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Reducing 30-day Heart Failure Hospital Readmissions Through the Implementation of a Telehealth Education and Screening Program

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Abstract

Heart Failure (HF) is a difficult disease to manage. It requires knowledge on weight monitoring, diet, exercise, medications, and symptom management. With this difficulty, there is a high incidence of HF patient readmissions into the hospital, especially in the first 30-days after discharge, showing that patients are not well equipped to manage their HF on their own at home. A review of the available literature found that some of the most common reasons for readmission include poor discharge planning, a lack of continuation of care, as well as a lack of education and adherence to their medications (Mathew & Thukha, 2018). Studies also found that implementing outpatient education can help to decrease the number of 30-day readmissions for HF patients (Blum & Gottlieb, 2014).

A Doctor of Nursing Practice (DNP) student-led quality improvement project focused on decreasing 30-day HF hospital readmissions was implemented using telehealth education and screening for patients recently discharged. Patients received four phone calls, one per week for four weeks, received education on management of their HF (medications, daily weights, diet, etc.) and were screened for symptoms and to see how they were doing outside of the hospital. The largest potential benefit of this program is reducing 30-day hospital readmissions, as it targets patients when they are recently discharged, which is their most vulnerable time. Other potential benefits include a higher quality of life, decreased morbidity and mortality, and large cost savings for the hospital. The potential benefits of this project depend upon buy-in from a hospital and full participation from patients. Limitations include a lack of participation from patients, lack of buy-in from a hospital and their staff, and patients not completing the full four

weeks of telehealth visits. This project has limited overhead costs and risks, and a large potential for successfully reducing 30-day hospital readmissions.

Introduction

Problem Description

Heart failure (HF) is a chronic issue affecting millions of people in the United States (US). In 2009, HF alone killed over 56,000 people (Kochanek et al., 2009). The prevalence of HF is enormous in this country, and the incidence and prevalence are expected to grow. HF diagnoses are projected to increase by 25% by 2030, the highest increase out of all cardiovascular diseases (Heidenreich et al., 2011).

Hospital admissions and frequent readmissions for HF cost the US healthcare system millions of dollars every year. The current cost of admissions for HF is $61.4 billion per year and that cost is expected to increase (Heidenreich et al., 2011). By 2030, admissions are projected to cost $77.7 billion (Heidenreich et al., 2011). Currently, 34.8% of people admitted to the hospital with HF were readmitted within 30 days in the US, demonstrating a failure in the outpatient care delivered to this population (Dharmarajan et al., 2013). If providers can find a way to increase education in the outpatient care setting, it can decrease hospital readmissions, saving millions of dollars for the patients, hospitals, and the government.

The Center for Medicare and Medicaid Services (CMS) specifies that it is mandatory for hospitals to report 30-day readmissions for HF diagnoses and adjusts the reimbursement rate for each hospital depending on if the HF patient is readmitted within that time frame (Dharmarajan et al., 2013). This is done so that hospitals can be aware of the impact of readmissions and to bring the focus onto preventative, primary care as opposed to tertiary care. While some readmissions are inevitable, many result from a lack of follow up and education in the outpatient setting.

Setting

Yearly, Stanford Health Care (SHC) measures their 30-day HF hospital readmission rates, with their goal for fiscal year (FY) 2020 being 14% or less. For FY 2020, SHC had a HF readmission rate of 19%, meaning they did not meet their goal. SHC's goal for FY 2021 is to reduce HF readmissions by 5%, going from 19% to 14%. This DNP student-led quality improvement project can help with that goal and occurred in the outpatient, telehealth setting through SHC's HF clinic. Patients were recruited while they were in the hospital or shortly after discharging (within 24 hours), and the intervention took place via telehealth phone calls. With this setting, patients could take these sessions in whichever setting they choose and do not have to live near SHC and come in person for appointments.

Specific Aim

The aim of the quality improvement project is: To create, implement, and evaluate a four-week outpatient telehealth HF education and screening program to decrease 30-day HF hospital readmissions from 19% to 14% by three months at the SHC HF Clinic. The purpose of this project is to educate and screen patients on HF management so they can manage their disease on their own, thus leading to fewer 30-day hospital readmissions. Screening was done during each telehealth visit to monitor for symptoms and make sure the patient remained stable while being out of the hospital.

Available Knowledge

PICOT Question

A review of evidence related to HF hospital readmissions and telehealth was performed. The following question was used to aid in the literature search: In patients with HF, how does additional education on HF management and screening from medical professionals compared to

the standard method of medical care affect reduced rate of hospital readmissions within the first 30-days after discharge?

Search Methodology

A literature search was performed utilizing the health science databases CINAHL, PubMed, and Scopus. CINAHL was the primary database used. Key words were used to find specific research articles. These searches included a combination of the key words "heart failure," "readmission," "education," "outpatient," "telehealth," and "30-day". Articles included in the search had to be published in a journal and written in English. Exclusion criteria were comprised of studies on people under 18 years old and studies that were ongoing. The results focused on the adult population, and only finalized data will be used. Searches were narrowed down to include only journal articles, and articles published within the last ten years. Searches were performed using "or" or "and" between key words to yield different results such as "heart failure and telehealth", or "heart failure and readmission". Truncations were also used for key words to yield more results, for example "readmi*" was used to yield results using the words "readmit" or "readmission". A total of ten articles were used. The Johns Hopkins Research/Non-Research Evidence Appraisal Tools (Dang & Dearholt, 2022) was used to assess the quality each journal article used.

Integrated Review of Literature

Telehealth Promotes Reductions in Readmission Rates

For a summary of the literature review, see Appendix A. Blum and Gottlieb (2014) performed a randomized control trial (RCT) to analyze Medicare claims data and evaluate costs, mortality, health-related quality of life, and 30-day readmission rates between people using telemonitoring versus usual care. They found significant results showing that there were less

hospital readmissions for the intervention group ($p<0.05$) (Blum & Gottlieb, 2014). These patients had performed daily monitoring of their weight, heart rate, blood pressure, and heart rhythm as well as worked with a nurse practitioner (NP) via telephone (Blum & Gottlieb, 2014). A study by Bernocchi et al. (2017) found similar results. This study was an RCT as well and used a nurse to perform the telehealth education for two months (Bernocchi et al., 2017). They found significant results showing the time to hospitalization was less for the intervention group ($p=0.048$). A study by Ong et al. (2016) also performed a RCT, but found mixed results. They implemented a telehealth intervention on 1,437 participants from six hospitals in California, and measured hospital readmission rates at 30 and 180-days post-intervention (Ong et al., 2016). They did not find significant results for the 30 and 180-day readmission rates ($p=0.74$, $p=0.56$ respectively), but did find significant results showing that 30-day mortality decreased for the intervention group ($p=0.04$) (Ong et al., 2016). Like Ong et al. (2016), a study by Long (2017) performed a systematic review of 30-day readmission and mortality rates for HF patients and found mixed results. They found that while mortality rates decreased by 50%, readmissions only decreased by 2% (Long, 2017). Woodside et al. (2011) looked at readmission rates for people in rural northern Michigan. They implemented telehealth and telerehabilitation via a nurse and found significant results. Readmission rates decreased by 2.9% in 2007, 2.5% in 2008, and 2.23% in 2009 (Woodside et al., 2011). Kasper et al. (2002) performed telehealth and in-person education to reduce readmissions and cost and found significant results. Patients had fewer readmissions ($p=0.09$), deaths ($p=0.03$), better diets ($p=0.02$), and better medication compliance ($p<0.001$) (Kasper et al., 2002).

