ASSESS AND ADDRESS: SCREENING AND MANAGEMENT FOR DEPRESSION IN PATIENTS WITH CHRONIC HEART FAILURE

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ABSTRACT

Elizabeth Ann Bocan Wilhelm: Assess and Address: Screening and Management for Depression in Patients with Chronic Heart Failure
(Under the direction of Leslie Sharpe)

Background: Depression is two to three times more likely in patients with heart failure (HF) than in the general population. Comorbid HF and depression are associated with poor outcomes and increased healthcare burden. Clinical guidelines from professional organizations recommend routine depression screening in patients with HF. However, screening is not systematically implemented in outpatient cardiology settings.

Objective: The objective of this process improvement project was to create a sustainable process for an outpatient cardiology clinic to screen adults with chronic HF for depression, to identify patients who have an elevated depression screening score, and to initiate an evidence-based treatment algorithm for patients evaluated as having elevated screening scores due to depression.

Methods: A nurse practitioner-led process improvement project, set in an outpatient cardiology clinic, administered the Patient Health Questionnaire (PHQ-9) tool to patients who presented to the clinic for HF care. The score was reviewed by the provider and, if elevated, addressed with assessment and plan. Compliance was measured by the percentage of patients screened. Clinical impact was measured by percentage of patients with an elevated PHQ-9 score addressed with a documented treatment plan by the provider.
Results: Post-implementation results for four Plan-Do-Study-Act cycles were 38%, 68%, 72%, and 66%, for an overall of 61.9% of patients screened during the project. Twenty-one unique patients (13.17%) had elevated PHQ-9 scores; all of whom had a documented assessment and treatment plan.

Conclusions: We demonstrated how a screening protocol and an accompanying treatment algorithm can be successfully implemented in an outpatient cardiology clinic. Elements of success included a standardized screening protocol, a clinical support algorithm for treatment/referral, an optimized electronic medical record that supported the screening tool used, and a follow-up system for patients with significant depressive symptoms. Stakeholder engagement throughout the project informed iterative changes and provided direction for sustainability.
Teamwork makes the dreamwork. 

- John C. Maxwell
ACKNOWLEDGEMENTS

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# TABLE OF CONTENTS

LIST OF TABLES .............................................................................................................. xi

LIST OF ABBREVIATIONS ............................................................................................... xii

CHAPTER 1: THE PROBLEM ............................................................................................. 1

General Problem .............................................................................................................. 1

Local Problem .................................................................................................................. 1

Purpose of the Project ...................................................................................................... 2

Clinical Practice Question ............................................................................................... 2

Significance of Outcomes to Nursing .............................................................................. 2

  Overlap of Depression and HF .................................................................................... 2

  Conceptual Framework for Managing Adults with Chronic HF ............................. 4

CHAPTER 2: LITERATURE REVIEW ............................................................................... 7

Search Strategy ................................................................................................................. 7

Synthesis of Literature ...................................................................................................... 8

  Comorbid HF and Depression .................................................................................... 8

  Depression Screening in Patients with HF ................................................................. 11

  Treatment of Depression in Patients with Chronic HF ........................................... 18

    Cognitive Behavioral Therapy ................................................................................. 18

    Antidepressant Pharmacotherapy .......................................................................... 20

    Exercise Therapy ..................................................................................................... 22

    Direct Comparison of Treatment Options .............................................................. 24
<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anticipated Project Barriers and Proposed Solutions</td>
<td>63</td>
</tr>
<tr>
<td>Unanticipated Barrier</td>
<td>65</td>
</tr>
<tr>
<td>Sustainability</td>
<td>67</td>
</tr>
<tr>
<td>Budget</td>
<td>67</td>
</tr>
<tr>
<td>CHAPTER 4: RESULTS</td>
<td>69</td>
</tr>
<tr>
<td>Baseline Clinic Data</td>
<td>69</td>
</tr>
<tr>
<td>Screening Compliance</td>
<td>69</td>
</tr>
<tr>
<td>Sample Characteristics of Eligible Patients</td>
<td>70</td>
</tr>
<tr>
<td>Characteristics of Ineligible Patients</td>
<td>72</td>
</tr>
<tr>
<td>Depression Screening Yield</td>
<td>72</td>
</tr>
<tr>
<td>Impact of Screening</td>
<td>74</td>
</tr>
<tr>
<td>Post Implementation Staff Feedback</td>
<td>74</td>
</tr>
<tr>
<td>Quality of Care Provided</td>
<td>74</td>
</tr>
<tr>
<td>Clinic Screening Process</td>
<td>75</td>
</tr>
<tr>
<td>Time Commitment and Clinic Flow</td>
<td>75</td>
</tr>
<tr>
<td>Screening Compliance</td>
<td>75</td>
</tr>
<tr>
<td>Documentation and Chart Review</td>
<td>76</td>
</tr>
<tr>
<td>Patient Follow-Up</td>
<td>76</td>
</tr>
<tr>
<td>Recommendations for Clinic Next-Steps</td>
<td>77</td>
</tr>
<tr>
<td>CHAPTER 5: DISCUSSION</td>
<td>79</td>
</tr>
<tr>
<td>COVID-19 Pandemic</td>
<td>79</td>
</tr>
<tr>
<td>Screening Compliance</td>
<td>80</td>
</tr>
<tr>
<td>Depression Screening Yield</td>
<td>80</td>
</tr>
<tr>
<td>Impact of Screening</td>
<td>81</td>
</tr>
<tr>
<td>Themes of Staff Participant Feedback</td>
<td>82</td>
</tr>
</tbody>
</table>
Implications for Future Projects and Practice ............................................................. 82
  EMR Utilization ........................................................................................................... 82
  Follow-Up .................................................................................................................. 83
  Depression Screening for Patients with HF ............................................................... 83
  Recommendations for Screening Frequency ......................................................... 84
  Future Screening Efforts ......................................................................................... 85
  Clinical Confirmation of Depressive Symptoms .................................................... 85
  Screening for Suicidality ......................................................................................... 86
  Telehealth Capabilities .......................................................................................... 86
  Limitations ............................................................................................................... 87
  Strengths .................................................................................................................. 88
  Conclusion ............................................................................................................... 88

APPENDIX A: DEPRESSION AND HF BIOBEHAVIORAL MECHANISMS ...................... 89
APPENDIX B: PHQ-9 SCREENING TOOL .................................................................... 90
APPENDIX C: P4 SUICIDALITY SCREENER ............................................................... 91
APPENDIX D: PROVIDER’S DEPRESSION TREATMENT AND REFERRAL ALGORITHM ............................................................ 92
APPENDIX E: QUANTITATIVE DATA COLLECTION TOOL ........................................ 93
APPENDIX F: QUESTIONS TO GUIDE STAFF DISCUSSION .................................... 97
APPENDIX G: PROJECT CONCLUSION QUESTIONS AND POST-PROJECT WRITTEN EVALUATION FORM ................................. 98
APPENDIX H: EXECUTIVE SUMMARY .................................................................... 99
APPENDIX I: COVID-19 TIMELINE ......................................................................... 103
REFERENCES .......................................................................................................... 104
LIST OF TABLES

Table 1: Depression screening tools ........................................................................................................ 15
Table 2: Depression treatment in patients with HF .................................................................................... 26
Table 3: Characteristics of eligible patients............................................................................................. 71
Table 4: PDSA cycles .................................................................................................................................. 73
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACS</td>
<td>Acute Coronary Syndrome</td>
</tr>
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<td>AHA</td>
<td>American Heart Association</td>
</tr>
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<td>APRN</td>
<td>Advanced Practice Registered Nurse</td>
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<td>BDI-II</td>
<td>Beck Depression Inventory-II</td>
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<td>CBT</td>
<td>Cognitive Behavioral Therapy</td>
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<td>CDS</td>
<td>Cardiac Depression Scale</td>
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<td>CHD</td>
<td>Coronary Heart Disease</td>
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<td>DSM</td>
<td>Diagnostic and Statistical Manual of Mental Disorders</td>
</tr>
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<td>EMR</td>
<td>Electronic Medical Record</td>
</tr>
<tr>
<td>GAD-7</td>
<td>Generalized Anxiety Disorder-7</td>
</tr>
<tr>
<td>GDS-15</td>
<td>Geriatric Depression Scale-15</td>
</tr>
<tr>
<td>HADS</td>
<td>Hospital Anxiety and Depression Scale</td>
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<tr>
<td>HDRS</td>
<td>Hamilton Depression Rating Scale</td>
</tr>
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<td>HF</td>
<td>Heart Failure</td>
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<td>HFpEF</td>
<td>Heart Failure with Preserved Ejection Fraction</td>
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<td>HFrEF</td>
<td>Heart Failure with Reduced Ejection Fraction</td>
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<td>LCSW</td>
<td>Licensed Clinical Social Worker</td>
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<td>LVEF</td>
<td>Left Ventricular Ejection Fraction</td>
</tr>
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<td>MDD</td>
<td>Major Depressive Disorder</td>
</tr>
<tr>
<td>NP</td>
<td>Nurse Practitioner</td>
</tr>
<tr>
<td>PHQ-2</td>
<td>Patient Health Questionnaire-2</td>
</tr>
<tr>
<td>PHQ-9</td>
<td>Patient Health Questionnaire-9</td>
</tr>
<tr>
<td>QI</td>
<td>Quality Improvement</td>
</tr>
<tr>
<td>QOL</td>
<td>Quality of Life</td>
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<td>Abbreviation</td>
<td>Description</td>
</tr>
<tr>
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</tr>
<tr>
<td>RCT</td>
<td>Randomized Control Trial</td>
</tr>
<tr>
<td>SADHART</td>
<td>Sertraline Against Depression and Heart Disease in Chronic Heart Failure</td>
</tr>
<tr>
<td>SSRI</td>
<td>Selective Serotonin Reuptake Inhibitor</td>
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<td>USPSTF</td>
<td>United States Preventative Services Task Force</td>
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</tbody>
</table>
CHAPTER 1: THE PROBLEM

General Problem

Patients who suffer from heart failure (HF) have increased prevalence of depression compared to the general population (Bhatt et al, 2016). Depressed mood and, most profoundly, major depression after a HF diagnosis increases the risk of cardiovascular and all-cause mortality (Fan et al., 2014). Furthermore, depression and depressive symptoms are predictors of poor quality of life (QOL), rehospitalization, and increased healthcare utilization in patients with HF (Freedland et al., 2016; Jha et al., 2019).

Local Problem

To improve patient outcomes including QOL, an opportunity existed to routinely screen for and address depression in patients with HF, especially in the outpatient cardiology setting where patients are already scheduled for routine follow-up. Personal communication with advanced practice registered nurse (APRN) nurse practitioners (NPs) at an outpatient cardiology clinic revealed that the many of their patients with chronic HF display symptoms of depression. However, patients at this clinic were not routinely screened for depression and depressive symptoms were not typically addressed by the provider. On average, patients are seen for follow-up every one-to-three months by a provider at this HF clinic. For many patients, this means they are being seen more frequently by the cardiology clinic providers than by their primary care provider. Cardiology specialists engaged in routine depression screening can benefit patients and help reduce stigma associated with depression (Jha et al., 2019).
Purpose of the Project

The project desired outcomes were to create a sustainable process for the cardiology clinic to screen patients with chronic HF for depression, to identify patients who have an elevated depression screening score, and for providers to initiate an evidence-based treatment algorithm for those patients. When screening in a population is implemented, it is important to address patients who screen positive and have a pathway to appropriately manage results.

Providers should review and confirm symptoms of depression, using Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-V) criteria, and initiate treatment or referral for specialized treatment (Celano et al., 2018). Compliance is measured by the percentage which screening assessments are completed. The impact of screening (clinical outcome) is measured by the percentage of which providers document an assessment and plan for patients who had an elevated depression screening score and the percentage of patients for which the provider initiated or referred for depression treatment using an algorithm. Providers at this cardiology clinic include NPs, physicians, physician assistants, clinical psychologists, pharmacists, and licensed clinical social workers (LCSW).

Clinical Practice Question

The clinical practice question identified prior to starting this project was: For adults with chronic HF, what is the effect of implementing routine screening by an APRN for depression on the number of patients identified and referred for depression treatment?

Significance of Outcomes to Nursing

Overlap of Depression and HF

One challenge of comorbid depression in patients with HF is that both conditions have symptoms in common, which may ultimately make it challenging for the provider to discern between the two causes. Classic symptoms of HF include dyspnea, fluid retention, and exercise
intolerance (Kop, Synowski, & Gottlieb, 2011). Symptoms of depression include depressed mood, anhedonia, irritability, changes in psychomotor function, feelings of worthlessness or guilt, recurrent thoughts of death, and social withdrawal (Kop, Synowski, & Gottlieb, 2011). Symptoms of both diseases include fatigue, lack of energy, reduced physical activity, changes in weight, changes in sleep, and decreased concentration or cognition (Kop, Synowski, & Gottlieb, 2011).

Moreover, while depression and HF share similar symptoms, they also have commonalities at the biologic pathways causing bidirectional effects including autonomic nervous system dysregulation, neurohormone release, vascular endothelial dysfunction, hypercoagulability, and increased inflammatory substances (Aloisi et al., 2019; Celano et al., 2018; Ishak et al., 2020; Sbolli, Fiuzat, Cani & O’Connor, 2020). Autonomic nervous system dysregulation involves increased sympathetic nervous system activity that releases epinephrine and norepinephrine neurohormones and reduces feedback control of the hypothalamic-pituitary-axis, thus, causing increased levels of cortisol and aldosterone. This dysregulation is seen in depression and the resultant levels of norepinephrine, cortisol, and aldosterone independently predict mortality in HF. Vascular endothelial dysfunction and elevated inflammatory markers (e.g., tumor necrosis factor, interleukin-6, C-reactive protein) are present with depression and are associated with poor of outcomes in patients with HF (Aloisi et al., 2019; Celano et al., 2018). Depression, aging, and HF independently contribute to hypercoagulable blood. Hypercoagulability not only contributes to thrombogenesis and cardiovascular events, but also worsens depressive symptoms by inhibiting formation of mature brain-derived neurotrophic factor (mBDNF) that plays an important role in mood regulation (Liguori et al., 2018). Central
nervous system responses to inflammatory processes can also trigger fatigue and other depressive symptoms (Aloisi et al., 2019).

Depression is bidirectionally associated with inflammation and both are linked to progression of HF (Kop, Synowski, & Gottlieb, 2011). Furthermore, exacerbations of HF can reduce oxygenation to the hippocampus, an important structure for neuropsychological functioning, and trigger a depressive episode (Aloisi et al., 2019). Therefore, it is reasonable to expect that a proportion of patients with HF will develop depression (Aloisi et al., 2019). Refer to Appendix A for the common symptomology and of both conditions.

The problem of comorbid depression in patients with HF is complex and outcomes depend on a relationship between many factors. It is the provider’s responsibility to assess the whole patient, then prioritize and facilitate treatment. Both depression and HF can require combining a variety of treatment approaches. Thus, it was important for this project to include a treatment/referral algorithm to aid the HF specialty providers to enhance their clinical practice in real time.

**Conceptual Framework for Managing Adults with Chronic HF**

The *Domain Management Approach* to HF, based on Engel’s (1977) biopsychosocial construct, is a useful four-dimensional holistic framework to view the complex clinical problem of comorbid depression and HF (Gorodeski et al., 2018). The four domains include medical, mind and emotions, physical function, and social environment. This framework was developed to highlight the complex interactions between multiple factors that contribute to the overall health of patients with HF and to provide clinicians with a comprehensive and multidimensional assessment approach to improve health outcomes for patients with HF (Gorodeski et al., 2018).

The *medical domain* aligns with a traditional biomedical approach to management and describes identifying disease etiology and severity as well as pharmacological treatment.
Relative to HF, this includes identifying the etiology of the condition (e.g., an ischemia etiology due to coronary heart disease [CHD] as opposed to other non-ischemic etiologies) and the severity of the dysfunction as measured by the ejection fraction. The mind and emotion domain aims to evaluate mental health and cognition. This domain is relevant to HF for treatment adherence, self-management abilities, and underlying mental health conditions that can affect outcomes and complicate treatment. The physical function domain encompasses the physical strength and functional capacity to perform activities of daily living, the capacity for aerobic activity, and the level of risk for injury (e.g., falls). This is addressed relative to HF by determining New York Heart Association (NYHA) HF functional class at each visit. Finally, the social environment domain is the patient’s physical and social living circumstances that exist outside the clinic or hospital setting. Relative to HF, this targets the patient’s family and social support system, home environment, transportation resources, and financial resources to increase treatment adherence and effectiveness (Gorodeski et al., 2018).

Based on this framework, all four domains should be addressed to adequately assess, manage, and care for the whole person with HF (Gorodeski et al., 2018). This framework fits well within the nursing metaparadigm of person, health, environment, and nursing. It is important for APRNs to assess patients holistically to help patients find overall wellness. This project primarily focused on improving HF management within the mind and emotion domain by incorporating depression screening, identifying patients with comorbid depression, and initiating an evidence-based treatment algorithm, when indicated, into the routine clinic visit assessment for patients with chronic HF. As a result, the other three domains, medical, social, and physical, may also be influenced; thus, enhancing the holistic approach to care.
From the onset, it was believed that if this project demonstrated an ability to address barriers to screening and provide a process (e.g., algorithm) that makes initiating depression treatment more efficient in this high-risk patient population, then a clinical practice improvement would be achieved. Through effective screening, assessment and identification, and management of comorbid depression, the value that APRNs have in providing holistic care to these complex patients is realized. Furthermore, if successful, this project would demonstrate the value of having APRNs in healthcare who bring the skill and knowledge of how to translate evidence into feasible and sustainable clinical practice.
CHAPTER 2: LITERATURE REVIEW

Search Strategy

Databases searched included PubMed, PsychInfo, and the Cumulative Index of Nursing and Allied Health Literature. Searches were limited to the English language, journal article(s), adult subjects, and years of publication were limited to the past 20 years. Search terms to capture the HF population included: “cardiac failure” or “heart decompensation” or “heart failure [mesh]” or “heart failure” or “cardio-renal syndrome” or MH "Heart Failure+". Search terms for depression included: depression [mesh] or depression or depressive or depressive disorder. Other search terms combined with heart failure and depression included: systematic [subset] or “Systematic review;” “quality improvement” [mesh] or “quality improvement” or "implementation science" or "process improvement" or "change management;" "guideline adherence" [mesh] or “guideline adherence” or “policy compliance;” screening or screenings or mass screening [mesh] or “depression screening;” barriers or facilitators and screening or screenings or mass screening [mesh] or “depression screening;” intervention or interventions or cognitive behavioral therapy or CBT; SSRI or selective serotonin reuptake inhibitor or “pharmacologic intervention;” exercise or exercise therapy or ET; consequences or untreated; theory or theories or theoretical or construct or mediator; random*; prevalence treatment (year limit 2010); prevalence; comorbid.

In addition to using databases, an ancestry approach was taken to retrieve seminal works cited in the reference lists of key articles. Article sharing through professional colleagues and committee members was also used. Moreover, professional organization guidelines relevant to
depression and HF were retrieved (e.g., American Heart Association [AHA], Heart Failure Society of America [HFSA], American Psychiatric Association). The total number of abstracts reviewed was 150, and based on the context of an abstract, the full article was reviewed; 76 articles were included in this review of literature.

