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IMPLEMENTATION OF PATIENT HEALTH QEUSTIONAIRRE IN A PRIMARY CARE SETTING

STUDENT NAME: JAYKUMAR MARADIA

DNP PROGRAM CHAIR
& DNP TEAM MEMBER(S):
DR. KATHLEEN PATUSKY, MA, PhD, RN, CNS
DR. KALPESHKUMAR PATEL, MD

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Implementation of PHQ-9 in patients with chronic medical illness for detection of depression

Jaykumar Maradia

Rutgers University

DNP Chair: Dr. Kathleen Patusky, MA, PhD, RN, CNS

DNP Team Member: Dr. Kalpeshkumar Patel, MD

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Abstract

Chronic medical illness (CMI) is the leading driver of increasing health care cost. Undiagnosed and untreated depression can add fuel, leading to serious repercussions in patients with CMI. Patients with depression are 2-3 times more likely to develop the chronic medical illness (CMI). Depression is one of the most common mental health disorders with lifetime prevalence of 10.8-16.2%. Depression can be easily detected in a primary care office where only 50% of patients are currently being diagnosed. Patients with CMI visit their primary care doctors on a regular basis which makes the primary care office the best place to detect depression. Depression screening can be easily done using the Patient Health Questionnaire (PHQ) -9, a self-administered tool. The goal of this hybrid project was to increase detection rate of depression in patients with CMI at a primary care office in a suburban area of southern New Jersey. This was achieved by screening participants with PHQ-9 during the initial or follow-up visit. A targeted qualitative question was also asked to better understand patient's perception of frequent depression screening. The goal was to screen approximately 40 participants within an 8-weeks period. Screening for depression in a primary care office helps us to increase access and delivery of quality health service. Increasing the number of patients diagnosed for depression will lower the incidence of suicide and help patients to receive treatment at the same place. Patient satisfaction will increase as well.

Implementation of PHQ-9 in patients with chronic medical illness for detection of depression

Introduction

The lifetime prevalence of major depressive disorder (MDD) can vary from 10.8 - 16.2% of the population in different countries, which is a significant range (Cameron, Habert, Anand & Furtado, 2014). The relationship between depression and chronic medical illnesses (CMI) is bi-directional. Depression can worsen the outcomes of CMI (Ghanmi, Sghaier, Toumi, Zitoun, Zouari, & Maalej, 2017), just as CMI can engender depression. According to the Centers for Disease Control and Prevention (CDC), chronic medical disease/illness is defined as any illness which lasts longer than 1 year with ongoing medical attention or limits activities of daily living (CDC, 2018).

Chronic medical illnesses are the leading drivers of health care cost with amount of $3.3 trillion annually in United Stated (CDC, 2018). Chronic medical illnesses include diabetes, hypertension, stroke, cardiac disease, epilepsy, chronic lung disease, and so on. More than 50% of the population in the United States have one or more CMI. If we consider population of age >65 years, that figure is 85% (Wiley et al., 2015).

One-third of psychiatric visits to an emergency department are due to depression. Silent depression and occult suicidality incidents in emergency department patients may be as high as 30% and 13% respectively (Bhandari, Shi, Hearld & Mchugh, 2018). Studies have documented that these patients had regular visits to their primary care doctor to manage CMI. Patients will visit their primary care physician on a regular basis to manage chronic illness, but not for depression. This finding makes a primary care office the best place to detect depression before it compels patients to visit the emergency department. However, depression is still under-

recognized by the general practitioners and therefore under-treated (Thabet et al., 2017).

Undertreated depression has serious repercussions, mainly for the patients with chronic medical

illness.