Each of these articles is ranked a Level I based on the Johns Hopkins Evidence-Based Research Appraisal Tool (2018) because they are either systematic reviews or RCT's, except the

article by Woodside et al. (2011). That article scored a level II due to it being a quasi-experimental study (Woodside et al., 2011). Each article scored Quality A based on the Johns Hopkins Evidence-Based Research Appraisal Tool (2018) except for the study by Blum and Gottlieb (2014) and Woodside et al. (2011). The articles that scored Quality A provided detailed content, methods, analysis, conclusion, limitation, and recommendation sections. The studies by Blum and Gottlieb (2014) and Woodside et al. (2011) are Quality B because they provide detailed analysis, methods, conclusion, limitations, but did not discuss recommendations. The study by Ong et al. (2016) has the most relevant data, and likely the most worth to practice since it takes place in California. The article by Long (2017) was a systematic review of studies that took place in the US, but many of the articles had limited sample sizes so may have led to skewed results. The articles by Blum and Gottlieb (2014) and Bernocchi et al. (2017) took place in the US and Italy respectively, making them less relevant than a study that took place in California, but still relevant to this population and setting.

Telehealth Applicable for Rural or Urban Sites

A variety of articles have shown that telehealth can work in many different situations. Woodside et al. (2011) looked at the rural community only and found that their readmission rates significantly decreased. The article by Bernocchi et al. (2017) took pace in an urban area in Italy and found significant results. Touching on a wide range of studies is very helpful when getting to the implementation phase of a study, as people can see what worked, what did not work, and how to go about future research.

Theoretical Framework

The theoretical framework used for this project is Dorothea Orem's Self Care Deficit Theory (Gonzalo, 2014). This theory discusses how every patient has a self-care need and

deficit, and nurses can look at those and the factors influencing them and help the patient (Gonzalo, 2014). There are five main concepts of this theory that all work together and ultimately lead to a patient being able to increase their ability to perform self-care: demand, agency, deficit, nursing agency, and basic conditioning (Gonzalo, 2014). A nurse needs to recognize a patient's self-care deficits, their basic conditioning (such as age, gender, environment), their demand, and ability (Gonzalo, 2014). This relates to this project as HF patients frequently have a large self-care deficit and a large self-care demand. It is up to the nursing agency to help bridge the gap so they can increase their own self-care agency, thus taking better care of themselves and managing their HF on their own.

Methods

Context and Stakeholders

Stakeholders involved in this project include my advisor/chair, co-chair, my mentor at SHC, providers at SHC's HF clinic (physicians, nurse practitioners), the participants, and myself. The first step was educating the stakeholders on the details of the project, the purpose and need for it, and the potential beneficial outcomes it could have. My advisor/chair, co-chair, and SHC mentor care most about the details of the project as they provide approval of it and support when needed throughout the intervention. The intervention took place over three months to allow for a larger number of participants and a more accurate outcome, so SHC will be working with me for a longer period. SHC has specific 30-day readmission rates that they want to meet, so showing them a project that can help them meet those goals was well received. The providers at the HF clinic are the second most important stakeholders behind the participants themselves. The providers can be directly impacted by this project as they may have better educated patients, less hospital admissions, and could have better 30-day readmission rates. The participants

themselves were educated on the project as they were being recruited. They were told of potential benefits of the project and any implications for them. They are the most directly impacted and have the most potential for benefitting from the project.

Intervention

The intervention was the implementation of outpatient telehealth education and screening for HF patients recently discharged from SHC. Patients were recruited from SHC shortly before or after discharging, and the intervention started the first week after discharging. The intervention consisted of four phone calls, one per week. Each phone call lasted approximately 15-30 minutes. During each phone call patients were educated on HF management, such as managing diet, exercise, medications, and daily weights. They were also screened for things such as symptoms they may be having, and just to check in with them to see how they are feeling and how well they think they are managing their HF. At the end of each session patients were asked questions, such as "what time are you going to weigh yourself each day?" to show evidence of learning the information discussed. Each patient was asked to fill out a five-question pre-survey and post-survey to assess their confidence in managing their HF before and after the intervention. The pre and post-surveys consisted of the same questions. Please see Appendix B for an example of the survey.

Gap Analysis and GANTT Chart

When looking at SHC specifically, there was a large gap between where the organization wanted to be and where they were. For fiscal year 2020, SHC had a goal of having 14% of HF patients be readmitted within 30-days after discharging. They did not meet that goal, and their actual percentage of 30-day HF readmissions was 19%, meaning they were 5% off from their target goal. They attributed this to a lack of following up with recently discharged patients and a

lack of patient education. Implementing this outpatient telehealth program will potentially help them reach their goal of 14% of HF patients being readmitted within 30-days. In doing this project, it will fill in any educational gaps that the patients may have, as they will be educated on HF management. It also serves as a patient follow-up and screening to fill in any gaps related to not having that outpatient provider follow-up. Please see Appendix D for a table of the current state, present gap, and action taken to close the gap.

A Gantt chart has been created and is displayed in Appendix E. It shows a timeline of the events leading up to the implementation of the project, the implementation itself, and the write-up of the project paper afterwards. Prior to implementing the project, the idea was finalized and approval was granted by the advisor/chair. After approval of the project, an application was sent to SHC to be able to implement the project at that hospital. After approval was gained, a mentor that works at SHC (a nurse practitioner) was established to help assist in the implementation and to help bridge the gap between USF and SHC. Also, around this time a co-chair was identified to review the project before implementing and help review the project and write-up after implementation. Prior to implementation, all details and paperwork were gathered for the project and all stakeholders were notified and educated on the project. Once all these components were set, implementation began and lasted for approximately three months to achieve a desired participant count. After implementation was finished, the formal write-up of the project began, including the quals prospectus and quals manuscript.

Strengths, Opportunities, Weaknesses, Threats (SWOT) Analysis

Please see Appendix F for a chart of the SWOT analysis. Two major strengths for this project include that it was inexpensive, and that the intervention could be performed from nearly anywhere. Since the project is telehealth based, the only major cost is hiring a nurse to recruit

patients and perform the intervention. Since the intervention is telehealth based, it can be performed anywhere that the nurse and patient have access to a phone, making it flexible to location. This adds a great convenience to the patient as well as the nurse and can help decrease attrition and increase patient satisfaction since patients do not have to worry about driving to SHC for an appointment. Along with this, it was also flexible to the time the telehealth visits take place. Since the visits are from the patient's home, it can be done whenever convenient for the patient and the nurse. The other strong benefit of this program was that it targets patients when they were at their most vulnerable, which is the first 30 days after discharge (Nathan et al., 2020).