**Synthesis of Literature**

**Comorbid HF and Depression**

Heart failure afflicts an estimated 26 million people worldwide (Savarese & Lund, 2017). Depression and HF are two chronic conditions that often coexist. More than one in five patients with chronic HF have clinically significant depression (Rutledge et al., 2006). Notably, depression is two to three times more likely in patients with HF than in the general population (Kim, Shin, & Song, 2015; Kop, Synowski, & Gottlieb, 2011; Rutledge et al., 2006). Those with HF who are at higher risk for comorbid depression include individuals who are women, younger than 60 years of age, have low socioeconomic status, and have never married (Chobufo et al., 2020).

Three studies reviewed specifically aimed to describe the prevalence of depression among patients with HF. The first was an observational cohort study which found a 36% prevalence of depression among the 153 enrolled participants who were from the United States, Canada, and New Zealand (Friedmann et al., 2006). Authors used a cut-off score of 13 on the *Beck Depression Inventory-II* (BDI-II) tool to measure for depression (Friedmann et al., 2006). The other two studies were observational cohort studies that used a cut-off score of ten on the *Patient Health Questionnaire* nine-item (PHQ-9) screening tool to determine depression in subjects (Bhatt et al., 2016; Zahid et al., 2018). While Bhatt and colleagues (2016) found 26% prevalence of depression in 308 participants with HF in the United States, Zahid et al. (2018) found 60% prevalence of depression in 170 outpatients with HF in Pakistan.
Furthermore, a meta-analysis conducted with data from 26 articles, including 80,627 participants, revealed that prevalence of depression varied from 10% to 79%, with an approximate average of 29% (Sokoreli et al., 2016). This illustrates that results yield a wide range of prevalence rates of depression among patients with HF. The marked range can be explained by subject demographics (e.g., regional and socioeconomic variations), clinical characteristics (e.g., comorbidities, medication regimens), timing and frequency of depression screening, and the methods used to define depression (e.g., screening, diagnostic assessment, medical records).

Due to the high prevalence of depression, studies have examined the association between depression and poor outcomes in patients with chronic HF. Two meta-analyses were reviewed, both indicating that depression in patients with HF was associated with higher all-cause mortality rates than in patients who had HF without depression. A large study by Sokoreli and colleagues (2016) and another meta-analysis by Fan et al. (2014), consisting of nine studies and 4,012 participants, reported similar significant hazard ratios: 1.40 and 1.51, respectively. Both studies reported hazard ratios adjusted for confounding factors (i.e., age, gender, NYHA class, ejection fraction) and Sokoreli and colleagues (2016) conducted their study based on PRISMA guidelines. Chobufo and colleagues (2020) found depression in patients with HF was independently associated with a more than twice the risk of HF associated morbidity and mortality. Furthermore, Chandra and colleagues (2020) found that higher PHQ-9 scores, indicating worse depression symptoms, was associated with all-cause mortality and cardiovascular death specifically among patients with HF with preserved ejection fraction. This suggests depression negatively affects patients with HF regardless of their ejection fraction as most HF research has been done with patients with reduced ejection fraction.
The impact of depression on patients with HF has further been associated with decreased QOL, poorer self-care, increased rehospitalization rates, and higher healthcare costs. One study with 200 patients with HF from Jordan found depression, measured with the *Hospital Anxiety and Depression Scale* (HADS), was an independent predictor of poor QOL, based on Short Form-36 scores (AbuRuz, 2018). As Jordan is considered a developing country, it was uncertain whether these results are transferable to a United States population. However, Bhatt and colleagues (2016) supported these findings with a United States population by showing that patients with mild depressive symptoms, using the PHQ-9 tool, were 13 times more likely to have poor QOL measured by the *Kansas City Cardiomyopathy Questionnaire* and patients with moderate to severe depressive symptoms were 60 times more likely.

Depression has also been shown to affect cognition, motivation, and engagement, thereby contributing to poorer HF self-care (Chobufo et al., 2020). Self-care is important for patients with HF in order to monitor HF symptoms, quickly recognize physiologic changes, and adhere to a treatment regimen. Freedland and colleagues (2020) found higher PHQ-9 scores (i.e., worse depressive symptoms) were independently associated with worse HF self-care. In fact, self-care interventions have been shown to have a positive impact on HF self-care, even in patients with depressive symptoms (Alosais et al., 2020).

Rutledge and colleagues (2006) reviewed seven studies that supported increased use of healthcare resources in patients with comorbid depression and HF. Notable findings included a doubled risk of emergency department visits and a 29% increase in total healthcare costs for those patients with comorbid depression and HF compared to those with HF alone (Rutledge et al., 2006). Ishak and colleagues (2020) also found that patients with comorbid depression and HF had increased emergency department visits.
In addition, two American studies sampled 662 hospitalized and 308 non-hospitalized patients with HF and found that depressive symptoms predicted the rate of hospital readmissions (adjusted hazard ratio of 1.09 and 1.57, respectively) (Freedland et al., 2016; Bhatt et al., 2016, respectively). Notably, the severity of depression significantly increased the risk of all-cause rehospitalization as the hazard ratio in major depression was 1.51 (Freedland et al., 2016) and 1.70 in patients with moderate to severe depressive symptoms (Bhatt et al., 2016). Freedland and colleagues (2016) used the National Institute of Mental Health Diagnostic Interview Schedule to measure depression and the participants were initially hospitalized between 1994 and 1999, while Bhatt and colleagues (2016) used the PHQ-9 tool to measure depression and conducted research between 2007 and 2011. These studies used different methods to measure depression and, although both studies were published in 2016, it is plausible that hospitalization rates may have been influenced by dated HF care and management in the Freedland et al. study.

Another study conducted in the United States included 14,902 Medicare participants’ healthcare costs and found significantly higher total healthcare costs in participants with depression and HF or diabetes ($15,750 per year) as compared to non-depressed participants with chronic disease ($10,673 per year) (Unützer et al., 2009). Furthermore, when costs were categorized, Unützer and colleagues (2009) found that specialty mental health care accounted for less than one percent of total healthcare costs of depressed participants. While this study is not specific to patients with HF, it is worth noting the presence of comorbid depression in chronic diseases as HF is a major, progressive, and chronic disease.

**Depression Screening in Patients with HF**

Currently, the European Society of Cardiology and the Italian Geriatric Cardiology Society HF guidelines recommend routine depression screening in patients with HF (Aloisi et al., 2019). These organizations suggest using the BDI-II and the *Geriatric Depression Scale* (GDS-
15) screening tools (Aloisi et al., 2019). While American guidelines have not yet made specific recommendations for the HF population, the AHA published a science advisory recommendation, endorsed by the American Psychiatric Association, to minimally screen all patients with CHD for depression using the abbreviated *Patient Health Questionnaire* 2-item (PHQ-2) tool (Lichtman et al., 2008). This recommendation addresses a portion of the HF population as approximately one half of adults with HF have CHD as an etiology.

Furthermore, the AHA recommends a stepwise-screening approach using the PHQ-2 and PHQ-9 (Lichtman et al., 2008). These recommendations are Level V evidence and lack thorough description of the literature review completed to support these statements. In response to these recommendations, two systematic reviews of literature published found no studies that met the aim of describing the effect of screening on depression outcomes in patients with CHD (Health Quality Ontario, 2013; Thombs et al., 2013).

Still, the AHA Heart Failure Management Guidelines, a Level I systematic review, note that depression is a common comorbidity in patients with HF and is associated with poorer outcomes (Yancy et al., 2013). While Yancy and colleagues (2013) state the most effective intervention for comorbid depression is not yet known, routine screening according to the United States Preventative Services Task Force (USPSTF) is endorsed as a part of HF management. Thus, adequate evidence exists showing that early detection of depression with support systems in place improves clinical outcomes and little to no harm results from screening adults for depression (Siu et al., 2016).

The USPSTF recommends that clinicians choose a screening method that is most acceptable to the specific practice setting and population served; there is no one superior screening tool (USPSTF, 2009). However, consensus is lacking regarding the specific timing or
interval that is recommended for screening. Jha and colleagues (2019) suggest rescreening could be considered annually and more frequently if significant stress, change in clinical condition, or hospitalization has occurred. Moreover, screening during all routine health visits (e.g., routine HF follow-up visits) is an acceptable option that adds ease to implementation (Maurer, Raymond, & Davis, 2018).

Three broad approaches have been used in research studies that identified depression in patients. The first broad approach, and least specific, is by retrospective chart review of patient medical history and prescribed use of antidepressant medication. The second broad approach is through clinical interview. A provider, qualified to diagnose, conducts an interview with the patient to assess for the DSM-V criteria necessary for a diagnosis of major depression. According to DSM-V criteria, major depressive disorder (MDD) can be diagnosed when at least five of the following symptoms have been present during the same two-week period and at least one of the symptoms must be diminished interest/pleasure or depressed mood: anhedonia, change in weight or appetite, sleep disturbance, psychomotor agitation or retardation, fatigue or loss of energy, feelings of worthlessness, diminished ability to think or concentrate, and recurrent thoughts of death or suicidal ideation (American Psychological Association, 2013).

The third broad approach is through patient self-report screening tools. Screening tools are clinically useful for initial assessment to help identify patients with depression. However, findings need to be confirmed by clinical interview for a diagnosis, based on DSM-V criteria, to be established (Sbolli, Fiuzat, Cani, & O’Connor, 2020). Findings from a recent systematic review by Ishak and colleagues (2020) reinforce heterogeneity among tools used to screen for depression in patients with HF. The PHQ-2 and PHQ-9, GDS-15, Cardiac Depression Scale (CDS), BDI-II, and HADS are noted as some of the commonly used and acceptable self-report
questionnaires to screen patients for depression (Ishak et al., 2020; Liguori, et al., 2018; Siu et al., 2016). All of the tools take approximately five minutes or less to complete, except for the BDI-II which takes ten minutes. The number of items, or questions, on each tool varies from two to 26. While most tools use a Likert rating scale (e.g., 0-3, 0-7) for each item, the GDS-15 and PHQ-2 ask for a binary response (i.e., yes versus no). All of these tools have been validated in the general population and the PHQ-9, GDS-15, and HADS have been validated in the HF population.
### Table 1: Depression screening tools

<table>
<thead>
<tr>
<th>Screening Tool/Year developed</th>
<th>Target Population</th>
<th>Purpose</th>
<th>Description</th>
<th>Format/time</th>
<th>Scoring</th>
<th>Cutoff Score</th>
<th>Reliability &amp; Validity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Beck Depression Inventory-II (BDI-II)</strong> <em>(Beck, Steer, &amp; Brown, 1996)</em> copyright</td>
<td>Inpatient Outpatient Age 13+ Lakkis</td>
<td>Screening; Severity of depression</td>
<td>21-item questionnaire Symptoms in past 2 weeks 0-3 rating scale 5th-6th grade reading level</td>
<td>Self-report 10 min.</td>
<td>Score range: 0-63 Minimal = 0–13, Mild = 14–19, Moderate = 20–28, Severe = 29–63</td>
<td>≥ 20</td>
<td>Mean internal consistency: 0.86 Alpha coefficient: 0.86 psychiatric population Cronbach alpha: 0.92</td>
</tr>
<tr>
<td><strong>Cardiac Depression Scale (CDS)/1995</strong></td>
<td>Cardiac Adult</td>
<td>Screening; Severity of depression symptoms</td>
<td>26-item questionnaire Mixed positively and negatively worded questions 0-7 rating scale</td>
<td>Self-report 5 min.</td>
<td>Score range: 26-182 Major Depression = ≥ 95</td>
<td>≥ 95</td>
<td>Reliability coefficient: 0.90 AUC 0.96 Sensitivity: 0.97 Specificity: 0.85</td>
</tr>
<tr>
<td><strong>Geriatric Depression Scale – Short version (GDS-15)/1986 Public domain</strong></td>
<td>Inpatient Outpatient Adults 55+ Cognitive limitations Lakkis</td>
<td>Screening; Severity of depression</td>
<td>15-item binary questionnaire Symptoms in past 1 week 4th grade reading level</td>
<td>Self-report 2-5 min.</td>
<td>Score range: 0-15 ≥ 5 suggest depression ≥ 10 depression highly likely</td>
<td>≥ 5</td>
<td>Internal consistency: 0.74-0.86 Sensitivity: 0.94 Specificity: 0.85 HF population: AUC 0.883 Sensitivity: 0.818 Specificity: 0.833 <em>(Haworth, Moniz-Cook, Clark, Wang, &amp; Cleland, 2007)</em></td>
</tr>
<tr>
<td><strong>Hamilton Depression Rating Scale (HDRS/HAMD)/1960/1967 Public domain</strong></td>
<td>Inpatient Outpatient Adult</td>
<td>Severity of and change in depression symptoms depression</td>
<td>21-item questionnaire; Scoring based on first 17 items Symptoms in past 1 week</td>
<td>Clinician-rated patient interview 20-30 min.</td>
<td>Score range: 0-53 Normal = 0-7 Mild = 8-13 Moderate = 14-18 Severe = 19-22 Very Severe = ≥ 23</td>
<td>≥ 8</td>
<td>Cronbach’s alpha:</td>
</tr>
<tr>
<td><strong>Hospital Anxiety and Depression</strong></td>
<td>Inpatient Outpatient</td>
<td>Screening; Assess anxiety and depression scale</td>
<td>14-item anxiety and depression scale</td>
<td>Self-report &lt; 5 min.</td>
<td>Score range: 0-21</td>
<td>≥ 8</td>
<td>Cronbach’s alpha:</td>
</tr>
</tbody>
</table>
The GDS-15 is a 15-item self-report screening tool that asks binary questions (i.e., yes versus no) based on symptoms experienced in the past one week. The tool was developed for adults 55 years and older (Lakkis & Mahmassani, 2015). As reported by McCabe and colleagues

<table>
<thead>
<tr>
<th>Scale (HADS)/1983 copyright</th>
<th>depressive symptoms</th>
<th>7 items related to depression (HADS-D) and 7 items related to anxiety (HADS-A)</th>
<th>Normal = 0–7, Mild = 8–10, Moderate = 11–15, Severe ≥ 16</th>
<th>HADS-D 0.82-0.90</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0-3 rating scale 3rd grade reading level</td>
<td>Sensitivity: 0.80, Specificity: 0.88, AUC: 0.93 (Olsson, Mykletun, Dahl, 2005)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Patient Health Questionnaire two-item (PHQ-2)/1999 Public domain</th>
<th>Outpatient Adults</th>
<th>Depression Screening; No Severity</th>
<th>2-item binary questionnaire (The first two questions of the PHQ-9.) Symptoms in past 2 weeks</th>
<th>Score range: 0-6 ≥ 3 Sensitivity: 0.83 Specificity: 0.92 PPV: 38.4 AUC: 0.93 (Kroenke, Spitzer, &amp; Williams, 2003)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Health Questionnaire nine-item (PHQ-9)/1999 Public domain</td>
<td>Outpatient Adults</td>
<td>Depression screening and severity</td>
<td>9-item questionnaire; One questions for each of the DSM-IV diagnostic criteria for depression Symptoms in past 2 weeks 0-3 rating scale 3.5-5th grade reading level</td>
<td>Score range: 0-27 ≥ 10 Cronbach alpha: 0.86-0.89 sensitivity and specificity: 0.88</td>
</tr>
<tr>
<td>Inpatient Adults</td>
<td>9-item questionnaire; One questions for each of the DSM-IV diagnostic criteria for depression Symptoms in past 2 weeks 0-3 rating scale 3.5-5th grade reading level</td>
<td>Self-report &lt; 1 min. (Smarr &amp; Keefer, 2011)</td>
<td>None = 1–4, Mild = 5–9, Moderate = 10–14, Mod-Severe = 15–19, Severe = 20–27</td>
<td></td>
</tr>
<tr>
<td>Older Adults</td>
<td>Score range: 0-27 ≥ 10 Cronbach alpha: 0.86-0.89 sensitivity and specificity: 0.88</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Older Adults</td>
<td>Cronbach’s alpha: 0.83 sensitivity: 0.70 Specificity: 0.92 (Hammash et al., 2013).</td>
<td></td>
<td></td>
<td></td>
</tr>
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<td></td>
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</tbody>
</table>
(2006), the GDS-15, with a cut-off score of six, has a 94% sensitivity and 85% specificity when administered to older adults with mild or moderate cognitive impairment. In this study, the GDS-15 was verbally administered by a research assistant to 113 participants ranging in age from 65 to 99 who lived in Australian assisted living facilities that varied in size and required level of care (McCabe et al., 2006).

The PHQ-2 is a two-item self-report binary question (i.e., yes versus no) depression screening tool. Kroenke, Spitzer, and Williams (2003) originally reported that this tool had a sensitivity of 83% and a specificity of 92% and an area under the curve of 0.93 in the general population when using a cut-off score of three. Furthermore, while the PHQ-2 has not been validated in a HF-specific population, it has been in patients with stable CHD. The PHQ-2 has a high specificity at 90%, with a relatively lower sensitivity of 69% using a cut-off score of one (Elderon et al., 2011).

However, the PHQ-9 has been validated in the HF population with a sensitivity of 70% and specificity of 92% (Hammash et al., 2013). Thus, a positive PHQ-2 screening warrants further screening with the PHQ-9. The PHQ-9 is widely used for adults in outpatient clinics and recognized for its validity and feasibility. This nine-item self-report depression screening tool asks, on a Likert scale (i.e., not at all, some days, more than half the days, nearly every day), the frequency of having specific symptoms based on DSM-IV, diagnostic criteria for depression and other psychiatric disorders. To align with the DSM-IV MDD diagnosis, the patient is instructed to answer questions of frequency based on the past two weeks (Kroenke, Spitzer, & Williams, 2001). The original research that tested validity of recognizing MDD was completed with 6,000 primary care and obstetrics and gynecology outpatients that yielded excellent internal validity.
(Cronbach alpha of 0.86 to 0.89), specificity (88%), and sensitivity (88%) (Kroenke, Spitzer, & Williams, 2001). A cutoff score of ten was used for these calculations.

As discussed, use of the PHQ-2 and PHQ-9 in a stepwise screening approach is recommended by the AHA (Lichtman et al., 2008). If either question on the PHQ-2 tool is answered positively, further screening is recommended using the PHQ-9 tool (Lichtman et al., 2008). The stepwise screening recommendation suggests using a cut point of ten on the PHQ-9 informs treatment. Patients who score less than ten on the PHQ-9 should be provided supportive care and follow-up treatment and rescreening within one month, while those with scores greater than ten should promptly receive clinical evaluation to determine appropriate treatment and referral as necessary (Lichtman et al., 2008). Notably, the AHA emphasizes the importance of using the PHQ-9 as the final question specifically screens for suicidality (Jha et al., 2019; Lichtman et al., 2008).

**Treatment of Depression in Patients with Chronic HF**

While robust research supports a link between depression and poor outcomes in patients with HF, there is less definitive research that points to a single effective intervention to treat depression. Three of the most studied treatment approaches for depression in patients with HF include cognitive behavioral therapy (CBT), antidepressant pharmacotherapy, and exercise therapy (Das et al., 2019; Sbolli, Fiuza, Cani, & O’Connor, 2020).

**Cognitive Behavioral Therapy**

A form of psychotherapy, CBT focuses treatment of depression on an individual’s patterns of thought and behavior, thus developing healthful coping skills (Jeyanantham et al., 2017). Freedland and colleagues (2015) conducted a high-quality randomized-control trial (RCT) of 158 participants with chronic HF that compared CBT to usual care and yielded positive results. Intensive treatment consisting of weekly 1-hour sessions following standard CBT
treatment manuals were led by experienced masters- or doctoral-prepared therapists for six months. The participants in the treatment arm had lower depression scores at their six-month follow-up and statistically significant maintenance of depression scores, mental health, and HF-related QOL at one-year follow-up as compared to participants in the control group (Freedland et al., 2015).

