**The Needs Statement**

Physical inactivity has been identified as the fourth leading risk factor for global mortality (6% of deaths globally) after high blood pressure, smoking and high blood glucose.1 With the exponential growth in the older population, increasing physical activity and exercise in older people has been identified as a key target to reduce the global burden of non-communicable disease.1

One in 10 Americans now die prematurely of disorders with origins related to physical inactivity, which issimilar to the risks from smoking tobacco and being obese. Research shows that being physically active helps control blood pressure, blood sugar and lowers bad cholesterol while increasing good cholesterol. It also lowers the risk of heart attacks, stroke, developing type 2 diabetes and some types of cancer. Exercise helps control weight, improves bone and joint health and builds stronger muscles.3

Despite the benefits from physical activity, 51% of adults in the US report they meet the physical activity recommendations, defined as 150 minutes of moderate-intensity aerobic activity a week and at least 2 days of muscle-strengthening activities. In comparison, only 42.3% of Pitt County residents reported they met the physical activity recommendations. Pitt County is located in Eastern North Carolina with about 10.5% of its overall population 65 years of age or older.3

About 1.5 million people live in nursing homes in the U.S. and most residents (88%) are 65 or older.9 Pitt County had approximately 878 residents in nursing homes as of 2010.2 This percentage is expected to increase with the anticipation that the elderly population will more than double to 92 million by 2060.5 North Carolina is also expecting a projected increase of 800,000 people over the next 20 years to be 65 years of age and older.4

There is no other group in our society that can benefit more from regularly performed exercise, than the elderly. A substantial amount of scientific evidence shows that older adults who engage in progressive resistance training and aerobic exercise are able to increase muscle strength, aerobic capacity, and bone density.10 Thus, promoting and facilitating the regular practice of physical activity in older adults is especially important because this population group is very often the least physically active. This is partially due to the misconception that it is unwise or unsafe for the elderly to exercise or older adults are unable to exercise because physical debilitation is a natural part of the aging process.6 Functional decline in the elderly is often the result of a sedentary lifestyle rather than the effects of the normal aging process thus a strengthening exercises program, especially for the institutionalized elderly, would help meet the needs of this population. Further, while exercises may slow the deterioration in physical and psychosocial capacities in the elderly, exercise strategies in nursing homes and other long-term care facilities are not standardized. Implementing a strengthening exercise program in nursing homes in Pitt County will help combat the risk factors associated with physical inactivity.

**Background**

Older Americans are the least physically active of any age group and generate the highest expenditures for medical care. Older Americans have been the most rapidly growing age group, yet more rapid growth in this group will occur in the next 20–30 years when millions of baby boomers turn 65 years old. The loss of functional mobility has been shown to be associated with 50 percent mortality rate among nursing home patients within 6 to 12 months.11

Published research on the effectiveness of exercise programming in institutionalized elderly populations is limited. There is however, research that addresses physical inactivity in the elderly population but the research does not to take into consideration the psychosocial differences between a community-dwelling elderly person versus an institutionalized elderly person. There is also a lack of evidence to support the relationship of the effects of exercise on disability. Moreover, evidence found in literature that does relate physical inactivity to institutionalized elderly does not clearly define the differences between physical activity and exercise. For the purpose of this program, physical activity will be defined as “any bodily movement produced by skeletal muscles that requires energy expenditure and includes activities carried out as part of normal daily life such as walking, climbing stairs, gardening and leisure activities such as dancing and swimming. Exercise will be defined as, “A sub-set of physical activity that is planned, structured, and repetitive which can include exercise classes and weight training.”1

 It can be challenging to motivate anyone to engage in physical activity especially the elderly population due to socioeconomic, personal, and environmental barriers.One half of older adults cite musculoskeletal discomfort or disability as a reason not to exercise.16 Given that benefits are possible from exercise and that barriers to exercise can be overcome, one commonly used technique is to assess a person’s readiness to start exercising according to their stage of change. Thus the transtheoretical model will be used to bridge the gap amongst institutionalized elderly and its effects on quality of life and disability. This model proposes that there are five distinct cognitive stages that must be resolved when contemplating a change in lifestyle or habit: precontemplation, contemplation, preparation, action, and maintenance.14 The first step is to determine whether patients have thought about incorporating some form of regular exercise into their lives (precontemplation to contemplation).16 Once the decision to exercise has been made, the preparation stage includes planning for the exercise routine, arranging the schedule, and setting a start date. The next stage is action, in which the patient engages in the new behavior.14,16 Consider the person’s self-efficacy. Patients with low self-efficacy should begin exercising with easily accomplished goals and receive frequent encouragement.16 Finally the maintenance stage guards against relapses and promotes continuation of the activity until it becomes habitual.14