One weakness about this project was that it requires hiring a part time (0.5 full time equivalent) nurse, which will be the major cost of the program. The potential benefit of the program is saving money through reducing hospital readmissions, but this is not guaranteed. A major weakness was that by having the intervention be performed via telehealth, there was no way to perform in-person assessments, such as listening to lungs or assessing edema, which could hinder the quality of the education and screening. Lastly, there is potential for patient attrition, with patients dropping out of the program before completing the full four weeks of telehealth sessions.

The two major opportunities are the potential to use this program for other diagnoses, such as telehealth diabetes education, and for expanding it to other hospitals so they can have a program similar to this. Also, if the program were successful it could lead to higher ratings for the hospital and higher patient satisfaction through patients being able to better manage their HF on their own.

The major threat to this project was if other hospitals or companies already have a similar program that patients prefer using. That would be a competitor to this project and could take away from the number of patients participating and could impact this project's outcome.

Work Breakdown Structure (WBS)

There are three major components to the WBS: Phase 1, Phase 2, and Phase 3. Please refer to Appendix G to see an outline of each component of the WBS.

Phase 1.

Phase 1 was the planning phase. Most of this was completed by the DNP student project lead, with some assistance from faculty. The first step was to find a mentor at SHC's HF clinic who can help find patients, guide the education sessions, and be there as a reference when needed. The second step was gaining approval from SHC to do the project there. This requires project approval, an SHC ID, and to gain access to patient's medical charts and records. The final step of this phase was to finalize the details of the project implementation, such as when it will take place, how many patients are needed for the program, and the details of what will be included in each education session.

Phase 2.

This was the implementation phase, where I recruited patients for the project and actively provided the education. I was the primary person involved in this phase but have the SHC mentor available in case I need assistance with any of the intervention. This phase took around three months to complete, but the timing was flexible.

Phase 3.

This was the evaluation and dissemination phase. I was the primary person involved in this phase, with support from my advisor and co-chair. In this phase the intervention was

evaluated to see its effectiveness, and a formal paper was written. After the paper was written it's disseminated to SHC, USF, and any members that were involved in the project (mentor, advisor, etc.).

Budget and Communication Plan

Overall implementing a telehealth education program was relatively low cost and would save the hospital money if the program were successful at preventing 30-day readmissions. The major cost of this program is hiring a 0.5 full time equivalent (FTE) nurse. Hiring a 0.5 FTE RN will cost $76/hour x 1040 hours/year = $79,040 annually. Additional costs include benefits (30% per year) at $23,712 per year, and hospital orientation, which costs approximately $5,000. This is a total of $107,752 for the first year.

The mean cost of a hospital stay for HF patients is around $18,000. SHC admits approximately 1,800 HF patients each year. $18,000 per patient x 1,800 patients = $32.4 million per year. Approximately 50% of medical bills are not paid at all, causing the hospital to lose about $16.2 million per year. Implementing telehealth could cause 30-day re-hospitalizations to drop approximately 5%. 1,800 hospitalizations x 5% x $18,000= $1.6 million per year. Not every patient wants to participate in this program, and not every patient that participates was successful at staying out of the hospital for at least 30 days, but there is potential for significant cost savings. Each telehealth session (lasting a half-hour) will cost approximately $100. Since there are 1,800 patients per year that qualify for the telehealth program, with each of them attending four sessions at $100 per session, the program could make approximately $720,000 (($100x4) x 1,800) if every single patient participated in all four sessions. Please see Appendix H for a breakdown of the cost savings over three fiscal years.

The communication plan consists of five different communication types. Please refer to Appendix I for a matrix of the different communication that will take place. The various meetings included alerting stakeholders at SHC to the project before it took place. This alerted them in case they have any patients of their own in the program and in case they had any questions about it. This consisted of one email, but could have been more depending on any questions that could have arisen. Recruiting patients alongside the project mentor was performed via phone calls between the mentor and myself as they found patients that could potentially be a part of the program. This happened multiple times over a few months as more patients became available. Recruiting patients was a large source of communication as it was face-to-face or via phone call; it occurred once per patient. The telehealth education and screening sessions were the largest source of communication, as the patients have 4 sessions each, one per week. Lastly, the chair and co-chair for the project were communicated with via email after the implementation was complete to discuss outcomes, anything else that needed to be done, and to move forward with the manuscript.

Outcome Measures

There are three outcome measures used, and they are quantitative measurements. The first and most important one, was measuring the percentage of hospital readmissions amongst patients. The goal is to have a maximum 30-day readmission rate of 14% amongst patients in this program. This number was measured at the end of the intervention portion of the project. The rationale behind this was that 14% 30-day readmission rates is the goal for SHC for FY 2021, and would be a 5% decrease from FY 2020, which is an achievable goal. The second measurement was increasing patient baseline HF self-management education by 50%. This was measured through a survey taken before and after the education was completed. The same

questions were asked before and after the education and were compared to see the difference. An example of questions asked is "I feel confident in managing my HF." They can answer *yes*, *no*, or *somewhat*. An average increase in education amongst all participants that complete the full program was measured. Please see Appendix B for an example. This was a helpful measurement to see if patients have an increase in confidence and education in HF management and will help identify if the telehealth sessions are helpful.

The outcome measurement was patient and staff engagement/satisfaction in the program. With each participant, I measured if they make it through the entire program or if they stop participating part of the way through. For this, the number of patients that finish the entire program were compared against the number of patients that do not participate in the entire program. The goal was to have full attendance be above 50%. This is an important outcome to measure because if patients do not fully participate in the program, they are not receiving the full extent of the telehealth education and are at a higher risk of being readmitted. It also shows if patients are willing to participate in a lengthy program such as this. If patients are not willing to participate in the full four weeks, then there may need to be changes made to programs like this in the future.

Analysis and Ethical Considerations

The data collected was entered and analyzed using Microsoft Excel. Data measured does not need complex statistical analysis, so Microsoft Excel was able to perform all mathematical/statistical functions needed. This project follows the Jesuit values through respecting and promoting dignity of every person (University of San Francisco, 2021). No patient is taken advantage of, their confidentiality is maintained, they are not forced to participate in the program and are made aware that they can choose to stop participating at any time.

HIPAA standards were met and all patient data was protected during this project. Data is stored on an encrypted USB for protection all protected health information (PHI) from participants. PHI was not shared or seen by anyone other than myself. All patients signed a confidentiality form during the recruitment stage stating that their information will not be shared and will be kept secure, and HIPAA standards are maintained. Only the minimum amount of patient information needed was collected to further protect patients' PHI. This project adheres to the American Nurses Association (ANA) code of ethics, and upholds provision 3.1, protection of the rights of privacy and confidentiality (ANA, 2015). As patients have the right to confidentiality, their information was not shared or seen by anyone other than myself.

Results

A total of six patients participated in the program. All of them were admitted to SHC with a primary diagnosis of heart failure. Of the six participants, four of them were recruited before discharging from the hospital and two of them were recruited within 24 hours after discharge.

Pre- and Post-Survey

All six participants filled out the pre-survey. When answering the pre-survey responses, three felt confident in managing their HF and think that telehealth is an effective form of education for HF. Every participant knew what to do if they had worsening symptoms, and only half of the participants felt they were given all of the materials and resources they needed. Also, half of the participants were concerned about being readmitted to the hospital in the next 30 days.

