

University of Texas at Tyler

Scholar Works at UT Tyler

MSN Capstone Projects

Nursing

Fall 12-5-2021

The Use of Tele-health Rehabilitation in Chronic Disease: A Benchmark Project

Emily C. Powers

University of Texas at Tyler, epowers4@patriots.uttyler.edu

Follow this and additional works at: https://scholarworks.uttyler.edu/nursing_msn



Part of the [Nursing Commons](#)

Recommended Citation

Powers, Emily C., "The Use of Tele-health Rehabilitation in Chronic Disease: A Benchmark Project" (2021). *MSN Capstone Projects*. Paper 146.
<http://hdl.handle.net/10950/3810>

This MSN Capstone Project is brought to you for free and open access by the Nursing at Scholar Works at UT Tyler. It has been accepted for inclusion in MSN Capstone Projects by an authorized administrator of Scholar Works at UT Tyler. For more information, please contact tgullings@uttyler.edu.

The Use of Tele-health Rehabilitation in Chronic Disease
A Paper Submitted in Partial Fulfillment of the Requirements
For NURS 5382: Capstone
In the School of Nursing
The University of Texas at Tyler
by
Emily Powers
December 5, 2020

Contents

Acknowledgements

Executive Summary

Implementation and Benchmark Project

1. Rationale for the Project
2. Literature Synthesis
3. Project Stakeholders
4. Implementation Plan
5. Timetable/Flowchart
6. Data Collection Methods
7. Cost/Benefit Discussion
8. Discussion of Results

Conclusions/Recommendations

References

Appendix

Acknowledgements

I would like to thank the many different people who participated and supported the development of this project including my classmates. I would especially like to thank Dr. Duke for making research fun and lighting more of a passion for evidence-based practice within me. Also, thanks to Dr. Marzilli for encouraging everyone through the process and always being willing to help. Finally, I would especially like to thank my family for being supportive during all phases of the development of this project.

Executive Summary

Chronic health issues such as heart disease or COPD are very common in the demographic of patients of an older age. Management often requires multiple medications and specific diets. However, an aspect of care that can often be neglected is that of exercise rehabilitation. Either due to distance, time-constraints, or simply just not wanting to do it, patients can easily neglect an aspect of their care that can have physical and mental benefits. One potential solution is that of tele-health rehabilitation which uses personalized exercise plans, a health watch, and communication through phone or video chat in order to bring the benefits of exercise directly to the patient. Research over the past five years clearly shows a need and benefit for tele-rehabilitation. Since the idea of tele-health rehab is relatively new, up-to-date research is frequently being published, and the large majority of it also supports the use of rehabilitation for improvement of quality of life in chronic health problems. If this benchmark project was implemented, a tele-rehabilitation program has great potential for both physical improvement as well as increasing chronically ill patients' perceived quality of life.

Use of Tele-Health Rehabilitation in Chronic Disease

Even though most people know the importance of diet and exercise for maintaining health, these things are often neglected. Exercise should not simply be used in healthy people but also for patients with chronic health issues such as heart and lung disease. The use of a tele-health monitored exercise program has the potential to provide patients with the benefits of a rehabilitation program but also the freedom to perform the exercises when it is best for them. Most importantly, an exercise program can improve a patient's quality of life and help decrease exacerbations.

Rationale

With a large portion of the population of the United States increasing in age, chronic health issues will become more prevalent due to body systems wearing out or not being taken care of properly. Currently, "forty-five percent of Americans (133 million) have at least one chronic condition" (Tinker, 2017). Approximately 10,000 adults from the Baby Boomer generation are turning 65 every day until 2030 which is only going to increase the numbers of chronic diseases and burden the healthcare system even more (Heimlich, 2010). The increase in occurrences of chronic disease means that more and more money will be spent on maintaining these diseases such as cancer, congestive heart failure, and COPD. When an exacerbation of these diseases occurs, both a significant amount of time and money are spent in hospitals. Having to put one's life on hold while being in the hospital can easily affect perceived quality of life. "A recent Milken Institute analysis determined that treatment of the seven most common chronic diseases coupled with productivity losses will cost the U.S. economy more than \$1 trillion dollars annually" with the top four chronic diseases being heart disease, cancer, stroke, and COPD (National Association of Chronic Disease Directors, 2017). While it is too late for the

patient to use preventative medicine in order to stop the disease from happening, they can use acute-on-chronic preventative medicine to stop acute flairs of their disease processes.

