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Patient Activation in Individualized Coaching for Congestive Heart Failure Patients

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Abstract

Adult patients diagnosed with congestive heart failure suffer from high hospitalization rates, recurrent readmissions, decreased quality of life, increased healthcare expenditures, and increased mortality. This project aimed to determine if individualized coaching plans based on patients' activation scores impacted emergency room visits and hospital readmissions. A pretest-posttest design was used. The 13-item Patient Activation Measure® (PAM®) tool was administered before and after completing 30-day individualized coaching. Seventy-five participants were recruited from referrals to the outpatient Continuum Case Management (CCM) program. Inclusion criteria included English-speaking adult patients diagnosed with congestive heart failure ≥ 18 years of age. The intervention consisted of individualized coaching administered by the CCM registered nurse and community workers based on patients' initial activation scores. Chart reviews were conducted to determine if 30- and 90-day emergency room (ER) visits and hospital readmissions were impacted. These data were compared to the prior six-month data for emergency room visits and readmissions of heart failure patients enrolled in the CCM program. Pre and post-intervention activation levels were compared to determine the impact of individualized coaching compared to standard care. Individualized patient-centered care can reduce hospital readmissions and emergency room visits, improve quality of life, and decrease healthcare expenditures.

Keywords: patient activation, congestive heart failure, readmissions, Patient Activation Measure®, emergency room visits

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Hospitals are often measured by the quality of patient care. One of the ways this is conducted is through the Hospital Readmissions Reduction Program by the Centers for Medicare & Medicaid Services (CMS). This program incentivizes hospitals to improve quality by reducing excessive readmissions in various health conditions, including congestive heart failure (Centers for Medicare & Medicaid Services, 2020). Despite many advances in health care and technology, excessive heart failure readmissions persist.

Background

Globally, cardiovascular disease is a leading cause of death for men and women of all races (Centers for Disease Control and Prevention [CDC], 2020). Congestive heart failure, or simply "heart failure," occurs when the heart muscle cannot adequately pump, leading to blood and fluid backing up into the lungs (Mayo Clinic, 2021). Heart failure is the leading cause of hospitalization in the United States, plaguing 6.2 million and projected to rise by 46% by 2030 (CDC, 2020; American Heart Association News, 2017). Annually, the incidence increases by 5% among those 85 years and older and 1.4% for ages 65 to 74 (Cajita et al., 2016).

In the United States, heart failure expenditures are estimated at $30.7 billion, and costs for readmissions alone exceed $10 billion (CDC, 2020; Mirkin et al., 2017). Of Medicare recipients, only 14% have a diagnosis of heart failure, but this accounts for 43% of total expenditures (Husaini et al., 2016). Estimated yearly costs range from $21,300 to $52,800 per patient (Groeneveld et al., 2019). Of patients with heart failure, over 20% are readmitted within 30 days of discharge and 50% at six months (O'Connor, 2017). Hospitalization due to heart failure is a prognostic indicator of mortality. Heart failure, specifically, was the cause of death for 379,800 Americans in 2018 (CDC, 2020). Stakeholders in heart failure readmissions include

patients themselves due to the costs of frequent hospitalizations, testing, medications, devices, management programs, decreased quality of life, and increased mortality. Additional stakeholders include hospital systems penalized by frequent readmissions and reduced reimbursement. Individualized patient-centered care has proven to be beneficial but is not currently used to the fullest extent.

Problem Statement

Prevention of heart failure readmissions at Sentara Rockingham Memorial Hospital (RMH) Medical Center was identified as a quality improvement goal. Within the Sentara system, consisting of 12 North Carolina and Virginia hospitals, SRMH had the highest heart failure readmission rate despite many new initiatives implemented to decrease this incidence over the past several years. Continuum Case Management (CCM) is one example of a previously implemented program to assist patients after discharge in preventing readmissions for heart failure. This program is offered at no cost to participants to assist with disease coaching and resource attainment. In 2020, a position for an inpatient heart failure nurse navigator was created to identify patients admitted to the hospital in greatest need of reinforced education and community services. In March 2021, Sentara RMH Medical Center opened its own nurse practitioner-led heart failure clinic as an additional attempt to combat high readmissions rates. Despite these initiatives, this location's high rate of heart failure readmissions persisted. Currently, all patients followed by the CCM team receive inconsistent coaching based on the nurse or community worker’s intuition. From July to December 2021, the 30-day heart failure readmission rate for the CCM program was 22.2%, and the 30-day emergency room visit was 15.9%. In adult patients diagnosed with heart failure (P), does an individualized coaching plan

using Patient Activation Measure® (I) compared to standard care (C) impact 30-day emergency room visits and readmissions (O) over three months (T)?

Review of Literature

After conducting a thorough literature review of multiple research databases on preventing heart failure readmissions, 16 articles supporting the use of patient activation and individualized coaching plans for disease management were located. These articles are included in Appendix A.

Patient activation measures an individual's understanding, competence, and willingness to participate in the care and treatment of a disease or health state (Hibbard et al., 2004). It is utilized in various populations with acute and chronic illnesses but has been most studied in heart failure (Dumitra et al., 2021; Mitchell et al., 2013). Other diseases including diabetes mellitus, myocardial infarction, arrhythmias, congenital disease, coronary artery disease, asthma, chronic obstructive pulmonary disease (COPD), hypertension, human immunodeficiency virus (HIV), chronic kidney disease (CKD), depression, cancer, and stroke have also been studied (Cuevas et al., 2021; Gholami et al., 2021; Kearns et al., 2020; Kinney et al., 2015; Lin et al., 2020; Roberts et al., 2016).

The Patient Activation Measure® tool, created by Hibbard et al. (2004), and patented by Insignia Health, utilizes a survey method to assess patient activation and places patients into four levels ranging from low to high based upon score. The most utilized version of this tool is an adapted 13-item version from the original 22-item tool (Cuevas et al., 2021; Dumitra et al., 2021; Dunlay et al., 2017; Gholami et al., 2021; Jacobson et al., 2018; Kearns et al., 2020; Kinney et al., 2015; Prey et al., 2016; Shively et al., 2013; Young et al., 2017). Since this has been the most

studied version, the 13-item tool noted in Appendix B was chosen for implementation in this project (Insignia Health, 2013). Other instrument variations have been utilized in research, including 8-, 9-, and 10-item versions (Bishop Mc-Wain, 2019; Cuevas et al., 2021; Kinney et al., 2015; Mitchell et al., 2013; Tecson et al., 2018).

Patients with lower identified activation levels tend to utilize the emergency room more often and have higher rates of unplanned readmissions than those with higher levels of patient activation (Dumitra et al., 2021; Prey et al., 2016). Studies have found a two-fold increased risk of readmission in low-activated patients compared to those with a higher activation level (Kinney et al., 2015; Mitchell et al., 2013). Being able to identify patients with low activation enables the tailoring of interventions to decrease emergency room visits and patient readmissions (Bishop-McWain, 2019; Dumitra et al., 2021; Kearns et al., 2020; Kinney et al., 2015; Mitchell et al., 2013; Prey et al., 2016; Shively et al., 2013).

The patient activation score is used to tailor individual coaching sessions to improve activation and self-management ability and decrease emergency room visits and readmission rates. Activation scores assessed at baseline identify individual patient activation levels seen in Appendix C (Insignia Health, 2013). Coaching plans, individualized for each of the four levels of patient activation, aim to increase patient activation in low-activated patients and increase self-management in patients with heart failure (Dumitra et al., 2021; Lin et al., 2020; Young et al., 2017). Self-management is found to positively correlate with the levels of patient activation (Gholami et al., 2021; Jacobson et al., 2018; Lin et al., 2020; Young et al., 2017). Those with higher activation levels tend to have greater self-management, including medication adherence, proper diet, exercise, and self-weighing (Kearns et al., 2020; Lin et al., 2020; Young et al.,

2017). Greater adherence to disease management decreases emergency room utilization and prevents hospital readmissions.

Theoretical Framework

The theoretical framework used to address this phenomenon of interest was Afaf Meleis' Transitions Theory. This theory recognizes that changes in health and illness create a transition process in the patient's life, posing additional risks to their health or enhancing their well-being (Meleis et al., 2000). Periods of transition increase a patient's vulnerability to experiences, interactions, and environmental conditions leading to extended recovery, potential damage, and delayed or unhealthy coping. This theory has been used to describe illness experiences, including diagnosis, surgery, rehabilitation, and lifespan transitions, such as pregnancy, childbirth, aging, and death (Meleis et al., 2000). The transitions theory framework has been applied to reduce 30-day readmission rates in Medicare and Medicaid patients by creating a care coordination team, reducing readmissions by 11% (Stixrood, 2019). There are two parts to Afaf Meleis' Transitions Theory: intervention and understanding the transition experience (School of Nursing, n.d.). An intervention facilitates the transition and promotes well-being. The goals are to provide knowledge, skills, strategies, and psychosocial support to endure the transition (School of Nursing, n.d.). The transition experience depends on developmental, health and illness, situational, and organizational triggers. The health-illness transition is defined by a person progressing from a healthy to acute or from a healthy to a chronic state. The healthy, acute, and chronic states fluctuate on a continuum with exacerbations and disease progression.

Receiving a diagnosis of a chronic illness such as congestive heart failure prompts a life transition. The patient will require ongoing coaching regarding lifestyle changes, medications, continuous follow-up, treatment, and disease progression from a state of health to illness. The

patient will also experience acute exacerbations of their chronic disease, possibly requiring hospitalization. Upon discharge from the hospital, the patient will transition back into a healthy state if the disease is controlled. In addition to addressing the needs of the disease process, this framework was utilized to address psychosocial needs. A heart failure diagnosis can lead to a decrease in quality of life. Some patients entering the CCM program have a new diagnosis of congestive heart failure and may be experiencing the transition from a healthy to a chronic disease state.

Project Purpose, Objectives, Expected Outcomes

This project aimed to identify the level of patient activation utilizing the Patient Activation Measure® tool and to provide tailored individualized coaching. The goals were to improve patient activation and self-management ability allowing patients to understand their disease, demonstrate competence, and increase willingness to participate in their care and treatment. Expected outcomes were to decrease emergency room visits and readmissions and increase patient activation by providing individualized coaching.

Project Design

Sentara Rockingham Memorial Hospital Medical Center (SRMH) is a 238-bed, not-for-profit community hospital partnered with Sentara Healthcare in Harrisonburg, Virginia. The hospital serves approximately 218,000 residents from seven counties in Virginia and rural West Virginia (Sentara, 2021). Heart failure services include cardiac imaging, cardiac catheterization, cardioMEMS monitoring implantation, and follow-up in the heart failure clinic. Before discharge, inpatient care coordinators and the heart failure nurse navigator arrange follow-ups with Sentara Cardiology and place referrals to the outpatient Continuum Case Management team consisting of community workers and registered nurses. Before this project, all patients followed

by the CCM team received inconsistent coaching based on the registered nurse or community workers' intuition of patient needs.

