Depression Screening to Improve Early Detection, Referral, and Treatment of Depression in Patients with Diabetes

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Abstract

Comorbid depression is common among adults with diabetes and is associated with negative impacts on quality of life, health outcomes, and mortality rates. As of 2015, it was estimated that 415 million people were living with diabetes in the United States, and of those affected, 20 to 25 percent have some degree of depression. Evidence-based guidelines recommend routine depression screening. This appears to decrease negative health outcomes and may be a cost-effective way to reduce the risk of adverse outcomes. Despite recommendations, depression screening in patients with diabetes is not consistent. This is true for patients at the study clinic who were not being routinely screened for depression. To address this gap, we developed a depression screening protocol that incorporated a brief, validated depression screening tool into the patient’s electronic health records. The protocol outlined the criteria for screening adult patients for depression using the Patient Health Questionnaire (PHQ). In this project, outcomes of implementation of the PHQ in the outpatient Endocrine clinic were evaluated. Included in this 4-week retrospective review were 54 patients who presented to the clinic for routine scheduled appointments. Of those, 40 patients (78%) were administered the PHQ and 14 (22%) were not screened. Results showed that screening in this clinic significantly improved, but rate of referrals was not impacted since none of the 40 screens resulted in a positive screen. This project addresses the healthcare needs of patients with diabetes and depression with emphasis on improving care, safety, and outcomes while reducing healthcare expenditures.

Keywords: diabetes, depression, screening tools, health outcomes
Depression Screening to Improve Early Detection, Referral, and Treatment of Depression in Patients with Diabetes

The purpose of this project is to implement a depression screening protocol in an outpatient endocrine clinic of a large university-affiliated teaching hospital located in metro Phoenix. The desired outcome is to improve early detection, referral, and treatment of depression among patients with diabetes and provide the clinical staff with knowledge to promote the use of the depression screening tools in clinical practice. This topic was chosen because comorbid depression is often undiagnosed in patients with diabetes, leading to lack of patient engagement and poor diabetes outcomes. A retrospective chart review was used to examine the results after implementation of depression screening. This project considered the following clinical question:

Does the implementation of a protocol for routine depression screening of adult patients with diabetes in the outpatient endocrine clinic result in early identification and proper referral.

Problem Description

Diabetes mellitus is one of the most serious chronic diseases with substantial prevalence, incidence, and economic burden. Recent estimates suggest the economic impact associated with diabetes is over $327 billion each year (American Diabetes Association [ADA], 2018). This total includes more than $237 billion in costs for health care services and medication to treat diabetes, and at least $90 billion in lost productivity (ADA, 2018). Diabetes has many health outcomes including, renal disease, blindness, lower limb amputation, and cardiovascular disease (Centers for Disease Control and Prevention [CDC], 2017). In recent years, there has been a growing interest in the correlation between diabetes and depression, and research in this area has been undertaken to inform current clinical practice. Comorbid depression is a growing problem among individuals with diabetes resulting in diabetic complications, poor glycemic control, and non-
adherence, which places a significant burden on the health care system and causes considerable stress to the patient (Alonso-Moran, Satylganova, Orueta, & Nuno-Solinis, 2014; Reus et al., 2017). As of 2015, an estimated 415 million people were living with diabetes in the United States, and of those, 20 to 25 percent have some degree of depression (CDC, 2017; Brieler et al., 2016). Mendenhall, Kohrt, Norris, Nduei, & Prabhakaran (2017) found that individuals with chronic conditions such as diabetes are up to two times more likely to suffer from depression compared to those without diabetes. To improve patient outcomes, the United States Preventive Services Task Force (USPSTF) (2016) recommends routine screening in clinical practice for depression among all adults to ensure early recognition, treatment, and proper follow-up care. The ADA (2019) also support this recommendation in individuals with diabetes. Despite these recommendations, screening for depression is often not completed due to a combination of provider and patient factors. For example, patients with depression may be less likely to seek medical care due to their belief that society stigmatizes individuals with mental illness (Reus et al., 2017). Other barriers to screening include short appointment times and provider lack of knowledge and skill in management of depression (Naskar, Victor, & Nath, 2017). Additional barriers include social and economic challenges to providing adequate, sustainable, and high-quality patient-centered health care (Reus et al., 2017; Zhang et al., 2015). While there are known barriers to screening for depression in patients with diabetes, the literature overwhelmingly supports doing so in all patients.

**Available Knowledge**

The research studies selected for this literature review focus on diabetes mellitus, depression, glycemic control, health outcomes, psychological screening. To identify potentially relevant studies a comprehensive literature review using CINAHL, PubMed, Medline, and
Cochrane Library. These database searches include systematic reviews, meta-analysis, randomized-control studies, and population-based cohort studies. In selecting literature to review results were limited to ten years, between 2008 to 2018. The preliminary search yielded a total of 70 articles. The literature review was further refined by using alternative key terms, for example, mental health, insulin resistance, and psychological screening along with searching the reference lists of ‘kept’ articles, with an additional yield of 12 articles. See Table 1 for Evidence tables. Some were research studies, and others were periodicals, and dissertation abstracts were also located but were not included in this literature review.

The following online journals and organizational websites were reviewed for relevant online research articles: The Journal of Psychosomatic Research, the Online Journal of Life Sciences, and the BioMed Central Health Services Research. The research studies selected in included 11 studies, three of which were systemic reviews which presented meta-analyses (Huang et al., 2013; Li et al., 2017; Reus et al., 2017). Two studies were population-based studies (Chaudhary et al., 2017; Zhang et al., 2015) and two of the studies were a randomized-control studies (Ell et al., 2010; Li et al., 2017). When literature was reviewed primary themes emerged that contained similar purpose statements and objectives. For example, a majority of the studies include participants who are diabetic with some degree of depression (Alenzi & Sambamoorthri, 2016; Chaudhary et al., 2017; Dhavale et al., 2013; Ell et al., 2010; Huang et al., 2013; Kearns et al., 2017; Li et al., 2017; Li et al., 2017; Reus et al., 2017; Zhang et al., 2015). Another study found that nearly 50 percent of diabetic individuals had some form of depression (Reus et al., 2017).

Mendenhall et al. (2017) also found that individuals with chronic comorbidities such as diabetes are up to two times more likely to suffer from depression compared to those without
diabetes. Similarly, a random sample study found that the risk of mood and anxiety disorders are higher among persons with diabetes relative to those without (Lin et al., 2017). Several study groups report a strong correlation exists between poor glycemic control and poor self-care behaviors (Andersohn et al., 2009; Li et al., 2017; Naskar et al., 2017; Reus et al., 2017). Furthermore, Reus et al., 2017; Alonso-Moran et al., 2014 and Alenzi et al., 2016, all shared a common theme and tended to focus on the prevalence between depression and diabetes.