Four participants completed the post survey. Of the four participants, three answered “yes” to all the questions asked (see Appendix B for the questions). The other participants did not complete

the post-survey due to a lack of responding, not being willing to participate, or not having a way to access the form via computer.

Educational Telehealth Visits

Of the six participants, four of them completed the full amount of telehealth visits (4). One participant completed two telehealth visits, and one participant completed one telehealth visit. Each visit lasted between 15-30 minutes and subjects discussed correlated with the ones listed in Appendix I. Patients asked questions and were referred to the correct provider as needed.

Readmission Rates

Of the six participants, one was readmitted within 30 days of discharge. This is a 16.6% readmission rate, which is less than SHC's previous admission rate of 19% but not to their goal of 14%. The participant that was readmitted was having signs and symptoms of fluid overload during a telehealth visit, was educated and seen by a member of the SHC team and was readmitted for fluid overload.

Discussion

Limitations

There are many benefits to implementing telehealth to decrease 30-day hospital readmissions. With this there are limitations as well. There are three major limitations that can be found with this project. The first one is that the interval between each telehealth session was too long. If a patient was having some symptoms secondary to their HF and they were advised on what to do, following up with them in one week was too long of a period to wait. HF symptoms can change on a day-to-day basis, and patients could benefit from more frequent follow up. A second limitation is patient participation and finishing all four telehealth visits. This takes

frequent reminders to patients and self motivation from patients. One phone call per week for four weeks is a lot to schedule and participate in, and this caused some patients to not complete the full program and could lead to worse outcomes for them. The third limitation is not being able to perform the same assessments as would be done in in-person visits. Telehealth has many benefits, but it means the nurse is not able to assess things such as edema or lung sounds, which can be very important in determining how a patient is doing. Seeing a patient in-person also helps build rapport and a stronger, more trusting relationship with them.

Conclusion

HF is a difficult disease to manage. It requires understanding and managing medications, diet, fluid restrictions, exercise, daily weights, and symptoms. HF hospitalization makes up two percent of annual healthcare costs in the United States (US) (Garcia et al., 2019). Implementing a four-week telehealth education and screening program can increase patient education and self-management of HF, thus decreasing 30-day hospital readmissions. The intervention is inexpensive, flexible to time and location, and is easy to implement. Short-term, the program can increase education and decrease readmissions; long-term, the program can save the hospital money, and lead to higher patient quality of life and reduce morbidity and mortality. This program has the potential to be expanded and successful in other disciplines within SHC and to other hospitals.

References

American Nurses Association (2015). Code of ethics with interpretive statements. Retrieved from: http://www.nursingworld.org/coe-view-only

Bernocchi, P., Vitacca, M., La Rovere, M. T., Volterrani, M., Galli, T., Baratti, D., Paneroni, M., Campolongo, G., Sposato, B., & Scalvini, S. (2017). Home-based telerehabilitation in older patients with chronic obstructive pulmonary disease and heart failure: a randomized controlled trial. *Age and Ageing*, *47*(1), 82–88. https://doi.org/10.1093/ageing/afx146

Blum, K., & Gottlieb, S. S. (2014). The effect of a randomized trial of home telemonitoring on medical costs, 30-day readmissions, mortality, and health-related quality of life in a cohort of community-dwelling heart failure patients. *Journal of Cardiac Failure*, *20*(7), 513–521. Doi: 10.1016/j.cardfail.2014.04.016

Dang, D., & Dearholt, S. (2022). *Johns Hopkins nursing evidence-based practice : model and guidelines*. Sigma Theta Tau International.

Dharmarajan, K., Hsieh, A. F., Lin, Z., Bueno, H., Ross, J. S., Horwitz, L. I., … Krumholz, H. M. (2013). Diagnoses and Timing of 30-Day Readmissions After Hospitalization for Heart Failure, Acute Myocardial Infarction, or Pneumonia. *Jama*, *309*(4), 355. Doi: 10.1001/jama.2012.216476

Garcia, M. G., Fatehi, F., Bashi, N., Varnfield, M., Iyngkaran, P., Driscoll, A., … Oldenburg, B. (2019). A review of randomized controlled trials utilizing telemedicine for improving heart failure readmission: Can a realist approach bridge the translational divide? *Clinical Medicine Insights: Cardiology*, *13*, 117954681986139. doi: https://10.1177/1179546819861396

Gonzalo, A., BSN, & RN. (2014). *Dorothea Orem: Self Care Deficit Theory Study Guide*. Nurseslabs. https://nurseslabs.com/dorothea-orems-self-care-theory/#Self-Care-Deficit

Grustam, A. S., Severens, J. L., De Massari, D., Buyukkaramikli, N., Koymans, R., & Vrijhoef, H. J. M. (2018). Cost-effectiveness analysis in telehealth: A comparison between home telemonitoring, nurse telephone support, and usual care in chronic heart failure management. *Value in Health*, *21*(7), 772–782. https://doi.org/10.1016/j.jval.2017.11.011

Heidenreich, P. A., Trogdon, J. G., Khavjou, O. A., Butler, J., Dracup, K., Ezekowitz, M. D., … Woo, Y. J. (2011). Forecasting the Future of Cardiovascular Disease in the United States. *Circulation*, *123*(8), 933–944. Doi: 10.1161/cir.0b013e31820a55f5

Kasper, E. K., Gerstenblith, G., Hefter, G., Van Anden, E., Brinker, J. A., Thiemann, D. R., Terrin, M., Forman, S., & Gottlieb, S. H. (2002). A randomized trial of the efficacy of multidisciplinary care in heart failure outpatients at high risk of hospital readmission. *Journal of the American College of Cardiology*, *39*(3), 471–480. https://doi.org/10.1016/s0735-1097(01)01761-2

Kochanek, K., Xu, J., Murphy, S., Minino, A., & Kung, H.-C. (2009). *National Vital Statistics Report*(3rd ed., Vol. 60). Deaths: Final Data for 2009. Retrieved from https://www.cdc.gov/nchs/data/nvsr/nvsr60/nvsr60_03.pdf

Long, G. (2017). Impact of Home Telemonitoring on 30-Day Hospital Readmission Rates for Patients with Heart Failure: A Systematic Review. *MEDSURG Nursing*, *26*(5), 337–348. http://web.b.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=2&sid=ed918601-2fb9-4c88-bdf4-b547037b3195%40sessionmgr103

Mathew, S., & Thukha, H. (2018). Pilot testing of the effectiveness of nurse-guided, patient-centered heart failure education for older adults. *Geriatric Nursing*, *39*(4),

376–381. doi: 10.1016/j.gerinurse.2017.11.006

Nathan, A. S., Martinez, J. R., Giri, J., & Navathe, A. S. (2020). Observational study assessing changes in timing of readmissions around postdischarge day 30 associated with the introduction of the Hospital Readmissions Reduction Program. *BMJ Quality & Safety*, *30*(6), 493–499. https://doi.org/10.1136/bmjqs-2019-010780