Project Goals

The goals of this benchmark study are to explore and plan the use of a tele-rehabilitation program in patient with chronic health problems. Not everyone can afford the time or money it costs in order to participate in a traditional center-based rehab program. Also in the future, due to the number of patients with chronic health problems, there are physically not going to be enough center-based locations to help all the patients who qualify for rehab to actually participate. The use of outpatient exercise programs can help decrease the acute disease exacerbations and lead to an increase in patient's perceived quality of life by spending less time in hospitals and at doctor's offices. In addition, telehealth is ideal for providing patients with a sense of safety due to someone supervising them and giving them access to healthcare in order to treat their chronic health issues.

Literature Synthesis

Within the past few years, tele-health rehabilitation has been receiving more attention in academic literature. Focuses included in these studies are heart failure, COPD, cancer, general activity promotion, and a combination of heart failure and COPD. While different methods are used to promote exercise programs at home, all were successful in increasing the patient's exercise capability. The programs help decrease infirmity-related deconditioning which comes from an activity decline and causes stress on the unused cardiovascular system (Brown, 2012). The various modes of communication included text, phone calls, and real-time video calls along with education or stress management at the beginning of the study. Each study had different types of exercise which varied from using a simple pedometer to employing a patient specific

exercise program. However, just about every study used the same measurement of a six-minute walk test in order to compare the control and intervention groups. Since each disease can have specific quality of life questionnaires, the studies included various surveys with the most common being Minnesota Living with Heart Failure Questionnaire. Other questionnaires included in the studies were the Short Form (36) Health Survey and Chronic Respiratory Disease Questionnaire.

Of the twelve articles examined, eleven of them all showed a statistical significance in an increased exercise capability for the intervention group which was received an exercise program compared to the control group which did not. While these articles address different disease processes, they all have the same end result. Within those articles, Peng et. al (2018), Frensham, Parfitt, & Dollman (2018), Tsai (2017), Beronocchi et. al (2018), Cavlleiro et. al (2021), Kjærgaard et. al (2019), Puhon et. al (2019), and Ding et. al (2021) all showed an increase in the patient's quality of life. So often, healthcare providers have the tendency to try to treat simply the physical ailment. However, with demanding, and sometimes life-threatening, health issues, stress can play a major role in a patient's adherence to the plan of care. Blumenthal et. al (2017) found that the use of stress management therapy along with regular cardiac rehabilitation results in a better long-term outcome in both physical and mental health. Interestingly, Tang et. al (2016) compared the physical outcomes of patients involved in tele-health cardiac rehab versus a center-based rehab and found that there was not much of difference in their physical outcomes, showing that tele-health rehab is just as effective as center-based programs. Of course, a patient is going to have much more responsibility to complete cardiac rehab when not being supervised. While the most successful method of rehab is found to be face-to-face, Pio et. al (2019) found that unsupervised cardiac rehabilitation also has the potential to have the same success. While

almost all of the studies demonstrate similar results, the most applicable study was done by Ding et. al (2021). It clearly showed the benefits of tele-health through monitoring of a health watch for the data and meeting with a tele-health nurse to set goals and monitor progress. While the group size was small, the adherence rate was high and demonstrated a beneficial outcome for health status and perceived angina stability improvement which would have an effect on long-term quality of life (Ding et. al, 2021)

A significant challenge that these studies face is that they cannot be double-blind because participants are going to clearly know whether or not they are in the intervention group. Although this has the potential to skew results, almost every study shows the same thing about how the intervention group showed a statistically significant difference that favored the intervention.