**Depression Screening**

In recent years, there have been more efforts by the USPSTF (2016) and other similar institutions to screen for depression in adults to ensure early recognition, treatment, and proper follow-up care to improve health outcomes. Several studies found that by identifying and treating depression early in patients lead to reductions in diabetes-related complications and improvement in the quality of life (Chaudhary et al., 2017; Kearns et al., 2017). In a systematic review conducted by Naskar et al. (2017) the authors examined depression and diabetes and provided evidence to show comorbid depression results in poorly controlled diabetes and suggest the implementation of screening tools to identify depression to improve diabetic outcomes with appropriate treatment. Research findings indicate that screening for depression in a patient with diabetes can often reduce poor health outcomes and may serve as a cost-effective way to reduce the burden associated of diabetic complications (Reus et al., 2017; Najafi et al., 2016). For example, in two cross-sectional studies Kearns at el., 2017 and Sweileh et al., 2014, researchers found that early identification and treatment of comorbid depression results in improved glycemic control and quality of life. In a 3-year follow-up study Zhang et al. (2015) found a significant improvement in overall diabetes outcomes when depression screening was utilized.
Strategies to screen for depression were examined in two studies that administered self-report questionnaires to evaluate the severity of depressive symptoms among adults in the primary care setting. These studies found that the severity of depression has a strong influence on diabetic outcomes (Li et al., 2017; Sweileh et al., 2014; Reus et al., 2017). Those who scored positive on the depression screen showed significantly higher hemoglobin A1c values when compared with patients who did not screen positive. Three studies examined depression scores in relation to glycemic control and diabetic outcomes (Dhavale et al., 2013; Zhang et al., 2015; Kearns et al., 2017) while the remaining four studies explored treatment options (Alenzi et al., 2016; Ell et al., 2010; Huang et al., 2013; Li et al., 2017). Interestingly, many studies found that depression screening is underutilized despite its efficacy in identifying depression (Naskar et al., 2017; Reus et al., 2017; Zhang et al., 2015).

Other relevant articles were located through focused searches using The Cochrane Library which identified six systemic reviews resulting from keywords diabetes, depression, and screening tools. Four of these studies are included in this literature review. Of the four reviews, one examined the association between depression and diabetes (Naskar et al., 2017; Roy and Lloyd, 2012) and the other three reviews discussed collaborative care, cognitive behavior health, pharmacological interventions (Alenzi & Sambamoorthri, 2016; Ell et al., 2010; Huang et al., 2013). For example, in the following article by Reus et al. (2017) estimated that 20 to 30 percent of patient develops signs and symptoms of depressive symptoms. In this study 704 diabetic individuals participated in this study, of which 48.27% screened positive for depression.

The extensive search for research studies related to the effectiveness of depression screening tool among diabetic individuals results in numerous articles. Whereas, the cross-
sectional study by Jani et al. (2013) examines the challenges and implications of routine depression. The authors of this study attributed challenges with low depression screening. Chaudhary and colleagues (2017) studied rural diabetic patients using a Geriatric Depression Scale to test the impact of diabetes on three characteristics: depression, lifestyle modifications, and socioeconomic status. The data collected from the study found the prevalence of depression was significantly higher in underserved populations.

In 2016, Janssen and colleagues conducted an observational population-based cohort study using the Patient Health Questionnaire (PHQ-9) and the Mini-International Neuropsychiatric Interview (MINI) to assess depression screening tools as it relates to diabetes. The study concluded the PHQ-9 was more effective in screening for depression. Both studies revealed that routine detection by screening tools has shown to be a promising approach that has the potential to improve the prevalence, incidence, and mortality as well as quality of life among those affected by diabetes and depression. By identifying and treating depression early in patients with diabetes may lead to reductions in diabetes-related complications and improvement in the quality of life (Chaudhary et al., 2017; Kearns et al., 2017).

Complications

Comorbid depression is common among people with chronic conditions, particularly those with diabetes, but the risk for depression is further increased among those who suffer diabetes diabetes-related complications. Several studies examined factors in the diabetic patient that may increase the incidence of comorbid depression (Kearns et al., 2014; Li et al., 2017; Naskar, Victor, & Nath, 2017; Roy & Lloyd, 2012; Reus et al., 2017). Kearns et al. (2014) and Naskar et al. (2017) found that loss of function from amputation or failing kidney may lead to a state of emotional hopelessness and feelings of self-reproach. Regardless of age, race, or
ethnicity, people with chronic diseases may become depressed about their physical illness; the more severe the disease, the more profound the depression (Naskar at al., 2017). Diabetes affects approximately 1 in 11 adults and is the leading cause of kidney failure, blindness, lower limb amputation, and cardiovascular disease. (CDC, 2017). Diabetes-related complications create considerable disability, further increasing the risk and severity of depression and adding to the economic burden (Alonso-Moran et al., 2014; Naskar et al., 2017). This is a significant issue because many people are affected at the local, national, and global levels. Accumulated research findings examining the relationship between depression and glycemic control shows that screening for depression in patient with diabetes has the ability to reduce poor health outcomes and may serve as a cost-effective way to reduce diabetes-related complications (Naskar et al., 2017; Reus et al., 2017; Zhang et al., 2015). A total of 15 current studies were found that answered the clinical question. Several studies examined the prevalence of comorbid depression among patients with diabetes, and found there are a variety of significant negative effects on diabetic outcomes. For example, Andersohn, et al. (2009), Andreoulakis et al. (2012), and Reus et al. (2017), all suggest that diabetes doubles the risk of depression compared to those without diabetes.

Studies by Jani et al. (2013) and Ell et al. (2010) demonstrated that certain demographics may increase the risks to developing depression in individuals with diabetes. Studies summarized in Naskar et al. (2017) and Jani et al. (2013) provide evidence that show the correlation between depression and diabetes is increased in patients with advanced age, female gender, lower literacy rate, lower socioeconomic status, and recent onset of diabetes (>2 years). In two other studies, Sweileh et al. (2016) and Chaudhary et al. (2017) found that by reducing diabetic related issues an improve symptoms associated with depression. Therefore, strategies to reduce these risks
have been examined in systemic reviews conducted by Li et al. (2017) and are an important part of diabetes management. For instance, self-care plays a vital role in the management of diabetes and further prevents progression of complications. Chaudhary et al. (2017) found that poor self-care behaviors increase the risks of complications among patients with diabetes. The authors of this article further suggest that the incidence and severity of depression may influence self-care management, placing patients at risk of developing diabetes-related complications (Alenzi & Sambamoorthi, 2016). Similarly, studies by Kearns et al. (2014) and Naskar et al. (2017) also found that the presence of comorbid depression often limits self-care and keep individuals from seeking help from their provider, adhering to medication, and following recommended dietary regimen.

In a population-based cohort study, Lunghi et al. (2016) suggest that the severity of depression increases as diabetic complications increase leading to elevated hemoglobin A1c, frequent hospital readmissions, and higher mortality rate. In studies summarized in Naskar et al. (2016), it is evident that comorbid depression and diabetes increases the concern for the development of micro- and macro related complications adding to the economic burden of managing these comorbid conditions.