Physical activity is one of the most important strategies for promoting health and treating diverse health problems in older adults. There have been rapid advances in knowledge on physical activity in older adult, and evidence of the benefits of regular physical activity and exercise in older adults with chronic diseases and disabilities is accumulating. In addition, there has been increasing investigation of how physical activity and exercise affect institutionalized older adults.11

Other studies addressed adaptation to resistance training in the institutionalized elderly reported improvement in strength, irrespective of the use of a high-intensity resistance program, a combination of isometric training and low-intensity weight-lifting exercises seated resistance exercises, and rowing exercises for restrained nursing home residents. Although high-intensity exercise clearly may elicit sizable gains in strength less strenuous programs have demonstrated significant gain in muscle strength.7Further, moderate-intensity physical activity is beneficial and easier for older adults to adhere to than vigorous activity.12

Moreover, several studies have shown that elderly men and women retain the capacity to adapt to progressive resistive exercise training with significant and clinically relevant muscle hypertrophy and increased muscle strength. Although sufficient evidence exists to recommend that older people should exercise and the findings suggest that exercise can increase function in the elderly, further studies are required to clarify its role in improving function in institutionalized elderly patients.7 The primary goal of rehabilitating the elderly should be to contribute to a better life quality by maintaining physical function.

**Program Goals/Objectives:**

Physical activity is one of the most important strategies for promoting health and treating diverse health problems in older adults.12 The initial goal for this program would be to improve the overall quality of life and mobility for institutionalized elderly in Pitt County. Specific goals are as follows:

1. To improve physical function demonstrated by improved scores on the Timed Up and Go, Functional Reach test, and 5 Times Sit-to-Stand test administered before the class, at 6 week mid-point, and after completion of the course
2. To increase awareness and educate the participants about proper nutrition and the importance of physical activity
3. To develop an exercise regimen for the institutionalized elderly population that fits their specific needs

**Site Parameters:**

For the initial start of the program, it is proposed that the site be a participating short-term skilled nursing facility in Greenville, NC since it is the largest city in Pitt County with more accessible resources. The exercise/strengthening program will be held in the facility’s provided therapy gym or activities room for convenience and space. The time frame will be contingent upon the facility’s schedule. Supplies that are needed are chairs with armrests, resistive bands, ½ pound beanbag, inflated beach ball, small notebook, and water bottles. At least one nursing assistant or registered nurse will be available to take vital signs before and after each session and vital signs as needed for patients who rate of perceived exertion increases to 17 and above.14 Nursing homes in particular might need to ensure that the room used for exercise not be overly heated to the temperature required for sedentary activities.13

**Intervention Component I: Selection Criteria**

The participants for this program will be high-functioning residents selected given written clearance from the on-site physician. They must be high-functioning, which is defined as residents who are able to ambulate and transfer as modified independently with or without an assistive device. The contraindications for participating are as follows: severe heart disease, such as unstable coronary artery disease or recent myocardial infarction, congestive heart failure that has progressed to dyspnea at rest, tachyarrhythmias induced by activity, and critical aortic stenosis.13 Also, any condition that becomes symptomatic with minimal activity beyond the routine activities of daily living would preclude meaningful exercise.13

**Intervention Component 2: Pre-Screening and Education**

The physical therapist along with an on-site registered nurse or certified nurse assistant will take basic vitals of the participant that will include: blood pressure, resting heart rate, SpO2, and predicted maximum heart rate (220 beats per minute minus the patient’s age). These vital signs will be recorded in each participant’s personal vital signs log book. The participants will perform the Timed Up and Go (TUG), Functional Reach Test (FR), and 5 sit-to-stands tests as outcome measures to determine baseline fall risk and physical activity level. The participating residents will also be assisted in taking the Nottingham Health Profile (NHP) as a measure of the their perception of overall Health Related Quality of Life (HRQOL). The NHP is a 38-item questionnaire scored by answering in a “yes/no” format grouped into six domains: energy level, pain, emotional reactions, social isolation, physical mobility, and sleep. The higher the score the worse the perception of HRQOL. Additionally, each participant will also receive education about proper nutrition and the importance of physical activity via the informational brochure “Exercising and Aging.”