Furthermore, the study by Freedland and colleagues (2015) was included in a meta-analysis with five other studies that explored the effects of CBT on depressive symptoms in patients with chronic HF (Jeyanantham et al., 2017). With the combined 320 participants across all six studies, Jeyanantham and colleagues (2017) found that depressive symptoms in the patients who received CBT sessions ranging from 30 to 60 minutes administered once to weekly for six months had significant improvement after the initial treatment and at the three-month follow-up, as compared to usual care. Quality of life was also assessed in the five RCTs. Across the studies, improvement of QOL was seen in participants in the CBT group as compared to those in the usual care group (Jeyanantham et al., 2017). Ishak and colleagues (2020) also conducted a systematic review that found support for psychotherapy as the first-line treatment for depression in patients with CHD. Notably, psychotherapy had the most benefit for patients with HF as compared to those with other forms of CHD (Ishak et al., 2020).

However, there are limitations to CBT. While CBT has been shown to have beneficial effects to patients with chronic HF who have depressive symptoms, the acceptability and feasibility may not be sufficient for some patients. For example, accessibility varies depending on where the patient lives and what medical coverage they use. Many counseling services do not accept Medicare/Medicaid and, therefore, patients may need to increase travel distance to find a provider or it may be necessary to seek care that offers alternative out-of-pocket reduced rate
counseling services. Furthermore, patients with comorbid depression and HF may have physical and mental limitations due to their conditions that can make adding another frequent medical appointment to their routine a challenge.

**Antidepressant Pharmacotherapy**

Pharmacologic interventions have also been used to treat depression in patients with HF. However, antidepressant pharmacotherapy has traditionally been used with caution in this population due to the potential risk of adverse effects in this relatively sick patient population. Furthermore, some drug classes have been determined to be associated with less side effects as compared to others.

**Safety of Antidepressant Pharmacotherapy.** Selective serotonin reuptake inhibitors (SSRIs) (e.g., sertraline, citalopram, and escitalopram) have been shown to be the safest pharmacologic treatment for depression in the chronic HF population (Sbolli, Fiuzat, Cani, & O’Connor, 2020). Historically, the Sertraline Against Depression and Heart Disease in Chronic Heart Failure (SADHART-CHF) RCT confirmed the safety of sertraline in patients with HF while the MOOD-HF RCT found that escitalopram was safe and well-tolerated among HF patients (Angermann et al, 2016; O’Connor et al., 2010). Rajeswaran and colleagues (2018) conducted a systematic review of the use of antidepressant medications, primarily SSRIs, in patients with chronic HF. Findings revealed no association between antidepressant use and increased mortality in patients with HF (Rajeswaran et al., 2018).

Notably, SSRIs are less likely to cause orthostatic hypotension and tachycardia compared to tricyclic antidepressants and, in general, are associated with few cardiac side effects (Celano et al., 2018). This is important since many patients with chronic HF have relatively low systolic blood pressure (i.e., low 100s or upper 90s) due to being on beta-blockers, renin angiotensin aldosterone system blockers, and aldosterone antagonists to improve survival and decrease
rehospitalization. In addition, tachycardia could potentially decrease cardiac output for those with reduced ejection fraction or precipitate other arrhythmias in patients with chronic HF.

The three most worrisome side effects associated with SSRI use in patients with chronic HF include bleeding, QTc prolongation, and drug-drug interactions with cardiovascular medications (e.g., antiarrhythmics, warfarin, angiotensin receptor blockers). Increased gastric acid secretion and inhibited platelet aggregation may occur with use of SSRIs which increases the risk of bleeding (Celano et al., 2018). Some patients with HF have comorbid atrial fibrillation or mechanical heart valves that required chronic anticoagulation. Therefore, the potential for bleeding needs to be considered when evaluating the risk versus benefit of the treatment option for these patients. QTc prolongation is a concern for HF healthcare providers as it can cause lethal ventricular arrhythmias when the QTc measures 450 milliseconds or greater (normal QTc 400 milliseconds or less). However, as a group, SSRIs increase the QTc by only 6.1 milliseconds with citalopram being associated with the most QTc prolongation at 10.58 milliseconds (Beach et al., 2014). Finally, SSRIs can affect serum drug levels of other medications that the patient is taking.

According to the AHA, sertraline and citalopram are first-line agents to treat depression in patients with CHD (Lichtman et al., 2008). Sertraline is often the preferred first-line choice of SSRI medication in patients with chronic HF given its safety as compared to other agents (Celano et al., 2018). Citalopram and escitalopram are additional SSRI options for patients with HF, although the patient-specific risk for QTc prolongation must be considered. Sertraline, citalopram, and escitalopram have the lowest risk of drug-drug interactions (Celano et al., 2018). As with the general population, pharmacologic antidepressant therapy for patients with HF
should be initiated at low doses and titrated until remission of depressive symptoms is achieved (Celano et al, 2018).

**Effectiveness of Antidepressant Pharmacotherapy.** A retrospective follow-up study to the SADHART-CHF trial compared the prevalence of cardiovascular events in participants who had improved depression scores and were considered “in remission” as compared to those who remained depressed (Jiang et al., 2011). Significantly less cardiovascular events were observed in patients with HF who were considered in remission of depression compared to those patients who remained depressed (Jiang et al., 2011). Therefore, this study showed that decreasing depressive symptoms using antidepressant pharmacotherapy was associated with a decrease in cardiac events.

Unfortunately, research studies have had mixed results showing the effectiveness of antidepressant pharmacotherapy on depressive symptoms and cardiovascular status in patients with HF. Rajeswaran and colleagues (2018) ultimately found that, among the five studies included in their systematic review, antidepressant use in patients with HF did not result in significant improvement of cardiovascular status (e.g., NYHA class, cardiopulmonary exercise test) or depressive symptoms. A recent scoping review revealed that more evidence exists that support the efficacy of using SSRIs to treat depression in patients with CHD than in patients with HF (Zambrano et al., 2020). However, among the 42 RCTs reviewed, nearly 80% of participants had CHD and only 20% had HF, indicating more research is needed in patients with HF (Zambrano et al., 2020).

**Exercise Therapy**

Structured exercise training serves as an appealing treatment option for depressive symptoms in some patients with complex comorbidities such as HF. Initially, due to safety concerns, providers were reluctant to consider this treatment option for patients with chronic HF.
However, exercise training remains a viable treatment option for patients with chronic HF as, over time, research has shown the benefits of this nonpharmacologic treatment option and that it has a neutral effect on HF mortality and morbidity. Exercise training is now an AHA class I recommendation for patients with HF to safely and effectively improve functional status (Yancey et al., 2013). Moreover, a recent Cochrane review, which included 44 trials, found that exercise-based cardiac rehabilitation programs reduce all-cause and HF-related hospitalizations and improve HF-related QOL (Taylor et al., 2019). Notably, exercise training as a nonpharmacologic treatment option eliminates the risk for drug-drug interactions and polypharmacy and it encourages active patient participation in care. Furthermore, exercise training has a potential positive effect on depressive symptoms as it stimulates an increase of essential mood-regulating neurotransmitters (e.g., serotonin, norepinephrine, dopamine) and helps regulate sympathetic activity and inflammatory processes (Aloisi et al., 2019). A meta-analysis by Tu and colleagues (2014) of 16 RCTs quantified the effects of exercise training on depressive symptoms in patients with chronic HF. Exercise training (e.g., Tai Chi, cycling, walking, resistance training) was conducted either at home or supervised and ranged from 20- to 90-minute sessions, two to seven days per week for six to 53 weeks. Analysis of data from 3226 patients revealed that exercise training, either by itself or combined with a cardiac rehabilitation program, resulted in a significant reduction in depressive symptoms, regardless of the specific exercise program or how depression was measured (Tu et al., 2014). Another meta-analysis of RCTs by Sagar and colleagues (2015) evaluated the effects of exercise training either alone or as a component of an exercise-based cardiac rehabilitation program on patients with HF. As Tu and colleagues (2014) also found, the exercise training was conducted either supervised or at home and with a wide variation in dose and duration. Analysis of 15 trials found that exercise training participants
reduced hospital admissions as compared to usual care at the 12-month follow-up. Moreover, pooled data from 18 studies revealed that exercise training in patients with HF yielded a significant improvement in QOL. The benefits of exercise training appeared to be independent of the type of exercise (e.g., exercise only, exercise-based cardiac rehabilitation program, aerobic, aerobic and strength training), amount of exercise, and length of follow-up (Sagar et al., 2015).

**Direct Comparison of Treatment Options**

Past research has also included direct comparison of various treatment options for depression. For example, a systematic review published by Qaseem, Barry, and Kansagara (2016) compared pharmacologic (i.e., SSRIs, serotonin norepinephrine reuptake inhibitors, bupropion, mirtazapine, nefazodone, trazadone) and nonpharmacologic (i.e., psychological interventions including CBT, complimentary alternative therapies including yoga and acupuncture, supplements including St. John’s Wort, and exercise) treatment options for initial management of MDD in adults. Results of the studies reviewed revealed no difference in response or depression remission rates when comparing sertraline to exercise training. Moreover, both interventions showed similar discontinuation rates. Furthermore, results revealed no difference in clinical response to SSRIs and other second-generation antidepressants compared to CBT.

However, there were mixed results related to the use of combination therapy consisting of second-generation antidepressants and CBT to improve clinical response or remission of depressive symptoms (Qaseem, Barry, & Kansagara, 2016). Gartlehner and colleagues (2011) argued that combination therapy is needed for many patients with MDD since remission is not typically achieved after an initial treatment of a second-generation antidepressant. Therefore, switching therapy or adding combination therapy may be required to achieve remission (Gartlehner et al., 2011). Moreover, Zambrano and colleagues (2020) found that flexible care
management approaches that combine treatments methods may show more promise in effectively treating depression than using a single treatment modality. More multimodal studies are needed to test efficacy of combination treatment for depression in patients with HF.

Ultimately, the American College of Physicians strongly recommends, with moderate-quality evidence, that providers prescribe either second-generation antidepressants or CBT to treat adults with MDD (Qaseem, Barry, & Kansagara, 2016). Shared decision making should be used with the patient to ascertain patient preferences in consideration of weighing adverse effects, cost, accessibility, and patient preferences (Qaseem, Barry, & Kansagara, 2016).

Specific to the HF population, Das and colleagues (2019) conducted a meta-analysis comparing CBT, antidepressant pharmacotherapy, and exercise therapy in treating depression in patients with HF. Results indicated that CBT and exercise therapy were associated with reduced depressive symptoms. Of the three treatment options, use of antidepressants was least effective in reducing depressive symptoms. However, authors noted that the relatively short duration (two to three months) of follow-up in the reviewed studies that examined antidepressant pharmacotherapy may have influenced the level of effectiveness (Das et al., 2019). Ultimately, using a thoughtful patient-centered approach is needed to determine the best course of treatment.
## Table 2: Depression treatment in patients with HF

<table>
<thead>
<tr>
<th>Treatment Option</th>
<th>Pros</th>
<th>Cons</th>
<th>How to Prescribe</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cognitive Behavioral Therapy (CBT)</strong></td>
<td>Reduces depressive symptoms, Improves QOL</td>
<td>Requires access to therapy resources</td>
<td>Referral based on patient’s geographic location and insurance status</td>
</tr>
<tr>
<td></td>
<td>Safe</td>
<td>Transportation</td>
<td>Can place social work referral to help find best fit for patient</td>
</tr>
<tr>
<td></td>
<td>Less polypharmacy</td>
<td>Access to telehealth technology</td>
<td>Mental Health Services Administration treatment directory <a href="https://www.samhsa.gov">https://www.samhsa.gov</a></td>
</tr>
<tr>
<td><strong>Patient active participant</strong></td>
<td><strong>High level of patient participation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Frequency of appointments</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Exercise Therapy</strong></td>
<td>Reduces depressive symptoms, regardless of the amount or type of activity</td>
<td>Access to structured services</td>
<td>Refer to cardiac rehab</td>
</tr>
<tr>
<td></td>
<td>Can be incorporated with Cardiac Rehab Program</td>
<td>Requires physical ability</td>
<td>Recommend home exercise option</td>
</tr>
<tr>
<td></td>
<td>Generally safe</td>
<td>Time commitment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Reduces Polypharmacy</td>
<td>Transportation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Home-based options available</td>
<td>High level of patient motivation for home-based program</td>
<td></td>
</tr>
<tr>
<td><strong>Pharmacotherapy (SSRIs)</strong></td>
<td>SSRIs have least side effects and relatively well tolerated compared to other antidepressant medications</td>
<td>Increased risk for drug interaction</td>
<td>Refer to clinical pharmacist for medication reconciliation and recommendations</td>
</tr>
<tr>
<td></td>
<td>Relatively inexpensive</td>
<td>Need for ongoing medication management</td>
<td>Sertraline preferred given its safety profile. Citalopram and escitalopram next options; Monitor QTc</td>
</tr>
<tr>
<td></td>
<td>Widely available</td>
<td>Least effective in HF to reduce depressive symptoms compared to CBT and exercise therapy</td>
<td>Side effects of SSRIs in HF: bleeding, QTc prolongation, and changes in cardiac drugs (levels/absorption/effectiveness)</td>
</tr>
</tbody>
</table>
Real-World Screening: Past Quality Improvement (QI) Successes and Challenges

While evidence supports the need for routine depression screening and the availability of reliable and valid screening tools to facilitate screening, there is a gap in the literature describing broad-scale implementation of depression screening in the outpatient HF population. Past research has demonstrated successes and lingering challenges to implementing systematic depression screening for adults across specific patient populations in both inpatient and outpatient settings. Eight studies were retrieved from the literature review that reported implementation of depression screening: three from in-patient (hospitalized) settings and five from out-patient settings.

Screening Hospitalized Patients with Cardiovascular Conditions

Smolderen and colleagues (2011) implemented a depression screening protocol based on the AHA guidelines to screen (using the PHQ-2 and PHQ-9 stepwise approach) in patients who had been hospitalized for an acute coronary syndrome (ACS) event in 2005 in a Heart and Vascular Institute in Kansas City. Prior to implementation, multidisciplinary stakeholders (e.g. clinicians, researchers, and quality managers) met to develop and finalize the stepwise depression screening protocol for patients who were on the ACS management pathway in their institute. The screening was incorporated into the ACS management pathway, thus becoming part of the mandated care for this patient population. Once the patient stabilized, the nursing staff administered the PHQ-2 to the patient (first step) to determine if they were at risk for major depressive symptoms. Then, if the PHQ-2 score was one or more, the electronic medical record (EMR) would automatically prompt completion of the PHQ-9 to be administered in real time by the nurse. The nursing staff then notified the provider of a positive PHQ-9 score, using the cut point score of ten. The provider then selected an appropriate treatment plan for the patient based on a treatment algorithm (available on a pre-printed standardized order set developed for this
project. The treatment plan included options such as referral to the pharmacy (to select and initiate an antidepressant medication), referral to social services (for outpatient treatment options, consultation with a chaplain while still in the inpatient setting, or referral to the in-hospital psychiatric service (mandatory if the patient endorses suicidal ideations). The provider documented the plan in the discharge summary (Smolderen et al., 2011).

Outcomes for the project included: 1) the percentage of patients who received screening and the reasons for those who did not receive screening, 2) the percentage of patients who were screened positive on the PHQ-2, and 3) the portion who scored in each category of the PHQ-9 (score < 5 with no depressive symptoms; score 5-9 with mild depressive symptoms, and score ≥ 10 with moderate to severe depressive symptoms).

Results revealed that approximately three quarters (73.2%) of patients were screened using the protocol during hospitalization in a median time of one day from admission to depression screening. Of the 26.8% of patients who were not screened, no valid reason was documented for lack of screening for majority of the patients. However, if a reason for non-screening was found, it related to either the patient being too sick for screening or the patient going to surgery. Those not screened were more likely to be female, had a history of acute myocardial infarction, angina, lung disease, or experienced an in-hospital cardiac arrest. Of those who were screened, one in five (20.4%) had a positive PHQ-2 screen, of which 30.1% had a PHQ-9 of ten or more (indicative of moderate to severe depressive symptoms). Notably, this percentage of patients with high PHQ-9 scores was similar to the data from the TRIUMPH registry (a comparison group of 3,533 patients from 23 other hospitals used as a benchmark for this study). In the TRIUMPH registry, about half (47.4%) had a positive PHQ-2 screen, of which 35.9% had a PHQ-9 score of ten or more. These results suggested that the PHQ-9 had better
reproducibility and accuracy than the PHQ-2, prompting authors to recommend using the PHQ-9 exclusively for all patients, eliminating the need for a two-step screening approach. Also, of those patients who scored ten or more on the PHQ-9, 90.9% received further action (diagnosis of depression in the discharge summary, prescribed depression treatment before discharge, or referred for depression treatment after discharge).

A second QI project conducted by McIntosh (2017) implemented an evidence-based depression screening protocol in patients hospitalized for stroke in an upstate New York inpatient hospital unit. Patients were excluded from screening if they were too ill to participate (i.e., obtunded \(n=3\), aphasic \(n=8\), demented \(n=2\), confused \(n=3\)). If the patient did not speak English an inpatient translator or telephone translator was used. As in the prior study with ACS patients, prior to implementation of the protocol a multidisciplinary stakeholder team convened to review the latest evidence and develop a step-by-step screening process that aligned with institutional policy. Staff nurses were educated on the importance of screening for depression in this particular patient population, the role of nurses and providers, and patient education including additional resources of information to provide for patients upon discharge. Staff nurses were also educated on how to use the PHQ-9 screening tool, who to notify about the results, and documentation needed. Copies of the handouts and a Screening Protocol Flow Diagram were posted on the stroke unit as a reminder of the protocol.

The screening protocol consisted of the following: the PHQ-9 tool was administered by the registered nurse in the hospital setting once a stroke diagnosis was confirmed (by imaging) and the patient was stabilized; the PHQ-9 results and communication to the provider were then documented by the nurse in the EMR. As part of the protocol and flow diagram, a suggested pharmacologic treatment strategy was provided. Notably, patients who endorsed suicidal
ideations (question nine of the PHQ-9) underwent an automatic suicide assessment and inpatient psychiatric consultation was made. The protocol was implemented over a six-week period (December 2014 to February 2015) and was followed by a retrospective review of the medical records in the two-week period following the implementation of the protocol. Chart audit data included: demographic data (patient age, race, gender), clinical data (comorbid conditions, type of stroke), and depression screening data (PHQ-9 score and the depression severity based on PHQ-9 score). The primary outcome of the study was whether the screening protocol was carried out as intended. Secondary outcomes examined the relationship between depression screening diagnoses and protocol variables (whether education was provided, treatment prescribed, and if the plan was documented in the EMR) (McIntosh, 2017).

Results indicated that, of the 95 patient records reviewed during the data collection period, 83.2 % (79 patients) were screened for depression at a median time of hospital admission to depression screening of 3.1 days. Of the 16 patients who were not screened, 50% (n =8) were aphasic while the other 50% were either confused (n=3), obtunded or too ill to participate (n=3), or had dementia (n=2). Of those who were screened, nearly half (48%) were classified as being depressed. Notably, 18% had a past medical history of depression at admission. Of those who were classified as being depressed, 100% received education and treatment for the depression. However, only 69% of those classified as being depressed had complete documentation by the nursing staff. A statistically significant relationship was found between patients who screened positive for depression and those who received education on stroke and depression (p=0.000), those with documentation by the nursing staff (p=0.002), and those who were medically treated for depression prior to hospital discharge (p=0.018). Not surprising, the group that was most likely to receive medical treatment were patients who had moderate-to-severe symptoms (scores
15 to 19). Limitations of this study included the lack of baseline data for comparison and the relatively short period of data collection done after implementation of the project (McIntosh, 2017).