**Rationale**

This project incorporated a theoretical and conceptual framework to guide the scholarly project. The approach used in developing the project entailed analyzing, synthesizing, and interpreting the literature and presenting the evidence to the clinical staff that supported identification of the most appropriate intervention, identifying the clinical guidelines to support the use of a validated depression screening tool in practice, and developing and designing the project. The plan-do-study-act (PDSA) model was used to guide the project leader (PL) through
the implementation process and evaluation of the quality improvement project. The PDSA is a useful tool used to keep track of the project through the improvement process and assist with development and communication of the project (AHRQ, 2008). The purpose for the development of the intervention was to identify an evidence-based protocol along with clinical guidelines to support the use of the PHQ-2 and PHQ-9 depression screening tools currently available for staff, and provide the clinical staff with knowledge to promote the use of the depression screening tools in clinical practice. This intervention was needed to improve early detection, referral, and treatment of comorbid depression in patients with diabetes. In light of the growing body of literature, depression screening coupled health care systems that have adequate systems in place to ensure early intervention, referral, and proper treatment and follow up care has shown to improve outcomes for at-risk populations (USPSTF, 2016). The following section will discuss the theoretical and conceptual frameworks used to explain the problem.

**Theoretical Framework**

The PDSA Model was used as a guide to plan and document processes during the quality improvement project. The key components of the PDSA Model are (1) plan (2) do (3) study, and (4) act. Each key component is based on an action step. In step one, the PL evaluated the need for change. In this project analysis showed a gap where providers were not screening for depression in clinical practice. Step two, explored the interventions to accomplish the desired change. For instance, in order to facilitate change, it was essential to gain a better understanding of the factors that influence change, to assist in recognizing the need when developing appropriate interventions. Therefore, as part of this project an educational intervention was initiated to provide the clinical staff with knowledge as to why important to screen for depression among patients with diabetes and to promote the use of the PHQ in clinical practice. The second
intervention was to increase screening for depression in adults with diabetes thereby increasing referrals to behavioral health providers for those with positive screen. Step 3, assessed the method of change, as it related to research findings. Finally step 4, evaluated the results.

**Conceptual Framework**

This project was also guided by the Health Belief Model (HBM). The HBM is a psychological health behavior change model developed to describe and predict health-related behaviors, particularly in regard to health services (Glanz & Bishop, 2010). This widely used model remains one of the most common theories in health behavior research. The application of the HBM has been used to predict a wide variety of health-related behaviors for instance health screening for the early detection of diseases with absence of signs of symptoms. More recently, the model has been applied to understand patients' response to disease symptomology, lack of engagement, lifestyle behaviors (e.g., exercising), and behaviors related to physical or mental illnesses, which may require behavioral interventions (Glanz & Bishop, 2010). Developed in the 1950s, the HBM suggests that the likelihood of engaging in health behaviors is dependent on the individual’s beliefs about health problems, perceived benefits of action, barriers to action, and lack of engagement in health-promoting behavior (Jones, 2014). A stimulus, or cue to action, must also be present in order to trigger the health-promoting behavior.

A major aspect of the HBM, *Cues of Action* refers to internal and external stimuli needed to activate the readiness of health behavior. Cues of Action are strategies to activate the decision-making process or health behavior. According to this concept, readiness to take action could be potentiated by other factors such as the presence of other comorbidities or environmental stressors. Cues to Action are the specific stimuli that facilitates the trigger a health behavior to integrate evidence into practice, such as depression screening. These cues may be internal such
as characteristic symptoms, family history of depression or personal knowledge about depression and screening; or external such as socioeconomic factors (e.g., stigma, cultural). Internal cues are associated with intrapersonal and communication. Both of these types of cues create awareness of a health threat. Important positive cues to depression screening reported by the USTFS and ADA recommendation, written materials, and open-discussion with clinicians.

Specific Aims

The purpose of this project is to implement a depression screening protocol for all adult patients with a diagnosis of diabetes in an outpatient endocrine clinic of a large university-affiliated teaching hospital located in metro Phoenix, Arizona. The primary aim of the study was to increase screening for depression in adults with diabetes thereby increasing referrals to behavioral health providers for those with positive screen. A secondary aim was to provide the clinical staff with knowledge to promote the use of the depression screening tools in clinical practice. This project considered the following clinical question: Does the implementation of a protocol for routine depression screening of adult patients with diabetes in the outpatient endocrine clinic result in early identification and proper referral?

Methods

The project was designed to initiate implementation of the Patient Health Questionnaire (PHQ) in clinical practice, collect data over a time period, and then do a retrospective chart review to collect that data. The proposed project called for screening for depression among adults with diabetes presenting to the outpatient endocrine clinic during regular business hours. Patients were seen by an inter-professional team comprised of medical doctors, nurse practitioners, endocrinologists, and certified medical assistants (MAs). Despite of the knowledge and proficiency of the health care professionals in management of the comorbid conditions in
clinical practice, patients visiting the study clinic were not being routinely screened for
depression. To address this gap, we implemented a universally accepted and validated depression
screening tool, and created a protocol whereby the screening was conducted for all patients with
diabetes. This quality improvement project was conducted at the Diabetes and Endocrine
Institute affiliated with Banner University Medical Center in Phoenix (BUMC-P). The setting
was selected because a large majority of patients have a diagnosis of diabetes with and without
complications as well as other comorbid conditions. The specialty clinic averages thirty patients
daily of which 4 to 5 are seen for diabetes management, and is comprised of three providers,
both physicians and nurse practitioners. The project was conducted over a 4-week period. In this
quality improvement project, the data was collected retrospectively from electronic health
records (EHR) of eligible patients at the outpatient endocrine clinic from October 15, 2018 to
November 15, 2018. The results of the depression screening were entered in the patients’ EHR.

Tools

To ensure the reliability and validity of the project methods, this study used the PHQ-9
screening tool to screen for depression in target population. Subjects were assessed using the
Cerner built-in PHQ-9 (see Appendix A for questionnaire). The PHQ is a widely used instrument
developed by Spitzer, Williams, and Kroenke, (n.d). The screening tool is a well-accepted,
public domain depression screen (Spitzer, Williams, and Kroenke, n.d.). The PHQ-9, is a
standardized 9-item measurement tool that captures the presence and severity of depression to
provide reliable and valid measurement to assess and monitor improvement of depression
symptoms (van Steenbergen-Weijenburg et al., 2010). The questionnaire took approximately 3
minutes to complete and was offered in the patient’s preferred language and method of
communication. The respondents’ rate the severity of each question using a 4-point Likert scale,
ranging from 0 (not at all) to 3 (nearly every day) (Spitzer et al., n.d.). The scale is then scored by summing up the items, a score of 10 or higher indicates the presence of moderate depressive symptoms. For this study, patients who score a 10 or higher are considered “referable.” According to Khamseh et. al (2011), the “cut off point that is most widely used to indicate a positive case or depressive disorder is the sum score of 10 of higher” (p. 2). A PHQ-9 score ≥10 has a sensitivity of 88% and a specificity of 88% for major depression (Spitzer et al., n.d.). Depression screening, using a valid tool is particularly important in proper identification and treatment of depression and is considered applicable for the diabetes population (Janssen et al, 2016).

**Intervention**

In accordance with BUMC-P and regulatory requirements for the review and approval process preliminary ideas for this scholarly project were discussed with the Director of Professional Practice (DoPP) and in collaboration with practice/faculty mentors. Approval for this study was obtained by the appropriate IRB prior to implementing the project. The project was approved by the practice setting on July 6, 2018 (see Appendix B for letter from Banner). This scholarly initiative was supported by the Banner Director of Nursing Research and letter of support was issued on August 10, 2018 (see Appendix C for support letter). Additionally, the scholarly project was orally presented to the Banner Research Review Committee for approval and feasibility on August 8, 2018. Approval was secured from the Banner Health Research Determination Committee (RDC) on behalf of Banner Health IRB Chair on September 13, 2018 for the retrospective review and implementation of the screening protocol (see Appendix D for Banner review letter). This scholarly project was determined ‘Not Research’ on July 30, 2018.
and thus did not require the IRB review and approval by the IRB of Northern Arizona University (see Appendix E, NAU Determination Letter).