Primary care physicians are the gateway to early detection of depression, especially in the

presence of CMI, because of the regular visits. Without early diagnosis of depression, patients,

families, and their loved ones suffer. As well, the health care economy is affected in a negative

way. MDD affects the population with chronic medical illness in variety of ways such as

reducing adherence to medical treatment, reducing participation in care, and reducing

occupational functioning. MDD is being considered as an independent risk factor for chronic

medical conditions (Cameron et al., 2014). If depression can be detected earlier than an annual

visit at the primary care visit, this can make a significant difference in the outcome. The Patient

Health Questionnaire (PHQ) is a self-administered instrument used to diagnose and monitor the

treatment of depression (Williams, 2014). Implementing use of the PHQ has demonstrated

effectiveness for primary care providers to detect undiagnosed depression.

Background and Significance

According to research, patients with chronic medical illness are 2-3 times more likely to

develop depression compared to the general population (Guthrie et al., 2016). Depression is one

of the major contributors of increasing health care costs as it not only leads to poor motivation of

self-care, but also leads to many chronic diseases. Several factors associated with depressive

symptoms include obesity promoting behavior, hypercaloric diet, lack of physical activity due to

lack of energy, and low motivation, all of which can lead to the development of CMI (Huang,

Dong, Lu, Yue & Liu, 2010). Depression occurs frequently but may be difficult to detect at a

primary care setting where patients present primarily with physical symptoms. The prevalence

rate of depression varies a lot worldwide (from 2.2 to 10.4%) due to cultural differences and

different objectives in mind when diagnosing and providing treatment. There is a big overlap

between depression and somatic complaints at the primary care setting. The result of the

variation in presentation profile is under- diagnosis and/or under- treatment of the depression.

Family practitioners (FPs) are the first point of care and gateway of the diagnosis (Nabbe et al.,

2017). Currently, the primary care providers are not able to identify 30-50% of patients with

depression, mainly older adults and patients with chronic medical illnesses (Agency for

Healthcare and Quality, 2013). Most of the primary care providers demonstrate a lack of

knowledge and training to assess depression. They also have insufficient time to provide an

assessment and/or do not feel comfortable in doing so with confidence. Current guidelines

suggest annual screening for depression. Implementation of systematic screening for depression

has been advocated by experts to improve detection, diagnosis, and treatment outcomes (Gray &

Dihingo, 2015).

       The presence of clinical depression and symptoms are elevated in patients with chronic

diseases. Studies of depressed adults indicate that they have poor functioning and outcomes with

chronic diseases, comparable to the adults without depression. Depression can not only lead to

development of chronic diseases, but also to a perception of poor health, under-utilization of

healthcare services, and increased healthcare costs. Depression is even a significant stressor for a

stroke; one systematic review showed that the presence of depression can lead to an increased

chance of having a stroke (Huang et al., 2010). Furthermore, depression itself is uniquely

disabling. A combination of depression with chronic health conditions increases the likelihood of

disability, leading to more disability days. The joint effect of chronic diseases and depression is

beyond that of an additive effect. Patients with chronic illness and depression are 13-times more likely to become disabled and utilize disability benefits. The disability proportion of those patients with depression and chronic diseases was 46.2%, compared to those with only depression as 15.9%. These numbers showed that patients who are chronically ill with depression are more likely to present with a greater number of medical symptoms at primary care settings, compared to the patients without depression (Deschenes, Burns & Schmitz, 2015).

Currently healthcare systems worldwide are struggling to manage the increasing population of patients with chronic medical diseases. Thirty percent of the population in England have one or more chronic medical illnesses, taking up approximately 70% of the entire healthcare budget. In United States, 80% of the overall healthcare budget is being spent on 50% of the population with chronic medical illnesses. For instance, people with diabetes are 1.5-3 times more likely to develop depression; depression rates are even higher among those with chronic obstructive lung diseases. Ultimately, increased rates of depression lead to poor outcomes for any disease, such as poor glycemic control and increased diabetic complications for diabetics. A study of 9-million people showed that patients with chronic illnesses with depression had an average monthly medical cost anywhere between 33% and--169% higher than those without depression. This finding does not include costs related to mental health services. (Guthrie et al., 2016).