Ong, M. K., Romano, P. S., Edgington, S., Aronow, H. U., Auerbach, A. D., Black, J. T., Marco, T. D., Escarce, J. J., Evangelista, L. S., Hanna, B., Ganiats, T. G., Greenberg, B. H., Greenfield, S., Kaplan, S. H., Kimchi, A., Liu, H., Lombardo, D., Mangione, C. M., Sadeghi, B., … Fonarow, G. C. (2016). Effectiveness of remote patient monitoring after discharge of hospitalized patients with heart failure: The better effectiveness after transition–Heart failure (BEAT-HF) randomized clinical trial. *JAMA Internal Medicine*, *176*(3), 310–318. https://doi.org/10.1001/jamainternmed.2015.7712

University of San Francisco. (2021). Vision, mission, and values statement. https://usfca.edu/about-usf/who-we-are/vision-mission

Woodside, P. A., Schofield, L. C., & Holman, C. (2011). *3. Use of telehealth to reduce heart failure readmissions in a rural community*. HEART AND LUNG. http://eds.b.ebscohost.com/eds/detail/detail?vid=0&sid=e06467d2-8c3e-4d04-bcb4-7da2d19c6751%40pdc-v-sessmgr04&bdata=JkF1dGhUeXBlPXNzbyZzaXRlPWVkcy1saXZlJnNjb3BlPXNpdGU%3d#AN=RN293813992&db=edsbl

Appendix A

Figure 1

Literature Matrix

Purpose of Article or Review	Conceptual Framework /Design/ Method	Major Variables Studied (and their definitions)	Measurement of Major Variables	Data Analysis	Study Findings	Level of Evidence (Critical Appraisal Score) / Worth to Practice / Strengths and Weaknesses / Feasibility / Conclusion(s)
Blum, K., & Gottlieb, S. S. (2014). The effect of a randomized trial of home telemonitoring on medical costs, 30-day readmissions, mortality, and health-related quality of life in a cohort of community-dwelling heart failure patients. *Journal of Cardiac Failure*, *20*(7), 513–521. Doi: 10.1016/j.cardfail.2014.04.016						
To analyze Medicare claims data and evaluate costs, 30-day readmission rates, mortality and health-related quality of life between people using telemonitoring versus usual care	-None -RCT -The interventio n group performed daily monitoring of weight, BP, HR, and heart rhythm. –Patients educated by heart failure nurse practitioner	-Cost of Medicare payments -Number of patients hospitalized -Length of stay in the hospital -Mortality -Scores of SF-36 and Minnesota Living with Heart Failure (MLHF) questionnaire s. –All variables	-Reviewed Medicare claims and costs -Objective numbers for hospitalization, length of stay, mortality -Averaged scores for SF-36 and MLHF questionnaires	-SPSS used for all statistical analysis -Performed power analysis for cost -Used an alpha of .05 -Averages taken for the rest of the variables	-75 patients in usual care and 81 in monitored group hospitalized ($p=.51$) -No difference in Medicare payments -Significant difference in 30-day readmission rates for one year ($p<.05$) -No difference in mortality ($p=.575$)	-Level 1 quality B -Strengths: done in the US so it is more generalizable to this population, RCT -Limitations: only done on Medicare participants, which eliminates part of the HF population, utliers were not excluded, as 2 patients received LVAD's, which significantly increased their cost, cause of admission was not monitored. -Feasible study to recreate, as it was simply laid out and described in detail -Quality of life was better for the intervention group,

		measured for 30 days -The SF-36 is a self-reporting measure of functional health and well-being			-Significant difference in SF-36 and MLHF ($p<0.001$)	as well as 30-day readmission rates.
Bernocchi, P., Vitacca, M., La Rovere, M. T., Volterrani, M., Galli, T., Baratti, D., Paneroni, M., Campolongo, G., Sposato, B., & Scalvini, S. (2017). Home-based telerehabilitation in older patients with chronic obstructive pulmonary disease and heart failure: a randomized controlled trial. *Age and Ageing*, *47*(1), 82–88. https://doi.org/10.1093/ageing/afx146						
To see how telerehabilitation and telehealth affects quality of life and overall health in COPD and CHF patients	-None Randomized control trial -Control group received usual care. -Intervention group given telehealth and rehab from nurse and physical therapist	-6 minute walk test performance -Median time to hospitalization -Dyspnea -physical activity profile (PASE, physical activity scale for elderly) -quality of life (MLHFQ, living with heart failure questionnaire	-Variables measured after 2 months of intervention -Compare usual care with intervention group	-Used STATA -All measurement based on 95% confidence interval	-Significant results for: 6 minute walk test ($p=0.004$), time to hospitalization ($p=0.0484$), dyspnea improving ($p=0.05$), PASE ($p=0.0015$), and MLHFQ ($p=0.007$)	-Level 1 Quality A -Beneficial to future practice as it finds beneficial results when using telehealth via nurse and physical therapist, a feasible study -Limitations: did not discuss the details of the method of intervention performed by RN and PT, this intervention is suited to people who can do more physical activity. Strengths: RCT, quality of life was assessed, and people of all ages participated

		)				
Grustam, A. S., Severens, J. L., De Massari, D., Buyukkaramikli, N., Koymans, R., & Vrijhoef, H. J. M. (2018). Cost-effectiveness analysis in telehealth: A comparison between home telemonitoring, nurse telephone support, and usual care in chronic heart failure management. *Value in Health*, *21*(7), 772–782. https://doi.org/10.1016/j.jval.2017.11.011						
-To determine how cost effective HTM and NTS is against usual care as well as the change in QALY's	Markov cohort model - Used data from previous, larger study (TEN-HMS)	-QALY's (measure of disease burden) -Net monetary benefit between the three variables	-Used Markov model to determine monetary differences, average costs of each group measured -QALY measured based on cost of intervention, hospitalizations, and number of patient hospitalizations	-Institute for Medical Informatics and Biostatistics used -Used averages of each group	-HTM gained 2.93 QALY's -NTS gained 3.07 QALY's -People willing to pay more for HTM and NTS -HTM saved $12,479 -NTS saved $8207	-Level II, Quality B -Benefits: you can see that while these interventions are expensive, they save money in the long run and people are willing to spend more for the intervention, seeing how QALY is increased along with cost and you can compare telemonitoring versus nurse telehealth -Weaknesses: difficulty duplicating, the TEN-HMS study was 15 year old data so new technology is available now.
Ong, M. K., Romano, P. S., Edgington, S., Aronow, H. U., Auerbach, A. D., Black, J. T., Marco, T. D., Escarce, J. J., Evangelista, L. S., Hanna, B., Ganiats, T. G., Greenberg, B. H., Greenfield, S., Kaplan, S. H., Kimchi, A., Liu, H., Lombardo, D., Mangione, C. M., Sadeghi, B., … Fonarow, G. C. (2016). Effectiveness of remote patient monitoring after discharge of hospitalized patients with heart failure: The better effectiveness after transition–Heart failure (BEAT-HF) randomized clinical trial. *JAMA Internal Medicine*, *176*(3), 310–318. https://doi.org/10.1001/jamainternmed.2015.7712						
-To determine the value of	-None -RCT -Usual care	-Within 180-day cause of	-Quality of life used MLHF -Cause of	-Used 95% CI -Took averages of each group	-No significant results for: 180-day	-Level I, Quality A