Heart failure readmissions impact all genders and races nationwide and globally. It is most common in rural, poor areas, among the elderly, and minority populations. Male gender, African American race, and those receiving Medicare benefits are at the highest risk of readmission (Mirkin et al., 2017). In Virginia, heart disease is the second leading cause of death, accounting for 14,861 deaths in 2017 (Centers for Disease Control and Prevention, 2018). The highest rate of heart disease deaths occurs in southwest Virginia. In Rockingham County, the location of Sentara RMH Medical Center, heart disease mortality rates are 275 per 100,000 for those 35 years of age and older for both genders and all races (Virginia Department of Health, 2021). Men have higher rates (347 per 100,000) compared to women (214 per 100,000), and African Americans of both genders have the most heart disease mortality in Rockingham County (330 per 100,000). The target population for this project included all English-speaking patients diagnosed with congestive heart failure over 18 years of age who were referred to the CCM program. This project used an evidence-based tool for a quality improvement initiative and consisted of 75 participants as required by Insignia Health for using the PAM® tool.

Implementation Plan/Procedures

Project Method/Model

While Afaf Meleis' Transitions Theory best addressed the psychosocial needs of heart failure patients, the model utilized to guide the implementation of this project was the Institute for Healthcare Improvement's Model for Improvement (MFI). This model, developed in 1996, is the most commonly used in quality improvement initiatives. The MFI is composed of two parts: three fundamental questions and the Plan, Do, Study, Act (PDSA) cycle created by Dr. William

Edwards Deming (Agency for Healthcare Research and Quality [AHRQ], 2013; Institute for Healthcare Improvement [IHI], 2021). The MFI asks three questions: What are we trying to accomplish? How will we know that a change is an improvement? What changes can we make that will result in improvement? The PDSA cycle evaluates the effects of changes through planning, trying, observing, and acting on what is learned (IHI, 2021).

Implementation Steps

In the pre-planning stages, the three fundamental questions of the Model for Improvement were answered. The goal was to impact heart failure readmissions and emergency room visits using a tailored coaching program directed by patient activation levels obtained using the Patient Activation Measure®. An improvement would be noted by observing a decrease in emergency room visits and readmissions and increased patient activation scores. A change was made by tailoring coaching based on patient activation, and this concept can be applied to other patient populations with acute and chronic diseases.

The planning phase of the PDSA cycle included gaining project site support, SRMH Evidenced-Based Practice & Research Council approval, SRMH and the University of South Carolina Institutional Review Boards' (IRB) permission, and approval from Insignia Health to use the Patient Activation Measure®. The heart failure nurse navigator, registered nurses, and community case workers within the CCM program were trained to provide the PAM-13® survey and coaching based on activation level. Emergency room visits, readmissions, and trends in patient activation scores were observed.

Measures, Tools, and Data Plan

Demographic information, including age, gender, education level, and marital status, were obtained from the Epic electronic health record (EHR) system. Patient activation scores

were obtained using the 13-item Patient Activation Measure® by Insignia Health. Participant all-cause emergency room visits and readmission data were extracted via manual chart review from the Epic EHR. The heart failure nurse navigator and continuum care team administered the tool upon enrollment in the CCM program and 30-days post-coaching. Respondent's answers to the PAM® tool were entered into an Excel software program provided by Insignia Health to calculate activation levels. Following calculation, individual levels were shared with the continuum care registered nurses and community health workers, but not the patients themselves so as not to introduce bias. Based on activation level, patients underwent level-specific coaching adapted from Shively et al. (2013) by the CCM registered nurses and health workers focusing on self-management, confidence & knowledge, skills & behavior, and skills & behavior in other situations as depicted in Appendix D. Over the project's duration, outcomes of 30-day emergency room visits and readmissions were monitored as required by Insignia Health. The Centers for Medicare and Medicaid Services (CMS) monitors all-cause 30 and 90-day readmission data; therefore, the frequency of data monitoring follows that of CMS. Since participants entered the CCM program on rolling enrollment, data was measured at a minimum of 30 days and a maximum of 90 days as able. A t-test was conducted on pre- and post-activation scores, and analysis of variance (ANOVA) testing was conducted between demographic variables and initial activation scores and between activation level and 30- and 90-day emergency room visits and readmissions.

Timeline

Project approval was sought and obtained from SRMH's Evidence-Based Practice and Research Shared Governance Council on October 14, 2021. Before obtaining IRB approval from SRMH and the University of South Carolina, a research license was obtained from Insignia

Health on December 31, 2021. Training was provided to the heart failure nurse navigator who administered the initial PAM® survey. After all IRB approvals were obtained, the first participant was enrolled in the project on January 27, 2022. Training was provided to the CCM nurses and community workers the following day. The final participant was administered the PAM® survey and enrolled in the project on June 3, 2022. The complete timeline for this project is noted in Appendix E.

Budget/Resource Requirements

A research license fee of $150 was paid to Insignia Health for using the PAM® tool. Since the Continuum Case Management program is offered to patients at no cost, the benefits of preventing future heart failure readmissions outweighed the cost of using the tool in this project. Patients benefit from decreased cost of frequent hospitalizations, emergency room visits, testing, increased quality of life, and decreased mortality. The nursing profession benefits from providing high-quality, evidence-based, patient-centered care. Sentara RMH Medical Center benefits from decreased costs and resource utilization endured from frequent readmissions and emergency room visits.

Protection of Human Subjects

Institutional Review Board approval from Sentara RMH Medical Center and the University of South Carolina was obtained before initiating this quality improvement project. All participants were protected by the Health Insurance Portability and Accountability Act (HIPAA). The risk to participants in this study did not differ from patients receiving current coaching. All data was stored on the secure, password-protected Research Electronic Data Capture (REDCap) application. The REDCap software is HIPAA-complaint and was available at no cost through the University of South Carolina. Confidentiality was ensured by coding participants using personal

identification numbers. Completed paper questionnaires were stored in the locked office of the quality improvement coordinator. Participants' answers and patient activation scores were stored in a password-protected Excel file. De-identified results will be shared with Insignia Health as required for using the PAM® tool. A USB drive containing backup files was stored in a password-protected safe. Only the researcher and project chairs had access to passwords and patient information. Informed written consent was obtained from all participants in the project.

Results

Statistical analyses were conducted using Intellectus Statistics software (2019). The table of descriptive statistics is found in Appendix F. The final sample population included 75 participants, 29 male (38.67%) and 46 female (61.33%). Participants' ages ranged from 33 to 95 years; 44% were married, and 56% were single, divorced, or widowed. Education level was not consistently documented and was excluded from statistical testing. Among the participants, 11 were readmitted within 30 days, and one was readmitted twice within the same time frame. During the measurement period, 16% of participants also had a 30-day emergency room visit. Due to the rolling enrollment design of the project, a complete 90-day follow-up was only possible for 34 of the total 75 participants. Of these, one person had a 90-day readmission, one had two 90-day readmissions, and one had three 90-day readmissions. Of the participants, five people had one 90-day emergency room visit, and two participants each had two visits. The 30-day readmission rate for this sample was 17.3%, which was lower than six months before the implementation of this project for the CCM program, which was 22.2%. The 30-day emergency room visit rate was 16%, similar to the 6-month prior rate of 15.9%.

All participants had initial PAM® levels calculated when they agreed to participate in the project and CCM program. The most common initial PAM® level was 3 (n=34), followed by 2

(n=20). Levels 1 and 4 were relatively similar: 1 (n=10) and 4 (n=11). Following the initial survey, 28 participants were lost to follow-up due to declining the CCM program after initially agreeing. Three additional participants were discharged to a skilled nursing facility instead of home, making them ineligible for participating in the program. The mean score of initial PAM® levels was 2.50, while the mean for re-survey levels was 2.91, as noted in Appendix G (Figure G1).

A two-tailed paired samples t-test was conducted to compare initial PAM® levels to re-survey PAM® levels completed 30-days after starting the CCM program (Table G1). Testing concluded there was a statistically significant difference between the two. The re-survey PAM® scores were significantly higher than the initial scores. A Shapiro-Wilk test indicated the normality assumption was violated, so a Wilcoxon Signed Rank test was also performed since it does not share distribution assumptions. The two-tailed Wilcoxon Signed Rank test result was significant, indicating that the differences between initial PAM® scores and re-survey scores were not due to random variation. The median scores of the re-survey PAM® level were significantly higher than the median initial scores (Figure G2).

One-way analysis of variance (ANOVA) testing was conducted to determine if a significant correlation existed between initial PAM® levels, demographic variables, 30-day ER visits, 30-day readmissions, 90-day ER visits, and 90-day readmissions (Appendix G). Mean PAM® levels by individual demographic variable are also noted. There was no significant difference in PAM® levels among marital status, age, gender, 30-day readmissions, 30-day ER visits, or 90-day readmissions (Tables G2-G15). There was a significant correlation between PAM® level and 90-day emergency room visits (Tables G16-G17, Figure G3). Those with two 90-day ER visits had a significantly lower mean PAM® score than those with one or no ER

visits. Education level correlation cannot be considered reliable due to incomplete data available for 57 participants.

The steps of the intervention can be noted in Appendix H. In the initial plan, the CCM registered nurse was to administer the initial survey to the participant upon enrollment. The initial administration of the survey was modified to be performed by the navigator since the heart failure nurse navigator position was filled before this project's implementation. Most referrals to the CCM program are from this position, and the navigator is the first point of patient coaching. Once PAM® levels were calculated, the CCM community workers and nurses utilized the plan outlined in Appendix D for individualized coaching with participants. After initially accepting, those who refused the CCM program were lost to re-survey follow-up but were included in the chart review for demographic information, 30- and 90-day readmissions, and 30- and 90-day emergency room visits. Due to rolling enrollment in the CCM program, 90-day readmission and 90-day emergency room visit data could not be obtained on all participants. The projected timeline for this project was for completion within three months. Due to the sample size requirement of 75 participants, it was conducted over approximately six months.

Discussion

The CCM program serves not only heart failure patients but also those with chronic diseases, including chronic obstructive pulmonary disease (COPD) and diabetes mellitus. The Patient Activation Measure® has been applied in other studies to various populations both in the inpatient and outpatient settings. The future direction of this project includes individualized coaching based on initial patient activation levels for increased self-management ability allowing patients to understand their disease, demonstrate competence, and improve willingness to participate in their care and treatment in other patient populations. Allowing care to be

individualized to each patient's needs will enable them to make sustainable lifestyle changes, medication adherence, follow-up, and understand treatments and disease progression.

Prior studies indicated that patients with lower identified activation levels tended to utilize the emergency room more often and have higher rates of unplanned readmissions than those with higher levels of patient activation (Dumitra et al., 2021; Prey et al., 2016). Although no statistically significant correlation was found between initial patient activation level and 30- and 90-day readmissions and 30-day emergency room visits, small sample size may have impacted these results. Among the 75 participant sample, the most common initial PAM level® was 3 (n=34), meaning they were "taking action and gaining control" before any intervention. Those with a PAM® score of 3 are already at low risk for ER utilization and readmissions. The male gender was previously implicated as an increased risk for readmission. The sample size for this project was predominately female (46) compared to male (29).