In another study Gorini and colleagues (2020) screened all patients admitted to cardiac specialty units (i.e., HF, Cardiac surgery, invasive cardiology, clinical cardiology, and arrhythmology) in an Italian hospital for depression using the PHQ-9 (and also the Generalized Anxiety Disorder [GAD-7] to screen for anxiety) to test the feasibility of a depression and anxiety symptom screening protocol. As part of the admission process, each patient received a paper PHQ-9 and GAD-7 screening tool to complete that was then reviewed by a clinical psychologist. The psychologist performed a clinical assessment on all patients who scored above a cutoff score of 10 for the PHQ-9 and a cutoff score of eight was used for the GAD-7. If clinically indicated, patients with elevated scores were then provided personalized support sessions. Patients who elicited a positive response to the PHQ-9 suicidality question were immediately followed by a psychologist who performed a suicide risk evaluation.

Of the 2515 consecutively patients admitted to cardiology units, 79.9% completed the PHQ-9 and GAD-7 screening tools. The authors did not report why patients did not complete the screening tools. Approximately 3% of patients scored above the cutoff of the PHQ-9, 6% scored above the cutoff of both the PHQ-9 and GAD-7, 9% scored above the cutoff of the GAD-7, and 2% elicited a positive response to having suicidal ideations. Notably, patients admitted to the HF unit had a 2.59 higher risk (OR 2.59; CI 1.678; \( p < 0.05 \)) for depressive symptoms as compared to patients admitted to other cardiac units. Additionally, women were more likely to experience depressive symptoms. Moreover, higher PHQ-9 depression scores correlated with longer hospital stays (\( r=0.052; p=0.020 \)) (Gorini et al., 2020).
Screening Outpatients in Primary and Specialty Care

Jani and colleagues (2013) examined systemic depression screening for one year (2008-2009) at family practices in Scotland who were incentivized by a national program to conduct an annual comprehensive health assessment for all patients with history of CHD, diabetes, or stroke. The one hour-long health assessment was conducted and documented by a nurse and included depression screening using the Hospital Anxiety and Depression Score (HADS-D) as part of the overall health assessment. A treatment algorithm recommended that patients with HADS-D scores of 11 or more be referred for CBT or pharmacotherapy. Referrals were initiated by either the nurse who completed the assessment or by the provider who reviewed the health assessment, depending on the individual practice protocols. The authors did not elaborate on whether screening was done by hard copy or electronically and how the results were communicated to the provider.

Results revealed that of the 125,143 patients who met criteria for the annual health assessment, 10,670 (8.5%) were already being treated for depression, thus exempt from screening. Of the remaining patients who had data collected retrospectively, 31% (35,537) were screened for depression (as part of the overall one-hour health assessment). Of those screened, nearly one in five (19.9%) had HADS-D scores of greater than eight, with the majority indicative of mild depression (scores between eight and ten). Possible explanations offered by the authors for the markedly low percentage of screening (despite incentives) included provider factors such as lack of confidence in the screening tool or belief that depression screening does not lead to improvement in clinical outcomes (Jani et al., 2013).

Another QI project by Aleem and colleagues (2015) revised depression screening in two outpatient adult primary care practices in a rural academic healthcare system in New Hampshire and Vermont. As with the projects discussed about, the authors began the project by convening a
multidisciplinary stakeholder group (physicians, nurses, care coordinators, representatives from psychiatry, general medicine, family medicine, and pediatrics). Changes in the screening process included using a reliable valid screening tool(s), EMR redesign including optimization of data entry into the EMR, follow-up of positive depression screens, and broad scale staff training.

In brief, the screening process included providing a paper PHQ-2 and PHQ-9 tool for the patient to self-administer while waiting for their appointment. Different colored sheets containing the PHQ-2 and PHQ-9 were used by staff to indicate if the patient had completed the surveys in the last 30 days versus not. The “flow staff” (e.g., nurse, medical assistant) then entered the PHQ-2 response data into the EMR (EpicCare®, a specific EMR vendor) to be scored automatically. By standardizing the threshold for PHQ-2 branching, if the PHQ-2 score was three or greater, through the EMR, the system automatically branched out to the PHQ-9 and calculated a score. Additionally, through use of the EMR screening template, PHQ-2/9 data were automatically imported into the provider’s note thereby increasing documentation efficiency.

Other aspects of the project included designation of roles among staff (i.e who collects data versus who enters data) and integrating other clinician roles into the treatment plan. Pre-set goals for the project included: increasing depression screening with the PHQ-2 from the baseline (17%) to at least 50% of visit encounters and ensuring that at least 90% of patient encounters that had a PHQ-2 score of three or more have a documented PHQ-9.

Results from 41,539 patient encounters between September and April 2014 revealed that, after two time periods (9/9/2013-10/28/2013 and 11/4/2013-4/21/2014), depression screening rates increased from 17% (at baseline) to 75.9% \( (p < 0.001) \). The PHQ-9 completion rates for those with a PHQ-2 score of three or more initially dropped from the baseline (100%) to 88.4%, but rose to 94.7% following data collection optimization. Thus, by using a standardized
screening method and optimizing the EMR workflow for documentation and data entry, the QI project goals were met (Aleem et al., 2015).

Peters and colleagues (2020) also conducted a QI project implementing universal depression screening at an outpatient heart transplant clinic at the University of Colorado. Project goals were to improve depression screening rates from a baseline of less than 2% to 75% or more. During the clinic check-in process the transplant nurse coordinators completed and documented the PHQ-2 (embedded within the EMR). Notably, the PHQ-2 was added to a pre-existing check-list used for each patient. The PHQ-9 was administered by the same nurse to patients with PHQ-2 scores of three or more. Patients with a PHQ-9 of ten or more received a one-page mental health resource guide that was embedded in the EMR for ease of access and individualization. A follow-up phone call was conducted by a cardiology NP within one week, one month, and three months after the elevated score. Additional options for intervention included referral to primary care, mental health services, and initiation or titration of medication. Patient engagement in mental health follow-up (i.e scheduling follow-up with primary care or seeking mental health services) was also measured for patients with elevated PHQ-9 depression scores (Peters et al., 2020).

Results from the 11-month data collection period of the project revealed that screening was completed for 93% of the 834 patient visits. Only five percent (n=40) of patients had elevated PHQ-2 scores; all of these patients were subsequently screened using the PHQ-9 and 82.5% (n=33) of those patients had scores that indicated moderate or severe depressive symptoms. At three months, 97% of patients with an elevated PHQ-9 were receiving mental health care, indicating high patient engagement (Peters et al., 2020). Notably however, it mattered who did the follow-up for patients with elevated scores. For example, when follow-up
phone calls were assigned to the cardiology NP, compliance was 100% as compared to 82% when follow-up was assigned to the transplant social worker. Reasons for noncompliance by the transplant social worker(s) included it not being in their job description, time constraints, and not remembering. Another challenge was that not all patients with elevated scores received the mental health resource guide. Although the staff found that the resource to be useful, it was not viewed as being applicable to every patient. In addition, at times staff forgot to add the resource to the patient’s after-visit summary (Peters et al., 2020).

In a fourth study, Russomagno and Waldrop (2019) implemented a standardized postpartum depression screening schedule and referral algorithm in a rural primary care pediatric outpatient practice in North Carolina. As in the other studies, preplanning with various multidisciplinary stakeholders in addition to EMR adaptations to ensure the required documentation that was acceptable to staff. The project leader met with the nurses and providers (separately) to education and engage them in the process. A self-administered screening tool (the Edinburgh Postnatal Depression Scale) was distributed at appointment check-in. Nurses verified distribution, documented that it was distributed and, if not, the rationale. Then, the provider scored and documented the score including the recommendation for referral, as appropriate, in the EMR. The new protocol was implemented over a four-month period (September 2017 to January 2018) which included weekly monitoring and checking in with staff for feedback. Data were collected for a 12-week period before implementation of the protocol and for four months (17.5 weeks) following screening implementation. Outcomes of the study included the number and type of well visits and administration of the screening tool, the number of positive and negative results, and reasons for noncompliance (Russomagno & Waldrop, 2019).
As compared to baseline (1 month before intervention), screening rates pre and post increased from 33% to 80% \((p < 0.001)\). Positive screening results varied between 7% to 12% by type of well-child-check (e.g., 2-week, 1-month, 6-month), while referral rates for those who screened positive increased from 66% at baseline to 79% in the 17.5-week post-implementation phase \((p= 0.7)\) (Russomagno & Waldrop, 2019). Reasons for not screening included mother not present during visit \((n= 18)\), mother’s refusal \((n=9)\), and other/documentation blank \((n=2)\). Documented reasons for not being referred included the mother already receiving help (31%), already had a list of counselors (7.7%), and mother’s refusal (7.7%).

In a fifth and final study, Berge and colleagues (2019) conducted a cross-sectional study to assess screening methods for depression and anxiety in a Norwegian outpatient cardiology clinic. Subjects were recruited from the inpatient cardiology department \((n=173)\) and the outpatient cardiology clinic \((n=57)\). Subjects recruited during hospitalization were screened by phone one-month post-discharge by a clinical psychologist with the PHQ-2, GAD-2, and PHQ-SADS (i.e., have you had an anxiety attack in the past month?). Outpatients were screened by a cardiologist or a nurse during their routine cardiology visit. Patients with elevated PHQ-2, GAD-2, and PHQ-SADS scores were administered the HADS tool orally by a clinical psychologist. Counseling sessions with a clinical psychologist were then offered to those who scored four or more on the HADS.

Results showed that 25% \((n=57)\) of the those surveyed had elevated PHQ-2, GAD-2, or PHQ-SADS (Berge et al., 2019). Of those, 73% \((n=41)\) had elevated HADS scores. Notably, 47% \((n=17)\) patients revealed that their mental health symptoms made it more difficult to adhere with health advice. The authors did not report the percentage of patients who were invited to
participate in the study. However, not all providers in the clinic participated in the study with high workload cited as one reason patients were not invited (Berge et al, 2019).

**Lessons Learned from Studies Implementing Depression Screening**

Eight studies reviewed implemented depression screening across a specific adult patient population. Study populations included three inpatient settings (post ACS, post-stroke, and all cardiac units) and five outpatient settings (two in primary care, one in a primary care pediatric clinic, one in a cardiology clinic, and one in a heart transplant clinic). Six of the eight studies implemented depression screening prospectively as a process improvement, while two studies used retrospective data to evaluate a process that had been previously implemented. All eight studies implemented a standardized process for screening including the use of validated screening methods.

**Patient Populations.** Patient populations included adults post-ACS (Smolderen et al., 2011), post-stroke (McIntosh, 2017), post-heart transplant (Peters et al., 2020), post-partum (Russomagno & Waldrop, 2019), and those with cardiac disease (Berge et al., 2019; Gorini et al., 2020), chronic disease (CHD, diabetes, or stroke) (Jani et al., 2013), and primary care patients (Aleem et al., 2015).

**Screening Tools Used.** Four implementation studies used a step-wise approach starting with the PHQ-2 (Aleem et al., 2015; Berge et al., 2019; Peters et al., 2020; Smolderen et al., 2011) to screen for depression. Then, if indicated, three of those studies followed with the PHQ-9 (Aleem et al., 2015; Peters et al., 2020; Smolderen et al., 2011), while one followed with the HADS (Berge et al., 2019). Four studies used one screening tool, thus avoiding a step-wise approach: Two used the PHQ-9 (Gorini et al., 2020; McIntosh, 2017), one used the HADS-D (Jani et al., 2013), and one used the Edinburgh Postnatal Depression Scale due to the specific post-partum patient population (Russomagno & Waldrop, 2019).
**Administering the Tools.** Four of eight studies used nursing or medical assistant staff to verbally administer the screening tool (Jani et al., 2013; McIntosh, 2017; Peters et al., 2020; Smolderen et al., 2011). Three of eight studies had patients self-administer the tool using a hard copy (Aleem et al., 2015; Gorini et al., 2020; Russomagno & Waldrop, 2019). In one study, screening cardiology inpatients and outpatients was verbally administered by a clinical psychologist or cardiologist (Berge et al., 2019).

Three studies had nursing staff document responses into the EMR as they orally administered the screening tool (McIntosh, 2017; Peters et al., 2020; Smolderen et al., 2011). One study had nursing staff transcribe responses from the paper tool into the EMR prior to the patient being seen by a provider (Aleem et al., 2015). One study had nursing staff document screening completion, while the provider scored and documented responses and findings (Russomagno & Waldrop, 2019). Three studies did not specify how screening results were documented (Berge et al., 2019; Gorini et al., 2020; Jani et al., 2013).

**Essential Elements of Screening Protocols.** Based on the evidence, collectively, three elements emerged as being essential for success by authors of the implementation studies discussed. The first essential element related to the need for a standardized screening protocol and a clinical support algorithm for treatment/referral. Copies of this information was given to participating staff. McIntosh (2017) additionally posted the protocols and provided patient resource information in staff breakrooms and restrooms. Key information provided by these resources included: who was responsible for administering and documenting depression screening, how and where to document, when screening was to take place, and what to do for an elevated score. For example, McIntosh (2017) noted that use of a standardized protocol and treatment algorithm helped communicate expectations, roles and responsibilities, and guided
staff who carried out the screening and follow-up care processes. Three studies (Aleem et al., 2015; McIntosh, 2017; Russomagno and Waldrop, 2019) used a decision flow chart which illustrated the screening process and how staff were to respond based on the depression screening score. Authors of five of the studies noted that they met with staff at the beginning of project implementation to provide education, discuss expectations, and clarify staff roles and responsibilities (Aleem et al., 2015; McIntosh, 2017; Peters et al., 2020; Russomagno & Waldrop, 2019; Smolderen et al., 2011).

The second essential element that was present included optimization of EMR charting infrastructure to provide automated decision support, enhance process workflow, and facilitate documentation and patient follow-up. For example, Aleem and colleagues (2015), Smolderen et al. (2011), and Peters et al. (2020) all used a depression screening tool that was embedded in the EMR. McIntosh (2017) also noted that optimizing EMR workflow made it easier to locate where to document, provided automatic scoring including automatic drop-down features to trigger subsequent questions or orders which collectively were beneficial to screening implementation and time saving for staff and providers. Moreover, Jha and colleagues (2019) note incorporating self-report assessments into the EMR can facilitate screening compliance and clinical decision support (e.g., “best practice alerts”) can help guide providers to initiate interventions for elevated scores or a positive suicide screen. Furthermore, Peters and colleagues (2020) also embedded a mental health resource guide for patient education into the EMR so it could be included in the after-visit summary for patients with elevated depression scores. Moreover, Peters and colleagues (2020) added a reminder to screen onto an existing checklist; the screening task was incorporated into the usual patient intake workflow that took place at the beginning of a clinic visit.
The third essential element that resonated was the need to adequately ensure proper intervention and follow-up for patients who have significant depressive symptoms as identified by screening and subsequent clinical assessment. One way to address this was to develop a resource list to aid in treatment and referral of patients identified as having depressive symptoms. Waldrop and colleagues (2018) noted that a referral resource list increased staff confidence to screen and provided quick and easy access to knowledge of local and emergency services available to meet the needs of the patient in real-time. This resource list included, for example, contact information for local mobile crisis teams, county crisis centers, emergency departments, and a comprehensive list of outpatient mental health services for the area (e.g., psychiatrists, psychologists, therapists). Russomagno and Waldrop (2019) noted that their clinical practice change success was aided by use of a resource list that identified community mental health resources to which those with positive screening results could be referred. Berge et al. (2019) and Peters et al. (2020) both noted the importance of identifying staff responsible for follow-up and providing staff with a protocol to follow for intervention and patient follow-up.

**Challenges Faced and Potential Solutions.** Several challenges were noted by authors of the eight studies reviewed that implemented depression screening. Challenges to implementation related to documentation, process complexity, provider and staff knowledge and beliefs, time constraints and competing patient priorities, and patient receptivity for depression screening.

*Incomplete or inefficient documentation* is a challenge for depression screening. *Incomplete documentation* can lead to inadequate treatment and referral for depressive symptoms. For example, in one study, although the nurse documented the PHQ-9 score for hospitalized post-stroke patients, there was lack of clear provider documentation in the medical record, handoff summary, and patient discharge summary regarding evaluation of those who
screened positive for depression (McIntosh, 2017). In the study, nearly half (49%) of depressed patients (screened positive on PHQ-9) did not have documentation of further treatment or referral as appropriate.

Possible solutions include optimization of EMR documentation workflow with automated decision support to facilitate treatment and seamless workflow between providers. Aleem and colleagues (2015) recommended augmenting EMR decision support by using standardized, visible and meaningful embedded psychiatry resources to assist with adequate treatment and referral for patients with elevated depressive symptoms. This decision support could be an EMR alert with easy click-options for psychiatric or social work referral that is automatically generated when a documented depression screening score is above the set cutoff (e.g., ten for PHQ-9). An automated template with click-options for pertinent assessment findings and treatment options that providers can use to document how positive depression screens were further assessed and addressed would also help ensure that proper care follow-up care is initiated.

**Inefficient documentation** can also impede process workflow and lead to poor screening compliance. For example, direct data entry into the EMR by clinicians during the real time screening eliminates a step of converting hard copy data into the EMR. Peters and colleagues (2020) noted that this implementation decision helped improve screening compliance. Aleem and colleagues (2015) advocated for EMR optimization to streamline data entry, storage, display, and reporting. This could include embedding the specific screening tool template with automatic scoring within the EMR. Purposefully placing the screening tool documentation in a location that is easy for the end-user to visually see and decreasing the number of key strokes or clicks needed to document in the EMR could also improve efficiency. Moreover, creating the ability to
generate reports based on the screening score data entry point could improve tracking, patient follow-up and screening compliance.

Process complexity challenges arose during implementation especially when the workflow required multiple steps, multiple personnel, or if follow-up communication required further action that was individualized based on the patient’s screening results and assessment. Smolderen and colleagues (2011) found using the stepwise screening approach (PHQ-2 and, if positive, PHQ-9) was challenging because adding the second tool required an additional process step. Therefore, authors advocated for simplification of the protocol by using the PHQ-9 alone to potentially increase rates of depression detection by a more comprehensive screening tool and to improve staff compliance by removing one step in the process. Robust initial staff education, reinforcing education over time, and providing support to staff throughout implementation would help counteract complexity and lead to increased process compliance (Aleem et al., 2015; McIntosh, 2017; Smolderen et al., 2011). Other ways to improve compliance could include providing staff feedback through process performance metrics (i.e., graphs of compliance rates), using multiple methods of staff communication (e.g., emails, posters, huddles), and seeking stakeholder input throughout implementation (Aleem et al., 2015; McIntosh, 2017; Smolderen et al., 2011).

Provider and staff knowledge and beliefs regarding the effectiveness of screening tools and whether systematic screening improves health outcomes were noted to influence the success of implementation. Jani and colleagues (2013) noted that providers were less compliant using a tool they thought was less accurate than other possible tools. Additionally, if providers did not believe that screening for depression would improve health outcomes, they were less compliant in screening (Jani et al., 2013). Berge and colleagues (2019) also noted that the gap in evidence
showing treatment of depressive symptoms increase survival for patients with cardiac disease contributes to why providers have not adopted screening into routine practice. Thus, education for staff and providers should emphasize the high prevalence of depression in patients with HF, the interconnectedness of behavioral and biological mechanisms, the negative patient outcomes associated with depression, and the benefits of a holistic approach to patient care.