Stakeholders

My project would potentially affect many different people due to a snowball effect. If a patient has fewer disease exacerbations, they will be able to spend more time with their families and at their jobs. This not only improves quality of life but also their economic status due to having money come in and not as much going out for medical bills. The programs could potentially decrease the number of chronic disease exacerbations in the emergency room and doctors' offices, allowing a small amount of relief on the congested medical system. A project of this nature will greatly involve physicians as stakeholders due to the need for them to refer patients to use a telemedicine rehabilitation program. As more patients are referred, the benefits of the project will grow and potentially become a readily accepted form of rehabilitation. While the program allows for patients to work in their own homes, it will require the use of employees

to follow up with patients and monitor their progress. This will open up more jobs and eventually have a benefit to the community through increases in the economy.

Implementation (Planned)

The first step is to acquire patients with recommendation from a cardiologist or doctor who has cleared the patient for cardiac rehab. The cardiologist must give a patient's maximal heart rate which will be individualized in order to find the optimal exercise rate. This will be put into the Karvonen formula to find the patient's target heart rate = $.8 (\text{maximal heart rate} - \text{resting heart rate}) + \text{resting heart rate}$ (European Society of Cardiology, 2010). Patient will be screened for eligibility and baseline fitness/ mental health with a six-minute walking test [6MWT] and mental health questionnaires. Those patients with heart disease will answer the Seattle Angina Questionnaire (Spertus et. al, 1995) and those with COPD will answer the Chronic Respiratory Disease Questionnaire (Guyatt, 2002). With both of these questionnaires, the higher score equals a higher perceived quality of life.

For the actual implementation of the exercise routine, each patient will need access to a device, preferably a smart watch, which will count their steps and heart rate. However, if a smart watch was not available, a patient could use their own smart phone with a pedometer app. In this case, a patient would need to be taught to count their pulse in order to keep a record of it. Patient will be given instructions about exercise program which will entail an individualized plan which they will continue for eight weeks. The patients will be instructed to walk at least four times a week for 45 minutes, based on their target heart rate. At the end of each day, the patients will upload their results of their distance walked and their heart rates before starting, every ten minutes during, and then within ten minutes after they stop walking. The nurse/ APRN will review this and be able to make small changes or better instruct the patient on the exercise

program. At least once a week, the patient will have a video chat or phone call with the nurse/APRN to survey how the patient is feeling and how the exercise program is progressing. If patients feel as if there is someone who is monitoring their progress, they are more likely to adhere to the program. Each patient will be instructed to call the project number if there are any questions or changes in condition. At the end of eight weeks, data will be collected. Patients will repeat the 6MWT and mental health questionnaires. The answers will be compared to all patients' entry answers as well as compare the beginning and end 6MWT distances.

Timetable/Flowchart

Starting with the first week, the plan will be to approach cardiologist and family doctors about getting patients to participate in a tele-health rehab program. By the second week, the program directors will screen patients for appropriateness and ensure they have stable heart disease or COPD. Patients will be started on their first tele-visit which will involve instructing them on starting their exercise programs. Throughout weeks three through nine, the patient will be following the exercise program and getting a weekly or biweekly tele-visit for any changes needed to their walking plan. Patients will also be uploading their data for the APRN to be able to analyze it. On the last week of the exercise program, patients will do the same 6MWT and the quality-of-life questionnaires. Their answers will be compared to the beginning scores to determine if there is any change in physical ability or quality of life. [See appendix for timeline]

Data Collection Methods

While this is a benchmark project, the proposed way of evaluating if my project is working is by comparing beginning and end data. The beginning evaluation process for each patient will include having them perform a 6-minute walking test where they will measure their pulse at the beginning and end. Patients will also fill out a questionnaire about their perceived

quality of life which will have a quantitative value assigned to each question. Throughout the program, patients will notify the nurse who is checking in on them about what their pulse was at the beginning and end of exercise as well as how many steps they have walked through their prescribed walking time. Each patient will have their data tracked through what is reported. At the end of the project, the same 6-minute walking test and quality of life survey will be performed and the data will be compared from the beginning and end.