Following determination from the appropriate IRB, all staff and providers were required to participate in a 20-minute educational session as part of the training. In compliance with institutional policy and procedures, a team comprised of medical doctors, nurse practitioner, and certified medical assistants were educated about the depression screening tool and the purpose and guidelines of the project. For this study, a PowerPoint presentation was used to ensure environment readiness and understanding of the project. The session included definitions of depression and elements of the study which included documentation requirements and duration of study. A series of meetings were held over the course of the 4-week study period to review the project process and engage staff as needed.

The MAs were instructed to administer the PHQ to all diabetic patients between October 15, 2018 and November 15, 2018. Adult patients with diabetes presenting to the outpatient endocrine clinic located in Phoenix for routine visits were asked to complete the first two questions of the Patient Health Questionnaire-2 (PHQ-2) of the Patient Health Questionnaire-9 (PHQ-9) in their preferred language (English or Spanish) and method of communication (written or verbal) during the usual intake and rooming process. A laminated copy of the PHQ was given to patients and MAs recorded the score into a password web-based electronic health record (EHR) screening template in Cerner computer software, designed to capture positive depression screens. Subjects were given the right to refuse to complete questionnaire. Patient completed the PHQ-2 and if positive (depression score >3), this was followed by completion of the remaining seven questions on the PHQ-9 (See Figure 1 for Algorithm). Sample items include, “Over the last 2 weeks, how often have you been bothered by any of the following problems?” The first
items are “little interest or pleasure in doing things” and “feeling down, depressed, or hopeless.” Patient response ranging from 0 (not at all) to 3 (nearly every day) (see Appendix A). The depression scale was then scored by summing up the items, with PHQ-9 scores of 5, 10, 15, and 20 indicating mild, moderate, moderately severe, and severe depression, respectively (see Appendix A). The medical assistant recorded the score and documented demographic data into a password web-based EHR, the providers then reviewed depression scores, if the PHQ-9 score was 10 or higher, the patient was offered referral for proper diagnosis, treatment, and follow-up.

After the study period was completed, the PL completed a retrospective chart review. A total of 54 charts were reviewed for administration of the PHQ. Charts were filtered using the inclusion of adults over the age of 18, new and established patients of the outpatient endocrine clinic with confirmed diagnosis of diabetes (type 1 or type 2) – diagnosis codes include: E10/E11. Exclusion criteria was based upon International Classification of Diseases, Tenth Revision (ICD-10) diagnosis codes and included patients with bipolar disorder (F31), schizophrenia (F20), psychosis (F29), or existing use of antipsychotic/antidepressant medication. After charts were reviewed and excluded based on criteria, 40 charts met the criteria for this study. The EHR was accessed to collect de-identified patient data. Charts were reviewed for depression screening completion rates (e.g. Yes/No if the PHQ was administered), PHQ scores, rate of referrals (e.g. Yes/No was patient referred), as well as demographic data: sex, age (e.g. 46 years), race/ethnicity, and recent hemoglobin A1c. Demographic information was linked to “subject 1, subject 2, subject 3, etc.” Results were tabulated using a Microsoft Excel spreadsheet on a workplace – owned computer. Statistical analyses of data were conducted using a pie chart and histogram to represent data collected and to summarize data.

**Study of the Intervention**
With the growing numbers of people with diabetes and the increasing prevalence of comorbid depression, patients visiting the study clinic were not being routinely screened for depression. To address this gap, we developed a clearly stated depression screening protocol, and the incorporated valid and brief depression screening tools and entering the results into the patients’ electronic health records. The number of depression screenings was determined by retrospective chart review following education intervention. A tally was then calculated to identify the number of screenings and rate of referral. PHQ-9 scores were collected at each clinic visit and recorded in EHR. Providers assessed corresponding disease activity using the PHQ-2 and PHQ-9. Patient with a at least moderate depression (PHQ score ≥ 10) were offered referral, if indicated. The protocol outlined the criteria for screening adult patients for depression using the PHQ. Following the 4 weeks, post intervention assessment was completed using retrospective review of 40 patients screened during the 4-week study period. This approach determined whether the observed outcomes were due to the intervention. This approach further allowed the PL to evaluate the rate of depression in relation to positive screens to meet the established aim. By the end of the study period, screening intervention in this clinic had significantly improved, but rate of referrals was not impacted since none of the 40 screens resulted in a positive screen. Prior to educational intervention, screening was not routinely done in clinic and after the educational intervention it was identified that screening PHQ scores were collected at each clinic visit.

Measures

To ensure the reliability and validity of the project methods, this study used the PHQ-9 screening tool to screen for depression in target population. Following the education of the staff, data was collected from the electronic health records by PL by means of retrospective chart
review. Results were tabulated using a Microsoft Excel spreadsheet on a workplace – owned computer. Of the forty 40 patients, none of them screened positive based on the PHQ tool. The PL compared the screening performance with the rate of screens administered based on the number of positive depression screens identified and the number of referrals for depression in diabetes population. This allowed the PL to investigate the system change of adding a depression screening protocol. Ongoing assessment was achieved by follow up sessions to ensure staff remained engaged and were completing depression screening which contributed to the success of the screen protocol. Despite efforts to screen all diabetic patient, none resulted in positive screen or referrals. Methods employed for assessing completeness and accuracy of data consisted of assessment of depression using self-reported questionnaire.

**Analysis**

The primary aim of this study was to improve early detection, referral, and management of diabetic patients with depression. Descriptive statistics were used to present primary outcomes. Descriptive statistics summarized the sample characteristics and calculated on demographic, age, sex, screen score, and outcome and analyses was stratified respectfully (see Table 2). Quantitative measures were used to determine if a specific change lead to improvement based on number of screens administered, positive screens identified, and number of referrals. Comparisons of groups after the 4-week period were examined. Descriptive statistics summarize the sample characteristics and variable of interest. At the end of the 4-week study, all data was analyzed using a pie chart and histogram to summarize and represent statistical analyses (frequencies, percentages, means, medians, standard deviations) of date was conducted. According to Agency for Health Research and Quality (n.d.), histograms are helpful tools used to present variation of the distribution to evaluate project change when implementing quality of
process improvements (AHRQ, n.d.). The data being analyzed was based on rate of depression screens, identification of depression rates (number of positive depression screens) and referral rates for depression. The PL collected data based on implementation of the screening and rate of referral from a retrospective chart review after a month of screening was completed. This approach is most appropriate compared to other methods as it aligns with goal of improving EBP in the population (Vassar & Holzmann, 2013). The 4-week duration of the project may have influenced outcomes. The primary investigator would expect to see increase in positive screen if study were extended to one year.