This project impacts patients with not only congestive heart failure but also hospital systems and the healthcare burden. Patients are affected due to the costs of frequent hospitalizations, testing, medications, devices, management programs, decreased quality of life, and increased mortality. Patient satisfaction and empowerment to take control of their health are also impacted. Hospital systems are penalized by frequent readmissions and reduced reimbursement. The average 30-day heart failure readmission cost at Sentara RMH Medical Center in 2021 was $14,696. A 4.9% decrease in 30-day heart failure readmissions was noted between the six months before and during the project measurement period. The potential for cost avoidance due to the decreased readmission rate is evident. This reduction in readmission rate also carries a reduced risk for CMS penalty due to excessive heart failure readmissions, which brings an additional 3% cost savings.

Several strengths can be drawn from this project. One strength is that the Patient Activation Measure® can be utilized in various patient populations and is not limited to heart failure. Using the patient's initial PAM® score provided guidance for the CCM team on coaching. A 4.9% decrease in 30-day readmissions was noted as a result of this project. While this percentage may seem small, the cost avoidance of even a few heart failure readmissions makes a significant impact. CMS penalizes hospital systems for excessive heart failure readmissions. This penalty is also avoided with any decrease in the readmission rate. The validity and reliability of the PAM® tool are evident from the various studies conducted since its creation in 2004. Since then, it has been patented and is marketed with a commercial license available for its use.

A limitation of the project was staff turnover before and during implementation. The time frame allowed for implementation was another limitation. Participants were enrolled on rolling enrollment, and due to time constraints, all participants were not coached and monitored for equal amounts of time. Data on 90-day emergency room visits and readmissions were unavailable for all participants. Another limitation is missing data if participants visited urgent care centers or outside facilities during the project; this information is not available in the Epic EHR. The small sample size was another limitation. Although 75 participants were initially enrolled, the minimum required by Insignia Health, 31 were lost to follow-up due to declining the program or being discharged to a skilled nursing facility after initially agreeing to participate. Data entry into REDCap and the PAM® Excel calculator was a manual process; therefore, the risk of entry error is possible. A double-check of all manually entered data was conducted. The pre/post format of the project could have induced bias since the same questions were used in both survey evaluations.

Conclusion

Individualized coaching performed by the CCM team and heart failure nurse navigator is evident in the impact on re-survey patient activation scores. Although statistically significant results on 30- and 90-day readmissions and 30-day emergency room visits were not seen in this sample population, the impact on a larger population is evident by a reduction in cost avoidance. The results of this project will be disseminated to Insignia Health as a requirement for using the Patient Activation Measure®. Dissemination will also likely include publication in a peer-reviewed case management or nursing journal, shared with the CCM team, SRMH leadership and management, and the SRMH Evidence-based Practice and Research Council. If hospital leadership sees the Patient Activation Measure® as a tool they would like to continue using, further steps include SRMH purchasing a commercial license for implementation.

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Appendix A
Literature Review Table

Brief Reference, Type of Study, Quality rating	Methods	Threats to Validity/ Reliability	Study Findings	Conclusions
Article 1: Lin, M. Y., Weng, W. S., Apriliyasari, R. W., Van Truong, P., & Tsai, P. S. (2020). Effects of patient activation intervention on chronic diseases: a meta-analysis **Evidence Level:** I – Systematic review of RCTs with meta-analysis **Quality:** A – High quality, generalizable results, definitive conclusion, consistent recommendations, comprehensive literature review	**Design:** Systematic review with meta-analysis **Sample:** 26 randomized control trials, English & Chinese language, adults ≥ 18 yrs. **Setting:** 13-United States, 4-Europe, 2-Taiwan, 2-Iran, 2-China, 1-South Korea, 1-Australia, 1-Thailand **Framework:** N/A **Measures:** Patient activation interventions on physiological, psychological, behavioral, and health-related quality of life outcomes **Analysis Plan:** Cochrane Handbook to assess the methodological quality of RCTs, Hedge's *g* values, 95% confidence interval. **Procedure:** Systematic search of PubMed, Cochrane, CINAHL, Embase databases	**Conclusion Validity:** Reasonable, some relevant studies were excluded due to lack of medical subject headings; limited effect could be due to number of studies. **Internal Validity:** Intervention designs and types of disease varied, significant heterogeneity. **External Validity:** Studies conducted in variety of settings in several countries. **Construct Validity:** ok. Measurements may vary based on diagnosis. **Reliability:** Applied across variety of physiologic, psychologic, behavior and QOL measurements **Precision:** Statistically significant pooled effect for HbA1C, SBP, DBP, body weight, LDL, depression, anxiety; no statistically significant differences between intervention types.	Patient activation on HbA1C had effect size of -0.31 ($p<.01$), small effect. Patient activation on SBP small effect, -0.21 ($p<.01$), but large effect on DBP, -0.80 ($p=.02$). Activation on body weight had small effect, -0.12 ($p=.03$). Activation on LDL had small effect, -0.21 ($p=.01$). Activation on depression had small effect, -0.16, ($p<.01$). Activation on anxiety had small effect, -0.25, ($p=.01$). Patient activation interventions on activation had small effect, 0.33, ($p<.01$). Activation on self-efficacy had medium effect, 0.57 ($p<.01$). Activation on health-related QOL had small effect, 0.25, ($p=.01$).	Patient activation interventions significantly improve physiological, psychological, and behavioral health statuses. Patient activation interventions are effective in improving quality of life in patients with chronic diseases. Healthcare providers should implement interventions that are tailored to patients' level of activation. Patients who are more activated are more likely to engage in self-management behaviors and improve health. A multimodal approach to disease management is needed to effect care outcomes in patients with chronic diseases.

Brief Reference, Type of Study, Quality rating	Methods	Threats to Validity/ Reliability	Study Findings	Conclusions
Article 2: Mitchell, S. E., Gardiner, P. M., Sadikova, E., Martin, J. M., Jack, B. W., Hibbard, J. H., & Paasche-Orlow, M. K. (2013). Patient activation and 30-day post-discharge hospital utilization. **Evidence Level:** I – Randomized Control Trial **Quality:** A – High quality – consistent, reasonably generalizable results, adequate control, definitive conclusions, consistent recommendations, large sample size	**Design:** Secondary analysis of RCT **Sample:** 695 general medical inpatients, English speaking, with complete data from RED-LIT trials **Setting:** Medical inpatient service at Boston Medical Center, an urban safety net hospital **Framework:** N/A **Measures:** 30-day post-discharge emergency department visits, hospital readmissions, observational stays **Analysis Plan:** Chi-square tests, 95% confidence, Poisson regression, two-sided tests, $p<0.05$. **Procedure:** Modified 8-item Patient Activation Measure® at baseline during index hospitalization	**Conclusion Validity:** Reasonable, number of patient-level variables controlled for many potential confounders. **Internal Validity:** Adjustment for confounding variables still indicated statistically significant results. **External Validity:** Study conducted in safety net hospital, may not be generalizable. Universal insurance in Massachusetts may limit generalizability. **Construct Validity:** Missing reutilization data from outside Boston Medical Center, obtained by medical record and self-report. **Reliability:** Questionable. PAM-8 has not been fully tested for reliability & validity. **Precision:** Statistically significant results for PAM score on primary and secondary outcomes, 95% confidence interval.	Significant associations between patient activation (levels 1 and 2) and education ($p=.01$), employment status ($p=.02$), health literacy level ($p<.01$), and depressive symptom level ($p<.01$). Lowest PAM score (level 1) has 2.27 times risk of reutilization within 30-days (95% CI, 1.56-3.30, $p<.001$). Level 2: 1.78 times risk of reutilization within 30-days (95% CI, 1.28-2.49, $p<.001$). Level 3: 1.42 times risk of reutilization within 30-days (95% CI, 1.04-1.95, $p=.03$).	Lower levels of patient activation had higher rates of post-discharge 30-day hospital utilization. Hospitals in 25 states use the Patient Activation Measure to tailor type and amount of support provided to patients during hospitalization and post-discharge. Transition care teams should use PAM to segment patient populations based on disease burden and ability to self-manage (PAM-score) –focus on low levels of activation. Greater access to health services is not sufficient to reduce avoidable readmissions; resources need to be tailored to the patients' individual needs and activation level. This study was included because it was the first to examine the role of patient activation on the rate of hospital readmission within 30-days of hospital discharge.

Brief Reference, Type of Study, Quality rating	Methods	Threats to Validity/ Reliability	Study Findings	Conclusions
Article 3: Shively, M. J., Gardetto, N. J., Kodiath, M. F., Kelly, A., Smith, T. L., Stepnowsky, C., Maynard, C., & Larson, C. B. (2013). Effect of patient activation on self-management in patients with heart failure. **Evidence Level:** I – Randomized Control Trial **Quality:** B – Good quality – reasonably consistent results, some control, small sample size but sufficient for this study, fairly definitive conclusions, reasonably consistent recommendations	**Design:** Stratified blocked randomized, 2-group (usual care, usual + 6 month activation/Heart PACT intervention), repeated measures. **Sample:** 84 participants, ≥18yrs., live in San Diego County, read/speak English, telephone access, has PCP. **Setting:** Single site affiliated with Veterans Affairs (VA) San Diego Healthcare System **Framework:** N/A **Measures:** Patient activation, self-management, hospitalizations, ED visits **Analysis Plan:** ANOVA for main effects and interaction effects, Little's MCAR test, F test. **Procedure:** 13-item Patient Activation Measure (PAM), Self-Care and Heart Failure Index (SCHFI) version 4 & Medical Outcomes Study Specific Adherence Scale, patient self-reported hospitalizations, ED visits, other unscheduled visits	**Conclusion Validity:** Small sample size (84), some significant effects showed observed power less than 0.80. **Internal Validity:** Age/gender demographics, attrition (19%) at 6 months, missing data, clinical practice changes during study, gasoline prices caused transportation issues. **External Validity:** Predominately male sample-may be gender differences, VA system may not be generalizable to private sector. **Construct Validity:** Measured as stated but small number of hospitalizations & ED visits during study. **Reliability:** Prior to this study, there were no published reports of PAM use and links between behaviors & patient outcomes. **Precision:** Statistically significant increase in activation/PAM from baseline to 6-months (F=3.73, P=.03).	Significant group-by-activation/PAM level-by-time interaction (F=3.89, P=.005). Intervention group improved more over time than usual care (control). No significant group-by-time interactions for the SCHFI maintenance, management, or self-confidence scales. Significant increase in activation/PAM from baseline to 6-months (F=3.73, P=.03). Baseline MOS Specific Adherence Scale mean was lower in the intervention group with significant group-by-time effect (F=7.48, P=.001). Intervention group improved more than usual care. Significant 3-way interaction for hospitalizations (F=2.57, P=.041). Intervention group had fewer hospitalizations than usual care when baseline PAM was low or high. Intervention showed increased perceived control scores at 6-months compared to usual care (F=3.23, P=.015).	This study was included because it is one of the first on efficacy of an activation intervention in patients with chronic HF. Patient activation can be improved through targeted interventions. Effect was more pronounced in people with medium level of baseline activation. Activation interventions supports previous research showing changes on level of activation accompanied by changes in self-management behaviors.