Cost/Benefit Discussion

While the end goal of this project is to improve quality of life, the cost benefits has the potential to be exponential. On average, each hospitalization costs for heart failure was \$11,552 as was found in a retrospective 2018 study (Jackson et. al, 2018). If a patient is hospitalized due to a COPD exacerbation, he or she could be left with an initial bill of \$7,000 to \$39,200 (Bollmeier & Hartmann, 2020). In a broader perspective, these frequent exacerbations of chronic diseases also effect a hospital's compensation from the Centers for Medicare & Medicaid Services [CMS]. CMS specifically tracks hospitalization and readmission rates for specific conditions, including myocardial infarction, COPD, heart failure, among other diseases. Hospital payments are adjusted based on performance with a potential decrease of payment up to three percent (CMS.gov). Participating in a rehab program is going to have a cost as well. However, "Over usual care, this had net cost-savings of USD\$965(€801)/patient and an 11.6% reduction in major cardiovascular events" (Edwards et. al, 2017).

Two of the major costs for this project will be technology to track patient's activity as well as staffing for monitoring patients. In order to simplify the process, the patient will need a combined pedometer and heart rate monitor which will cost the program approximately \$50-100, depending on the brand used. While this will be a large up-front cost, the pedometers will be able

to be reused. Staff to monitor the patients will be where the largest portion of the program cost will go. Considering the strategy of allowing thirty minutes per patient check in, a nurse would be able to check-in with approximately fourteen patients in a day. Taking technical difficulties and unavailable patients into account, a conservative estimate of number of patients a nurse would be able to contact on a weekly basis would be about sixty people. In addition to this nurse, another nurse would be needed for the admission and ending processes. If each nurse got paid \$28 an hour and worked a forty-hour work week, the cost per nurse would be \$8,960 for the 8-week project, with a combined cost of \$17,920 for both nurses.

Overall benefits to this project ideally include a decreased amount of time spent in a hospital due to exacerbations which will lead to an increased in quality of life. While the perceived quality of life will vary from person to person, the monetary benefits from decreasing exacerbation rate has the potential to be exponential. Since chronic disease exacerbations are a major cause of death, decreasing exacerbations also has the end result of saving lives.

Discussions/Results

Since this project was not able to be implemented due to COVID-19, a clear success or failure is not able to be seen. However, throughout the research, there is clearly a gap in patient's care that could be filled with a tele-health program. The distance required to travel in order to participate in a traditional rehab program can be a daunting and an influencing factor to why patients do not participate. The inability to take part in a beneficial aspect of healthcare can lead to patients not being able to live their lives to their fullest. As a result, once able to implement this project, I would anticipate that the project would support the research. In order to determine if it was a success, I would look at the beginning and end data to determine if patients have an increase in their physical fitness as well as an increase in their perceived quality of life.

Recommendations

The first recommendation for the project would be to be able to act upon the plan. From there, changes would need to be made based on the success or failure of certain aspects. While success and changing parts of the project would be the end goal, failure of the entire plan is not ruled out. However, lack of complete success is not truly failure. There will no doubt be one part of the plan that is useful to base changes off of. At the end of the project, the next step would be to have participants fill out a survey stating what they liked or didn't like about the program. This will also help make future changes and evolve the project to where it is more beneficial for both the project leaders and patients.

As a future MSN, my personal recommendations for this project would be that this is a type of plan that is worth spending the time, money, and effort to enact. With heart disease and COPD being such chronic health problems in Americans today, the need for different types of treatment will become even bigger as more patients are affected. Requiring patients to come to a specific location for rehabilitation is not realistic, especially in rural areas. Thus, the use of tele-rehab is a more conducive way to get patients to participate in cardiac rehab and get the benefits of improvement to their physical and mental health.

I currently work in a facility that is known for its cardiology program as a whole. It has a cardiac rehab that many patients go to. There is also another hospital in the same city that also has a cardiac rehab. These two hospitals are the main ones for a large geographical area, a lot of which is very rural. As a result, one could imagine there have to be many patients with chronic health problems such as COPD and heart disease who do not get the opportunity to participate in rehab simply due to location or transportation issues. For my facility, I would recommend using a local home health agency as the base of operation in order to offer a tele-health rehabilitation.