180-days of remote patient monitoring after discharge for heart failure patients to see if they have an increased quality of life and decreased hospital readmissions	versus BEAT-HF for 180 days	readmission rate -Within 30-day cause of readmission rate -Quality of life at 30 days -Quality of life at 180 days	admission measured through hospital charts	-Did not mention software used	readmission (p=0.74), 30-day readmission (p=0.56), 180-day mortality (p=0.3), 30-day quality of life (no statistic given) -Significant results: 30-day mortality (p=0.04), 180-day quality of life (p=0.02)	-Strengths: RCT, is repeatable, took place in California -Limitations: not enough funding to obtain enough power for the study, possibly altering results as well as not having strong control over the nurse doing the intervention -feasible based on the location and details integrated into the review
Kasper, E. K., Gerstenblith, G., Hefter, G., Van Anden, E., Brinker, J. A., Thiemann, D. R., Terrin, M., Forman, S., & Gottlieb, S. H. (2002). A randomized trial of the efficacy of multidisciplinary care in heart failure outpatients at high risk of hospital readmission. *Journal of the American College of Cardiology*, *39*(3), 471–480. https://doi.org/10.1016/s0735-1097(01)01761-2						
-Find benefits of telehealth and in-person HF education -readmission, deaths, diet and medication compliance, symptoms, cost	-None -6-month interventio n -RCT -increase telehealth and in-person education	-Cost of medical care, readmission rate, deaths, diet compliance rated as “good” or “average”, medication compliance, presence of symptoms	-60-day post intervention measurement	-Statistics -P-value for each variable -did not mention software used	-decreased hospitalizations (p=0.09) -decreased deaths (p=0.03) -increased diet compliance (p=0.02) -increased medication compliance (p<0.001)	-Level I quality A -Limitations: not addressing comorbidities, not considering caregiver assistance at home

Long, G. (2017). Impact of Home Telemonitoring on 30-Day Hospital Readmission Rates for Patients with Heart Failure: A Systematic Review. *MEDSURG Nursing*, *26*(5), 337–348. http://web.b.ebscohost.com/ehost/pdfviewer/pdfviewer?vid=2&sid=ed918601-2fb9-4c88-bdf4-b547037b3195%40sessionmgr103						
Evaluate effect of home telemonitoring on 30-day readmission rates	-None -Systematic review	-Mortality within 30-days -Readmission rates within 30-days	-Combination of each study -Measured in percentage	-Averages from each study -Measured as percentage	-Readmission rates decreased by 2% -Limited data available -Some studies had small sample sizes -Mortality decreased 50%	-Level 1 Quality A -Strong worth to practice as you can see results from many articles at once and each article from US -Limitation: some studies had small sample sizes and limited data available for 30-day and in US variables
Woodside, P. A., Schofield, L. C., & Holman, C. (2011). *3. Use of telehealth to reduce heart failure readmissions in a rural community*. HEART AND LUNG. http://eds.b.ebscohost.com/eds/detail/detail?vid=0&sid=e06467d2-8c3e-4d04-bcb4-7da2d19c6751%40pdc-v-sessmgr04&bdata=JkF1dGhUeXBlPXNzbyZzaXRlPWVkcy1saXZlJnNjb3BlPXNpdGU%3d#AN=RN293813992&db=edsbl						
See effectiveness of telehealth on rural hospitals on 30-day readmission rates	-None -Quasi-experimental	-30-day readmission rates	-Percentage increase or decrease of readmissions	-Statistics, percentage change of admission rates	-Decreased by 2.9% in 2007 -Decreased by 2.5% in 2008 -Decreased by 2.23% in 2009	-Level II Quality B -Limitations: small sample size and quasi-experimental -Strengths: well-laid out implementation, feasible to redo.
Definition of Abbreviations: , RCT: randomized control trial, BEAT-HF: Better Effectiveness After Transition-Heart Failure, MLHF: Minnesota Living with Heart Failure questionnaire, CI: confidence interval, HTM: home telemonitoring, TNS: nurse telephone support, QALY: quality adjusted life years, TEN-HMS: Trans-European Network-Home-Care Management System, COPD: chronic obstructive pulmonary disease. CHF: chronic heart failure, BP: blood pressure, HR: heart rate						

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Appendix B

Heart Failure Education Telehealth Clinic: Pre-Survey

1. I feel confident in managing my heart failure.
    a. Yes
    b. Somewhat
    c. No

2. I know what to do if I have worsening heart failure symptoms.
    a. Yes
    b. Somewhat
    c. No

3. I have been given all the educational materials and resources I need to successfully manage my heart failure.
    a. Yes
    b. Somewhat
    c. No

4. I am concerned about being readmitted to the hospital in the next 30 days.
    a. Yes
    b. Somewhat
    c. No

5. I think telehealth will be an effective form of education for heart failure.
    a. Yes
    b. Somewhat
    c. No

Appendix C

Heart Failure Education

What is it?

- 4 telehealth education sessions
- Lasting 15-30 minutes

Why should I have this education?

- To prevent you from being readmitted to the hospital
- To help you learn how to manage your heart failure

How do I participate in this?

- You will receive an email from megeib@dons.usfca.edu with a link to a telehealth meeting (via Zoom or Google Hangouts)

What will I learn during each education session?

Week 1	Week 2	Week 3	Week 4
Establish who to call if you have questions	Diet and fluid restriction	Exercise	Recap it all
Symptoms to look out for	Daily weights, when to know you are gaining too much weight too quickly	Symptom management	Medication management, diet, fluid restriction, exercise, symptom management
Go over most important medications	Medication management	Diet and fluid restriction	Who to call if you have worsening symptoms

What if I want to drop out part of the way through?

- You can choose to stop participating in the telehealth education at any time during the 4 weeks

Who will be running the education sessions?

- Madison Geib
- Doctoral Student, Nurse Practitioner Student

Who do I contact with questions?

- Madison Geib
- megeib@dons.usfca.edu

Appendix D

Figure 1

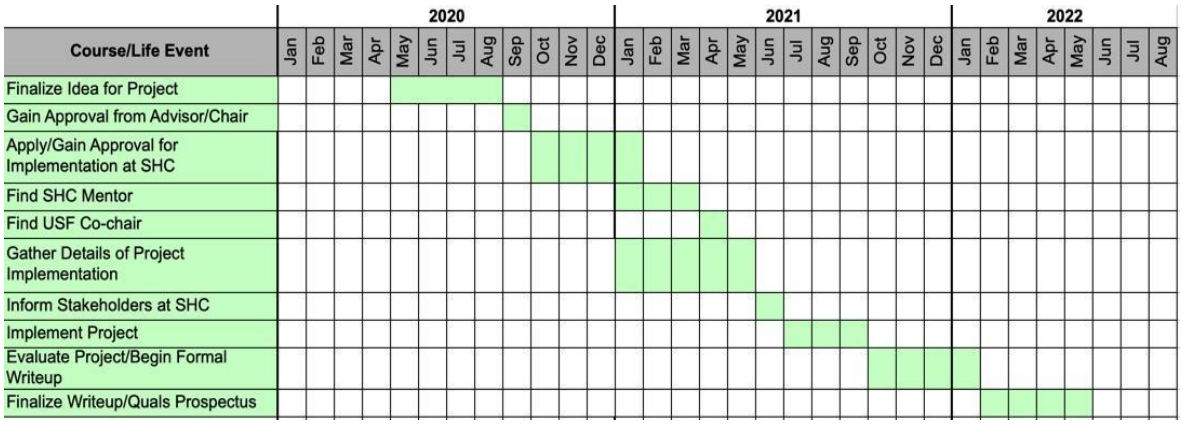
Gap Analysis

	Current State	Future State	Gap	Actions to Close Gap
Gap Analysis	19% of HF patients at SHC readmitted within 30-days of being discharged from the hospital. Attributed to lack of successful follow-up with patients after they discharge and lack of successful HF education	14% of HF patients at SHC readmitted within 30-days of being discharged from the hospital. This will occur because patient will be better educated on management of their HF and will have closer follow-up.	30-day SHC hospital readmission rates are 5% above goal, mostly related to a lack of successful HF management education and follow-up.	Design and implement an outpatient telehealth education and screening program to decrease 30-day hospital readmission rates.