Brief Reference, Type of Study, Quality rating	Methods	Threats to Validity/ Reliability	Study Findings	Conclusions
Article 4: Young, L., Kupzyk, K., & Barnason, S. (2017). The impact of self-management knowledge and support on the relationships among self-efficacy, patient activation, and self-management in rural patients with heart failure. **Evidence Level:** I – Randomized Control Trial **Quality:** A – High quality – Consistent, generalizable, sufficient sample size, adequate control, definitive conclusions, consistent recommendations.	**Design:** Secondary analysis of Randomized Control Trial **Sample:** 100 adults ≥ 21yrs., discharge diagnosis of HF, NYHA class I w/ at least 1 HF-related hospitalization or ED visit in past year, NYHA class II to IV, discharged to home, English-speaking, access to telephone, data from "Patient Activated Care at Home (PATCH)" RCT. **Setting:** Rural hospital in Southeast Nebraska **Framework:** Wagner's Chronic Care Model **Measures:** Self-management (SM) knowledge, self-efficacy, patient activation, and self-management behaviors at baseline, 3- and 6-months after intervention **Analysis Plan:** Shapiro-Wilk for normality. Pearson correlations & linear regression, $P < .05$ **Procedure:** Self-care of HF Index (SCHFI) Subscale C – self-efficacy, 13-item Patient Activation Measure® (PAM), Heart Failure Self-Care Behavior Scale (RHFSCBS) in control and 12-weeks home-based intervention to improve SM behavior group	**Conclusion Validity:** Convenience sampling, adequate sample size (medium effect n=98, r=0.3, 5% α=.05, 80% power). **Internal Validity:** selection bias, enrolled patients may have more confidence and are actively engaged in SM behaviors. **External Validity:** participant recruitment results in selection bias, more female subjects than male **Construct Validity:** Complexity not adequately captured-measures of SM knowledge and support were rudimentary and heterogenous. **Reliability:** Feasible & effective to improve SM behaviors & needs in vulnerable & high-risk population **Precision:** Significant bivariate correlations between education level, physical functioning, SM knowledge, and support at baseline and 3-months.	Factors related to baseline & 3 month activation scores: education, physical functioning, SM knowledge & support. Patient activation mediated effect of self-efficacy on SM behaviors with low levels of knowledge. Self-efficacy had significant association with patient activation (β=.48, P<.001). 3-month post-intervention, self-efficacy for SM was positively related to patient activation (r=0.712, P<.001) and SM behaviors (r=0.46, P<.001). Patient activation significantly associated with SM behaviors (r=0.528, P<.001). Patients with greater self-efficacy more likely to engage in SM behaviors (r=0.46, P<.001). Intervention group who received 12-week activation-enhancing program showed significantly greater activation scores at 3 months.	Low SM knowledge & poor support should be targets for patient activation intervention. Self-efficacy leads to changes in patient activation, which leads to changes in SM behaviors. Patient activation mediates the relationship between self-efficacy and SM behavior. Patients with high levels of SM knowledge, neither self-efficacy nor patient activation accounted for behavioral changes. In patients with low required support, confident patients (higher self-efficacy) were more likely to engage in SM behaviors. If patients receive greater support, they are more likely to engage in SM behaviors, regardless of activation and self-efficacy.

Brief Reference, Type of Study, Quality rating	Methods	Threats to Validity/ Reliability	Study Findings	Conclusions
Article 5: Cuevas, H., Heitkemper, E., Huang, Y. C., Jang, D. E., García, A. A., & Zuñiga, J. A. (2021). A systematic review and meta-analysis of patient activation in people living with chronic conditions. **Evidence Level:** II – Systematic review of a combination of RCTs and quasi-experimental studies with meta-analysis **Quality:** B – Good quality – Reasonably consistent, generalizable results, sufficient article sample size for systematic review, insufficient population sample size for RCTs, comprehensive literature review	**Design:** Systematic review, meta-analysis **Sample:** 9069 participants, ages 40.8-74.0. 32 articles: English language, peer-reviewed, adults ≥ 18 yrs., at least 1 chronic condition, assessment of patient activation, one-disease relevant self-management behavior published after 2005. **Setting:** 20 – United States, 5 – United Kingdom, 3 – Norway, 2 -Netherlands, 1 – Spain, 1 - Singapore **Framework:** N/A **Measures:** Patient activation using PAM tool on interventions-group (8), in-person one-on-one coaching (9), telehealth (8). **Analysis Plan:** Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA), Cochrane Review Manager (version 5.3) used for meta-analysis. **Procedure:** PubMed, CINAHL, & Web of Science databases searched using MeSH: patient activation, self-management, intervention during December 2019.	**Conclusion Validity:** Small sample size in RCTs **Internal Validity:** No attention to control group, this would address equal treatment of groups evaluating effects of behavioral interventions. Lack of diversity in the samples. **External Validity:** Low income, less education, poorer reported health will have low activation levels – focusing only on activation will not address disparities. **Construct Validity:** Considerable heterogeneity – various methods of patient activation strategies. PAM well-validated tool **Reliability:** Moderate correlation of 0.4. Ability to apply PAM across all studies. **Precision:** Significant heterogeneity $p < 0.1$, 95% confidence interval.	19 Randomized Control Trials 13 Quasi-Experimental designs Interventions included weight management, exercise, disease management, & education. Modalities included in-person one-on-one coaching, interviews via telehealth, & combination Phone messages or telehealth visits positively impacted patient activation. Videos, internet-based interventions, smartphone app showed no improvement in patient activation. Mean Patient Activation Measure (PAM) scores: 59.1-82.5 baseline, 58.9-84.39 postintervention. 6 month follow-up showed significant improvement in patient activation in 16 studies. 12 month follow-up: additional 7 studies showed a significant improvement in patient activation.	Patient activation is not significantly improved solely by participation in self-management interventions. Interventions that are tailored to pre-intervention activation levels improve patient activation significantly. Improvements in patient activation are most likely to occur when an interdisciplinary team is included. Teams including physicians, nurses, allied health providers, educators, patient navigators, & care managers may improve patient activation and provide cost savings. Future research should include interdisciplinary teams, social support, and in-person interactions.

Brief Reference, Type of Study, Quality rating	Methods	Threats to Validity/ Reliability	Study Findings	Conclusions
Article 6: Gholami, M., Talaei, A. A., Tarrahi, M. J., Taqi, F. M., Galehdar, N., & Pirinezhad, P. (2021). The effect of self-management support program on patient activation and inner strength in patients with cardiovascular disease. **Evidence Level:** II – Quasi-experimental **Quality:** A – High quality – consistent, generalizable results, adequate control, sample size may be insufficient for strength of study, consistent recommendations, definitive conclusions	**Design:** Quasi-experimental, pretest-posttest design **Sample:** 86 patients in cardiac care wards from June 2017-May 2018, 18-65 yrs., cardiovascular disease (CVD) diagnosis > 1yr., hospitalization d/t CVD, no cognitive problems, residence in Lorestan province, read/speak Persian, access to phone, receiving routine medical care. **Setting:** teaching hospital affiliated with Lorestan University of Medical Sciences, Western Iran. **Framework:** Inner Strength Theory, Continuous Care Model **Measures:** 13-item Patient Activation Measure (PAM), inner strength scale (ISS) **Analysis Plan:** t-test for normally distributed variables, Chi-square test for nominal/categorical variables, normality measured using Kolmogorov-Smirnov test, paired t-test for pretest/posttest impact of support program, P<0.05. **Procedure:** 3 month nurse-led self-management support program administered to 38 in intervention group.	**Conclusion Validity:** Moderate sample size, increases likelihood of Type II errors. **Internal Validity:** Design limits confirmation of activation promotion as a result of administering the program, external variables are not controlled. **External Validity:** Sample consists of symptomatic, seeking/requiring continuous post-discharge care, may not be generalizable. **Construct Validity:** Study adequately measured intended outcomes. **Reliability:** Translation of PAM tool into Persian may limit reliability. **Precision:** Statistically significant difference in mean score of patient activation (P.001) in both groups No statistical significance in mean score of inner strength between the two groups (P<0.104)	Low levels of patient activation at baseline in both groups. Statistically significant differences between mean scores of patient activation between groups (P<.001). Within-group analysis indicated significant improvement in patient activation in the intervention group (P<.001). Between-group analysis showed no statistically significant differences in means of inner strength (P<.104). Within-group analysis indicated significant increase in inner strength in the intervention group (P<.001), and no significant improvement in the comparison group (P<.150).	Self-management support for patients with CVD after their discharge may not promote inner strength but significantly improves activation level. Lowest initial activation levels demonstrate patients at risk of failing to control their health status and disease during hospitalization. An increase in self-reported PAM score is associated with changes in self-care behaviors, promotes health decisions, and adherence to symptom control behaviors. Implementation and effectiveness of self-management support programs are highly variable based on previous research. Patient condition, continuation of interactions, and content of self-management program are important.

Brief Reference, Type of Study, Quality rating	Methods	Threats to Validity/ Reliability	Study Findings	Conclusions
Article 7: Tecson, K. M., Bass, K., Felius, J., Hall, S. A., Jamil, A. K., & Carey, S. A. (2018). Patient "activation" of patients referred for advanced heart failure therapy. **Evidence Level:** II – Quasi-experimental **Quality:** C – Low quality/major flaws – little evidence without outside variable control, insufficient sample size, outcomes not specified, conclusions cannot be drawn based on this study.	**Design:** Prospective, Observational **Sample:** 196 patients: 133 selected for advanced HF therapy, 63 not selected **Setting:** Baylor University Medical Center **Framework:** N/A **Measures:** Patient activation, anxiety, depression **Analysis Plan:** Two-sample t test, Wilcoxon Rank Sum tests, Chi-square tests, & Fisher's Exact tests **Procedure:** 10-item Patient Activation Measure (PAM) Questionnaire, anxiety and depression measured by hospital anxiety and depression scale (HADS).	**Conclusion Validity:** No limitations were listed in the study. **Internal Validity:** Self-reporting may cause bias; advanced therapy intervention could contribute to outcomes. **External Validity:** May not be generalizable to populations other than those receiving advanced HF therapy. **Construct Validity:** Measured intended outcomes. **Reliability:** The Patient Activation Measure is a reliable tool. **Precision:** No statistical significance between PAM levels and patient characteristics ($p>.28$), except COPD ($p=0.04$) which was associated with higher rates of low activation. Statistically significance between PAM levels for those selected for advanced therapy vs not ($p=0.02$)	Statistically higher proportion of males accepted for therapy than women ($p=0.04$). Neither anxiety nor depression levels differed by selection status ($p=0.30$ therapy, $p=0.40$ no therapy). Those not selected for advanced HF therapy were 4x more likely to have lower activation. Those selected had higher prevalence of being categorized in the two highest activation levels than those not selected. Mortality at 1-year increased in those not selected for therapy (29%) v. selected (15%)($p=0.10$). Participants in the intervention group had significant increases in PAM scores from baseline to 6 months and fewer hospitalizations.	Patients referred for advanced heart failure therapy have higher activation than those who are not selected. Patients with activation have poorer health literacy and often require skilled care. The PAM tool may be an important tool in identifying patients at high risk of mortality. Patients with high activation are more likely to be approved for advanced therapy, so it is critical to be highly engaged and activated. The need for targeted interventions to improve patient activation and engagement was demonstrated in this study.