A home health agency will already have a physical location with internet, computers, and telephones that would be needed along with the knowledge of patients who would most likely benefit and be willing to participate in tele-health rehab. My recommendations to my colleagues is to encourage leadership to see where there is a gap in patient care and how tele-health rehab could fill it. For patients, their recommendation is to inquire about the use of tele-rehab instead of rehab in a physical location.

Overall, since this project was not able to be implemented, it is difficult to say if it would be a success or not. Research clearly shows a gap where a program like this could be used. In even the past year, there has been a significant increase in amount of research done in this area and the majority of it shows how a tele-rehabilitation program would provide a benefit to patients. It will require patients to be dedicated enough to adhere to the exercise program. However, if they do, these patients have the potential for an increase in physical abilities and better quality of life.

References

- Bernocchi, P., Vitacca, M., La Rovere, M. T., Volterrani, M., Galli, T., Baratti, D., Paneroni, M., Campolongo, G., Sposato, B., & Scalvini, S. (2018). Home-based telerehabilitation in older patients with chronic obstructive pulmonary disease and heart failure: a randomised controlled trial. *Age and Ageing*, 47(1), 82–88. <https://doi-org.ezproxy.uttler.edu/10.1093/ageing/afx146>
- Blumenthal, J.A., Sherwood, A., Smith, P. J., Watkins, L., Mabe, S., Kraus, W. E., Ingle, K., Miller, P., & Hinderliter, A. (2016). Enhancing cardiac rehabilitation with stress management training. *American Heart Association*, 133(4). doi:10.1161/CIRCULATIONAHA.115.018926.
- Bollmeier, S. G., & Hartmann, A. P. (2020). Management of chronic obstructive pulmonary disease: A review focusing on exacerbations. *American journal of health-system pharmacy : AJHP : official journal of the American Society of Health-System Pharmacists*, 77(4), 259–268. <https://doi.org/10.1093/ajhp/zxz306>
- Brown, Marybeth. (2012). The physiology of age-related and lifestyle-related decline. *Journal of Geriatric Physical Therapy*, 27-37. DOI:10.1016/B978-0-323-02948-3.00012-2.
- Cavalheiro, A. H., Silva Cardoso, J., Rocha, A., Moreira, E., & Azevedo, L. F. (2021). Effectiveness of tele-rehabilitation programs in heart failure: A systematic review and meta-analysis. *Health services insights*, 14. <https://doi.org/10.1177/11786329211021668>
- Centers for Medicare & Medicaid Services [CMS], (2021). Hospital readmission reduction program. Retrieved from <https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/Readmissions-Reduction-Program>

- Ding, E.Y., Erskine, N., Stut, W., McManus, D.D., Peterson, A., Wang, Z., Escobar-Valle, J., Albuquerque, D., Alonso, A., Botkin, N.F., Pack, Q.R., McManus, D.D., (2021). MI-PACE Home-Based Cardiac Telerehabilitation Program for Heart Attack Survivors: Usability Study. *JMIR Hum Factors*, 8(3) doi:10.2196/18130.
- Edwards, K., Jones, N., Newton, J., Foster, C., Judge, A., Jackson, K., Arden, N. K., & Pinedo-Villanueva, R., (2017). The cost-effectiveness of exercise-based cardiac rehabilitation: a systematic review of the characteristics and methodological quality of published literature. *Health Economics Review*. 7(37). <https://doi.org/10.1186/s13561-017-0173-3>
- European Cardiology Society, (2010). Whether and how to establish an exercise plan in cardiac patients. *European Cardiology Society*, 9(1).
- Frenchsam, L.J., Parfitt, G., & Dollman, J. (2018). Effect of a 12-Week online walking intervention on health and quality of life in cancer survivors: A quasi-randomized controlled trial. *International Journal of Environmental Research and Public Health* 15(10). <https://doi.org/10.3390/ijerph15102081>
- Guyatt, G. H. (2002). Chronic Respiratory Disease Questionnaire-CRQ. *American Thoracic Society*
- Heimlich, R. (2010). Baby Boomers Retire. *Pew Research Center*.
<https://www.pewresearch.org/fact-tank/2010/12/29/baby-boomers-retire/>
- Jackson, S. L., Tong, X., King, R. J., Loustalot, F., Hong, Y., & Ritchey, M. D., (2018). National burden of heart failure events in the United States, 2006 to 2014. *Circulation*, 11(12). DOI: 10.1161/CIRCHEARTFAILURE.117.004873
- Kjærgaard, J. L., Juhl, C. B., Lange, P., & Wilcke, J. T. (2020). Early pulmonary rehabilitation after acute exacerbation of COPD: a randomised controlled trial. *ERJ open research*, 6(1), 00173-2019. <https://doi.org/10.1183/23120541.00173-2019>