Appendix E

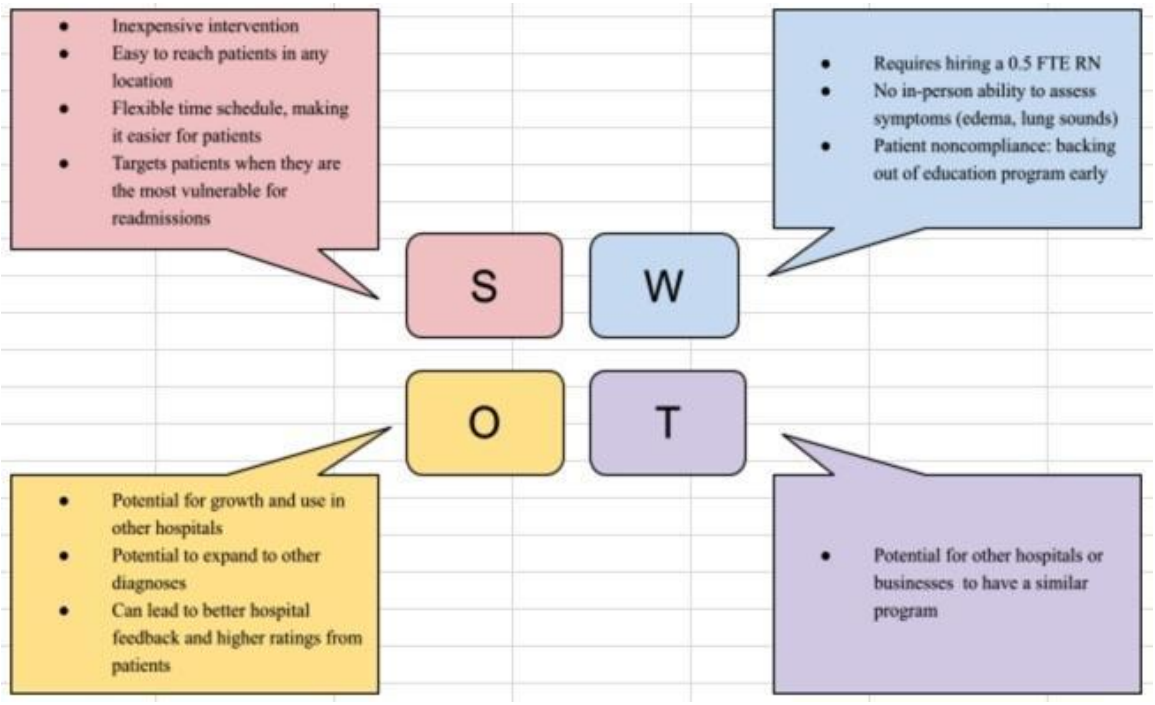
Figure 1

Gantt Chart



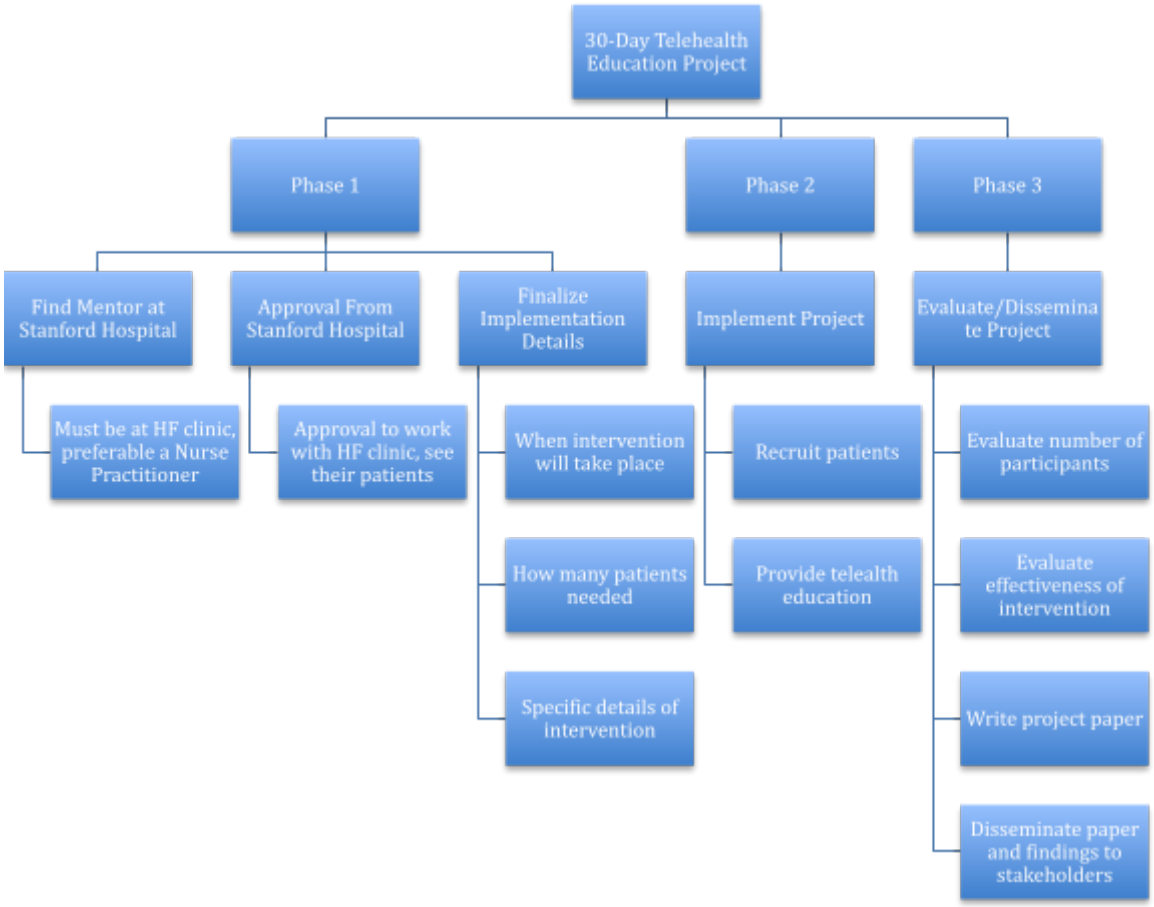
Appendix F

Strengths, Weaknesses, Opportunities, and Treats Analysis



Appendix G

Work Breakdown Structure



Appendix H

Table 1

3-Year Potential Cost Savings

FY 1			
Budget total	Estimated	Prior Year	Difference
Total Income	$2,320,000.00	n/a	n/a
Total Expenses	$107,752.00	n/a	n/a
Difference	$2,212,248.00	n/a	n/a
FY 2			
Budget total	Estimated	Prior Year (FY1)	Difference
Total Income	$2,354,800.00	$2,320,000.00	$34,800.00
Total Expenses	$109,368.28	$107,752.00	$1,616.28
Difference	$2,254,431.72	$2,212,248.00	$33,183.72
FY 3			
Budget total	Estimated	Prior Year (FY2)	Difference
Total Income	$2,390,122.00	$2,354,800.00	$44,322.00
Total Expenses	$111,008.80	$109,368.28	$1,640.52
Difference	$2,279,113.20	$2,254,431.72	$42,681.48