**Ethical Consideration**

Given the well-documented association between depression and poor diabetic outcomes, the potential ethical issues to consider when screening for depression is that depression screening could subject patients to unnecessary mental health referral. Another possible concern is that some screening tools have been found to have a high false positive rate when used with patients not already identified as depressed. A way to address these areas is to (1) obtain approval from the IRB (2) inform the patient of the potential false-positive results (3) close monitoring of data to ensure patient safety (Moran, Burson, & Conrad, 2017). Further, this project did not collect information that could identify subjects. Provisions to protect the privacy of subjects and the confidentiality of data was maintained by not collecting information that could identify subjects. The only information that was gathered through chart review was demographic data (i.e. gender, age, race/ethnicity, hemoglobin A1c, depression score and rate of referrals). Demographic information was linked to “subject 1, subject 2, subject 3, etc.” No informed consent process was necessary given the nature of patient information utilized (e.g. de-identified data). Data was stored on a Banner-issued laptop. Laptop could only be accessed by PL with use of password.
Password was not shared with anyone and was stored on site in PLs office. Collection data was not shared outside the data collection setting. Microsoft Excel spreadsheet will be deleted after completion of study or as directed by IRB regulation. No potential conflicts of interest were identified that could affect effectiveness or credibility of this study. Patients were given the right to refuse to complete the questionnaire.

Results

There was no significant association between increased screening and number of positive screens during the timeframe of the project. The project was designed to initiate implementation of the PHQ in clinical practice, collect data over a time period, and then do a chart review to collect that data. Patients completed the PHQ-2 and if positive (depression score >3), this was followed by completion of the remaining seven questions on the PHQ-9. The depression scale was then scored by summing up the items, patients who screen 10 or higher were offered referral to mental health provider for proper evaluation and management, if indicated (See Figure 1 for Algorithm). During the 4-week study period (October 15, 2018 to November 15, 2018) this clinic saw a total of 54 patients with diabetes. Of those 54 patient encounters; 42 patients (78%) were administered the PHQ and 14 (22%) were not screened, for reasons unclear (see Figure 3). In all, this project screened 42 adult patients with diabetes.

After four weeks, the PL conducted a retrospective chart review which showed a total of 42 patients were administered the PHQ-9, two met exclusion because were currently receiving treatment for depression. The total sample size was 40 patients (N=40); 12 (30%) of patients with type 1 and 28 (70%) with type 2 diabetes and ranged in age between 18 to 88 years (mean = 56.6). Males constitute 20 (50%) of the sample and females 20 (50%). In 82% of subjects, the onset of diagnosis of diabetes was greater than two years ago. Table 2 shows subject
characteristics. Among those who received PHQ-9 screening, 32% (80%) reported absence of depressive symptoms, eight (20%) exhibited “minimal” depressive symptoms (PHQ score 0-4), and 0% exhibited moderate to severe depressive symptoms (PHQ score >10) (see Figure 2 Depression Severity). Over half, 53% (N=21) of the subjects in the study, the hemoglobin A1c (A1c) level was ≤ 7% which is indicative of reasonably good glycemic control, 47% (N=19) of the subjects in the study, the A1c was > 7% which is indicative of poor glycemic control. The hemoglobin A1c ranged from 5.8% to 12.1% with an average A1c of 7.6 percent. The variation in distribution of A1c is presented here as a presumptive explanation for low depression scores in this study. The number of subjects screened relatively exhibited good glycemic control (A1c level <7 in 53% (N=21) of the sample).

**Summary**

The goal of this study was to determine if the implementation of a protocol for routine depression screening of adult patients with diabetes in the outpatient endocrine clinic resulted in early identification and proper referral. Also provide the clinical staff with knowledge to promote the use of the depression screening tools in clinical practice. Prior to educational intervention there were no depression screens completed in this clinic to compare post intervention. The use of depression screening tools provides numerous advantages, including recognition of comorbid depression that clearly indicate a need for management recommendations. In this retrospective review, this DNP student analyzed current evidence from a comprehensive literature review to examine if the implementation of a protocol for routine depression screening of adult patients with diabetes in the endocrine clinic resulted in early identification and proper referral. This study showed that while implementing a depression screening protocol improved routine screening in this clinic, it did not lead to any positive screens resulting in referrals. The project
strength identified was the effective communication between provider and interprofessional collaborative team to ensure success of the quality improvement project. Effective communication is vital among the multidisciplinary team as this contributes to the identification of needed education and resources, as well as potential barriers to the implementation of this protocol.

**Interpretation**

Prior to the implementation of this project, educational intervention there were no depression screens completed in this clinic to compare post intervention. Because of that, there was no data to compare. While this study showed that educating staff and implementing a depression screening protocol improved routine screening in this clinic, it did not lead to any positive screens resulting in referral. A comprehensive literature review and an analysis of current evidence was examined and several studies found that routine depression screening of adult patients with diabetes resulted in early identification and prompt referral (Naskar et al., 2017). Evidence supports depression screening; this study’s results were not consistent with other studies that found a significant relationship between screening positive identification of depression among patients with diabetes. Diabetes management requires careful assessment of clinical, functional and psychosocial factors. Missing an opportunity to identify and properly treat depression can lead to nonadherence to medications and can also lead to social isolation (Alonso-Moran et al., 2014; Reus et al., 2017). In an effort to reduce the quality gap to meet challenges in today’s rapidly evolving healthcare system it is particularly important for clinicians to be cognizant of the impact comorbid depression has on people and systems as a whole. For comorbid depression can interfere with patients’ ability to perform diabetes self-care adding to the economic burden. Possible reasons for differences between observed and anticipated
outcomes could be the allotted time frame of this study. No additional cost was associated with implementation of screening tool because the screen was completed during intake and was built into Cerner taking approximately 3 minutes to complete.

**Limitations**

Limitation identified in this study is that data was collected using self-reported questionnaire which may result in social desirability bias. Limitations or risks related to subjects: Screening tool may produce a false-positive result; subjecting patients to mental health referral and possible unnecessary treatment. These risks can be minimized by ensuring patients have a thorough subjective and objective assessment and evaluation. Other limitations to this study was that it was a retrospective study of routinely collected data (Vassar & Holzmann, 2013). The retrospective review method used for this study was compromised because not all 54 patients presenting to the clinic were screened. Also, the duration of the project and clinic type were identified limitations. The practice setting is a specialty clinic with tighter control of patients with diabetes resulting in low depression screens.

**Conclusions**

Comorbid depression among adults with diabetes is a serious health problem with adverse consequences so, screening for this problem is imperative. In this study we sought to review increase depression screens in an effort to identify positive screen and increase rate of referral to mental health providers among patient with comorbid depression. Diabetes and depression are both chronic disorders that involve ongoing management and patient education thereby decreasing complications, improving quality of life, and minimizing the economic burden. Depression is not only widespread among individuals with diabetes, but it is also a disorder that usually responses to appropriate intervention. Therefore, early recognition and
screening for depression should be a crucial component of any treatment plan for a patient with diabetes and key to reducing morbidity and mortality. Accumulated evidence shows screening for depression appears to decrease negative health outcomes among patients with diabetes and may be a cost-effective way to reduce the risk of adverse outcomes. It is particularly important for clinicians to screen for diabetes and depression at routine visits to ensure early recognition, treatment, and proper follow-up care for depression. The aim of this DNP project is not only to identify, properly refer, and treat diabetic patients with comorbid depression, but also implement a sustainable protocol to assist in screening for depression in the diabetic population.
References


Kearns, B., Rafia, R., Leaviss, J., Preston, L., Brazier, J., Palmer, S., & Ara, R. (2017). The cost-effectiveness of changes to the care pathway used to identify depression and provide
treatment amongst people with diabetes in England: A model-based economic evaluation. 