**Rationale for Selected Outcomes**

Recent guidelines suggest that for patients planning low-intensity exercise, heart rates remain below 60% of the predicted maximal rate (220 beats per minute minus the patient’s age x 60%).13  In the absence of cardiac or respiratory symptoms, a maximum heart rate of 60% to 75% of the predicted maximum heart rate should be set as a ceiling. Any exercise intensity that increases the baseline resting heart rate is desirable.13 There is evidence that exercise programs that have included target-directed reaching, coordination, and balance training in addition to strengthening with or without gait training have an impact on functional mobility.16 Improved ability to reach would enable the resident to become more independent with functional mobility such as selecting clothing from elevated shelf and in other daily activities that involve reaching. The TUG requires the resident to move from sitting to standing, walk, and turn through 360 degrees.16 The 5 times sit-to-stand test requires the participant to be timed going from sitting to standing in five consecutive trials.16 The TUG, FR, and 5 times sit-to-stand test has proven reliability and validity when used with older adults.16 Research has found that the HRQOL and functional ability among the healthiest recipients of residential care is substantially worse than in the non-institutionalized population and was deemed reliable in determining quality of life for institutionalized elderly population.17 Measuring HRQOL can help determine the burden of preventable disease, injuries, and disabilities, and it can provide valuable new insights into the relationships between HRQOL and risk factors.16,17  The participant’s HRQOL will be measured using the Nottingham Health Profile (NHP) questionnaire which is commonly used in literature to measure quality of life among the elderly population.17,18 This instrument is also considered clinically valid to distinguish patients with different levels of disability and to detect changes in health condition over time.18

**Intervention Component 3: Physical Activity Program**

Participants will start seated in chairs with armrests in a circle with enough space in between them to walk around. The physical therapist will lead the exercise class. The nursing staff will retrieve vitals before and after each session. They will also take basic vitals (heart rate, blood pressure, SpO2) based on a high (>16) rate of perceived exertion of the patients during rest breaks.

Warm-Up: 5-10 minutes of less intense activity

Balance: (As adapted from Balance Strategy Training Program)16

Duration-15 minutes

1. Deep breathing coordinated with large reaching movements, high above head, forward down to the floor, across body toward neighbor on alternate sides
2. Passing an inflated beach ball around the circle in each direction to gain trunk rotation
3. Kicking the beach ball across the circle in random directions to stimulate concentration and foot control
4. Tossing small bean bags (1/2 pound) into a box placed in the center of circle ensure all subjects have at least 5 attempts with each hand
5. Bringing hands together in a prayer position and move elbows apart to get wrist extension
6. Seated knee extension, hip abduction/adduction, and ankle dorsiflexion/plantarflexion

Rest Break for 5 minutes; drink water

1. Practice sit-to-stands from chair; arm rests can be used if needed
2. Rest and practice sitting as “tall” as possible away from chair back support
3. Standing holding the back of chair for support if needed (Can progress to light-weight on ankle)
* Rise up onto toes
* Take weight into heels and lift toes from floor
* Marching in place
* Lift alternate legs out to the side
* Lift alternate legs behind bending the knee

Seated Rest break for 5 minutes; drink water

1. Holding hands above head and sway from side to side while sitting away from the chair back support
2. Drawing large circles with finger with arm extended in front, above head, and together out to the sides
3. Alternate toe tapping out to the front and back then to each side
4. Gentle deep breathing while sitting “tall” away from chair support

Cool-down: 5-10 minutes stretching major muscles of arms and legs in sitting

**Recommended Levels of Physical Activity 15**

*Strength Training:*

Resistive bands will be added to seated leg exercises (number 6) and with some standing exercises after 2 weeks. If strength training is new for the individual, it is best to participate in 2 to 4 weeks of aerobic exercise training before beginning strength training.14 Participants should start with resistive bands/tubing, and lightweights. A single set of 10-15 repetitions using different exercises should be done through full range of motions while avoiding holding one’s breath.15

*Cardiovascular:15*

Moderate aerobic activity for a combined total of at least 30 minutes; Individual bouts of activity may be as brief as 10 minutes

*Balance and Flexibility:15*

Stretch major muscle groups after exercise when muscles are more compliant.

**Intervention Component 4: Reassessment of Outcome Measures**

The TUG, FR, and 5 times sit-to-stand test will be taken before the initial class starts, at the mid-way point (6 weeks), and upon completion of the course (12 weeks). If there are no differences in any of these outcome measures at 6 weeks, the therapist will discuss adapting the program to meet the participant’s needs. The NHP will be given before and after the completion of the course to determine if the exercise program influenced the resident’s overall quality of life even if they did not necessarily improve functionally. Also, a post-interview survey will include a one-on-one session with each participant to discuss and reflect what they have learned in regards to exercise and aging.