Note. This 3-year profit estimate factors in a 1.5% inflation rate each year. The initial income is $1.6 million savings (from 5% decrease readmission rates) plus $720,000 revenue from the cost of the telehealth sessions. This table is assuming every patient fully participates in the study.

Appendix I

Table 1

Communication Matrix

Communication	Purpose	Medium	Frequency	Audience
Alerting Stakeholders	To tell stakeholders at SHC about the project that will be implemented. To alert them about what the project entails as some participants may be their patients.	Email	Once	Stakeholders at SHC
Recruiting Patients Alongside Mentor	The SHC mentor will alert about patients to try and recruit as they are about to be discharged from the hospital	Phone call	1-2 per week	Mentor and I
Recruiting Patients	To try and recruit patients to participate in the program	Face-to-face or via phone call	1+ per week	The patient being recruited and I
Telehealth Education/Screening Sessions	To educate patients on management of their HF and screen for symptoms and overall well-being	Phone call	1 per week for 4 weeks each	Patient/participant
Update for chair and co-chair	After implementing project, will update them upon completion and will review the outcome to begin writing the manuscript	Email	1+	Chair and Co-chair

Appendix J

Stanford HEALTH CARE

MAGNET RECOGNIZED AMERICAN NURSES CREDENTIALING CENTER

Health and Background Screening Attestation

The student and University representative must agree to the following and sign below prior to placement at SHC.

- The University has confirmed that the student has current (and valid for the duration of the clinical experience) documentation on file for the following:
  - Cleared criminal background check
  - Drug screening test (if required per school policy)
  - Health screen clearance (see below)
  - American Heart Association BLS for Healthcare Provider Certification
  - Influenza vaccination or declination from

Required health clearance screening

The signature below indicates that the school is attesting that the student has cleared the following tests and complies to COVID-19 testing:

1. A Tuberculin skin test (TST) or QuantiFERON test, or a chest X-ray within 90 days prior to start day of clinical work/rotation (except for Stanford Health Care employees)
   a. If the test is newly positive, a chest x-ray must be completed within 90 days prior to clinical work
      i. Once a baseline chest x-ray is on file with the school, and the student remains a student at Stanford, there is no need to repeat the chest x-ray and an annual TB questionnaire should be administered
      ii. If there is a gap and the student leaves Stanford for a period of time and returns to Stanford, a TB questionnaire should be administered within 90 days of the start date is required
2. Documentation of immunity to measles, rubella, chicken pox/varicella, tetanus, diphtheria, pertussis and mumps. These may be provided two ways:
   a. Documentation of appropriate number of doses of the vaccines.
   b. Lab reports of positive titers for each of these diseases.
3. Hepatitis B vaccine x3 or a positive titer is necessary. A waiver is also accepted.
4. Influenza vaccine is mandatory for all healthcare providers. Documentation of having received the current vaccination is necessary from October 1-March 31 (Per Santa Clara County Public Health till April 30).
5. If titers need to be drawn contact the student's health care facility.
6. Has the student tested positive for COVID-19 within 90 days prior to start date of rotation? ☐ **Yes** ☒ **No**
7. Is the student fully vaccinated for COVID-19 (14 days after 2 dose mRNA or 1 dose vector – approved for EUA in the USA)? ☒ **Yes** ☐ **No**
8. Students who are not fully vaccinated for COVID-19 (14 days after 2 dose mRNA or 1 dose vector – approved for EUA in the USA) must be COVID tested at Stanford less than 7 days prior to start date.
   a. Students will follow all SHC COVID-19 policies and procedures listed on intranet.
   b. Students will complete daily COVID-19 symptom check and follow SHC OH/REC protocols.
   c. Students will comply with masking/face covering SHC policy at all times.

Typing your name represents agreement with the above attestation:

University representative Name (Printed): Prabjot Sandhu

University representative Signature: 

Student Name (Printed): Madison Geib

Student Signature: Madison Geib

Appendix K

UNIVERSITY OF SAN FRANCISCO | School of Nursing and Health Professions

DNP Statement of Determination
Evidence-Based Change of Practice Project Checklist*

The SOD should be completed in NURS 7005 and NURS 791E/P or NURS 749/A/E

Project Title:

Implementing 30-day Telehealth Education to Heart Failure Patients to Decrease 30-day Hospital Readmissions

Mark an "X" under "Yes" or "No" for each of the following statements:	**Yes**	**No**
The aim of the project is to improve the process or delivery of care with established/accepted standards, or to implement evidence-based change. There is no intention of using the data for research purposes.	X	
The specific aim is to improve performance on a specific service or program and **is a part of usual care**. All participants will receive standard of care.	X	
The project is **not** designed to follow a research design, e.g., hypothesis testing or group comparison, randomization, control groups, prospective comparison groups, cross-sectional, case control). The project does **not** follow a protocol that overrides clinical decision-making.	X	
The project involves implementation of established and tested quality standards and/or systematic monitoring, assessment or evaluation of the organization to ensure that existing quality standards are being met. The project does **not** develop paradigms or untested methods or new untested standards.	X	
The project involves implementation of care practices and interventions that are consensus-based or evidence-based. The project does **not** seek to test an intervention that is beyond current science and experience.	X	
The project is conducted by staff where the project will take place and involves staff who are working at an agency that has an agreement with USF SONHP.	X	
The project has **no** funding from federal agencies or research-focused organizations and is not receiving funding for implementation research.	X	
The agency or clinical practice unit agrees that this is a project that will be implemented to improve the process or delivery of care, i.e., **not** a personal research project that is dependent upon the voluntary participation of colleagues, students and/ or patients.	X	
If there is an intent to, or possibility of publishing your work, you and supervising faculty and the agency oversight committee are comfortable with the following statement in your methods section: *"This project was undertaken as an Evidence-based change of practice project at X hospital or agency and as such was not formally supervised by the Institutional Review Board."*	X	

Answer Key:

- If the answer to all of these items is "Yes", the project can be considered an evidence-based activity that does not meet the definition of research. IRB review is not required. Keep a copy of this checklist in your files.
- If the answer to any of these questions is "No", you must submit for IRB approval.

*Adapted with permission of Elizabeth L. Hohmann, MD, Director and Chair, Partners Human Research Committee, Partners Health System, Boston, MA.