- Martin, S.S., Feldman, D.I., Blumenthal, R.S., Jones, S.R., Post, W.S., McKibben, R.A., Michos, E.D., Ndumele, C.E., Ratchford, E.V., Coresh, J., & Blaha, M.J. (2015). mActive: A randomized control trial of an automated mHealth intervention for physical activity promotion. *American Heart Association*, 4(11), 1-9. doi: 10.1161/JAHA.115.002239
- National Association of Chronic Disease Directors. Why public health is necessary to improve healthcare. *National Association of Chronic Disease Directors*.
https://chronicdisease.org/resource/resmgr/white_papers/cd_white_paper_hoffman.pdf
- Peng, X, Su, Y, Hu, Z, Sun, X, Li, X, Dolansky, M, Qu, M, & Hu, X (2018). Home-based telehealth exercise training program in Chinese patients with heart failure: A randomized controlled trial. *Medicine* 97(35). doi: 10.1097/MD.00000000000012069.
- Pio C.S.A., Chaves, G., Davies, P., Taylor, R., Grace, S. (2019). Interventions to promote patient utilization of cardiac rehabilitation: Cochrane systematic review and meta-analysis. *Journal of Clinical Medicine*, 8(2). DOI: 10.3390/jcm8020189.
- Puhan, M.A., Gimeno-Santos, E., Cates, C.J., Troosters, T. (2019). Pulmonary rehabilitation following exacerbations of chronic obstructive pulmonary disease. *Cochrane Database of Systematic Reviews*, 12 DOI: 10.1002/14651858.CD005305.pub4.
- Spertus, J.A., Winder, J.A., Dewhurst, T.A., Deyo, R.A., Prodzinski, J., McDonnell M, & Fihn, S. D. (1995). Development and evaluation of the Seattle Angina Questionnaire: a new functional status measure for coronary artery disease. *J Am Coll Cardiol*, 25(2):333-341
- Tang, L. H., Zwisler, A., Berg, S.K., Doherty, P., Taylor, R.S., & Langber, H., (2016). Is the cardiovascular response equivalent between a supervised center-based setting and a self-care home-based setting when rating of perceived exertion is used to guide aerobic

exercise intensity during a cardiac rehabilitation program? *American Journal of Physical Medicine & Rehabilitation*. p 381–387. doi.org/10.1097/PHM.0000000000000628

Tinkler, A. (2017). How to improve patient outcomes for chronic diseases and comorbidities. *Health Catalyst*. <http://www.healthcatalyst.com/wp-content/uploads/2014/04/How-to-Improve-Patient-Outcomes.pdf>

Tsai, L.Y., McNamara, R. J., Moddel, C., Alison, J. A., McKenzie, D., & McKeough, Z. J. (2017). Home-based telerehabilitation via real-time videoconferencing improves endurance exercise capacity in patients with COPD: The randomized controlled TeleR Study. *Asian Pacific Society of Respiriology*, 22, 699-707. doi: 10.1111/resp.12966

Appendix

Timeline image

