaluation results documented and used for program improvement? (Content delivery issues, frequency with which outcomes are measured, program changes made as a result of evaluation data, resident input into program improvements)

Musick, D. (2006). A conceptual model for program evaluation in graduate medical education. *Academic Medicine*, *81*, 759-765. Retrieved from http://journals.lww.com/academicmedicine/Fulltext/2006/08000/A_Conceptual_Model_for_Program_Evaluation_in.15.aspx

Appendix H - Multiple Sclerosis Exercise Class Medical Release Form

Name:_____ Age:_____ Phone:_____

Address:_____ City:_____ Zip:_____

Contact person and phone (in case of emergency): _____

This class will consist of activities to foster improvement in strength, flexibility, coordination, balance, and respiratory and cardiac endurance through repetitive resistive and stretching exercises in the sitting and standing positions. Light cardiovascular such as marching in place will occur.

Medical Information: Participant to complete: Please circle or add any significant medical concerns you have.

Multiple Sclerosis Cardiac Pulmonary Osteoporosis Joint replacements Cancer

Diabetes Hypertension Spine surgeries or injuries

Other neurological diagnosis_____

Other medical concerns _____

Physician's signature_____ Date_____

Physician's telephone number: _____
Provider is aware that the above-named person is participating in the class.

The participant agrees to accept all liability concerns for attending the MS exercise class

Signature of participant_____ Date_____

Please return this signed form to the Neuroscience Rehabilitation Department or bring to your first class.

Contact the physical therapist with any questions
Phone: (555) 555-5555; Fax: (555) 555-5555

(Office use) Provider approval received date: _____

Appendix I - Grand Valley State University Human Research and Review Committee Determination

GRAND VALLEY STATE UNIVERSITY
www.gvsu.edu

DATE:	February 19, 2016
TO:	Tiffany Kuipers
FROM:	Grand Valley State University Human Research Review Committee
STUDY TITLE:	[829081-2] Evaluating the Effectiveness of an Exercise Program for Persons with Multiple Sclerosis
REFERENCE #:	16-083-H
SUBMISSION TYPE:	Response/Follow-Up
ACTION:	NOT RESEARCH
EFFECTIVE DATE:	February 19, 2016
REVIEW TYPE:	Administrative Review

Thank you for your submission of materials for your planned research study. It has been determined that this project:

DOES NOT meet the definition of covered human subjects research* according to current federal regulations. The project, therefore, *DOES NOT* require further review and approval by the HRRC.

If you have any questions, please contact the Research Protections Program at (616) 331-3197 or rpp@gvsu.edu. The office observes all university holidays, and does not process applications during exam week or between academic terms. Please include your study title and reference number in all correspondence with our office.

*Research is a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge (45 CFR 46.102 (d)).

Human subject means a living individual about whom an investigator (whether professional or student) conducting research obtains: data through intervention or interaction with the individual, or identifiable private information (45 CFR 46.102 (f)).

Scholarly activities that are not covered under the Code of Federal Regulations should not be described or referred to as *research* in materials to participants, sponsors or in dissemination of findings.

Appendix J- Organization's Institutional Review Board Determination

NOTICE OF CLINICAL QUALITY IMPROVEMENT MEASUREMENT DESIGNATION

To: Tiffany Kuipers, RN, BSN

Re: IRB# 16-0210-4
Evaluation of the Effectiveness of an Exercise Program for Persons with Multiple Sclerosis

Date: February 11, 2016

This is to inform you that the [redacted] Institutional Review Board (IRB) has reviewed your proposed research project entitled *"Evaluation of the Effectiveness of an Exercise Program for Persons with Multiple Sclerosis.* The IRB has determined that your proposed project is not considered human subjects research. The purpose and objective of the proposed project meets the definition of a clinical quality improvement measurement. All publications referring to the proposed project should include the following statement: *"This project was undertaken as a Clinical Quality Improvement Initiative at* [redacted] *and, as such, was not formally supervised by the* [redacted] *Institutional Review Board per their policies."*

The IRB requests careful consideration of all future activities using the data that has been proposed to be collected and used "in order to assess quality and improve an evidence based exercise program for MS patients."

The IRB requests resubmission of the proposed project if there is a change in the current clinical quality improvement measurement design that includes testing hypothesis, asking a research question, following a research design or involves overriding standard clinical decision making and care.

Please feel free to contact me if you have any questions regarding this matter.