Life stress is very important corner stone of outcomes in healthcare. It is well known that stress levels are high among patients with depression. The same goes for patients with chronic medical illnesses. Stress itself is well known as a factor which can lead to depression. This confluence creates a vicious cycle for the patients. Thus, it is important to identify depression early enough before it forms the cycle. Baseline depression is a significant predictor of an

emergency department visit. The higher the level of depression, the likelihood of having an

emergency hospital admission increase. Severe depression can have a 2-fold increase in

emergency hospital visits. Due to increased level of stress, patients with undiagnosed depression

will consult with their primary care physician more often than those without depression (Guthrie

et al., 2016).

The prevalence of CMI may be as high as 75% in the current working population. The

putative joint effect of having CMI and MDD leads to stress in life from possible personal loss of

consistency in life, poor physical health, loss of control over one's own body, and negative

changes in family. In addition, the presence of depression and CMI can lead to early burn out in

our working population (Armon et al., 2014). The more complex the illnesses, the higher the

chances the patients have of developing depression.

Given that the current depression screening rate is very low, only 2% of primary care

visits document the screening of depression. The increase in screening and identification would

most likely lead to an increase in diagnosis of depression and, thus, treatment. Numerous studies

have documented an important gap in the diagnosis and management of depression. The primary

care providers provide an important opportunity for the detection and treatment of depression in

timely manner (Duhoux et al., 2012). A systematic depression screening program can be

implemented to improve positive outcomes, helping patients to receive effective and timely

treatment of depression.

Needs Assessment

In a nationally represented sample of the United States ages 18 and over, the prevalence of depression increased to 25.7% in 2010 from 20.9% in 2005. Depressive disorder is the fourth highest global burden; it is projected that high-income countries will have highest burden by 2030. The fact is that 70% of these patients are not receiving treatment (Opperman, Hanson & Toro, 2017). The mission of this Doctoral Nursing Practice (DNP) project was to improve the process of detection of depression at a primary care setting, utilizing the PHQ-9 at the initial/follow up visit. The target population included those patients with chronic medical illnesses, such as chronic heart failure (CHF), diabetes mellitus (DM), epilepsy, chronic obstructive pulmonary disease (COPD), and hypertension (HTN). These patients often complaint of feeling tired or not feeling "good" overall to the staff of the office, but no action was being taken currently for the complaints. This issue could be effectively addressed by using a screening tool of depression, such as the PHQ-9. Research has demonstrated that depression is underdiagnosed and/or undertreated at primary care settings as discussed above.

The responsibility of the initial diagnosis and long term follow up of depression is falling on the primary care providers. They are the first contact for the patients. Depression is found in about 10 % of primary care patients (Watson et al., 2012). As per research evidence, only 50% of patients are being diagnosed without proper screening of depression. Unless asked directly, patients prefer not to say anything about depression for a variety of reasons which include, but are not limited to, stigma related to mental health diagnosis and thoughts that depression is out of the scope of primary care practice (Mitchell, Vaze & Rao, 2009). Many potential barriers to the routine screening include concerns about stigma which can play a role in losing existing patient to other providers, limited time for visits, poor insight about effects of depression on overall

quality of life, insurance reimbursement related to utilizing frequent screening tools, and limited

community and mental health resources for those who screened positive (Ell, 2006; Park &

Unotzer, 2012). Most of the patients diagnosed with depression present with a variety of somatic

complaints including chronic pain, lethargy, and headache. The vague nature of these complaints

makes it more difficult to detect depression (Tylee, Gandhi & Tylee, 2005).

Best Practice in Depression Screening

The U.S. Preventive Services Task Force recommends screening adults for depression

annually when there is support care available if needed (Siu et al., 2016). Studies such as

IMPACT and PROSPECT have shown that general medical ancillary personnel, such as nurses

and social workers, can be trained effectively to carry out effective screening. This screening can

lead to great reduction in depression-related risk for mortality. In the absence of screening, the

care provided is not enough. Although current guidelines recommend annual screening with

well-visits, there is a strong rationale for shorter screening intervals due to high presence of

subsyndromal depression, mainly in primary care patients. Depression is more prevalent in

patients living with medical risk factors, such as chronic medical illnesses. The Institute of

Medicine (IOM) indicates the need for the prevention of depression to avoid episodes of frank

depression and to stop chronicity of symptoms (Reynolds & Frank, 2016).