Brief Reference, Type of Study, Quality rating	Methods	Threats to Validity/ Reliability	Study Findings	Conclusions
Article 8: Dumitra, T., Ganescu, O., Hu, R., Fiore, Jr., J. F., Kaneva, P., Mayo, N., Lee, L., Liberman, A. S., Chaudhury, P., Ferri, L., & Feldman, L. S. (2021). Association between patient activation and health care utilization after thoracic and abdominal surgery. **Evidence Level:** III – Non-experimental **Quality:** A/B – High/Good Quality – Sufficient size for study design, reasonable conclusions, describes how data justify conclusions, identifies sources to corroborate evidence, data and knowledge are linked, consistent recommendations made	**Design:** Prospective cohort, observational study **Sample:** 653 patients admitted for thoracic, general, colorectal, and gynecologic surgery **Setting:** 2 hospital sites of the McGill University Health Care Center (MUHC) tertiary care hospital network, from October 2017-January 2019. **Framework:** Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) **Measures:** 30-day post-discharge healthcare utilization (emergency department/outpatient clinic visit, hospital readmission). Secondary: length of stay, 30-day emergency department visits, readmissions, and post-operative complications **Analysis Plan:** Chi-squared/Fisher exact test, t-test/2-sided Mann Whitney test, P<.05, 95% CI **Procedure:** Patient Activation Measure during initial admission immediately after surgery, self-reported healthcare utilization	**Conclusion Validity:** adequate sample size for study (n=650, 2-sided testing, α=0.05, 80% power), wide range of surgical procedures. 59 patients lost to follow-up. **Internal Validity:** Observer bias was minimized-outcomes researcher unaware of baseline characteristics. **External Validity:** **Construct Validity:** Primary outcomes were adequately measured. **Reliability:** Patients were informed at time of enrollment; sensitized documentation of unplanned healthcare uses. Relied on patient's self-report of healthcare use. **Precision:** Statistically significant result P<.001 for unplanned healthcare utilization, outpatient clinic visits and P=.03 for ED visits.	Unplanned healthcare utilization at 30 days was significantly higher in patients with low patient activation [64(42%) v. 100(20%), P<.001]. Hospital readmissions were similar between high and low patient activation [16(11%) v. 55(11%)]. Patients with low activation had longer initial LOS [3.5(2-6) v. 3(1-5), P=.04]. A similar proportion of post-operative complications were noted among both groups [30(48%) v. 64(40%), P=0.29]. Multivariate regression showed low level of activation was associated with higher risk of unplanned healthcare visits (adjusted OR 3.15, 95% CI, P<.001). Low level of patient activation was associated with increased ED visits (adjusted OR 1.64, 95% CI, P=.04) but not associated with risk of readmission (adjusted OR 1.04, 95% CI, P=.90). Low activation was associated with increased risk of complications (adjusted OR 1.63, 95%CI, P=.01).	Lower level of patient activation is associated with higher risk of unplanned healthcare utilization 30 days after thoracic and abdominal inpatient surgery. Assessing patient activation level preoperatively could identify patients at risk of unplanned visits and prompt interventions to prepare and support them after discharge. Most of the work in patient activation has been studied in chronic conditions, this is the first study in patients undergoing surgery. Patients with lower levels of activation are at higher risk for developing complications.

Brief Reference, Type of Study, Quality rating	Methods	Threats to Validity/ Reliability	Study Findings	Conclusions
Article 9: Dunlay, S. M., Griffin, J. M., Redfield, M. M., & Roger, V. L. (2017). Patient activation in acute decompensated heart failure. **Evidence Level:** III – Nonexperimental **Quality:** A/B – High/Good Quality - Sufficient size for study design, reasonable conclusions, data justified conclusions, identifies sources to corroborate evidence, data and knowledge are linked, consistent recommendations made	**Design:** Prospective cohort study, observational **Sample:** 302 patients currently hospitalized with acute decompensated HF (ADHF) meeting Framingham Criteria from January 2014-July 2015; chronic HF, ≥ 20yrs., resident of 1 of 7 Southeastern Minnesota counties. **Setting:** Mayo Clinic, Rochester, Minnesota **Framework:** N/A **Measures:** Length of stay, discharge location, inpatient mortality, 30-day post-discharge readmissions, 30-day post-discharge mortality **Analysis Plan:** Linear regression models, Mantel-Hanszel Chi-Squared test, Cox proportional hazard regression **Procedure:** 13-item Patient Activation Measure (PAM) administered	**Conclusion Validity:** Hospital mortality should be replicated in larger sample size. **Internal Validity:** Readmissions not at Mayo facility was not recorded in data. **External Validity:** Conducted in single community, may not be valid in other geographic areas. **Construct Validity:** First study to investigate associations of activation and outcomes with hospitalized ADHF patients. **Reliability:** Patient Activated Measure® is a reliable and validated tool. **Precision:** Association between patient activation and 30-day readmission was not statistically significant, P=.067, 95% confidence interval. No significant association between patient activation and length of stay (β=.06, 95% CI, P=.92).	Patient activation scores ranged 29-100. Patients less activated were older, less educated, worse general and financial satisfaction, and worse health literacy. Median length of stay was 4 (3-7) days. 30-day readmission rate was 21.7% 30-day post-discharge mortality rate was 7.0%. Increase in proportion discharged to skilled nursing facility with decreasing activation (P<.001). Increase in 30-day mortality with decreasing activation (P=.003).	Lower activation is associated with higher 30-day mortality. Lowest activation level had more than 6-fold increased risk of death within 30 days of discharge. Most patients hospitalized with ADHF lack skills, confidence, and motivation to manage their health. Those with lower activation are less satisfied with their care, often require skilled care on discharge, and have higher 30-day mortality.

Brief Reference, Type of Study, Quality rating	Methods	Threats to Validity/ Reliability	Study Findings	Conclusions
Article 10: Hibbard, J. H., Stockard, J., Mahoney, E. R., & Tusler, M. (2004). Development of the patient activation measure (PAM): Conceptualizing and measuring activation in patients and consumers. **Evidence Level:** III – Qualitative **Quality:** A/B – High/Good Quality – Decisions on tool creation and methods were explicitly detailed, several stages demonstrate verification of findings, data is relevant, definitive conclusions drawn.	**Design:** Pilot-study: 4 stages **Sample:** Stage 4: Convenience samples with and without chronic illness during initial stages, national probability random sample of 1,515, ≥45yrs. **Setting:** Not explicitly stated, United States. **Framework:** Chronic Illness Care Model **Measures:** Assessing activation and psychometric properties **Analysis Plan:** Rasch methodology **Procedure:** Pilot-test and initial psychometric analysis	**Conclusion Validity:** Adequate sample size, first study on this tool. **Internal Validity:** Investigator bias – creators of this tool are conducting the study to evaluate efficacy; it is expected to be valid and reliable. **External Validity:** Outcomes measured as intended. **Construct Validity:** Variables believed to be related to activation were examined for relationship to measured activation. Results indicated considerable evidence for construct validity. **Reliability:** Rasch reliability for 22-item PAM showed high level of reliability **Precision:** Precision of item's scale location/calibration estimated by the item's standard of error. Precision of each individual respondent's estimated scale location specified by the standard error of measurement of that person.	Rasch measurement was used to create interval-level, unidimensional, probabilistic Guttman-like scales from ordinal data. An individual's location indicates how activated the person is. 48% response rate during stage 4 study. 73% respondents reported 2 or more chronic conditions. Those with higher activation reported significantly better health (r=.38, p<.001) and have lower rates of doctor office visits, ER visits, and hospital nights (r=-.07, p<.01). Findings indicate a high degree of construct and criterion validity. Patients with higher activation are more likely to exercise regularly, follow a low-fat diet, eat more fruits and vegetables, and not smoke.	Higher activation significantly more likely to engage in consumeristic behaviors. Engaging patients to be an active part of care is essential in quality of care. The Patient Activation Measure appears to be a valid and reliable instrument to measure activation. The PAM tool may be useful for designing interventions and evaluating them. This measure can be used in the clinical setting to assess individual patients to develop care plans tailored to that patient and integrate into their care. Activation appears to involve 4 stages: believing the patient role is important, having the confidence and knowledge necessary to take action, taking action to maintain and improve one's health, and staying the course even under stress.

Brief Reference, Type of Study, Quality rating	Methods	Threats to Validity/ Reliability	Study Findings	Conclusions
Article 11: Jacobson, A. F., Sumodi, V., Albert, N. M., Butler, R. S., DeJohn, L., Walker, D., Dion, K., Lin Tai, H. L., & Ross, D. M. (2018). Patient activation, knowledge, and health literacy association with self-management behaviors in persons with heart failure. **Evidence Level:** III – Nonexperimental **Quality:** A/B – High/Good Quality – Reasonably consistent results, sufficient sample size, data and knowledge is meaningful.	**Design:** Prospective cross-sectional, correlational **Sample:** Convenience sample of 151 adults with HF, ≥ 18yrs., established outpatient center patient (1mo. or longer), diagnosed with any type of HF, read/write English **Setting:** 4 outpatient centers of a large health system in Northeast Ohio **Framework:** N/A **Measures:** HF self-management: adherence to medications, diet, exercise, weight and symptom monitoring, patient activation **Analysis Plan:** Correlation and multiple regression, α=0.05 **Procedure:** European Heart Failure Self-Care Behaviour Scale (EHFScBS), Patient Activation Measure®	**Conclusion Validity:** Adequate sample size (n=150, power 0.80, α=0.05). **Internal Validity:** Self-reported surveys are subject to bias. Cognitive function not assessed. No dedicated data collector. **External Validity:** Convenience sample limits generalizability to other locations. Excluding those unable to read, write, or speak English, or chose not to participate limits generalizability. **Construct Validity:** Variables accurately measured as stated. **Reliability:** PAM tool is reliable and validated. Missing data may influence reliability. Those with low literacy levels may have left blanks. **Precision:** Significant correlation between age (*r*=0.305, P=.0007), patient activation stage (*r*=.281, P=.0008), and heart failure self-management.	Older age was associated with higher degree of self-management (p=.0007). Patient activation was the only variable positively associated with self-management (p=.0008). A significant association between health literacy and HF knowledge was observed (*r*=.292, p<.0001). No correlation of a mediation effect of HF knowledge on patient activation (*r*=.030, P=.24).	There is a positive relationship between patient activation and self-management behaviors in HF and other chronic conditions. Patient activation does not increase HF knowledge and HF knowledge does not improve self-management. Patient activation level and patient age, but not heath literacy level or HF knowledge positively relate to HF self-management behaviors.