*Health Science Services Research, 17*(78), 1-10. doi: 10.1186/s12913-017-2003-z


### Table 1. Evidence Table

<table>
<thead>
<tr>
<th>Citation Author(s), Date of Publication &amp; Title</th>
<th>Conceptual Framework</th>
<th>Design/Method</th>
<th>Sample/Setting</th>
<th>Major Variables Studied and their Definitions</th>
<th>Measurement of Major Variables</th>
<th>Data Analysis</th>
<th>Studying Findings</th>
<th>Appraisal of Worth to Practice Strength of the Evidence (i.e., level of evidence + quality [study strength and weakness])</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Reus, G. Z., Dos Santos, M. A., &amp; Strassi, A. P., Abelaira, H. M., Ceretta, L. B., Quevedo, J. (2017). Pathophysiological mechanisms involved in the relationship between diabetes and major depressive disorder. <em>Life Sciences, 183</em>(1), 78-82.</td>
<td>None stated</td>
<td>Systematic review Meta-analysis of 24 studies Longitudinal studies</td>
<td>1-study showed high prevalence of MDD in diabetic patient 7.8 and 12% for MDD and depressive symptoms 1-longitudinal study 40% of DM developed MDD Neurological studies show various abnormalities in individuals with MDD (Maes, 2012) 1-study shows obesity found to contribute to 55% of DM2 cases (CDC, 2004) 10-year study in Norway</td>
<td>IV= HbA1c measurements IV2= Depressive symptoms DV= Demographic profile</td>
<td>Self-report Depressive symptom questionnaires</td>
<td>DM2 has the highest prevalence amongst the 4 types reaching 90% of patient worldwide Estimated that 20-30% of patients develop MDD in its various forms (Anderson, 2001) 704 DM individuals participating in this study where 48.27% were positive for MDD</td>
<td>Study showed a prevalence of between 7.8 and 12% for depression and depressive symptoms in diabetic patients MDD and DM affect QOL and have an impact. Further increasing complications</td>
<td>Conclusion: Further investigation is necessary in studying the mechanisms which connect these two conditions, so that prevention of one may improve the QOL, prevent complications, and reduce economic burdens</td>
</tr>
<tr>
<td>(2) Lin, M., Von Korff, J., Alonso, M. C., Angermeyer, J. Anthony, E. Mental Disorders among persons with diabetes—results from the World Mental Health Surveys. <em>Journal of Psychosomatic Research.</em></td>
<td>None stated</td>
<td>From 2001-2004, 18 surveys of household-residing adults were conducted in 2 phases across 17 countries. (Part 1, N=85,008). Diabetes was ascertained by self-report (Part 2, N=42,697). Association was</td>
<td>G= M/F A= ≥ 18 years old Setting: 17 countries in Europe, America, Middle East, Africa, Asia, and South Pacific</td>
<td>IV= Depressive symptoms DV= Treatment rates Prevalence of DM Sample characteristics</td>
<td>All surveys used the World Mental Health–Composite International Diagnostic Interview Population sample surveys Self-report</td>
<td>Risk of mood and anxiety disorders was slightly higher among persons with diabetes relative to those without: odds ratio of 1.38 for depression (95% CI=1.15–1.66) and 1.20 for anxiety</td>
<td>Studies show that there is a high prevalence of depression in diabetic patients Association was assessed by age gender adjusted odds ratios.</td>
<td>Conclusion: Population sample surveys revealed mood and anxiety disorders occurred with somewhat greater frequency among persons with diabetes than those without diabetes. Prevalence of major depression</td>
</tr>
</tbody>
</table>
### Research, 65(6), 571-580

Assessed by age-gender adjusted odd ratios. Disorders, (95% CI=1.01–1.42), after adjusting for age and gender. Odds ratio estimates across countries did not differ more than chance expectation. Alcohol-use disorders were uncommon among persons with diabetes in most countries, and not associated with DM in pooled survey data.

Alcohol-use disorders were uncommon among persons with diabetes in most countries, and not associated with DM in pooled survey data. Strength of association did not differ significantly across disorders or countries.


None Stated

Comparative study

Population-based cohort study

N= 50 patients diagnosed with DM

A= ≥ 18 years

G= M/F

Ed= lower literacy and socioeconomic status

Married

Duration of DM > 2 years

Setting= Tertiary Care Hospital in North India

IV: Blood glucose measurement

HbA1c measurements

Oral glucose tolerance

Self-reporting

Medical files

DV:

Standardized rating scales for depression and anxiety (HAM-D HAM-A)

HAM-D

DM1 group 33.3% (8) males were depressed whereas 42.3% (11) females had depression. A total of 38% (19) patients with DM1 were depressed; DM2 group 40.9% (9) males and 42.8% (12) females were depressed. Overall, 42% (21) patients with DM2 were depressed.

HAM-A

DM1 group 37.5% (9) males and 50% (13) females had anxiety; DM2

DM1 mean age was 34.2 years; DM2 was 47.8

Study concludes that DM1 and DM2 are slightly different in terms of psychiatric illness. Depression is associated with hyperglycemia and an increased risk for diabetes complications; relief of depression is associated with improved glycemic control.