Gaps at Primary Care Setting

Yearly screening of depression is mandated at primary care settings by the Department of

Veterans' Affairs, yet MDD is being under-diagnosed and remains untreated. At this time, it is

only mandated to Veterans' Affairs health system only. Even after recommendations from the

U.S Preventative Task Force, only 21% of patients reported being screened for depression by

their family physician. Nationally, approximately 6.6% of Americans are depressed at any given year with a lifetime prevalence of 16.2%. Evidence of chronicity with impaired functional and occupational life is present. The health care system values that treatment during the acute phase of depression is cost effective. (Yano et al., 2012). Many times, one of the factors that leads to under- diagnosis of depression is the physician who is not comfortable asking questions related to mental health, specifically about depression (Duckett, ,2015).

The American Association of Family Practice (AAFP) model was utilized to identify the gap at the project site. The area of gap here was the lack of addressing the tiredness and feeling of not feeling well among patients by the primary care provider and staff of the setting. This gap was identified after conducting interviews with the medical assistant, the office manager, and the provider. Currently, patients with chronic medical illness are being screened for depression the same as patients without CMI: on an as- needed basis after the complaint of depression. Annual screening was being done informally without using any depression screening tool.

The relevant office provided services to a variety of 20-30 patients every day, including not only walk-in patients, but also patients with chronic medical illnesses. On an average, the frequency of appointments for patients with chronic medical illnesses is every 2-3 months. These visits can be utilized to screen the patients for depression on a regular basis to detect the early signs and symptoms of depression so that treatment could begin early enough to avoid further consequences. The target population consisted of patients of a variety of demographics including age and ethnicity. Per the provider, most of the patients have a chronic medical illness with frequent appointments to either emergency care or to a primary physician. The Project plan was discussed with the provider (the team member) and the chairperson to identify the need and benefits.

Problem/Purpose Statement

Given the bi-directional relationship between depression and chronic medical illnesses along with under- diagnosis of depression at the primary care setting, the identification and treatment of underlying depression is necessary. Depression leads to increased morbidity and mortality. The implementation of an evidence-based intervention for depression screening is recommended (Shoenbaum et., 2002; Saver et al., 2007). The lack of depression screening is associated with poor health outcomes along with serious consequences for the patient and family, affecting the community as well (Maurer & Darnall, 2012). These consequences can include geriatric patients committing suicide within months of the last appointment with their primary care provider (Raue, Ghesquiere & Bruce, 2014); indicating that depression is routinely undertreated, often under-diagnosed, and misunderstood at the primary care setting. The identification of untreated depression is the purpose of the project.

Clinical Question

The clinical research question is formed using the PIO format for the project as follows:

P – Patients with a chronic medical illness, age 18 years and above.

I – Screening depression using PHQ-9 and a qualitative question regarding experience of depression screening.

O – Early detection of depression.

T – Over a duration of 8 weeks.

PIO: In patients with chronic medical illnesses, will implementation of the PHQ-9 result in detection of depression?

Aims and Objectives

The World Health Organization (WHO) has identified addressing mental health at the primary care settings as of "utmost importance" (Watson et al., 2012). Early detection of depression was the aim in patient populations with chronic medical illnesses. The primary aim of the project was to improve the process of screening of depression, which is currently being done annually. The secondary aim was to fill the gap in screening of depression to improve timeliness of treatment.

There were three primary objectives of this project: 1) Identify, consent, and screen 40 patients with chronic medical illness for depression using the PHQ in a primary care setting over a period of 8 weeks; 2) Identify the prevalence of depression with chronic medical illness among consented patients at the primary care setting over period of 8 weeks; 3) By the end of 8 weeks' project, a theme will be identified using answers from qualitative question from a demographic questionnaire sheet.