Brief Reference, Type of Study, Quality rating	Methods	Threats to Validity/ Reliability	Study Findings	Conclusions
Article 12: Kearns, R., Harris-Roxas, B., McDonald, J., Song, H. J., Dennis, S., & Harris, M. (2020). Implementing the patient activation measure (PAM) in clinical settings for patients with chronic conditions: a scoping review. **Evidence Level:** III - Exploratory **Quality:** A/B – High/Good Quality - Reasonable results, sufficient sample size of articles, data regarding sample size in each article was not provided.	**Design:** Scoping review methodology **Sample:** 21 articles, published in English, 2004-2017, adult ≥ 18yrs. patients with chronic conditions, PAM-tailored intervention. **Setting:** Organisation for Economic Cooperation and Development countries, USA and UK **Framework:** N/A **Measures:** PAM-tailored interventions **Analysis Plan:** Preferred Reporting Items for Systematic Reviews and Meta-Analysis **Procedure:** Insignia Health website and Medline database searched	**Conclusion Validity:** Sample sizes of studies not provided; article sample size sufficient for analysis. **Internal Validity:** No analysis of bias **External Validity:** All intervention studies were in USA or UK, lack of diversity, cultural and demographic background may limit generalizability. **Construct Validity:** Analyzed intended measures. **Reliability:** Quality of the studies nor interventions were assessed. **Precision:** No statistical analysis provided.	PAM has been used to tailor interventions including: motivational interviewing, health coaching, goal setting, development of care and self-management plans, provision of health information, hospital to home transition, care coordination, self-management, and readmission prevention programs. Enablers and barriers to PAM implementation include: organization & leadership support for patient activation, culture changes to patient, professional, and provider roles, clinician engagement & “buy-in” about the need for patient-centered care, perceptions about the value of PAM, confidence & ability to deliver intervention. The effect of PAM-tailored interventions on patient behaviors differed across studies. Declines in hospital admissions, readmissions, and hospital days were reported.	PAM is used to help clinicians understand how to effectively coach, tailor support, health information, and advance based on activation level. Programs such as care coordination, health coaching, self-management interventions, in-home/hospital outreach programs should be tailored to patient activation based on PAM. PAM-tailored interventions may have the potential to improve patient behaviors. PAM is being used to tailor and differentiate care for patients with chronic conditions in a variety of settings. The PAM tool does not have widespread use outside of the USA or UK or in patients from culturally and linguistically diverse backgrounds. The effect of PAM-tailored interventions on clinical and patient behaviors was unable to be determined based on this analysis.

Brief Reference, Type of Study, Quality rating	Methods	Threats to Validity/ Reliability	Study Findings	Conclusions
Article 13: Kinney, R. L., Lemon, S. C., Person, S. D., & Pagoto, S. L. (2015). The association between patient activation and medication adherence, hospitalization, and emergency room utilization in patients with chronic illnesses: a systematic review. **Evidence Level:** III – Systematic review of non-experimental studies without meta-analysis **Quality:** A/B – High/Good Quality – Small sample size, decision justified, admits to bias, reasonable conclusions, identifies sources to corroborate evidence	**Design:** Systematic review of observational cohort design without meta-analysis **Sample:** 10 articles published 2007-2014: adults ≥ 18yrs., with a diagnosis of a chronic medical condition (heart disease, diabetes, COPD, depression), published in English, patient activation and PAM-13, PAM-8, or PAM-22 scale **Setting:** United States **Framework:** N/A **Measures:** Association between PAM scores and at least one other outcomes of interest (hospitalization, emergency room utilization, medication adherence). **Analysis Plan:** Downs and Black criteria for methodological quality **Procedure:** Ovid, MEDLINE, PsychINFO, PubMed, Cochrane Database of Systematic Reviews, CINAHL, ISI Web of Science, Health and Psychosocial Instruments	**Conclusion Validity:** Small sample size, limited to observational studies conducted by developers of PAM. **Internal Validity:** Publication bias – 6/10 studies were conducted by developers of PAM. **External Validity:** Studies were limited to only English, may limit generalizability to other countries. **Construct Validity:** Other measures that may examine constructs of activation were not included. Heterogeneity did not allow meta-analysis to be performed. **Reliability:** PAM is the most widely accepted measure of patient activation. **Precision:** Significant associations for patient activation and ER utilization and readmissions. Not significant for medication adherence.	5 studies examined patient activation and hospitalization. 4/5 demonstrated an inverse association between PAM score & hospitalization. Chronic cardiopulmonary illness reported lower PAM scores & were 2x more likely to be hospitalized within 30 days (IRR=1.93, CI 95%). 3/3 studies found significant associations with lower PAM score and increased likelihood of utilizing the ER (IRR=1.68, 95% CI). 3/7 studies demonstrated low PAM scores were 2.5x more likely to have self-reported missing 2 or more days of medications in past 7 days (OR=2.65, 95% CI, P<.001).	Patient activation is associated with reduced hospitalization and emergency room utilization. Patient activation is modifiable, changes over time, and may be associated with better utilization. This is the first review that synthesized PAM literature on several healthcare utilization outcomes. Strong evidence that lower activation in chronically ill patients is associated with higher rates of hospitalization than higher activation. Association of patient activation and medication adherence is inconclusive.

Brief Reference, Type of Study, Quality rating	Methods	Threats to Validity/ Reliability	Study Findings	Conclusions
Article 14: Prey, J. E., Qian, M., Restaino, S., Hibbard, J., Bakken, S., Schnall, R., Rothenberg, G., Vawdrey, D.K., & Creber, R. M. (2016). Reliability and validity of the patient activation measure in hospitalized patients. **Evidence Level:** III – Exploratory study **Quality:** A/B- High/Good quality – discusses enhancement of the overall inquiry in sufficient detail, verified methodological coherence, addresses potential generalizability concerns, data and knowledge is linked to relevant literature, consistent conclusions	**Design:** Exploratory analysis **Sample:** 100 participants from cardiology and oncology units, ≥18yrs., English speaking **Setting:** Large, urban, academic medical center **Framework:** N/A **Measures:** Patient activation, sample characteristics, quality of life, health literacy **Analysis Plan:** Internal consistency using Cronbach's alpha, forward and backward stepwise selection, Wilcoxon rank-sum tests to analyze planned vs unplanned, Spearman ranked correlation for convergent validity, ANOVA for strength of association between PROMIS scores and activation level. **Procedure:** PAM-13 tool administered to planned vs unplanned admissions	**Conclusion Validity:** Small sample size, analysis of predictors of low activation may have been too underpowered to detect differences. **Internal Validity:** Did not include non-English speaking patients. **External Validity:** Conducted at a large, urban, academic center with a diverse population, makes it generalizable. **Construct Validity:** Demonstrated validity and reliability of measuring patient activation. **Reliability:** Demonstrated PAM is a reliable measure of patient activation. **Precision:** The PAM demonstrated adequate internal consistency (Cronbach α=0.81). Statistically significant difference in PAM-13 levels of planned compared to unplanned admissions (p=.0001).	Unplanned admissions were more likely to have low activation (adjusted OR=5.8, p=.008). Higher proportion of participants with low activation in the unplanned admission group for both oncology and cardiology (p=.007, p=.047). The PAM-13 was modestly correlated (p<.001) with each of the three PROMIS Global Health components (global, physical, and mental health). ANOVA demonstrated lower scores on PROMIS measures, associated with low activation.	There is a significant difference in PAM levels between hospitalized patients with unplanned compared to planned admissions. This supports previous research that admission type predicts low patient activation. There is modest correlation between PAM-13 levels and quality of life. The PAM-13 is a reliable and valid measure to be used in the inpatient setting. It has also shown admission type is an important predictor of patient activation. Understanding patient activation is important for optimizing patient communication.

Brief Reference, Type of Study, Quality rating	Methods	Threats to Validity/ Reliability	Study Findings	Conclusions
Article 15: Roberts, N. J., Kidd, L., Dougall, N., Patel, I. S., McNarry, S., & Nixon, C. (2016). Measuring patient activation: The utility of the patient activation measure within a UK context – Results from four exemplar studies and potential future applications. **Evidence Level:** III – Exploratory, Explanatory mixed method **Quality:** C – Studies contribute little to overall findings, small sample size, missing data, reliability of tool in this setting is undetermined, discussed limitations to each study.	**Design:** Exploration of 4 exemplar studies: 1. Observational prospective cross sectional, 2 and 3. Secondary retrospective analysis, 4. Two phased mixed method **Sample:** 1. 40 COPD patients, 2. 29 COPD patients, 3. 274 attending pulmonary rehab., 4. 20 stroke patients **Setting:** UK **Framework:** N/A **Measures:** explore and describe PAM scores in populations with stroke or COPD **Analysis Plan:** Descriptive statistics, ANOVA w/ post hoc Tukey HSD comparisons, repeated measures ANOVA w/ Greenhouse-Geisser correction, Mann Whitney, Chi-Square **Procedure:** PAM tool administered 1. Before and after appointment, 2. Before and after self-management program, and at 3-, 6-, and 12-months post, 3. Prior to pulmonary rehab program, 4. Prior to qualitative interview on self-management needs	**Conclusion Validity:** Small sample for all 4 studies. Studies were significantly underpowered. **Internal Validity:** No control group, some data missing for variables, convenience samples. **External Validity:** Single site studies, only conducted in UK. Likely not generalizable. **Construct Validity:** PAM score was not assessed post-intervention in exemplar 4. **Reliability:** PAM tool has not been studied in UK, missing data and lack of access to data may limit reliability. **Precision:** Significant differences in PAM scores pre- and post-intervention when data available.	1. Significant difference in PAM between respiratory clinic patients & those attending pulmonary rehab ($p=0.023$). No significant difference between disease severity ($p=0.389$). 2. Median PAM scores higher post-program but dropped at 3 months post. Significant differences between means at different time points ($F=7.164$, $p=0.002$). Significant differences between baseline and post-program ($p=0.001$). 3. Significant differences between baseline PAM scores and 6 ($p<0.001$) and 12 months ($p<0.001$). 4. No significant differences in PAM scores when comparing gender and Modified Rankin Scores (level of disability). Qualitative interviews reflected characteristics of lower PAM levels (1 and 2).	PAM can be used as an outcome measure to measure effectiveness of interventions. PAM can be useful to inform tailoring of interventions. Most of data regarding PAM has only been conducted in the United States, not the UK, may limit feasibility in other countries. Tool should not be used in isolation, good demographic and patient history need to be obtained.