Brenda Hoffman

Brenda Hoffman
IRB Chairperson

Copy: File

Appendix K - Class Style Preferences Survey

1. Days and times that work best for me:
    a. Thursdays from 9:00-10:00 am
    b. Wednesdays from 4:00-5:00 pm
    c. Thursdays from 6:30-7:30 pm
    d. Tuesdays from 6:00-7:00 pm

2. I would be willing to pay
    a. $0/per class
    b. $1/per class
    c. $3/per class

        *The National Multiple Sclerosis Society has funds available (up to $100) to help cover the cost of wellness activities. Call 1-800-fightMS for more information.

3. My interest in a class is
    a. Very interested
    b. Somewhat interested
    c. Not interested

Appendix L - MS Exercise Class Flyer

MERCY HEALTH
HAUENSTEIN NEUROSCIENCES

Multiple Sclerosis Physical Wellness Program

Enroll today to learn stretches and light exercises that can improve your muscle tone, nd overall endurance.

Class is best suited for those with mild to moderate physical limitations.

Classes Begin March 30, 2016

- Wednesdays from 4-5 pm
- Cost: $3 per class
- Class will be held in room 7-9 on the lower level of the Wege Building at 300 Lafayette, Grand Rapids, MI 49503

Medical clearance is required to participate in the program. Please have your physician sign medical release form and bring it to class on the first night.

Email NeuroPatientSupport@mercyhealth.com **to RSVP or call 616-685-4444**

Data Collection Form

We wish to help you track your progress in moving more easily after the classes, but want to avoid putting your name on any information. Please think of a birthdate of a spouse, child, parent or other person important to you and place that information here: _____. We will ask you to provide that information again on the sheet we will use to record your results at the final class.

If you are willing, please also provide the following information. This data will not be used for any purpose outside of the evaluation of this class.

Age:_____ Gender:_____ Time since MS diagnosis:_____

(For office use only)
Timed 25-foot walk test at first class Trial 1: _____ Trial 2: _____
Timed 25-foot walk test at last class Trial 1: _____ Trial 2: _____

Please contact Tiffany Kuipers if you wish to know more about how this information may be used.

Tiffany Kuipers, RN, BSN
DNP Student, Grand Valley State University
kuiperti@mail.gvsu.edu

Appendix N- Summary Sheet

Evaluating the Effectiveness of an Exercise Program for Persons with Multiple Sclerosis – Quick Reference

Facts and Figures

- MS affects nearly 2.3 million people worldwide
- Over 400,000 people are affected in the United States
- Treatment costs range from $8,528-$54,244/person per year
- Individuals experience decreased muscle strength, bone strength, mobility, vision, sensation, and coordination, among other symptoms
- Individuals are 3-6 times more likely to develop osteoporosis and have higher fall rates
- Physical therapy and speech language pathology costs combined are capped at $1,960/year

Exercise can relieve some symptoms and slow the progression of the disease

Project Purpose

To assist the clinical staff with the improvement of a piloted exercise group tailored to patients with MS and to evaluate the outcomes.

The objectives: 1) **improve the existing program, 2) evaluate the effectiveness of the marketing and recruitment strategies, and 3) evaluate the effectiveness of the program on patient perception and physical mobility**

Methodology

Generate a query of all MS patients in the EHR
Add patient email addresses to database
Send patient surveys to select a class day and time to fit their schedules
Email correspondence to increase awareness
Hold 1 hour weekly exercise classes
Assess patient perceptions and timed 25-foot walk tests at week 1 and 4 of class

Project Outcomes

Objective 1 Outcomes:
Program format was changed from monthly meeting to weekly meeting
New exercises were introduced at each session

Objective 2 Outcomes:
Marketing efforts were increased
A **357%** increase in information distribution was noted
Over 240 individuals receive email information, compared to 58 individuals, prior
Class attendance did not improve, but consistency in attendance did

Objective 3 Outcomes:
After 4 weeks:
Participants gained knowledge in the benefits of exercise and appropriate exercises
Frequency of exercise increased
Perceptions of mobility and quality of life improved
Timed 25-foot walk test scores improved by **62%**

"Wow, I can see where this stretch would help me walk better!"

"We're so fortunate to have a class like this available!"

"I went to the normal gym, and they had no idea what to do with someone like me."

Recommendations and Tips for Sustainability

- Outpatient programs that are specific to patient populations should be developed
- Marketing efforts should include correspondence through email, letters, and text messages to increase attendance. Additionally, physician-direction and word of mouth communication should be encouraged and utilized
- Promote the program using positive quotes from participants
- Provide information well in advance of class days and provide consistent reminders
- Continue charging participants $3/per class to contribute to hospital foundation
- Continually advertise the funding available through the National Multiple Sclerosis Society (1-800-FIGHT-MS)
- Provide pamphlet or presentation-style information about the benefits of exercise during class sessions
- Use goal-setting intentionally during class periods
- Continually reassess participant desires for class meeting days and times, as well as physical progress
- **Make the class fun!**

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