*Competing priorities and time constraints* were identified as barriers to depression screening, especially for inpatient populations that had relatively short hospital stays (Berge et al., 2019; Smolderen et al., 2011). These challenges have also been noted by NPs during routine outpatient depression screening. In a qualitative dissertation by Chieka (2017), 16 NPs from primary care and cardiology specialty clinics were interviewed to determine provider perceptions and practices for depression screening in patients with HF. Nearly one in five (18.8%) of the NPs reported not screening at all because they had “more pressing concerns” to address or “not enough time” to screen for depression during the patient visit.

To relieve some of the time burden for providers, screening and documentation of screening could be delegated to the nurse or medical assistant during initial patient intake prior to seeing the provider. This may be especially helpful in primary care settings where time allocation for appointments is shorter as compared to specialty care settings (e.g., 20-minutes vs. 30-minutes, respectively).

A final challenge to implementation of depression screening identified by authors related to *patient receptivity to screening*. Some patients may associate stigma with discussing mental health and may not endorse symptoms of depression even if asked (Chieka, 2017; Jani et al., 2013). Possible solutions to addressing stigma include the use of common language (e.g., feeling low or down) rather than medical jargon (e.g., depressed) by clinicians (Vieira, Brown, & Raue,
In addition, discussing depression in the context of other medical conditions (e.g., “feeling down can effect how to manage your HF and your response to treatment”) may help decrease or avoid feelings of stigmatization related to endorsement of depressive symptoms (Vieira, Brown, & Raue, 2014). Likewise, shifting language to reframe depression as a chronic neurological disease may increase patient acceptability of screening and provide a more conducive environment for endorsement of depressive symptoms (Vieira, Brown, & Raue, 2014). Finally, providing patient and family education about biological mechanisms, risk factors, and consequences of depression in plain language may help patients better understand the importance of screening.

**Lessons Learned from Real-World Screening Studies**

There is a gap in the literature describing broad-scale implementation of depression screening in the outpatient HF population. However, depression screening has been successfully implemented in other patient populations and settings. From the literature reviewed, inpatient screening compliance ranged from 73.2 to 83.2 percent post-implementation (Gorini et al., 2020; McIntosh, 2017; Smolderen et al., 2011). Outpatient screening compliance ranged from 75.9 to 93 percent post-implementation (Aleem et al., 2015; Peters et al., 2020; Russomagno & Waldrop, 2019). One outpatient study (Jani et al. (2013) reported much lower screening compliance (31%); however, this study was a retrospective evaluation of a preexisting screening process. Implementation periods generally ranged from seven weeks to one year (Aleem et al., 2015; Gorini et al., 2020; Jani et al., 2013; McIntosh, 2017; Peters et al., 2020; Russomagno & Waldrop, 2019). Smolderen et al. (2011) reported data from hospital screening for a three-year period.

There was compelling rationale for using the PHQ-9 alone based on data from Smolderen et al. (2011) which indicated better reproducibility and accuracy with the PHQ-9 compared to the
PHQ-2. This is not surprising considering nine items versus two are used to detect depressive symptoms. Therefore, it is reasonable to start with the PHQ-9, which also simplifies the screening process and is less likely to miss patients with depressive symptoms (false negatives).

Three essential elements emerged as strategies for successful depression screening implementation. These included use of: 1) a standardized screening protocol, 2) embedded EMR automation to optimize workflow, data entry (e.g., integrate screening tool and scores), and decision support to prompt provider assessment and treatment, and 3) an established process for treatment and referral (e.g., resource/referral list) including plans for follow-up. Several challenges to implementation were also identified including documentation issues, process complexity, provider and staff knowledge and beliefs, time constraints and competing patient priorities, and patient receptivity to depression screening. Simplifying steps within the screening protocol, optimizing EMR documentation workflows and decision support, reinforcing staff education, incorporating stakeholder input, and using communication pearls are strategies suggested to address these challenges.

**Summary of the Evidence Reviewed**

Comorbid depression among patients with HF is a significant problem due to increased prevalence as compared to the general population and being associated with poor outcomes including an increased risk of mortality, healthcare costs, and decreased QOL. Professional organizations recommend regularly screening for depression in patients with HF (although frequency of interval screening is not specified). Several depression screening tools are available for use that are reliable, valid, and acceptable, including use of the PHQ-9, that is widely accepted and used to screen for depression in the outpatient population.

The three most common treatment modalities for comorbid depression in patients with HF include: CBT, pharmacotherapy, and exercise therapy. There are advantages and
disadvantages for each type. For example, CBT has been shown to be effective in treating depression while eliminating the potential side effects of pharmacological treatment. However, cost, availability, and time may be barriers to CBT. Use of selected pharmacotherapy to treat depression in patients with HF has led to some improvements in depressive symptoms and QOL. Pharmacotherapy, specifically SSRIs, have been shown to be generally well-tolerated and safe for use in patients with HF. However, patients with HF are on multiple medications and may opt out of adding another medication. Exercise therapy is safe for patients with chronic HF and has been shown to decrease depressive symptoms and increase QOL without the risk for drug-drug interactions and polypharmacy. However, some patients may have limited access or time constraints disallowing use of exercise therapy as a viable option. Ultimately, pharmacotherapy has been shown to be the least effective treatment compared to CBT and exercise therapy in managing depression in patients with HF (Das et al., 2019). Thus, providers should implement shared decision making with the patient and caregivers, as appropriate, to incorporate patient values and preferences to determine next steps, including whether combination therapy could be used.
CHAPTER 3: METHODOLOGY

Conceptual Framework

Deming’s Plan-Do-Study-Act (PDSA) model is an iterative four-part interrelated rapid-cycle of actions that has further evolved into a part of the Associates in Process Improvement’s Model for Improvement (Moen & Norman, 2010). The Institute for Healthcare Improvement currently uses the PDSA model to guide quality improvement (Institute for Healthcare Improvement, 2019). The model provides step-by-step instruction for action along with visual representation for a concept. First, the model requires the implementor to answer the following questions: What are we trying to accomplish? How will we know that a change is an improvement? What change can we make that will result in improvement? This helps set a clear aim with measurable outcomes.

Based on the model, each PDSA cycle is repeated, theoretically indefinitely, until a sustainable goal has been met. Planning, involves forming a theory of an intervention that will produce a change and how to measure that change. Doing, involves implementing that intervention on a small scale and gathering outcome data. Studying, involves evaluating the intervention and outcome data and making modifications as needed. Acting, involves applying modifications to the intervention and implementing this to create a sustained quality improvement (Anderson, 2018).

While the PDSA cycle was originally designed for the manufacturing industry, it is frequently used today throughout healthcare and nursing. The PDSA model is a valuable framework that can be applied to any setting where one seeks to examine and implement a
change to create quality and process improvement. Use of this model encourages small-scale, repetitive cycles to test interventions and make rapid assessments and changes based on results to make a successful process improvement (Taylor et al., 2014). For example, Hountz and colleagues (2017) used Deming’s PDSA model as a guiding framework to increase colorectal cancer screening in a nurse-managed primary care clinic. The PDSA model helped Hountz et al. produce positive results by emphasizing staff input and feedback which has been shown to improve morale and organizational effectiveness. This aspect of the PDSA cycle was particularly important for the current DNP project as it helped staff buy in to a student-led project that added a new process to the current clinic workflow. Additionally, this model provided visual structure that enhanced the overall organization and transparency of the project. This highly visual model also helped communicate process, plans, and outcomes to stakeholders and will aid in future reproducibility.

Therefore, the PDSA cycle set a foundation for this DNP project. Project planning, implementation, and the timeline were structured around four PDSA cycles, each lasting approximately three weeks. Prior to the initial implementation cycle, process planning and staff education were conducted. The first two weeks of each cycle entailed the doing phase of the PDSA cycle. The planned process implementation was then carried out and the outcome data points were measured (studied) daily and compiled. The final week of each cycle was reserved for studying outcomes, obtaining process feedback, and creating a plan for re-implementing with identified modifications (acting).

**Project Design**

This was a QI project aimed to improve patient care by implementing a practice behavior change primarily targeting an APRN provider. Using this design, evidence-based literature was applied to a local clinical problem to find a solution. Quality improvement is a problem-solving
process that guides discovery and implementation of quality processes and outcome indicators in healthcare to improve the health of the community (Bonnel & Smith, 2018). Thus, it was a fitting design for this project. As noted by Bonnel and Smith (2018) this design can help engage staff to take accountability to provide more effective care, which was applicable to this project. Additionally, using a team approach, evaluating the project, and providing feedback to the team is essential to quality improvement (Bonnel & Smith, 2018).

For this project, APRN providers at an outpatient cardiology clinic enhanced their holistic approach to care by adding a psychological component to their assessment of patients with chronic HF that could lead to improved patient care and outcomes. As an APRN-driven practice change, the focus was on optimizing patient wellness as part of managing chronic illness. In addition, because some providers struggle to integrate current evidence into routine patient care (Stanik-Hutt, 2016) APRNs can help bridge that gap. Evidence needs to be incorporated into care protocols through a streamlined process that is easily implemented into practice. Application of evidence-based care is one way that APRNs can improve clinical outcomes (Stanik-Hutt, 2016).

**Participants**

Project participants included two APRNs who were board-certified adult NPs who cared for patients with chronic HF at the clinic. The target patient population was adults with chronic HF who were either new or established patients to the clinic. This included patients with preserved ejection fraction as well as those with reduced ejection fraction. Patients who presented to the clinic in acute HF decompensation or with a mechanical assist device were excluded from the project. The NP providers were allowed to exclude a patient from screening if they gave a reason based on clinical judgement (i.e., patient with dementia followed every three months by psychiatry). Patients who did not speak or understand English were also excluded.
Patients who had been screened by the cardiology clinic using the PHQ-9 within three months of their visit encounter were excluded.

Consent

The project purpose and outcomes were described at a meeting with two APRNs who were nationally board-certified NPs and employed at the clinic setting being used. These NPs, who care for patients with chronic HF, verbally agreed to participate in this project.

Ethical Considerations

This project was presented to the University of North Carolina (UNC) at Chapel Hill Institutional Review Board prior to implementation. The review board deemed this project to meet non-human subjects research requirements.

Setting

The UNC Heart Center at Meadowmont was the setting for this DNP project. The UNC Heart Center is a 7,000 square-foot tertiary care referral center that includes 20 exam rooms, five procedure rooms for echocardiogram and stress test, and a phlebotomy laboratory. In this outpatient clinic setting, a highly specialized team of cardiology providers have approximately 150 visits per month of patients with chronic HF. Types of cardiology specialists include HF, heart transplant, cardiac electrophysiology, and interventional and structural cardiology. This group of providers is part of a multidisciplinary team that include social work, psychology, pharmacy, nursing, medical assistants, and business administration. Services at the clinic include education on the management and prevention of cardiovascular disease and HF, and diagnostic tests such as electrocardiogram, echocardiogram, treadmill stress test, stress echocardiogram, outpatient intravenous diuresis, and enhanced external counterpulsation.
Screening Tool

For this project, the PHQ-9 tool was selected to screen patients with chronic HF for depression. The PHQ-9 is a nine-item self-report screening tool that asks, on a four-point Likert scale, the frequency of having specific symptoms based on DSM-IV diagnostic criteria for depression and other psychiatric disorders. To align with the DSM-IV major depression diagnosis, the patient is instructed to answer questions of frequency based on the past two weeks (Kroenke, Spitzer, & Williams, 2001). As discussed in the review of literature, this tool has excellent internal reliability, sensitivity and specificity. Additionally, the PHQ-9 reliability and validity has been established specifically in the HF population: Results from past studies have yielded good internal validity (Cronbach alpha of 0.83), sensitivity (70%), specificity (92%), and association with the BDI-II (Spearman’s rho of 0.80) (Hammash et al., 2013). Similarities between cardiac related and depression symptoms may explain some of this variability and highlights why a healthcare provider must review the completed screening assessments and provide further patient evaluation to confirm findings.

The PHQ-9 is highly acceptable in an outpatient clinic setting as it is notable for its ease of use, takes less than five minutes for the patient to complete, is available in multiple languages, and has public domain, making it free for clinics to administer (Bhatt et al., 2016; Jha et al., 2019). Moreover, at the setting for this DNP project, the PHQ-9 is built into the clinic EMR, includes automatic scoring, and can be easily added to staff charting flowsheets for accessible documentation. See Appendix B for the full PHQ-9 screening tool and how the tool is displayed for charting in the clinic EMR.

The last question of the PHQ-9 screens for potential suicidality by asking the frequency of having “thoughts that you would be better off dead or hurting yourself in some way.” A patient who elicits a positive response to this question warrants further clinical assessment to
determine suicide risk and a plan of care. The P4 Suicidality Screener consists of four questions (i.e., past attempts, plan for suicide, probability of completing, preventative factors) to assess level of suicide risk. For this DNP project, this tool is also built into the clinic EMR and can be easily added to staff charting flowsheets for accessible documentation if a patient elicited a positive response to suicidality. See Appendix C for the P4 Suicidality Screener tool.

Use of the P4 tool is supported by work from Dube and colleagues (2010) who reviewed two trials that examined the effectiveness of the brief P4 Suicidality Screener tool. Patients were assessed during five encounters over the course of one year. Of the 250 patients with comorbid depression and chronic pain and of the 309 patients with comorbid depression and cancer, about one in six triggered a suicide assessment, initiating use of the P4 tool. The P4 tool findings stratify the suicide risk into minimal, lower, and higher risk. The percentage of patients who were stratified as high risk for suicide was small: 0.4% for patients with chronic pain and 1.6% for patients with cancer. There were no suicide attempts or completions recorded for any patients in these trials. The most common preventative factors included family, future hope, faith, and fear of a failed attempt (Dube et al., 2010).

Several other depression screening tools were examined and subsequently excluded from use in this project. The PHQ-2, as previously discussed, while not validated in a HF-specific population, has shown a relatively low sensitivity (69%) in patients with stable CHD. Moreover, if a patient scores three or higher using the PHQ-2, further screening with the PHQ-9 is necessary. A previous implementation study noted decreased sensitivity in the PHQ-2 compared to the PHQ-9 and that the stepwise screening approach increased the process complexity and, therefore, could have potentially decreased process compliance (Smolderen et al., 2011). Therefore, the PHQ-2 was not the ideal tool for use in this project.
While the BDI-II screening tool has been used for patients with HF, Friedmann and colleagues (2006) found it measures some symptoms that are similar to those of HF and could cause altered results based on the patient’s current HF status. Thus, the authors suggested that the PHQ-9 may be more appropriate to use in the HF population (Friedmann et al., 2006). Furthermore, the BDI-II is under copyright and requires a fee per use. The HADS is also under copyright and has fees associated with use. Therefore, it was not feasible to use the BDI-II or the HADS tools for this DNP project.

The GDS-15 was another tool examined. The specific cardiology clinic patient population for this project has an age range of adults that is wider than that of the GDS-15 target population (adults 55 and older). This clinic population is younger than other similar outpatient cardiology clinics because it is a tertiary clinic that receives referrals for HF management from a wide geographical area including all of North Carolina and parts of South Carolina and Virginia. Therefore, the GDS-15 was ruled out for use in this project in an effort to use one screening tool that can accommodate all of the clinic’s patient population.

The Hamilton Depression Rating Scale (HDRS) is a clinician-rated patient interview that takes 20 to 30 minutes to complete. This tool requires more education for providers to learn how to administer the screening than other tools available. Additionally, this tool is too time intensive to complete during a routine cardiology clinic visit. For these reasons, the HDRS was eliminated for use in this project. Another tool, the Cardiac Depression Scale (CDS) has 26 items that are scored using a scale ranging from zero to seven and has a possible score of 26 to 182. This wide range of scoring was seen as a possible barrier as scoring could become cumbersome for the provider and, therefore, was eliminated for use in this project.
Stakeholders

As this was an APRN-driven process improvement, one of the two clinic NPs who cared for patients with chronic HF acted as the on-site project champion. The identified champion partnered with the clinic’s LCSW and psychologist to facilitate a process to address patients with positive depression screenings. Other clinic staff including providers, nurses, medical assistants, office staff, and clinic pharmacist played a role in the implementation and success of this project. Finally, the target population of patients who were screened and their families were also key stakeholders.

Implementation

Education

First, the project and rationale were vetted through the NP champion, LCSW and psychologist. With support from these key roles, the project was introduced to the whole clinic during a staff lunch-and-learn meeting. Project implementation began with two weeks of staff education specific to each member’s role in the practice change. Education was facilitated by the student investigator (Elizabeth Wilhelm). The cardiology clinical psychologist (Dr. L. Rossman) supported staff education by emphasizing the relevance of this project and providing clinical pearls for how to approach and discuss depression and depression screening with patients. The two NP providers received the most intensive education of all the staff including how to interpret scores, DSM-IV major depression disorder diagnostic criteria, suggestions for patient receptive dialogue (i.e., normalizing mental health care in words the patient understands), how to utilize depression algorithm and, how and where to document. See Appendix D for the provider’s depression treatment and referral algorithm. The nursing and medical assistant staff who bring patients to their rooms were educated on the purpose and relevance of screening, how to provide
instructions for completing the screening tool using patient receptive dialogue, and from where to obtain screening forms.

Process

The following section describes the initial clinic work-flow process that was used during the implementation of this DNP project. The PHQ-9 tool was supplied digitally to the clinic by the student investigator. Nursing staff were responsible for printing and maintaining hard copies of the PHQ-9 screening tool in the clinic administrative office. As part of the patient rooming process, nursing staff, medical assistant, or technician gave a blank PHQ-9 form to the patient on a clipboard with a pen. Staff explained that the PHQ-9 screening was an evidence-based standard of care for patients with chronic HF and provided directions for how to complete the questionnaire. Staff were instructed to emphasize that patients were to answer questions based on symptoms over the previous two weeks. Patients completed the screening tool in a private exam room while waiting to be seen by a provider. If the patient had difficulty answering the questions, either nursing staff or the provider helped the patient complete the screening tool.

During the clinic visit, the NP provider reviewed the completed PHQ-9 tool and document responses into the EMR which automatically generated a score. If the patient scored a ten or higher on the PHQ-9, the provider further assessed depressive symptoms during the clinic visit. After an assessment was completed, the provider discussed findings, treatment and follow-up options with the patient and, together, they decided on a plan of care. The NP provider used the algorithm in Appendix D for patient referral and depression follow-up care to assist in clinical decision-making. Based on the algorithm, the LCSW was utilized to assist in patient follow-up and ensured that patients had the information needed to connect with referred services that best fit the patient’s geographic place of residence and financial ability. The NP provider notified the LCSW when a patient who had an elevated PHQ-9 score needed follow-up or
assistance with finding services. If the patient scored less than ten on the PHQ-9, further assessment was at the NP’s discretion. If the NP determined there was no need for further depression treatment or follow-up, then the clinic would rescreen in three months, according to the clinic screening procedures.

The NP documented the PHQ-9 score and related assessment and plan in the visit encounter EMR provider note by using an EPIC SmartPhrase which was a preconstructed template that inserted text and selectable text options into the provider note and included a link that automatically pulled PHQ-9 score data from within the patient chart. The PHQ-9 patient responses and score were documented in a designated section of the ambulatory care rooming documentation once patient responses had been obtained on the paper form. The NP was responsible for documenting PHQ-9 responses, patient assessment, and plan for follow-up based on the PHQ-9 score. Once the PHQ-9 responses were documented, the hard copy of the PHQ-9 patient form was placed in the confidential recycle bin at the clinic.

Should the patient respond with any frequency other than “not at all” to the final PHQ-9 question that screens for suicidality, the NP provider further screened for suicidality risk using the four-question P4 tool that was built into the EMR. See Appendix C for P4 Suicidality Screener tool. The NP would then follow the facility policy for suicidality which entailed assessing if a higher level of care was indicated and followed the established clinic protocol for transfer to a higher level of care if necessary.