Brief Reference, Type of Study, Quality rating	Methods	Threats to Validity/ Reliability	Study Findings	Conclusions
Article 16: Bishop-McWain, T. (2019). Reducing 30-day heart failure readmission rates using patient activation scores: An interprofessional approach. **Evidence Level:** V – Organizational Experience/Quality Improvement **Quality:** B – Good quality – clear objectives in single setting, quality improvement methods used but no statistical analysis, reasonable recommendations with some reference to scientific evidence from literature review	**Design:** Quality Improvement Study **Sample:** 107 HF patients identified with low-activation (level 1 and 2 on PAM survey), age ≥18 **Setting:** OSF Healthcare St. Joseph Medical Center, Illinois **Framework:** Plan, Do, Study, Act **Measures:** 30-day HF readmissions **Analysis Plan:** Chart audit, Microsoft Excel pivot table, Insignia Health Patient Activation Measure-10 (PAM-10) **Procedure:** Interprofessional HF team approach applied to low-activated patients	**Conclusion Validity:** reasonable, addresses limitations, small sample size, small community hospital. **Internal Validity:** many inaccurately/missed HF diagnosis coding, some interprofessional team members not always included in intervention, other variables could impact results, no control. **External Validity:** May not be applicable to other healthcare centers without adequate resources. **Construct Validity:** activation level never reassessed to determine intervention effectiveness on readmission. **Reliability:** only 70% completed PAM-10 survey, HF coordinator not always present for intervention **Precision:** No statistical analysis available	HF readmission rate declined for the 1st time in 3 years. HF readmission rate dropped below project goal of 16% to 11-15% during data collection period. Importance of stratifying patients based on activation level was inclusive based on patient feedback received during interview. Sustainability may be an issue due to lack of engagement by staff and time constraints to administer the PAM survey. HF coordinator role had no formal job description, new role in organization	Tailored interdisciplinary care reduces 30-day HF readmission rate in patients with low-activation. Palliative care as an interdisciplinary team member could significantly contribute to reduced readmissions, was not included in this study. Difficult to determine if readmissions were related to activation level since this was never reassessed or if interprofessional intervention impacted readmission rate, no statistical analysis.

Appendix B
13-item Patient Activation Measure®

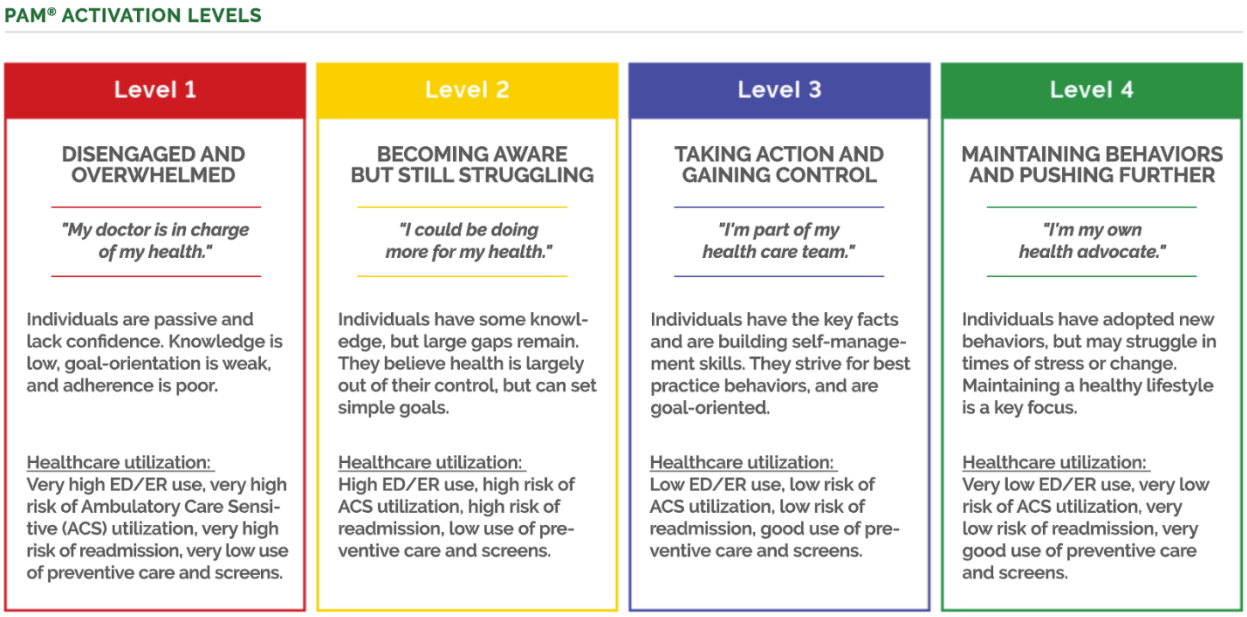
Name	
ID	
Date	

Below are statements people sometimes make when they talk about their health. Please indicate how much you agree or disagree with each statement as it applies to you personally.

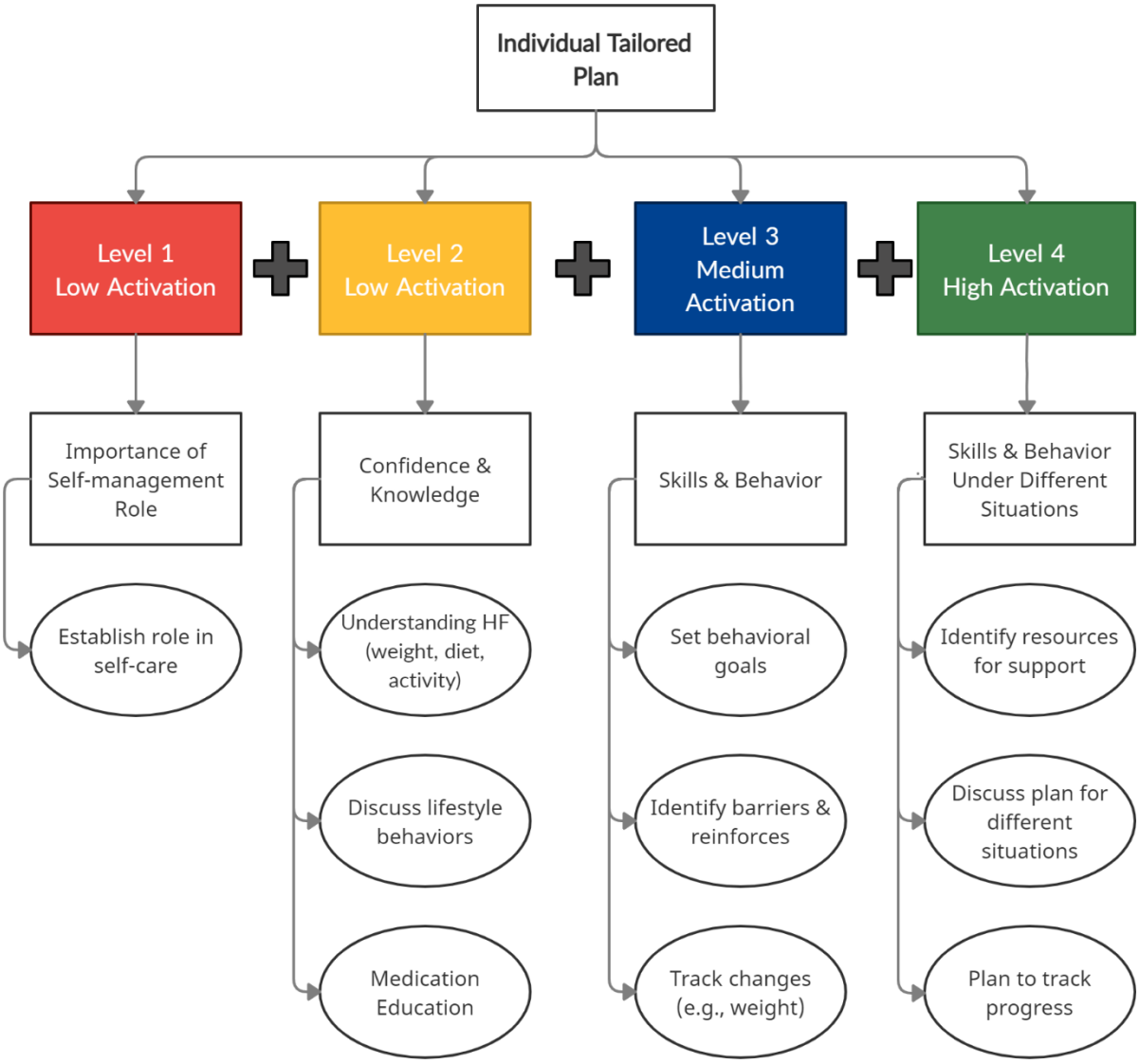
Circle the answer that is most true for you today. If the statement does not apply, select N/A.

1.	When all is said and done, I am the person who is responsible for taking care of my health.	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A
2.	Taking an active role in my own health care is the most important thing that affects my health.	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A
3.	I am confident I can help prevent or reduce problems associated with my health.	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A
4.	I know what each of my prescribed medications do.	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A
5.	I am confident that I can tell whether I need to go to the doctor or whether I can take care of a health problem myself.	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A
6.	I am confident that I can tell a doctor concerns I have even when he or she does not ask.	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A
7.	I am confident that I can follow through on medical treatments I may need to do at home.	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A
8.	I understand my health problems and what causes them.	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A
9.	I know what treatments are available for my health problems.	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A
10.	I have been able to maintain (keep up with) lifestyle changes, like eating right or exercising.	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A
11.	I know how to prevent problems with my health.	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A
12.	I am confident I can figure out solutions when new problems arise with my health.	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A
13.	I am confident that I can maintain lifestyle changes, like eating right and exercising, even during times of stress.	Strongly Disagree	Disagree	Agree	Strongly Agree	N/A

Appendix C
Levels of Patient Activation



Appendix D
Individualized Coaching Plan



Appendix E
Project Timeline

October 2021	14	Obtain SRMH's Evidence-Based Practice and Research Shared Governance Council approval.
November 2021	12	UofSC DNP Project Proposal Defense Presentation
	23	Submit required forms to SRMH IRB for review and approval.
December 2021	31	Obtain research license from Insignia Health for the use of the Patient Activation Measure® tool & paid $150 fee
January 2022	4	SRMH IRB approval obtained
	11	UofSC eIRB submission
	18	Provide training to HF Nurse Navigator on PAM® survey
	20	UofSC eIRB approval obtained
	27	Project Implementation. Begin data collection
	28	Provide training to CCM team on PAM® survey & coaching recommendations
May 2022	18	Begin demographic data collection & analysis
June 2022	1	Begin final paper revision.
	3	Project completion. Last participant enrollment
July 2022	7	Complete data collection & analysis
	22	UofSC DNP Final Defense
August 2022	TBD	Disseminate study findings to Insignia Health
	TBD	Submit final deliverable to SRMH Evidence-Based Practice & Research Shared Governance Council