Conclusions: Further sensitization of health-care professionals, especially in primary care, is imperative, to enhance timely detection and treatment of depression.
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Stepped-care algorithm</td>
<td>RCT</td>
<td>N= 387 diabetic patients (96.5% Hispanic) with depression August 2005-July 2017 and followed over 18 months Settings: Public safety-net clinics</td>
<td>IV=intervention group (INT) included problem solving therapy and/or antidepressant medication First-line treatment choice Telephone treatment response Adherence Relapse prevention Systems navigation assistance DV=EUC Depression educational pamphlets Community resource list</td>
<td>Symptom Checklist-20 depression score INT group had significantly greater depression improvement (≥50% reduction in Symptom Checklist-20 depression score from baseline; 57, 62, and 62% vs. the EUC group’s 36, 42, and 44% at 6, 12, and 18 months, respectively; odds ratio 2.46–2.57; P &lt; 0.001). Mixed-effects linear regression models showed a significant study group–by–time interaction over 18 months in diabetes symptoms; anxiety; Medical Outcomes Study Short-Form Health Survey (SF-12) emotional, physical, &amp; pain-related functioning; Sheehan disability; financial situation; &amp; number of social stressors (P = 0.04 for disability)</td>
</tr>
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<tr>
<td>Mathematical Model used to assess the cost effectiveness of potential changes (policies) to the care pathways: improved opportunistic screening for depression, collaborative care for depression treatment, and combination of both United Kingdom Prospective Diabetes Study Outcomes Model version 2 (UKPDS OMv2)</td>
<td></td>
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<tr>
<td>A mathematical model of care pathways experienced by individuals with DM2 was developed. Both an NHS perspective and wider social benefits were considered. Evidence was taken from published literature</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demographics A= Adults G= M/F R= English E= Setting=</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n= 647 (39.1%) individuals with pre-diabetes n= 1009 (60.9%) individuals with non-diabetes A= 35-74 G = M/F R= Chinese FH= first degree relative</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV= Depressive symptoms DV= Depression treatment</td>
<td></td>
<td></td>
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<tr>
<td>A study showed that implementing a 12-month depression treatment program for people with diabetes led to reduced outpatient resource use</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Limitations: Lack of relevant and robust evidence Evidence for this association was limited as it was derived from a single non-randomized study Lack of probabilistic sensitivity analysis to evaluate the uncertainty in the results</td>
<td></td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>None Stated</td>
</tr>
<tr>
<td>Stratified cluster sampling method Population-based diabetes screening program in 2009 were re-examined in 2012-2013. Changes at the end of 3 years in HRQoL, depression, BMI, weight, frequency</td>
</tr>
<tr>
<td>n= 647 (39.1%) individuals with pre-diabetes n= 1009 (60.9%) individuals with non-diabetes A= 35-74 G = M/F R= Chinese FH= first degree relative</td>
</tr>
<tr>
<td>IV= Diabetes education Health promotion activities Printed materials Audio visual media Internet Free distribution of information booklets</td>
</tr>
<tr>
<td>Population-based diabetes survey 1) HRQoL Measurement 2) Depressive Symptom Measurement (ZSDS) 3) Physical Activity Questionnaire 4) Food Questionnaire</td>
</tr>
<tr>
<td>At baseline, 39.1% (647/1656) individuals has pre-diabetes In men, with non-diabetes the mean (SD) 15D depression scores were 0.974 (0.04) at baseline and</td>
</tr>
<tr>
<td>Limitations: First population based study to use preference-based instrument to evaluate the impact of diabetes screening program Assessing impact of screening or diagnosis on physical, mental, and emotional</td>
</tr>
</tbody>
</table>
### Screening for Comorbid Depression

<table>
<thead>
<tr>
<th>Study Details</th>
<th>Methods</th>
<th>Participants</th>
<th>Outcomes</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dhavale et al. (2013)</td>
<td>Patients were collected using a specially designed semi-structured proforma.</td>
<td>N=100</td>
<td>0.973 (0.05) at follow-up; and 0.971 (0.05) and 0.966 (0.06) with pre-diabetes</td>
<td>Well-being is complex because of presence of many other influencing factors which cannot be isolated or controlled. Limitations: HRQoL in individuals labeled pre-diabetes was not assessed within 1-2 weeks after screening test results; short term psychological effects of screening undetermined.</td>
</tr>
<tr>
<td>Li et al. (2013)</td>
<td>Systematic Review</td>
<td>10 RCTs N=998</td>
<td>Data thus collected was analyzed using SPSS Software</td>
<td>Prevalence of depression with/without anxiety in the study was 39%. Among depressed patients stressors were found in 84% of patients with social and interpersonal stressors as the more prevalent types. 47% of the patients started on escitalopram showed lower fasting and post-lunch blood sugar values on follow up, which was clinically and statistically significant.</td>
</tr>
</tbody>
</table>
### Inclusion Criteria:
- RCT of CBT conducted with DM patients with depression ≥ 6 month duration
- Review Manager version 5.3 was used to obtain pooled results

### IV2=
- Control groups
- No treatment
- Usual care
- Basic diabetes education

### DV:=
- Depression
- Glycemic control
- QOL

### CES-D
- BDI
- PHQ-9
- DSM-IV
- HAMD

### A=
- ≥ 40 years old

### IV2=
- Control groups
- No treatment
- Usual care
- Basic diabetes education

### DV:=
- Depression
- Glycemic control
- QOL

### Compared to control groups, the CBT groups had statistically significant, long-term improvements in depression
  SMD = -0.65, 95% CI -0.98 to – 0.31, P=0.0002
  QOL SMD 0.29, 95% CI 0.08 to 0.51, P=0.007
  Fasting glucose SMD 0.21, 95% CI 0.04 to 0.37, P=0.01

### 2) Study found that CBT can be effective in reducing depression symptoms and fasting glucose in DM patients with comorbid depression as well as improve QOL.

### Limitations:
- Signiﬁcant variations in outcomes
- Overall results reveal signiﬁcant heterogeneity exists
- All studies were rated as high risk of bias for blinding of participants and personnel
- There may missing information as investigators were unable to collect additional information from authors from original studies
- Study size limiting data

### Conclusion:
Further research is needed to help
response at 6 and 12 months follow up 4 trials evaluate treatment response rate at 6 months follow (RR= 1.64, 95% CI=1.28-2.10; P=0.33 for heterogeneity MD= -.13, 95% CI= -.46=0.19 clarify whether collaborative care can be implemented outside the U.S.

| (10) Alenzi, E. O., Sambamoorthi, U. (2016). Depression treatment and health-related quality of life among adults with diabetes and depression. Quality of Life Research, 25(6), 1517-1525 | 1-RCT found that those who received paroxetine treatment had better HRQoL (Paile-Hyvarinen, 2007) 1-RCT examined the effect of sertraline and found no significance in HRQoL (Echeverry, 2009) 1-RCT showed combination of CBT and escitalopram improved self-reported outcomes (Lam, 2013). | Individuals who received psychotherapy with or without antidepressants had higher PCS scores vs. those without any treatment for depression (beta=1.28, p < 0.001) Individuals who reported using only antidepressants had lower PCS scores (beta= -0.54, p < 0.001) vs. without depression treatment. | Limits: Data on all variables were self-reported may be bias Study focused on individuals with diagnosed depression and may have missed individuals who fail to receive treatment or undiagnosed |
| Andersen behavioral model was used to guide the selection of other independent variables that may affect the HRQoL | Retrospective longitudinal study design with a baseline period (1 year) and follow-up period (1 year) Medical Expenditure Panel Survey Inclusion: Adults ≥ 18 years with DM and depression | RCTs A= 50-70 years G= M/F (64.3%) Ed= most had at least high school education (77.6%) | IV= Depression treatment Only antidepressant use Psychotherapy with or without antidepressants No treatment DV= HRQOL measurement Physical functioning Role limitations | SF-12 version 2 PCS SF-12 MCS OLS SF-36 Self-reported ICD-9-CM | Conclusion: Associations between depression treatment and the HRQoL varied by the type of depression treatment and the component of the HRQol measures |
| DV= Dependent variable DM2= Diabetes Mellitus Type 2 DM1= Diabetes Mellitus Type 1 ES= Effect size HAM-A= Hamilton Anxiety Rating Scale HRQoL= Health-related quality of life IV= Independent variable INT= Intervention | 78x139 | 78x130 | 78x122 | 78x113 | 78x105 | 78x96 | 78x88 | 78x79 | 402x139 | 402x130 | 402x122 | 402x113 | 402x105 | 402x96 | 402x88 | 402x79 |
Table 2
Sample Characteristics