**Anticipated Outcomes**

By the end of the 12-week program, the participants in the skilled nursing home of Greenville, NC will be as follows:

* At least 75% of the participants will demonstrate increased knowledge about the importance of physical activity and nutrition per discussion during the post-interview survey after the completion of the program.
* At least 90% of participants will exhibit improved physical function and reduced fall risk as demonstrated by improved scores of the TUG, FR, and 5 times sit-to-stand scores administered at baseline, 6 week mid-point, and at 12 weeks (completion of program).
* At least 90% of participants will demonstrate improved overall quality of life as indicated by decreased NHP scores taken before and after completion of the program.
* At least 75% of participants will show 100% compliance in completing the 12 week program as deemed evident from the attendance log taken at every session

**Program Evaluation**

 A detailed program evaluation of the effectiveness of exercise promotion among institutionalized elderly will be conducted to determine the best outcomes, strengths, and weaknesses of the program. This we will be used to further enhance and improve the implementation and benefits of future exercise/strengthening programs done in institutionalized facilities.

Overall progress towards the program’s goals will be assessed in order to document accomplishments and identify areas of improvement. Goal One, “To improve physical function,” will be assessed by comparing scores of the Timed Up and Go, Functional Reach Test, and 5 Times Sit-to-Stand test before the program begins, at the 6 week mid-point, and after completion of the program. Additionally, the participant’s vital signs log taken throughout the course of the program will be evaluated by the physical therapist to determine if there were any improvements of basic vitals signs (blood pressure, heart rate, and SpO2). Goal Two, “To increase awareness and educate the participants about proper nutrition and the importance of physical activity,” will be reviewed during the post-interview survey given within one week after the program’s completion. Finally, goal three, “To develop an exercise regimen for the institutionalized elderly population that fits their specific needs,” will be evaluated based on pre and post scores of the NHP. As stated before, the lower the score the greater Health Quality of Life the participant has about themself.

The TUG, FR, and 5 sit-to-stand outcome measures will be used as quantitative data to determine if the exercise/strengthening program improved the participant’s balance, strength, and endurance thus reducing overall risk of falls. Reviewing the vital signs log of each patient will also be used as quantitative data to denote improvement of vital signs that may have been out of range but begin trending within functional limits throughout the course of the program. Even though the questions use to conduct the NHP can be viewed as subjective, the scores will be used as an outcome measure to compare pre and post self perceived quality of life and to determine if the program positively affects the participants self-efficacy and attitude with or without changes in overall functional mobility. The post-interview survey will give the participant’s perspective on any positive elements, their perceived participation, measure of satisfaction about the program, and if there were any suggestions they would like to see in future exercise programs. This would help identify trends of improvement to fit the needs of the participants. Also, THE attendance log will be used to determine those who were not compliant or did not complete the entire 12-week program. They will be interviewed to evaluate reasons for non-compliance and determine if those particular reasons could have been prevented.

There are possible limitations to the program. One major issue would be finding a nursing home in Pitt County that was willing to participate. If the nursing home did not provide an area within the facility, it would be difficult to transport the residents to an outside location, such as a community center, three times a week. Additionally, having insufficient support staff or inadequate staffing would also be deemed a limitation. The nursing staff at the facility will play a vital role gathering the participants in one room, assisting with vital signs throughout each session, and being available to assist with the overall needs of the residents. Time constraints could also be a potential barrier. Finding the best time to coordinate the residents, along with the nursing staff, and any other outside activities that the facility may engage in throughout the week could restrict participation. Ultimately, participation and compliance from the residents could severely limit progress and affect outcomes of the program especially with internal factors such as motivation and external factors that include comorbidities causing illness or even death of a participant.

**Relevance**

In the coming decades the number of elderly people will increase because of the aging population. Studies indicate that there is a growing need to care for the people aged 65 years and older.19 Worldwide, the growing number of older adults continues to increase demands on the public health system and on medical and social services.19 Physical inactivity and sedentary lifestyles is an issue among all ages especially for the elderly, more specifically, the institutionalized older adult. The nursing-home setting has been largely neglected by research. There is thus an urgent need for programs capable of facilitating physical activity in institutionalized older adults.13 Barriers to exercise for this patient population include a lack of knowledge about the documented benefits of exercise in older patient populations, attitudes about the appropriateness of physical exercise for older adults, and environmental factors that do not encourage exercise (i.e. skilled nursing facilities). Developing an exercise regimen for the institutionalized elderly will assist to discredit those myths in anticipation to expand to other populations. The outcomes of this program can be adapted for low functioning or dependent elderly residents in nursing homes. Additionally, this program could be modified for the needs of the community dwelling older adult in assistive living facilities or community centers. The nursing staff could also be trained to lead the exercise sessions for additional residents after completion of the program to assist in maintaining their functional mobility.

**Resources**

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