**PDSA Cycles**

Once education was completed, project implementation began. The project was structured using four PDSA cycles, each with two weeks of implementation and one week of evaluation. In the first cycle, patients with chronic HF were screened for depression using the
PHQ-9 tool. To refine the workflow process, as discussed, the project began with two NP providers, one of which was designated the project champion.

Data were collected from each PDSA cycle and then shared with clinic staff in real-time at the end of each cycle. Clinic staff were given an opportunity to provide feedback and suggestions on how to improve the process during each PDSA cycle. Any updates or changes in the process were communicated by the UNC DNP student and the project champion. The goal was to increase the number of patients who will be screened with each PDSA cycle. This would, in turn, increase the number of completed assessments, thus providing a greater number of patients the opportunity to be assessed for underlying depression and be further managed if indicated.

Use of Stakeholder Feedback to Inform the PDSA Process

Feedback throughout PDSA cycles mainly pertained to three elements: Determining who to screen, the screening process itself, and documentation and chart review. See Table 3 (p.79) for detailed PDSA cycles and stakeholder feedback used for revision.

Determining Who to Screen. During the first PDSA cycle it was determined that telehealth patient encounters would be excluded from the initial project since those encounters had a different patient rooming process. In addition, due to the COVID-19 pandemic, work flow and processes for large scale implementation of telehealth was rapidly evolving. During the first PDSA cycle, it was also determined that all patients with HF that the two NPs cared for would be screened at least once every three months. Patients receiving care from the diuresis clinic often had multiple encounters in close succession with some patients scheduled in the clinic three days per week. Thus, for those with frequent encounters (e.g., the diuresis clinic) depression screening did not occur at each visit. For the in-between encounters, the patient was excluded from screening.
**Screening Process.** It was challenging for staff to adopt the screening process into their clinic routine. Some staff members acknowledged forgetfulness, indicating that at times screening was not done. Since nursing staff room patients for multiple providers throughout a typical clinic day, consistency with depression screening for two specific NP providers was challenging. Over time, staff improved at remembering to screen. Changes were implemented to help improve compliance by encouraging the participating NP provider champions to ‘huddle’ with their rooming staff at the beginning of each shift to remind them to initiate PHQ-9 screening. In addition, nursing staff moved copies of the PHQ-9 form into the exam room for easier access during the rooming process and to serve as a “cue to action.” Staff were also encouraged to link screening with other intake tasks associated with rooming (e.g., an initial diuresis clinic encounter).

Some patients \((n=4)\) were not screened because the NP deferred screening based on clinical judgement. For example, one patient was excluded from depression screening by the NP provider because of a significant psychiatric history, including dementia, and was already receiving care every three months by a psychiatric specialty clinic. In this case, the NP determined that the patient already had a robust mental health care plan in place. Providers used clinical judgement to exercise autonomy, including documentation of their decision making if depression screening for a specific patient encounter was deferred. As a result, clinical reasoning for deferred screening was added into the EMR SmartPhrase for documentation (consistent with recommendations from the literature).

**Documentation and Chart Review.** Both NPs indicated that the PHQ-9 flowsheet (to document patient responses) and the EPIC SmartPhrase in the EMR (developed to streamline documentation of PHQ-9 assessment and plan) were easy to use. To further streamline
documentation, the NPs opted out of including an assessment and plan for patients with PHQ-9 scores less than ten. However, the NPs identified that previously documented PHQ-9 scores were cumbersome. The NP providers were not easily able to determine, based on EMR documentation, if a patient had recently completed a PHQ-9 tool. Once this was identified in the first PDSA cycle, NPs began using the “sticky note” communication function in the EMR to communicate when the next PHQ-9 screen was due. However, in the second PDSA cycle, staff discovered that the “sticky note” information, unfortunately, was often deleted and was thus not a reliable way of communicating past screening efforts.

During the third PDSA cycle, the clinic’s LCSW identified that patients were not being consistently referred to her for follow-up on elevated PHQ-9 scores. The NPs did not have a formal process, or mechanism to order, a consultation with the social worker. Therefore, the NP needed to communicate with the social worker by an EMR tag, EMR messaging, an in-basket tag, or verbally for any patient who would benefit from follow-up. During the project, the NP providers were encouraged to consider referral to the LCSW as a viable option for follow-up for patients with PHQ-9 scores greater than ten who were deemed to have depressive symptoms.

**Data Collection**

Data were collected from the EMR by the DNP student investigator and recorded into an Excel spreadsheet. Although inclusion criteria screening and data collection tools were designed for this project, ultimately data collection was streamlined for efficiency and accuracy with direct data entry into an Excel spreadsheet. The Excel spreadsheet was created by referring to the tools for data points. See Appendix E for the quantitative data collection form. The UNC SON compliance office granted the student investigator access to the EMR data. The EMRs accessed included those patients seen by the two NP providers who participated in the process.
improvement project. Once the cases were identified from the provider patient list, the DNP student investigator extracted relevant data from the EMR.

Baseline data were collected for two weeks prior to implementation of the new screening protocol. Quantitative data were collected by chart review and included patient demographics (age, sex), clinical factors (HF etiology, left ventricular ejection fraction status, NYHA class, stage of HF, past medical history of depression, past depression treatment history, PHQ-9 score), and the protocol compliance factors (number/percentage of patients with chronic HF seen by the participating provider, the number/percentage of PHQ-9 assessments completed, the number/percentage of PHQ-9 scores of ten or greater, the number/percentage of LCSW referrals placed, the number/percentage of pharmacy referrals placed, and the number/percentage of PHQ-9 follow-up documented by the NP provider). Data were retrospectively collected for every day participating NP providers saw patients who met project criteria.

All data collected were de-identified, ensuring patient privacy. Although the DNP student investigator temporarily had access to identifiable private information, the data needed for the project were abstracted in such a way that the information can no longer be connected to the identity of the subjects. This means that the abstracted data set did not include any direct identifiers (e.g., names, social security numbers) or indirect identifiers (e.g., codes that are linked to the participant’s identity).

Each data collection form had a consecutive identification number on it (001, 002, 003, …) so that the patients’ data remained confidential. The coding numbers and the collected data were kept secure following the UNC-CH rules and regulations regarding data and information storage. All results are reported in aggregate rather than individual form. The compiled results of
the study may be published in scientific research journals or presented at professional conferences, but do not contain individually identifiable information.

**Data Storage**

All data were securely stored in a UNC password protected server behind a firewall. The UNC OneDrive through Office 365® UNC system is a secure electronic storage database housed in a password protected firewall. This system allowed for the DNP student investigator and the faculty advisors (DNP committee) to collaborate during analysis.

**Data Analysis**

Quantitative data related to the patient characteristics and project outcomes were analyzed descriptively and reported as frequencies or percentages to evaluate the degree to which project outcomes were met. Data were analyzed to identify staff compliance in completing screenings and the rate of depression specific to this site’s target patient population. A screening goal of 50% was used. A follow-up documentation goal of 90% was used.

Qualitative data related to process implementation were collected by the DNP student investigator from semi-structured discussions with staff and stakeholders during the study phase of each PDSA cycle. Staff, including the NP champion, who implemented the process were asked “What barriers have you encountered in the depression screening process?” and “What change would you implement to make this process more effective or efficient?” See Appendix F for a list of questions used to solicit staff discussion. Qualitative data were collected without identifying information (e.g., names, staff position) and recorded as field notes. Notes were analyzed on an iterative basis to inform revisions made as necessary during each PDSA cycle to support overall process feasibility, sustainability, and staff acceptability. Notes were maintained until the end of the project to allow for directed content analysis of the data to be used for dissemination efforts. See Table 3 (p.79) for PDSA cycles and data analysis.
At the project’s conclusion, a group interview was conducted with all staff who took part in the process. All staff participants were given the opportunity to provide private feedback via a written evaluation, verbal or telecommunication with the student investigator in the event that a participant was unable to attend the group interview, or did not communicate their feedback in the group setting. Inquiries were made specifically regarding the process’ impact on staff time and clinic flow. Staff were also asked if they found the practice change to be valuable to the patients that they serve and the quality of care in which they deliver. Eleven staff who participated in the project attended the group interview. One staff member, who was not in attendance, provided written feedback. See Appendix G for project conclusion questions and post-project written evaluation form.

**Communicating Results**

A summary of findings was emailed to staff participants at the end of each PDSA cycle. Project progress was visually shared with staff with a run chart and descriptive statistics (frequencies and percentages) of compliance of PHQ-9 completion that was posted in the staff breakroom. Charts were updated by the student investigator every one to two weeks during the project duration. Once the process was fully implemented and PDSA cycles were complete, the staff were invited to attend a post-implementation meeting to discuss the project outcomes. At the post-implementation meeting, project results were shared with staff participants and the group interview, as described above, was conducted. Based on project results, an executive summary, including recommendations for clinic next steps, was created and given to the NP project champion to share with the clinic administration and medical director of the HF program. See Appendix H for the executive summary provided to the clinic.
Project Facilitators

The proposed process lent itself to trialability as it did not create any permanent implications and, therefore, the process could be stopped or reversed without any negative effect to the clinic. In addition, because specialty appointment times for established patients were generally 30 minutes (versus a shorter time period for most primary care settings), time was viewed as a facilitator for routine depression screening in this cardiology specialty setting. The project setting, the UNC Heart Center at Meadowmont, is part of a mature and highly regarded healthcare system that possesses high quality social networks and community resource connections in addition to onsite social work services. This project had the support of strong opinion leaders from UNC-affiliated HF research and clinical practice, and cardiac psychology who were viewed to have influence over the attitudes and beliefs of their colleagues to promote implementation success (Damschroder et al., 2009). The project also had an identified NP champion from within the clinic who was willing and motivated to be a driving force throughout project implementation. Moreover, this project did not require equipment purchases or additional staff. For example, the healthcare system’s ambulatory EMR had a preexisting ability to document PHQ-9 patient responses which then provided automatic scoring. Scores were captured in data entry fields that were searchable and reportable, creating ease for data collection.

Anticipated Project Barriers and Proposed Solutions

This project sought to improve the quality of care provided to patients with HF by adding the additional steps of screening for and, if indicated, addressing depressive symptoms during a cardiology clinic visit. This could potentially have been seen by staff as time intensive or outside the scope of a cardiology specialty visit. A specific potential challenge for the cardiology NP provider was the ability to discern depression from HF symptoms, as many symptoms and
biological mechanisms overlap. Moreover, when HF specialty services are provided, competing priorities may occur in real-time, which the provider ultimately needs to consider. For example, at times, initiating HF treatment for a change of status may be top priority placing depressive symptoms in the background to be addressed at a future follow-up visit, once the patient has stabilized.

One remedy for this potential barrier was to provide education and a depression treatment and referral algorithm to the cardiology clinic NP providers. The clinic LCSW and psychologist were key stakeholders and assets to help further address and support patients who have a positive depression screening and assessment. The staff and NPs were educated on how to use preconstructed PHQ-9 documentation and an EMR Epic SmartPhrase was created for ease and efficiency of documenting the follow-up plan. Furthermore, clearly communicated expectations and responsibilities were presented with a simplistic process map that to help all staff and practitioners in better understanding their responsibilities.

In addition, implementing routine depression screening among patients with HF may potentially identify patients who need referred to mental health resources; thus, the overall use of mental health services would be increased. One strategy to address this barrier was to build relationships to promote a network inside and outside of the organization to facilitate communication and collaboration (through a “warm handoff”) that would ultimately help project sustainability (Powell et al., 2015). Therefore, it was important to identify referral options to mental health community resources, and partner with or include complementary organizations in this project. The depression treatment and referral algorithm and use of the clinic’s social work resources was intended to facilitate viable referral options for mental health treatment within the most common counties of patient residency.
Gaining staff buy-in, especially nursing and medical assistant staff, was identified as another potential barrier specific to this clinic. A strategy that was viewed as potentially helpful with engagement was to audit and provide feedback (Powell et al., 2015). Incorporating outcome data into quality reports generated from EMRs was viewed as a way of implementing an engagement strategy that had the potential to been associated with higher success among a QI project (Balasubramanian et al., 2018).

Other engagement strategies included educational meetings for stakeholder groups that explained and demonstrated the importance of the project outcomes. This incorporated support and encouragement from the clinic’s psychologist and NPs who endorsed the project. These meetings were believed to be useful for building rapport and incorporating another engagement strategy, identifying champions, or individuals who will support, market, and drive the project purpose before, during, and after implementation (Damschroder et al., 2009). It was especially important to identify staff champions because this was a DNP student-led project. A spokesperson, directly from the staff who worked in the cardiology clinic and who would be directly affected by the new process, was needed to advocate for the change in practice and help other staff to assimilate. Obtaining project endorsement from the clinic’s HF program director was viewed as being highly beneficial to engage clinic staff.

**Unanticipated Barrier**

An unanticipated barrier that occurred during the implementation period was a historic event, the COVID-19 global pandemic. In North Carolina, where this project was implemented, a statewide stay-at-home order was implemented on March 30, 2020 and continued through May 8, 2020. Due to escalating pandemic severity and state restrictions, in-person clinical was suspended for UNC students and the project clinic site closed during the week of March 15,
Beginning on March 23, 2020, 80% of clinic visits were changed to a virtual telehealth platform. The clinic observed an 80% decrease in patient volumes in March, 2020.

The COVID-19 pandemic response initially placed physical limitations on this project. Therefore, the project proposal was discussed with faculty advisors to identify revisions or a contingency plan to make the project work within the pandemic limitations. The project proposal was approved on April 4, 2020 and the UNC Office of Human Research Ethics determined that the project did not constitute human subject research and, therefore, did not require IRB approval on April 29, 2020. Project implementation was postponed by approximately one month. Initial project education and ramp-up was done remotely via Zoom on May 28, 2020 rather than in-person as originally planned.

Beginning in June, in-person clinic visits resumed. The majority of patients were seen face-to-face in the clinic. The first two weeks of the project were monitored remotely by the student investigator. The clinic allowed students to return to in-person clinical on June 22, 2020. By mid-June, the NP project participants’ patient volumes were similar to pre-COVID patient volumes. Several nursing and ancillary staff were initially furloughed from the clinic in March, 2020 but returned in June, 2020. The original project proposal included inviting other providers to participate in the process improvement in an effort to implement depression screening for all patients with chronic HF who were cared for at the clinic. However, due to the pandemic, the project committee decided to scale back initial implementation and limit to the two NPs who were already vested in the project. During the entire project implementation, visitors were not allowed in the clinic unless it was medically necessary to accompany a patient. See Appendix I for COVID-19 timeline.
Sustainability

One essential key to the sustainability of this project was the EMR infrastructure that had the PHQ-9 screening tool already built into the ambulatory care charting system. This facilitated screening, automatically scores responses, and storage of data input related to the PHQ-9 in a quarriable way that allowed for easy data collection. The clinical use of the Substance Abuse and Mental Health Services Administration (SAMHSA) treatment directory (https://www.samhsa.gov) also ensured that clinic staff could locate current community referral information for pharmacologic and nonpharmacologic depression management. Having a full-time LCSW at the clinic who can follow-up with patients who have elevated PHQ-9 scores also helped the project’s sustainability.

A potential barrier to sustainability is long-term staff fidelity to the process. Clinic champions need to continue to support and encourage staff to maintain the process. Increasing greater universality of clinic practice by eventually screening all cardiology clinic patients will help fidelity to screening and follow-up. It is easier to hold staff accountable to a practice change if it is a process that is intended for every patient, at every visit. Thus, opportunity exists for future projects to show the importance of depression screening for all patients with cardiovascular conditions.

Budget

This project had minimal associated direct costs that included paper and printing supplies for patient screening tools, snacks for staff provided on a weekly basis, and lunch provided to staff at the beginning and end of the project. Estimated direct cost was $450. The largest indirect cost was staff and provider time required for initial education, project implementation, and progress discussions after each PDSA cycle. Anticipated resources needed to continue the practice change include the nursing and medical assistant time to distribute and explain the
screening tool and the provider time to address the assessment during the clinic visit. Clinic LCSW and pharmacy services will also be a valuable resource moving forward to assist the providers with patient follow-up for elevated PHQ-9 scores.
CHAPTER 4: RESULTS

The project desired outcomes were to create a sustainable process for the cardiology clinic to screen patients with chronic HF for depression, to identify patients who had an elevated depression screening score, and for providers to initiate an evidence-based treatment algorithm for those patients. Compliance was measured by the frequency and percentage at which screening assessments were completed. The impact of screening (clinical outcome) was measured by the percentage at which providers documented an assessment and plan for patients who had an elevated depression screening score and number of patients for which the provider initiated or referred for depression treatment using the algorithm.

Baseline Clinic Data

Baseline clinic data were collected from May 25, 2020 to June 5, 2020. During this two-week period, the two NP providers identified to pilot the project had 69 patient encounters with 41 of those patient encounters that met project criteria for depression screening. Of those 41 patient encounters, none of the patients had documentation of depression screening (by the PHQ-9). These data confirmed that there was no clear process for depression screening during routine clinic visits for patients with chronic HF.

Screening Compliance

Compliance was measured by the frequency/percentage at which screening assessments were completed and the frequency/percentage at which providers documented an assessment and plan for patients who had an elevated PHQ-9 score. A screening goal of 50% was used. A
follow-up documentation goal of 90% was used. These goals were based on comparable depression screening goals in the literature.

Depression screening using the PHQ-9 tool was completed with patients with chronic HF seen by two NPs for eleven weeks (from June 8, 2020 until August 21, 2020). Screening percentages for each PDSA cycle were 40%, 77%, 72%, and 69%, respectively. Over the 11-week implementation period, out of a total of 429 patient encounters, there were 240 patient encounters (56%) that met criteria to be screened. Of those eligible, 151 were screened over the course of the project, yielding an overall screening compliance rate of 63% (exceeding the project goal of 50%). There were 192 unique patients eligible for screening.

**Sample Characteristics of Eligible Patients**

The mean age of the 192 unique patients eligible for screening was 61.7 years (SD 13.8) with an age range from 20 to 97 years. Forty-three percent (n=82) were female. About one in four patients had a history of depression (26%; n=49), while 13.5% (n=26) had a history of other neurological or psychiatric diagnosis. Current (or history of) antidepressant or psychotropic medication use was documented in 34% (n=66) of the patients.

Patient clinical HF variables recorded included type of HF diagnosis, HF etiology, left ventricular ejection fraction (LVEF), and NYHA Class. Documented diagnoses consisted of HF with reduced ejection fraction (HFrEF) 66% (n=127), HF with preserved ejection fraction (HFpEF) 24% (n=47), and combined HF 7% (n=13). Type of HF diagnosis was not recorded for five patients. About one in five patients had an ischemic etiology to their HF (21.4%; n=41) with 142 (74%) patients having a nonischemic etiology. Etiology was not recorded for seven patients. The mean LVEF recorded in the medical record of the patients was 37.5% (SD 16.42%). A little over half of the patients (54.7%; n = 105) had an LVEF of less than or equal to 40%, while 14.1% (n=27) had a mid-range LVEF between 41% and 49% and 27.6% (n=53) of patients has a
preserved LVEF of 50% or greater. The NYHA functional class for the patients consisted of nineteen patients with an NYHA Class I (9.9%) meaning they had no symptoms of HF on the day of the visit. Whereas about one in four (24.5%; \( n=47 \)) were classified as NYHA Class II, meaning they were slightly limited by their HF symptoms. Notably, 26 patients (13.5%) were classified as being in NYHA Class III (markedly limited in activities by their HF symptoms), while no patients were classified as having symptoms at rest (NYHA Class IV). It is important to note that in a little over half of the 192 eligible patients (52.1%; \( n=100 \)) did not have their NYHA Class documented in the medical record on the day of screening. Refer to Table 3 for a summary of the sociodemographic and clinical characteristics of the 192 eligible patients.