<table>
<thead>
<tr>
<th>PHQ Screen</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall, N (%)</td>
<td>40</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>20 (50%)</td>
</tr>
<tr>
<td>Male</td>
<td>20 (50%)</td>
</tr>
<tr>
<td><strong>Race</strong></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>24 (62%)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>9 (23%)</td>
</tr>
<tr>
<td>African</td>
<td>4 (10%)</td>
</tr>
<tr>
<td><strong>T2DM</strong></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>28 (70%)</td>
</tr>
<tr>
<td>No</td>
<td>12 (30%)</td>
</tr>
<tr>
<td><strong>Severity</strong></td>
<td></td>
</tr>
<tr>
<td>None to Minimal (0-4)</td>
<td>32 (80%)</td>
</tr>
<tr>
<td>Mild (4-9)</td>
<td>8 (20%)</td>
</tr>
<tr>
<td>Moderate to Severe (10-14)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>
Figure 1

Algorithm

MA will administer PHQ-2

Score PHQ-2

PHQ-2 >3

No Action Needed

PHQ-2 <3

No Action Needed

MA asks remaining 7 questions of PHQ-9

Score PHQ-9

PHQ-9 <10

No Action Needed

PHQ-9 >10

Consider Referral
Figure 2

Depression Severity

Depression Severity

Moderate to Severe
Mild (4-9)
None to Minimal (0-4)
Figure 3
Rate of PHQ Screens

RATE OF PHQ SCREENS (N= 54)

- Screened (40) 75%
- Not Screened (14) 21%
- Excluded (2) 4%

Total (54)
### Appendix A

**PHQ-9 Questionnaire**

**PATIENT HEALTH QUESTIONNAIRE-9 (PHQ-9)**

<table>
<thead>
<tr>
<th>Over the last 2 wk, how often have you been bothered by any of the following problems? (Use “✓” to indicate your answer)</th>
<th>Not at all</th>
<th>Several days</th>
<th>More than half the days</th>
<th>Nearly every day</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Little interest or pleasure in doing things</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>2. Feeling down, depressed, or hopeless</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>3. Trouble falling or staying asleep, or sleeping too much</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4. Feeling tired or having little energy</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>5. Poor appetite or overeating</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>7. Trouble concentrating on things, such as reading the newspaper or watching television</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>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</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>9. Thoughts that you would be better off dead or of hurting yourself in some way</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

For Office Coding: 0 + 1 + 2 + 3 = 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?

<table>
<thead>
<tr>
<th>Not difficult at all</th>
<th>Somewhat difficult</th>
<th>Very difficult</th>
<th>Extremely difficult</th>
</tr>
</thead>
<tbody>
<tr>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
</tbody>
</table>
Appendix B
Banner Health Approval Letter

Dr. Sathya G Jyothinagaram, M.D., MRCP (UK), FACE
Executive Director, Institute of Diabetes and Endocrinology
Clinical Professor of Medicine,
University of Arizona College of Medicine at Phoenix

July 6, 2018

To Whom it may Concern

This letter serves to verify that Ms. Karina Aveduco, FNP-C can participate in the study to screen Adult patients with Diabetes, at the Institute for Diabetes and Endocrinology, Banner University Medical Center-Phoenix for depression, prompting early detection and thereby referral of the positive screens to appropriate personnel.

If you have any questions please feel free to reach out me.

Yours truly,

Sathya G Jyothinagaram, MD, MRCP (UK), FACE,
Exec. Director, Institute of Diabetes and Endocrinology
Appendix C
Banner Health Support Letter

August 10, 2018

Karina Avechuco, MSN, FNP-BC
NAU Doctoral Student

Dear Karina,

It is my pleasure to support your DNP project proposal: Implementation of Depression Screening Protocol to Improve Recognition of Depression and Proper Referral among Adults with Diabetes in the Outpatient Endocrine Clinic. Your study aligns with Banner Health’s mission to “make health care easier so life can be better.”

We welcome this opportunity to advance nursing education and professional nursing practice in our ambulatory patient setting. We would also like you to report the outcomes from your project after full implementation and analysis.

If I can be of any further assistance, please don’t hesitate to contact me.

Sincerely,

Sandra Thompson, MS, BSN, RN, NE-BC
RN Director of Professional Practice
Banner – University Medical Center Phoenix (BUMCP), Banner – University Medical Group (BUMG) Clinics, and Banner Alzheimer’s Institute (BAI)
Appendix D

Banner RDC “Not Research” Letter

September 13, 2018

Karina Avoshuco MSN, BSN, RN, FNP-BC
Diabetes and Endocrine Institute
1441 N 12th Street 2nd Floor
Phoenix, AZ 85006

RE: RDC Project: 18-013: Implementation of Depression Screening Protocol to Improve Recognition of Depression and Proper Referral Among Adults with Diabetes in the Outpatient Endocrine Clinic
Research Determination Committee Evaluation: Not Research, No IRB Review and Approval Required

Dear Ms. Avoshuco,

Thank you for your submission of the Banner Research Project Review and Determination Form which outlined the above noted project. The project information you provided was reviewed on September 11, 2018 by the Banner Health Research Determination Committee (RDC) on behalf of the Banner Health Institutional Review Board (IRB) Chair.

The RDC determined this project is not research per 45 CFR 46.102. As such, this project does not require IRB review and approval.

**PLEASE NOTE**

The RDC determination is based on the information you provided to the committee on your application version 2.0 dated 09/12/2018 and supporting documents. If the project is modified in any way, such as, but not limited to, re-analysis of data, adding/revising data sheets, changing team members or the addition of new information, the determination is no longer valid. You must resubmit a Banner Research Project Review and Determination Form to the RDC for review and approval.

Please note: As part of continuing process improvement, random audits are conducted to assess compliance and adherence with submitted/approved applications.

A copy of this letter will be placed in the RDC project file.

Sincerely,

Signature Redacted

Susan Colvin, MHSA, BSN, CCRP, CHRC
Human Subjects Protections Administrator, Banner Health
Appendix E

Northern Arizona University IRB “Not Research” Letter

To: Karina Avechuco
From: NAU IRB Office
Date: July 30, 2018

Project: Implementation of Depression Screening Protocol to Improve Recognition of Depression and Proper Referral Among Adults with Diabetes in the Outpatient Endocrine Clinic
Project Number: 1203628-1
Submission: New Project
Review Level: Administrative Review
Action: NOT RESEARCH
Project Status: Not Research

The project listed above does not require oversight by the Northern Arizona University Institutional Review Board because the project does not meet the definition of "research" and/or "human subject".

- **Not Research as defined by 45 CFR 46.102(d):** As presented, the activities described above do not meet the definition of research as cited in the regulations issued by the U.S. Department of Health and Human Services which state that "research means a systematic investigation, including research development, testing and evaluation, designed to contribute to generalizable knowledge".

- **Not Human Subjects Research as defined by 45 CFR 46.102(f):** As presented, the activities described above do not meet the definition of research involving human subjects as cited in the regulations issued by the U.S. Department of Health and Human Services which state that "human subject means a living individual about whom an investigator (whether professional or student) conducting research obtains data through intervention or interaction with the individual, or identifiable private information".

Note: Modifications to projects not requiring human subjects review that change the nature of the project should be submitted to the Human Research Protection Program (HRPP) for a new determination (e.g., addition of research with children, specimen collection, participant observation, prospective collection of data when the study was previously retrospective in nature, and broadening the scope or nature of the research question). Please contact the HRPP to consult on whether the proposed changes need further review.

Northern Arizona University maintains a Federally Wide Assurance with the Office for Human Research Protections (FWA #0000357).