Appendix F
Sample Population Descriptive Statistics

Variable	*n*	*%*
PAM Level		
1	10	13.33
2	20	26.67
3	34	45.33
4	11	14.67
Re-Survey PAM Level		
1	4	5.33
2	10	13.33
3	16	21.33
4	14	18.67
Missing	31	41.33
Gender		
Male	29	38.67
Female	46	61.33
Marital Status		
Married	32	42.67
Single	11	14.67
Widowed	16	21.33
Divorced	12	16.00
Life Partner	1	1.33
Separated	3	4.00
Education Level		
Some college, no degree	2	2.67
High School graduate	4	5.33
12th grade	2	2.67
Master's degree	1	1.33
Some college	1	1.33
8th Grade	1	1.33
10th grade	2	2.67
11th Grade	2	2.67
11th Grade/GED	1	1.33
12th Grade	2	2.67

Missing	57	76.00
30-Day Readmission		
0	63	84.00
1	11	14.67
2	1	1.33
30-Day ER Visit		
0	63	84.00
1	12	16.00
90-Day Readmission		
0	31	41.33
1	1	1.33
2	1	1.33
3	1	1.33
n/a	41	54.67
90-Day ER Visit		
0	27	36.00
1	5	6.67
2	2	2.67
n/a	41	54.67

Appendix G
Statistical Results

Figure G1

The means of PAM Level and Re-Survey PAM Level with 95.00% CI Error Bars

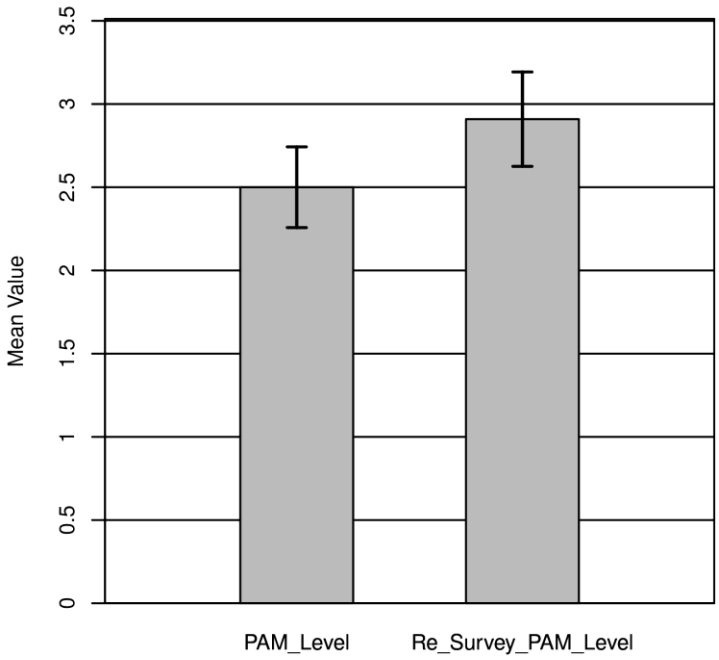


Table G1

Two-Tailed Paired Samples t-Test for the Difference Between PAM Level and Re-Survey PAM Level

PAM Level		Re-Survey PAM Level				
M	*SD*	*M*	*SD*	*t*	*p*	*d*
2.50	0.82	2.91	0.96	-2.86	.006	0.43

Note. N = 44. Degrees of Freedom for the *t*-statistic = 43. *d* represents Cohen's *d.*

Figure G2

Ranked values of PAM Level and Re-Survey PAM Level

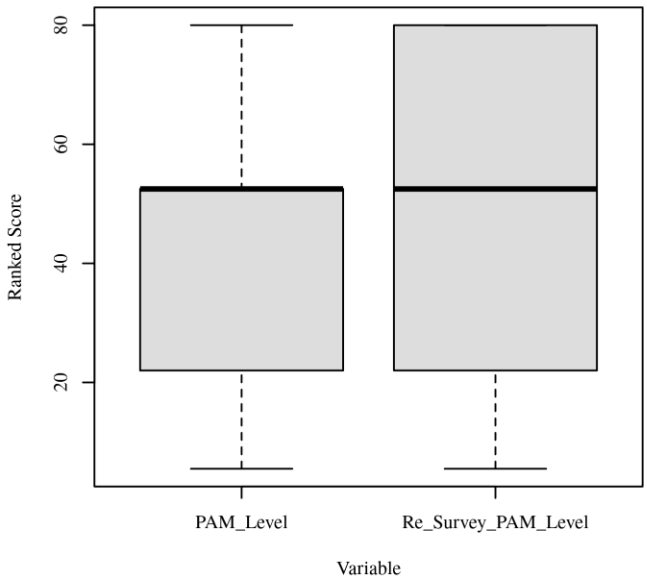


Table G2

Analysis of Variance Table for PAM Level by Marital Status

Term	*SS*	*df*	*F*	*p*	η_p^2
Marital Status	0.91	5	0.21	.955	0.02
Residuals	58.87	69			

Table G3

Mean, Standard Deviation, and Sample Size for PAM Level by Marital Status

Combination	*M*	*SD*	*n*
Married	2.69	0.82	32
Single	2.55	1.04	11
Widowed	2.44	0.96	16
Divorced	2.67	1.07	12
Life Partner	3.00	-	1
Separated	2.67	0.58	3

Note. A '-' indicates the sample size was too small for the statistic to be calculated.

Table G4

Analysis of Variance Table for PAM Level by Age

Term	*SS*	*df*	*F*	*p*	η_p^2
Age	33.33	41	1.01	.488	0.56
Residuals	26.46	33			

Table G5

Mean, Standard Deviation, and Sample Size for PAM Level by Age

Combination	*M*	*SD*	*n*
33	4.00	-	1
37	3.00	-	1
38	3.00	-	1
40	3.50	0.71	2
44	3.00	-	1
45	3.00	-	1
46	3.00	0.00	2
52	2.50	0.71	2
54	2.33	0.58	3
55	2.00	-	1
56	3.00	-	1
58	3.00	-	1
59	2.00	-	1
60	4.00	-	1
61	2.00	-	1
62	1.67	1.15	3
63	2.33	0.58	3
64	2.00	-	1
65	3.00	-	1
66	3.50	0.71	2
67	2.50	0.71	2
69	3.00	0.00	2
71	2.50	0.58	4
72	3.33	0.58	3
73	2.00	-	1
74	1.00	-	1

75	3.00	1.41	2
76	2.00	1.41	2
77	2.75	1.26	4
79	1.00	-	1
80	2.88	0.99	8
81	4.00	-	1
82	2.00	1.41	2
83	4.00	-	1
84	3.00	-	1
85	1.50	0.71	2
86	2.00	-	1
87	2.33	0.58	3
88	2.00	-	1
89	3.00	-	1
92	3.00	-	1
95	1.00	-	1

Note. A '-' indicates the sample size was too small for the statistic to be calculated.

Table G6

Analysis of Variance Table for PAM Level by 90-Day Readmission

Term	*SS*	*df*	*F*	*p*	η_p^2
90-Day Readmission	3.99	4	1.25	.297	0.07
Residuals	55.79	70			

Table G7

Mean, Standard Deviation, and Sample Size for PAM Level by 90-Day Readmission

Combination	*M*	*SD*	*n*
1	3.00	-	1
0	2.39	0.92	31
2	2.00	-	1
3	2.00	-	1
n/a	2.80	0.87	41

Note. A '-' indicates the sample size was too small for the statistic to be calculated.

Table G8

Analysis of Variance Table for PAM Level by Gender

Term	*SS*	*df*	*F*	*p*	η_p^2
Gender	1.88	1	2.37	.128	0.03
Residuals	57.90	73			

Table G9

Mean, Standard Deviation, and Sample Size for PAM Level by Gender

Combination	*M*	*SD*	*n*
Male	2.41	0.91	29
Female	2.74	0.88	46

Note. A '-' indicates the sample size was too small for the statistic to be calculated.

Table G10

Analysis of Variance Table for PAM Level by Education Level

Term	*SS*	*df*	*F*	*p*	η_p^2
Education Level	8.19	9	0.88	.575	0.50
Residuals	8.25	8			

Table G11

Mean, Standard Deviation, and Sample Size for PAM Level by Education Level

Combination	*M*	*SD*	*n*
Some college, no degree	3.00	1.41	2
High School graduate	2.75	1.26	4
12th grade	1.00	0.00	2
Master's degree	3.00	-	1
Some college	2.00	-	1
8th Grade	2.00	-	1
10th grade	2.50	0.71	2
11th Grade	2.50	0.71	2
11th Grade/GED	3.00	-	1
12th Grade	3.50	0.71	2

Note. A '-' indicates the sample size was too small for the statistic to be calculated.

Table G12

Analysis of Variance Table for PAM Level by 30-Day ER Visit

Term	*SS*	*df*	*F*	*p*	η_p^2
30-Day ER Visit	0.01	1	0.02	.901	0.00
Residuals	59.77	73			

Table G13

Mean, Standard Deviation, and Sample Size for PAM Level by 30-Day ER Visit

Combination	*M*	*SD*	*n*
0	2.62	0.91	63
1	2.58	0.90	12

Note. A '-' indicates the sample size was too small for the statistic to be calculated.

Table G14

Analysis of Variance Table for PAM Level by 30-Day Readmission

Term	*SS*	*df*	*F*	*p*	η_p^2
X30_Day_Readmission	0.53	2	0.32	.728	0.01
Residuals	59.26	72			

Table G15

Mean, Standard Deviation, and Sample Size for PAM Level by 30-Day Readmission

Combination	*M*	*SD*	*n*
0	2.60	0.91	63
1	2.73	0.90	11
2	2.00	-	1

Note. A '-' indicates the sample size was too small for the statistic to be calculated.

Table G16

Analysis of Variance Table for PAM Level by 90-Day ER Visit

Term	*SS*	*df*	*F*	*p*	η_p^2
90-Day ER Visit	6.28	3	2.78	.047	0.11
Residuals	53.50	71			

Table G17

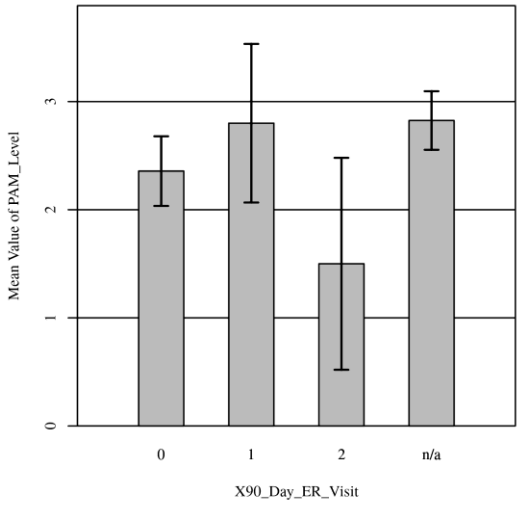
Mean, Standard Deviation, and Sample Size for PAM Level by 90-Day ER Visit

Combination	*M*	*SD*	*n*
0	2.36	0.87	28
1	2.80	0.84	5
2	1.50	0.71	2
n/a	2.83	0.87	40

Note. A '-' indicates the sample size was too small for the statistic to be calculated.

Figure G3

Means of PAM Level by 90-Day ER Visit with 95.00% CI Error Bars



Appendix H
Steps of the Intervention