**Table 3: Characteristics of eligible patients**

<table>
<thead>
<tr>
<th>Variable</th>
<th>n (percentage)</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in Years</td>
<td>61.68 (13.80)</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>82 (43%)</td>
<td></td>
</tr>
<tr>
<td>History of Depression</td>
<td>49 (26%)</td>
<td></td>
</tr>
<tr>
<td>History of Other Neuro/Psych Diagnosis</td>
<td>26 (13.5%)</td>
<td></td>
</tr>
<tr>
<td>History of Antidepressant/Psychotropic Medication Diagnosis</td>
<td>66 (34%)</td>
<td></td>
</tr>
<tr>
<td>HFrEF</td>
<td>127 (66%)</td>
<td></td>
</tr>
<tr>
<td>HFpEF</td>
<td>47 (24%)</td>
<td></td>
</tr>
<tr>
<td>Combined HF</td>
<td>13 (7%)</td>
<td></td>
</tr>
<tr>
<td>Not Recorded</td>
<td>5 (3%)</td>
<td></td>
</tr>
<tr>
<td>HF Etiology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nonischemic</td>
<td>142 (74%)</td>
<td></td>
</tr>
<tr>
<td>Ischemic</td>
<td>41 (21.4%)</td>
<td></td>
</tr>
<tr>
<td>Not Recorded</td>
<td>7 (3.6%)</td>
<td></td>
</tr>
<tr>
<td>LVEF %</td>
<td>37.5 (16.42)</td>
<td></td>
</tr>
<tr>
<td>( \leq 40% )</td>
<td>105 (54.7%)</td>
<td></td>
</tr>
<tr>
<td>41-49%</td>
<td>27 (14.1%)</td>
<td></td>
</tr>
<tr>
<td>( \geq 50% )</td>
<td>53 (27.6%)</td>
<td></td>
</tr>
<tr>
<td>NYHA Class</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class I</td>
<td>19 (9.9%)</td>
<td></td>
</tr>
<tr>
<td>Class II</td>
<td>47 (24.5%)</td>
<td></td>
</tr>
<tr>
<td>Class III</td>
<td>26 (13.5%)</td>
<td></td>
</tr>
<tr>
<td>Class IV</td>
<td>0 (0%)</td>
<td></td>
</tr>
<tr>
<td>Not Reported</td>
<td>100 (52.1%)</td>
<td></td>
</tr>
</tbody>
</table>
Characteristics of Ineligible Patients

There were 96 unique patients deemed ineligible for screening according to the project inclusion criteria. Notably, 39% of ineligible patient encounters were patients being seen for a different cardiology service (electrophysiology subspecialty), 35% had already been screened within the past three months, 17.4% were telehealth visits, 4.8% were deferred by the provider for various reasons, and 1.6% were medically unstable. During the project implementation period, two patients with electrophysiology subspecialty encounters were screened using the PHQ-9. These patients did not meet project inclusion criteria and were excluded from data analysis.

Depression Screening Yield

Over the 11-week project implementation period, there were 20 unique patients (13.2%) who had an elevated depression score (PHQ-9 score 10 or greater). Based on further assessment, providers determined that 80% (n=16) of elevated depression scores were due to depressive symptoms, while 20% (n=4) of elevated depression scores were attributed to HF symptoms. One patient who did not meet project inclusion criteria was screened and had an elevated PHQ-9 score. These data were excluded from analysis. Notably, of those who had elevated PHQ-9 scores, 100% (n=20) had a HFrEF diagnosis, 90% (n=18) had a nonischemic HF etiology, and 80% (n=16) had a history of either a mental health diagnosis or psychotropic medication use. Refer to Table 4 for a summary of findings from each PDSA cycle.
<table>
<thead>
<tr>
<th>PDSA Cycle</th>
<th>Dates</th>
<th>Goal % of Patients Assessed</th>
<th>% of Patients Screened with PHQ-9</th>
<th>% of Patients PHQ-9 Score ≥ 10</th>
<th>% Algorithm Used</th>
<th>Recommended Revisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>5/29-6/5</td>
<td>50%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>- Implement Screening process.</td>
</tr>
<tr>
<td>1</td>
<td>6/8-6/26</td>
<td>50%</td>
<td>40%</td>
<td>10%</td>
<td>100%</td>
<td>- No screening for telehealth visits.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>- Patients at diuresis clinic do not need to be screened at every appointment.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>- Patients should be screened by the clinic every 3 months.</td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>- Provider to place due date for next screening in chart 'sticky note.'</td>
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<td></td>
<td>- Providers to connect with rooming staff at the beginning of each shift to remind</td>
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<td>- Providers to connect with rooming staff at the beginning of each shift to remind</td>
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<td>- Providers to connect with rooming staff at the beginning of each shift to remind</td>
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<tr>
<td>2</td>
<td>6/29-7/16</td>
<td>50%</td>
<td>77%</td>
<td>9%</td>
<td>100%</td>
<td>- Link screening with initial diuresis visit tasks.</td>
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<tr>
<td></td>
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<td></td>
<td>- Providers do not need to address PHQ-9 in assessment and plan if score is less</td>
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<td></td>
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<td></td>
<td>- Keep stack of PHQ-9 forms in the exam room.</td>
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<td>- Providers to connect with rooming staff at the beginning of each shift to remind</td>
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<td></td>
<td>- Providers to connect with rooming staff at the beginning of each shift to remind</td>
</tr>
<tr>
<td>3</td>
<td>7/20-8/07</td>
<td>50%</td>
<td>72%</td>
<td>14.5%</td>
<td>100%</td>
<td>- Provider to consult social work via EMR tag/message/in-basket for any patient who</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>- Provider to consider social work follow-up for all patients who score PHQ-9</td>
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<td></td>
<td></td>
<td></td>
<td>- Provider to consider social work follow-up for all patients who score PHQ-9</td>
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<td>- Provider to consider social work follow-up for all patients who score PHQ-9</td>
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<td>- Provider to consider social work follow-up for all patients who score PHQ-9</td>
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<td></td>
<td></td>
<td>- Provider to consider social work follow-up for all patients who score PHQ-9</td>
</tr>
<tr>
<td>4</td>
<td>8/10-8/21</td>
<td>50%</td>
<td>69%</td>
<td>22.7%</td>
<td>100%</td>
<td>- Results sharing and staff participant discussion at the conclusion of PDSA cycle.</td>
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<td>- Provider to initiate psychiatry referral within 24 hours of patient encounter</td>
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<td>- Provider to initiate psychiatry referral within 24 hours of patient encounter with</td>
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<td></td>
<td></td>
<td></td>
<td>- Provider to initiate psychiatry referral within 24 hours of patient encounter with</td>
</tr>
</tbody>
</table>
Impact of Screening

The impact of depression screening (the clinical outcome) was measured by the number/percentage of patients for which the provider initiated or referred for depression treatment using the algorithm. As noted, a project goal was to give NP providers an evidence-based treatment algorithm to guide treatment initiation for patients identified with depressive symptoms. Thus, the NPs implementing the project were asked to document an assessment and plan for every patient encounter with a PHQ-9 score of ten or greater. Results revealed that NPs documented an assessment and plan for 100% of encounters that met criteria, exceeding the project goal of 90% documentation compliance.

Specifically, NPs initiated and documented an intervention for all 16 patients who had a PHQ-9 score of 10 or greater due to depressive symptoms. Based on clinical assessment of elevated depression symptoms, NPs initiated the following interventions: primary, psychiatric, or psychological care referral (11); LCSW referral (9); financial assistance referral (4), medication initiation or titration of antidepressant therapy (5); cardiac rehab referral (2); and a prescription for increased exercise (2).

Post Implementation Staff Feedback

Qualitative data from staff during at the project’s conclusion revealed four key themes relating to feedback on the quality of patient care provided, clinic screening process, documentation and chart review, and patient follow-up.

Quality of Care Provided

Data from semi-structured interviews with staff revealed overwhelming support from participating nursing staff, two NPs participating in the project, the LCSW, and the clinical psychologist to continue depression screening. Interviewees advocated for broad scale implementation of depression screening for other providers that care for patients with HF as well
as all patients seen in the cardiology clinic. Staff saw depression screening as a vehicle for providing a holistic approach to care that added value and improving the quality of care delivered to clinic patients. In fact, staff noted how the screening tool was a conversation starter to assess and identify medical and psychosocial needs for patients that otherwise may not have been discovered. For example, by administering the PHQ-9 and providing further assessment, staff were able to identify homelessness in one patient and untreated sleep apnea in another patient and were able to facilitate appropriate services.

**Clinic Screening Process**

*Time Commitment and Clinic Flow*

Based on feedback from those interviewed, depression screening was not viewed as time consuming and did not impede clinic flow. The nursing staff estimated that it took less than one minute to explain and distribute or administer the PHQ-9 paper form. It took NPs an estimated less than one minute to score and document the PHQ-9 patient provided responses. Assessment and planning for patients with elevated PHQ-9 scores took NPs an estimated five and ten minutes to complete. These time commitments were in line with staff and provider expectations and were not viewed as burdensome to patients or staff.

**Screening Compliance**

Since the nursing staff room patients for multiple providers throughout a typical clinic day, consistency with depression screening for two specific NP providers was challenging. The nursing staff suggested that broadscale implementation within the clinic (i.e., every patient; every time – unless contraindicated) would enhance compliance by incorporating a habitual process into the standard clinic workflow.
Documentation and Chart Review

Both NPs indicated that the PHQ-9 flowsheet (to document patient responses) and the EPIC SmartPhrase in the EMR (developed to streamline documentation of PHQ-9 assessment and plan) were easy to use. The NPs also identified a need for a more efficient way for staff to view PHQ-9 score flowsheets (all scores and dates of screening) to know if a particular patient was due for screening. Moreover, there was a need to easily view in the EMR how, if ever, scores change over time.

Patient Follow-Up

The staff discussed the importance of follow-up for patients who had an elevated PHQ-9 score and were subsequently deemed to have depressive symptoms by the NP. The nursing staff were also concerned with those patients with ‘borderline’ scores, who may not have met the PHQ-9 cut off of ten, but still warranted symptom monitoring. Reassurance was given to staff related to the sensitivity of the PHQ-9 and the need to screen each patient at least every three months.

Although the LCSW at the site was willing to follow patients with who scored above the PHQ-9 cutoff, patients were not being consistently referred to the LCSW. This may have been because the NPs did not have a formal process, or mechanism to order, a consultation with the social worker. Therefore, the NP needed to communicate with the LCSW by an EMR tag, EMR messaging, an in-basket tag, or verbally for any patient who would benefit from follow-up. A streamlined process for LCSW referral was needed. This project algorithm did not indicate that every patient with an elevated PHQ-9 should be referred to social work but that the referral was an option at the discretion of the NP. An expectation of when to consult social work was also needed.
The NPs reiterated the importance of having a plan for those who disclosed suicidal ideations. Although encounters with patients that have suicidal ideations are rare, the situation is high-risk and time-sensitive. After one such situation arose during the third PDSA cycle, a more deliberate educational effort was made to remind NPs of the need for psychiatry referral within 24 hours of patient encounter for those with suicidal ideations.

**Recommendations for Clinic Next-Steps**

At the project conclusion, the executive summary and project recommendations were given to the NP project champion to share with clinic administration and the director of HF and heart transplant management. The project committee recommended to continue the current screening process with the two original NP project champions. Recommendations were made for the clinic to formally identify a project lead, an NP champion, and nurse champion to maintain momentum and facilitate next steps.

Recommendations for next steps include reviewing the current process and determining a roll-out of staff-suggested changes. For example, process review could include evaluating the best time to administer the screening, determining if any changes are needed for who would document initial screening score, and which providers would be added to the screening process in the next phase of launching depression screening in the clinic. A recommendation was made for the designated team to consider inviting another graduate nursing or health affairs student to enhance future plans for more full-scale depression screening.

Additionally, recommendations were made to add a case study approach to train nursing staff and providers on implementation of screening and referral processes. This would enhance staff education and relay important lessons learned during the initial project specific to both common and rare, high-risk patient presentations. Specific case studies may include a patient with elevated PHQ-9 score and later deemed to be related to HF symptoms, a patient with
elevated PHQ-9 score who screens positive and deemed by provider have elevated depressive symptoms, and a patient who screens positive for suicidal ideation.

To continue to provide staff with meaningful data, recommendations were also made for the clinic to identify a champion to specifically provide compliance feedback to the team and clinic at large (e.g., number/percentage of positive screens, number/percentage of those who received interventions). The clinic could also consider implementing a regular audit system to ensure that follow-up is documented for those who screen positive.
CHAPTER 5: DISCUSSION

The overarching goal of this project was to create a sustainable process for an outpatient cardiology clinic staff to screen patients with chronic HF for depression. Overall, this goal was achieved. We met the metric goals set for screening compliance and follow-up documentation. Moreover, we provided the clinic with suggestions for how to make the established screening and referral process sustainable.

COVID-19 Pandemic

While the full extent is unknown, it is clear the COVID-19 pandemic impacted this project. The pandemic required initial staff education to be conducted virtually. Moreover, the first two weeks of project implementation did not have onsite support from the student investigator. Therefore, it is plausible that COVID-19 effected initial rates of compliance, staff engagement, and process clarity. It is also plausible that patients were experiencing increased depressive symptoms manifested during the COVID-19 global pandemic. Stay at home orders, social isolation, fears of COVID-19 contracting, and general uncertainty were potential stressors for patients and their caregivers during the project implementation period. Furthermore, these same stressors undoubtedly impacted the staff. Interestingly, staff commented that, more than ever, it was important to assess patients’ mental health during the pandemic. Thus, the pandemic may in fact have led to higher staff engagement.

This project provided patients an additional service during a global pandemic that may have ultimately changed their clinic experience. Clinical staff offered patients the opportunity to engage in a discussion about how they were feeling, not just physically, but emotionally and
psychologically. This gave many patients the permission to express themselves and start a conversation with their provider about their mental health at a time when they may have needed a holistic approach to health care delivery, more than ever.

**Screening Compliance**

This project established an overall screening compliance of 61.9%, notably lower than the 75.9 to 93% range of outpatient screening compliance as cited in the literature (Aleem et al., 2015; Peters et al., 2020; Russomagno & Waldrop, 2019). However, at baseline there was no systematic process in place for routine depression screening at the site. In the 11-week implementation period, attaining depression screening in nearly two out of three patients with heart failure is laudable. Furthermore, as noted, the project was implemented during the COVID-19 pandemic.

**Depression Screening Yield**

As discussed, our screening yielded 21 unique patients (13.7%) who had elevated depression scores (PHQ-9 score ≥ 10), comparable to the positive yield from screening with the PHQ-9 (with a cutoff of 10 or higher) from the literature which consistently reports approximately one in five (20%) adults with HF. We were able to identify nearly one in every seven unique patients with HF over the 11-week implementation period. Notably, it is plausible that some patients with elevated depression symptoms were missed because clinically unstable patients and those who had virtual (telehealth) visits were excluded. Likewise, it is unknown how including patients with HF who were receiving care through telehealth would have changed the yield obtained.

Based on further assessment, NP providers determined that 81% (n=17) of those with elevated PHQ-9 scores (10 or higher) were due to depressive symptoms. Comparison of this finding with studies conducted in the literature is challenging because the process of how and
when clinical confirmation of depression is varied, including who makes the determination (e.g., provider, psychologist, LCSW) as dictated by workflow.

**Impact of Screening**

In our project, impact of screening was defined as initiation of the treatment plan for those identified as having increased depressive symptoms. As discussed, we were successful in documenting an assessment and treatment plan for all 21 unique patients with elevated PHQ-9 scores, thereby meeting our project goal of following the evidence-based algorithm adopted for the setting. Comparing impact of screening with studies from the literature is challenging as very few studies reported these data. However, our results were markedly better than those of McIntosh (2017) who found in a post implementation sample chart review that nursing documentation of depression screening improved from baseline while the provider acknowledgement of screening results was not clearly documented. Another study addressed the impact of screening as they reported a clinically significant increase in referral rates for mothers from a baseline of 66% to 79% after implementing a standardized depression screening and referral algorithm (Russomagno & Waldrop, 2019).

Treatment varied for the 17 unique patients that the NP providers determined to have elevated depressive symptoms, aligning with best practice for shared-decision making that incorporates patient preferences into treatment plans. The NPs initiated treatment and/or referrals consistent with evidence-based options in the literature for patients with HF, including psychiatric/psychotherapy referrals (8); antidepressant medication initiation or titration (5); and exercise therapy (4). Four patients had a plan that combined more than one treatment modality (also consistent with evidence-based recommendations in the literature). Notably, some treatment plans included interdisciplinary collaboration (i.e., referral to the LCSW) to address
social determinants of health (e.g., financial assistance) which was evidence of a holistic care approach within the clinic.

**Themes of Staff Participant Feedback**

Staff showed overwhelming support of screening their patients with HF for depression. Moreover, staff verbalized depression screening improved the quality of care they provided their patients and saw value in broad scale implementation for all cardiac patients seen in the clinic. By encouraging communication, screening yielded positive unintentional consequences. Additionally, staff feedback echoed key elements of implementing depression screening found in the literature including optimizing EMR utilization and ensuring patient follow-up (Aleem et al., 2015; Berge et al., 2019; Peters et al., 2020; Russomagno & Waldrop, 2019; Smolderen et al., 2011; Waldrop et al., 2018).

**Implications for Future Projects and Practice**

**EMR Utilization**

As evidenced by our project, it is vitally important to build EMR infrastructure that incorporates documentation templates for evidence-based screening tools. This includes automatic scoring and branching of tools calculated by documented patient responses. This infrastructure could include EMR programming that automatically cascades from the PHQ-2 to PHQ-9 if the PHQ-2 cutoff score is met and that prompts a suicide severity screening (e.g., P4) if a positive suicidality response is documented. Additionally, efficiency and compliance may improve when scores are able to be pulled for reporting purposes and automatically imported into provider notes. Eliminating paper tools and directly documenting patient responses into the EMR either by staff or patient self-report (e.g., via iPad, cell phone application, or electronic kiosk) could also benefit process compliance and efficiency. These solutions involving EMR infrastructure need further investigation to determine the proposed benefit.
Follow-Up

As discussed, our findings reinforce the need for an adequate follow-up process for those with a positive depression screen as indicated in the literature (Berge et al., 2019; Peters et al., 2020; Russomagno & Waldrop, 2019; Waldrop et al., 2018). Other clinician roles (e.g., LCSWs, psychologists) could be better integrated into the treatment plan and/or patient referral process. For this project, the LCSW was engaged and willing to provide follow-up for patients who had elevated PHQ-9 scores deemed to be depressed by the NP. An opportunity exists to establish a more formal structure for referring patients to the LCSW and to develop a process for when and how often to follow-up with patients. For example, there was no consistency in how or if the LCSW was being notified of elevated PHQ-9 scores. Therefore, creating an EMR pathway for the provider to order a consultation specifically with the LCSW in the cardiology clinic was needed to ensure follow-up. One solution identified by Peters and colleagues (2020) was to establish a protocol with follow-up at 1-week, 1-month, and 3-month intervals.

Ultimately mental health providers within the community, such as providers who prescribe antidepressant therapy and medication management for patients served at this clinic, are project stakeholders that may see potential impact from this project and should be considered in long-term planning. Establishing a relationship with the psychiatric service where warm hand-offs can take place would be potentially beneficial to patient care in future projects that implement depression screening.