Review of Literature

A literature review was conducted to objectively analyze available research to gain more insight into the problem question in March 2019. The clinical problem question was "In patients with chronic medical illnesses, will implementation of PHQ-9 result in early detection of depression in patients with chronic medical illness?" The following databases were utilized for the review: PubMed, CINAHL, Gray literature, Google scholar and MedLine. To achieve optimum search, the MeSH function in PubMed and the subject heading function was utilized in CINAHL. The population key terms used in the search were: chronic medical conditions, chronic medical illness. The outcome key terms used in the search were: depression, depressive disorder,

major depressive disorder. The intervention key terms used in the search were: public health

questionnaire, PHQ, PHQ-9, PHQ-2, depression screening tool. Terms from each category were

combined using Boolean term "OR" initially. To narrow down search, "OR" was replaced by

Boolean term "AND". Additional filters were applied for language and year published. Included

evidence are articles in English and published between 2002-2019.

Using PubMed, the initial search using key terms categories (population, intervention and

outcome) and "OR" resulted in 4,39,461 articles without applying any filters. After applying

filters and replacing "OR" with "AND", 82 articles were found in PubMed database. In the

CINAHL database, the initial search without filters resulted in 144,738 articles. When the search

was modified using Boolean term "AND", it resulted in 2 articles. After excluding the

intervention term, the search resulted in 763 articles. After the application of filters (year range,

language, and age), the search included 199 articles. Using MedLine, the initial search resulted in

96,288 articles with Boolean term "OR," which was narrowed down to 13 articles by replacing

term "AND".

Grey literature and scholarly articles searches were also performed using greylit.org and

the Google Scholar website. The search was modified in various ways to find pertinent relevant

information including year range, language, and age filters. In grey literature, many duplicates

were found when compared with PubMed and CINAHL databases. A very broad search was

performed in the Google Scholar website and manual sorting was performed. Reviewed articles

from the Google Scholar were appraised using the Johns Hopkins Research Evidence Appraisal

Tool. A total of 11 articles were accepted and included in the table of evidence of the project.

Please refer to Appendix A for PRISMA diagram.

Relationship of Depression and Chronic Medical Illness

Depression and chronic medical illness share a bidirectional relationship. Patients with depression die prematurely, approximately 5-10 years earlier, compared to the patients without depression. Patients who have a chronic medical illness have 2-3 times increased risk of depression (Katon & Katon, 2011). One meta-analysis of 6,916 subjects examined the prediction of depression among patients with chronic medical illness. Here, the pooled relative risk of depression was 1.60 (95% CI 1.37, 1.88) to predict diabetes. Due to concurrent development of depression and chronic medical illness, symptom burden and functional impairment are increased. Patients with depression make 2 times more visits to primary care on an average, and depressed patients are less satisfied with the care they received. Due to negative effects of depression on memory, energy, and executive function, the care of chronic medical illness becomes hard. Patients with major depression have 50-100% higher medical costs. Patients with depression also have 2-3 times more medical symptoms. Depression increases cardiovascular-related mortality by 2.6-fold and creates a 2.4-fold increase in all- cause mortality (Katon & Katon, 2011). Lin et al. study of 4,000 patients showed that patients with diabetes and depression have 10-fold increase in functional impairment. Similar findings have been observed in patients with CHF in a cross-sectional study as cited in Katon & Katon, 2011.

A systematic review conducted by DeJean and his team (Dejean, Giacomini, Vanstone, & Brundisini, 2013) discussed the importance of depression screening in patients with chronic diseases. According to World Health Organization (WHO) (2001), depression will be the 2nd leading public health concern by 2020, after cardiovascular disease. Point prevalence of depression in United States is 4.8% - 8.6% in the primary care settings (Dejean et al., 2013). A literature search was performed between January 2002 and May 2012. After analysis, the authors

identified three pathways of possible relationships: chronic disease leads to depression, depression leads to chronic disease, and a cyclical relationship. The majority of patients identified gradual progression from chronic disease to depression and felt "trapped in a different life" due to limitations imposed by depression symptoms, such as low energy and fatigue (Kouwenhoven, Kirkevold, Engedal, Biong, & Kim, 2011). Feelings of guilt related to chronic disease also add on to depression. A major barrier identified for identifying depression is an overlap of physical symptoms of chronic diseases and feelings of depression, such as the fatigue of both heart failure and depression. Another important finding was that clinicians tend to normalize symptoms of depression with those of chronic illnesses rather than identifying symptoms separately for depression and chronic medical illness. Most of the studies found that patients can experience depression due to the diagnoses of chronic illnesses (Dejean et al., 2013).