Depression Screening for Patients with HF

Depression screening protocols for patients with HF are underrepresented in the literature. More studies are needed that evaluate the effectiveness of pharmacotherapy in the HF populations. Likewise, more studies are also needed that offer a direct comparison treatment
options and the effects of combining treatments (e.g., CBT and SSRI therapy vs CBT alone) in the HF population.

An emerging intervention for depression in patients with HF is collaborative care. These programs use clinical care managers to assess and longitudinally monitor patients and coordinate delivery of psychosocial interventions (Zambrano et al., 2020). For example, in an effort to find treatment options that improve patient outcomes, the Hopeful Heart Trial is currently comparing the effects of “blended” collaborative care, traditional collaborative care, and usual medical care in treating patients with comorbid depression and HF with reduced ejection fraction (Herbeck Belnap, et al., 2019).

Finally, continued efforts are needed to incorporate use of standardized evidence-based culturally relevant verbal and written education for patients with HF who have elevated PHQ-9 scores deemed to be depressed, including a list of local resources (adapted to the specific geographical location). While each setting could develop their own educational products, standardized education that could be personalized to the patient and setting are needed.

**Recommendations for Screening Frequency**

Guideline recommendations for the best time interval between visits for routine depression screening are needed. Generally, the most common interval seen in practice is annually. However, recommendations based on research or expert consensus are needed to provide guidance to clinicians who care for patients with chronic conditions such as HF, who are at higher risk for depression than the general patient population. Recommendations should address whether patients at higher risk for depression (which would be specified) should be screened more frequently than the general population. Furthermore, recommendations are needed to address intervals for screening in both patients with and without history of elevated scores. Since the PHQ-9 tool questions are based on DSM diagnosis criteria for MDD, recommendations
are needed to determine if repetitive use of the same tool is clinically useful to track severity of depressive symptoms and effectiveness of treatment. Once recommendations are established, process implementation solutions are needed to identify when patients are due for depression screening. For example, Aleem and colleagues (2015) used a colored sheet method to indicate if a patient had a documented PHQ-9 score within the set timeframe. Ultimately, it will be helpful for clinicians to utilize a workflow established within the EMR to determine when screening is due.

**Future Screening Efforts**

Despite implementation efforts and notable improvements to screening, results from our project, consistent with those in the literature, demonstrated that roughly one in four patients are not routinely screened for depression. Continued process improvement efforts are needed to increase screening compliance. Efforts should also target the subset of patients with HF who are at highest risk for depression (i.e., patients who are younger than 60 years of age, women, never married, or with low socioeconomic status) (Chibufo et al., 2020; Smolderen et al., 2011). In addition, processes for determining whether patients who are traditionally excluded from depression screening in the outpatient setting are experiencing depression symptoms, should be considered. For example, if a patient is excluded from screening due to being acutely ill and in need of hospitalization, transitions of care into the hospital setting should include communication to continuing care providers to initiate depression screening once the patient stabilize.

**Clinical Confirmation of Depressive Symptoms**

While screening tools are clinically useful, they are only intended to screen patients, not for confirmation of a clinical diagnosis. Clinical confirmation is essential to provide discernment of whether heightened scores reflect major depression, situational/acute depression, or another disease process (e.g., HF). Therefore, a subsequent clinical interview by a provider for every
elevated PHQ-9 score is necessary. Although a clinical interview was completed by a NP and clinical confirmation was described for this project, the process of clinical confirmation is not routinely discussed in the literature. The literature reviewed reported depression among the sample populations based on screening tool scores. However, future reports need to include depression screening scores in addition to the clinical confirmation of those scores. This is especially important for the HF population to address the gap noted in the literature.

**Screening for Suicidality**

Endorsement of suicidality during depression screening, although a relatively rare occurrence, presents a potentially high-risk situation. Thus, it is imperative to include a process to address and intervene for a suicidal patient when initiating depression screening. Moreover, this process needs to be clearly defined and communicated to participating staff so that they may provide the safest patient care. To reinforce process expectations, providers could potentially learn by case-based study approaches that review the required risk assessment (e.g., P4 Suicidality Screener), documentation, and steps for follow-up if a patient endorses suicidality. Furthermore, providers need readily accessible facility policies for emergency transfer, patient education, and necessary psychiatric patient referrals when this rare, but high-risk, situation presents itself.

**Telehealth Capabilities**

While we excluded telehealth patient encounters, a growing need exists to adapt best practice processes for patients who obtain healthcare virtually. The current global pandemic has reinforced the need to have processes and infrastructure in place to screen patients for depression using telehealth. Thus, projects are needed that build infrastructure for depression screening and referral systems for telehealth. Treatments options (e.g., psychotherapy) with telehealth capabilities may also serve a solution that addresses such barriers to care as access,
transportation, and pandemic related social distancing recommendations. As noted by Koehler and colleagues (2020) telemedical care delivered via daily telemonitoring, 24/7 medical support, and monthly clinician interaction, have been shown to improve depressive symptoms and results in improved QOL in patients with HF and moderate depression. In the midst of COVID-19 and beyond, it is plausible that the broadscale use of telemonitoring as an enhancement to usual care may improve depression symptoms and QOL. However more research is needed to test this hypothesis.

**Limitations**

There were some limitations to this process improvement project. Consistent with a PDSA process improvement project, a limitation of the project was that implementation was done on a relatively small scale at one site with two NP providers. In addition, compliance measured over a relatively short duration of 11 weeks. However, it is important to note that there was no pre-existing process in place for depression screening at this large cardiology practice. In addition, it is unknown whether the success would be transferable to other clinic settings with less resources available. For example, our project had a LCSW, a clinical psychologist, and pharmacy support available onsite. All clinics, especially those outside of an academic setting may not have these resources. A third limitation of the project was that we did not record the percentage of patients that opted out of screening; therefore, we are unable to objectively describe patient acceptability of screening. A final limitation was that we were unable to incorporate the EMR development team into the planning and implementation of the project. Thus, we utilized preexisting EMR structure and functions, including negating any opportunity to improve existing processes. However, it was not feasible to include the EMR development team in our planning due to priority shifting during the COVID pandemic. Opportunities remain to further optimize EMR capabilities to improve end-user experience and facilitate follow-up.
Strengths

Despite the limitations noted above, we were able to implement the project, meeting goals, in the middle of a pandemic. We implemented depression screening using a one-step validated and widely-used screening tool that staff found to be acceptable in a setting where systematic screening was not occurring. Our results also demonstrate success in providing holistic quality care to patients at a higher risk for depression as compared to the general population. Lastly, this project adds to the small body of literature that shows how depression screening can be successfully implemented in a specialty clinic.

Conclusion

Routine depression screening is an important part of the holistic approach to HF care. Assessing and addressing comorbid depression in patients with chronic HF is recommended by clinical practice guidelines. Results from this process improvement project found that depression screening was well-received among staff. We demonstrated how a screening protocol and an accompanying treatment algorithm can be successfully implemented into an outpatient cardiology clinic. Key elements to the successful screening implementation included a standardized screening protocol, a clinical support algorithm for treatment/referral, an optimized EMR infrastructure that supported the depression screening tool used, and a system in place for follow-up of patients deemed to have significant depressive symptoms. Stakeholder engagement prompted PDSA cycle feedback that informed iterative changes made to the process over the course of the project and provided direction for sustainability.
APPENDIX A: DEPRESSION AND HF BIOBEHAVIORAL MECHANISMS

**Depression**
- Depressed Mood
- Anhedonia
- Psychomotor Changes
- Worthlessness/Guilt
- Irritability
- Social Withdrawal
- Anxiety

**Symptoms**
- Fatigue
- Lack of Energy
- Weight Change
- Sleep Changes
- Decreased Concentration
- Decreased Cognition
- Reduced Physical Activity

**Neurobiological Mechanisms**
- Neurohormones (NE, E, HPA, RAAS)
- Autonomic nervous system dysregulation
- Inflammation (IL-6, CRP, TNFα)
- Endothelial Dysfunction
- Coagulopathy

**Heart Failure**
- Dyspnea
- Fluid Retention
- Exercise Intolerance

**Symptoms**
- Fatigue
- Lack of Energy
- Weight Change
- Sleep Changes
- Decreased Concentration
- Decreased Cognition
- Reduced Physical Activity

**Neurobiological Mechanisms**
- Neurohormones (NE, E, HPA, RAAS)
- Autonomic nervous system dysregulation
- Inflammation (IL-6, CRP, TNFα)
- Endothelial Dysfunction
- Coagulopathy
APPENDIX B: PHQ-9 SCREENING TOOL

Nine-symptom Checklist

Name __________________ Date __________

Over the last 2 weeks, how often have you been bothered by any of the following problems?

1. Little interest or pleasure in doing things
   - Not at all
   - Several days
   - More than half the days
   - Nearly every day
   0 1 2 3

2. Feeling down, depressed, or hopeless
   0 1 2 3

3. Trouble falling or staying asleep, or sleeping too much
   0 1 2 3

4. Feeling tired or having little energy
   0 1 2 3

5. Poor appetite or overeating
   0 1 2 3

6. Feeling bad about yourself—or that you are a failure or have let yourself or your family down
   0 1 2 3

7. Trouble concentrating on things, such as reading the newspaper or watching television
   0 1 2 3

8. Moving or speaking so slowly that other people could have noticed?
   Or the opposite—being so fidgety or restless that you have been moving around a lot more than usual
   0 1 2 3

9. Thoughts that you would be better off dead or of hurting yourself in some way
   0 1 2 3

(For office coding: Total Score _______ = _______ + _______ + _______)

If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all  Somewhat difficult  Very difficult  Extremely difficult

(Kroenke, Spitzer, & Williams, 2001).
APPENDIX C: P4 SUICIDALITY SCREENER

P4 Suicidality Screener *

Have you had thoughts of actually hurting yourself?

NO       YES

Four Screening Questions

1. Have you ever attempted to harm yourself in the past?

   NO       YES

2. Have you thought about how you might actually hurt yourself?

   NO       YES  \[\text{[How? \underline{\hspace{2cm}}]}\]

3. There’s a big difference between having a thought and acting on a thought. How likely do you think it is that you will act on these thoughts about hurting yourself or ending your life some time over the next month?"

   a. Not at all likely  
   b. Somewhat likely  
   c. Very likely  

4. Is there anything that would prevent or keep you from harming yourself?

   NO       YES  \[\text{[What? \underline{\hspace{2cm}}]}\]

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<tr>
<th>Risk Category</th>
<th>Shaded (“Risk”) Response</th>
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</thead>
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<td>Items 1 and 2</td>
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<tr>
<td>Minimal</td>
<td>Neither is shaded</td>
</tr>
<tr>
<td>Lower</td>
<td>At least one item is shaded</td>
</tr>
<tr>
<td>Higher</td>
<td>At least one item is shaded</td>
</tr>
</tbody>
</table>

(Dube et al., 2010)
APPENDIX D: PROVIDER'S DEPRESSION TREATMENT AND REFERRAL ALGORITHM

Provider Start

Document PHQ-9 responses in Epic

Review PHQ-9 question #9

Negative Suicidality

Positive Suicidality

Score < 10

Score ≥ 10

Administer P4 Suicide Screen

Assess patient:
1. Depression based on DSM-V criteria
2. Patient willingness for treatment

Further action at provider discretion

Re-screen at next visit

Imminent risk?

No

Yes

Treatment indicated?

No

Prescribe referrals

Cardiac Rehab
Initiate exercise therapy

Social Work
Specify referral for pharmacological vs nonpharmacological therapy

Clinical Pharmacy
Initiate SSRI therapy

Initiate process for transfer to higher level of care

Document PHQ-9 score and plan using .EKBFHDEPRESSIONTOOL SmartPhrase

Provider End
APPENDIX E: QUANTITATIVE DATA COLLECTION TOOL

SAMPLE DATA FORM

Student Investigator: Elizabeth Wilhelm

STUDY PACKET

Date of Clinic Visit: ____/____/____
Subject ID________
Date of Chart Audit: ____/____/____
### Screening Tool

**Inclusion Criteria:**

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Yes</th>
<th>No → Exclude (stop)</th>
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<tbody>
<tr>
<td>Heart failure diagnosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Established patient</td>
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</tr>
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</table>

**Exclusion Criteria:**

<table>
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<tr>
<th>Criteria</th>
<th>Yes → Exclude (stop)</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-native English speaker</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute decompensation day of clinic visit</td>
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<td></td>
</tr>
</tbody>
</table>

Subject ID________
If the patient qualifies:

Patient Information (from the medical record):

<table>
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<tr>
<th>Variable</th>
<th>Answer</th>
<th>Comments</th>
</tr>
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</tr>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heart Failure Etiology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coronary Heart Disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Idiopathic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of Heart Failure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduced LVEF</td>
<td></td>
<td></td>
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<tr>
<td>Preserved LVEF</td>
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<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NYHA Class (day of visit)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage of Heart Failure (day of visit)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Past medical history of depression documented in problem list or note</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Past treatment for depression treatment documented in the problem list or note</td>
<td>Yes</td>
<td>No</td>
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</table>

Subject ID________
## Screening Outcome Information (from the medical record):

<table>
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<th>Answer</th>
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</thead>
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<tr>
<td>PHQ-9 Score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHQ-9 Score ≥10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New diagnosis of depression documented</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHQ-9 follow-up documented by provider</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social work referral</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pharmacy referral</td>
<td></td>
<td></td>
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<tr>
<td><strong>COMMENTS:</strong></td>
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<td></td>
</tr>
</tbody>
</table>
APPENDIX F: QUESTIONS TO GUIDE STAFF DISCUSSION

1. How familiar are you with your clinic’s depression screening process?
2. How likely are you to use the depression screening process?
3. How likely are you to have enough time to screen for depression?
4. How confident are you in managing depression?
5. How comfortable are you with prescribing antidepressants?
6. Do you want more information on assessment and management of depression?
7. How do you prefer to learn?
8. What barriers have you encountered in the depression screening process?
9. What change would you implement to make this process more effective or efficient?

Questions to Guide Final Staff Discussion

1. How likely are you to sustain depression screening in your practice?
2. What are lingering challenges to implementing depression screening?
3. Do you find depression screening beneficial to the patients to whom you provide care?
APPENDIX G: PROJECT CONCLUSION QUESTIONS AND POST-PROJECT WRITTEN EVALUATION FORM

Project Evaluation:
Assess and Address: Screening and Management for Depression in Patients with Chronic Heart Failure

What impact did the process have on staff time and clinic flow?

Was depression screening valuable to the patients that you serve?

Do you think depression screening improved the quality of care you deliver?

Do you think you will be able to sustain depression screening in your practice?
Why or Why not?

What are the lingering challenges to implementing depression screening?

Please provide any additional observations, comments, or suggestions:

Submit Eval to Sarah Waters by Oct. 14, 2020

PREFER TO EMAIL, CALL, or TEXT?
I WELCOME YOUR FEEDBACK:
Beth Wilhelm, BSN, RN
bocan002@live.unc.edu
814-795-7564
Executive Summary: October 21, 2020

Project goal #1: To create a sustainable process for an outpatient cardiology clinic staff to screen patients with chronic heart failure (HF) for depression. A screening goal of 50% was used.

- **Results** Depression screening using the PHQ-9 tool was completed with pts with chronic HF seen by nurse practitioners, Sarah Waters and Emily Baker, between June 8th and August 21st 2020.
  - Patients who met criteria for screening: 240
  - Total pts screened: 153
  - Overall screening compliance: 63%
**Project goal #2:** To identify the rate of patients with elevated depressive symptoms among the clinic’s HF population.

![Depression Score Breakdown](image)

**Results**
- Number of unique pts with elevated depression score (PHQ-9 score 10 or greater): 21
- Percentage of pts screened with an elevated depression score: 13.7%
- 2/3 of elevated depression scores were due to depressive symptoms based on provider assessment; 1/3 were due to HF symptoms.
**Project goal #3:** To provide an evidence-based treatment algorithm to guide providers in treatment initiation for patients identified with depressive symptoms. The goal for provider documentation of an assessment and plan for patients with an elevated depression screening score was 90%.

- **Results**
  - Providers were given an algorithm and EPIC Smartphrase to document an assessment and plan for patients who had an elevated depression score (PHQ-9 score 10 or greater).
  - Documentation compliance: 100%
  - Interventions documented included: referral to psychiatry, clinical psychology, clinical social work, primary care, or cardiac rehab; medication initiation/adjustment, financial assistance; encouraged exercise. (*Note: some patients received more than one of these interventions)

**Summary of Debriefing Session with Staff:**

- Overwhelming support from participating nursing staff, NP providers, social work, and clinical psychologist to continue depression screening and to expand screening for broad scale implementation.
- Value seen in how depression screening provides a more holistic approach to care and improves quality of care.
- The screening tool served as a vehicle for conversation for uncovering unmet medical and psychosocial needs that otherwise may not have been shared.
- Screening is not time consuming and does not impede clinic flow. Assessment and plan for patients with an elevated score took approximately 5-10 minutes of provider time.
- Need to ensure follow-up for patients who have elevated scores and are deemed depressed by provider (including those who are borderline).
- Clinical Social Work (Lindsay Mosteller) willing to follow patients with elevated PHQ-9 scores
- Providers reiterated the importance of having a plan for those who disclose suicidal ideations (rare event, but time-sensitive, potentially high-risk situation)
- Referral Personnel (Clinical Psychology - Dr. Rosman; Clinical Social Work – Lindsay Mosteller) very supportive of project.

**Recommendations:**

- Continue current screening process with NPs, Sarah Waters and Emily Baker.
- Identify champion(s) to plan and initiate next steps:
  - Potentially a lead champion, provider champion, and/or nursing champion
  - Roll out process changes suggested by staff (e.g., best time to administer the screening; changes in who would document initial screening score; and which providers to roll out in the next phase).
- Identify a champion to provide feedback on number of positive screens and received intervention(s). Consider implementing a regular audit to ensure that follow-up is documented for those who screen positive.
- Add a case study approach to training nursing staff and providers such as: 1) case with elevated score and later deemed to be related to HF symptoms; 2) case with elevated score who screens
positive & deemed by provider to be depressed; 3) case with positive screening who expresses suicidal ideations

- Potentially invite another NP/DNP student to continue the process for Spring/Summer/Fall of 2021.
APPENDIX I: COVID-19 TIMELINE

3/6/2020
UNC Spring break.

3/10/2020
State of Emergency by Governor Roy Cooper.

3/11/2020
Spring break extended by one week and in-person classes suspended starting 3/20/20.

3/15/20
Cardiology clinic shut down.

3/19/20
In-person clinicals suspended.

3/23/20 through first week of 6/2020
80% of HF encounters were telehealth visits.

3/26/20
Stay at home orders for Wake/Orange/Durham counties.

3/30/20-5/8/20
North Carolina statewide stay at home orders.

4/6/2020
Proposal approved by committee.

3/23/20
Telehealth visits started.

4/29/20
Project received IRB approval.

5/28/20
Lunch and learn via zoom (staff in person). NP participants selected 6/8/2020 as go-live.

6/8/2020
95% HF encounters were in-person clinic visits.

6/24/20
Student investigator allowed on site.
REFERENCES


Review literature


Smarr, K. L., & Keefer, A. L. (2011). Measures of depression and depressive symptoms: Beck Depression Inventory-II (BDI-II), Center for Epidemiologic Studies Depression Scale (CES-D), Geriatric Depression Scale (GDS), Hospital Anxiety and Depression Scale (HADS), and Patient Health Questionnaire. *Arthritis Care & Research, 63*(S11). https://doi.org/10.1002/acr.20556