Depression leads to increased disability in adjusted life years and decrements in quality of life, patient safety failures, and high amounts of unscheduled care (Panagioti et al., 2016). One of the proven interventions is early detection of depression, which can be done at any primary care office as a collaborative care. The authors conducted a one-step meta-analysis, undertaken to avoid bias. A total of 76 randomized control trials (RCTs) and 86 independent comparison articles were included in the meta-analysis. A total of 10,962 cases were calculated, out of which 569 individual cases were ineligible due to missing baseline values. After analyzing the data, collaborative care showed significant improvement in short term depression outcomes. There was no difference noted in treatment effects of collaborative care after analyzing 10960 patients with a depression alone and in patients with comorbid chronic physical conditions (Panagioti et al., 2016).

    The relationship of depression and chronic diseases is well established. Mean life span of

patients with depression is 25-30 years shorter than those of general population. A total of 9.1%

of the adult population will report the presence of depression in the past 12 months of their life,

whereas 17% will report depression once in their lifetime (Voinov, Richie, Bailey, & Voinov,

2013). However, less than 50% of patients with depression get diagnosed and receive treatment

of the same. A review of literature was conducted by Voinov and his team from PubMed articles

searched from 1992 to 2012. According to the American Academy of Family Physicians,

approximately 54% of patients who have mental illness are being served in their primary care

offices. Forty-two percent of patients with clinical depression are diagnosed by the primary care

physicians. One of the research works, published by Mental Health America in 2011, noticed

that most patients with mental illness prefer to receive care from their primary care doctors,

possibly due to leftover stigmas (Voinov, Richie, Bailey, & Voinov, 2013). In underserved areas,

depression is undertreated due to cultural factors and lack of mental health facilities or providers.

Using already existing screening methodology and treatment modalities, depression can be well

taken care of by primary care physicians to improve overall quality of life. Given the bi-

directional relationship of depression and chronic medical illness, screening of depression should

be as routine as vital signs in order to achieve optimum outcomes. The American Health

Association Prevention Committee recommends routine screening of depression using the PHQ-

2 of all cardiac patients (Bigger & Glassman, 2010). If they are positive using PHQ-2, then it

should be followed by the PHQ-9 and referred for mental health care accordingly. This approach

was endorsed by the American Psychiatric Association in 2008 (Voinov, Richie, Bailey, &

Voinov, 2013).

Moussavi and his team conducted large scale study, a worldwide review of 245,404 participants across 60 countries from all around the world. A relationship between depression and diabetes and/or arthritis was well established (Moussavi et al., 2007). Depression leads to lower health status. The authors utilized data from WHO (World Health Survey, year) from a total of 60 countries. The diagnosis of depression was done using the International Classification of Diseases tenth revision (ICD-10) diagnostic criteria. From the worldwide participants, of those who had diabetes, 9.3% of them had depression as well and 10.7% of participants with arthritis had depression. Almost 23% (a quarter) had depression along with other chronic physical conditions. The prevalence of depression was significantly higher (3.2% higher; $p<0.0001$) between respondents with and without chronic diseases (Moussavi et al., 2007). Collected data demonstrated comorbidity between depression and chronic physical conditions. The findings were consistent with earlier studies leading to a high association of depression with chronic illnesses.

Banhato (2016) conducted a study at the Center for the Treatment of Chronic Diseases such as hypertension, diabetes, and chronic kidney disease in Brazil. This was a 3- month long study. Thirty to sixty percent of the total cases of depression were not being diagnosed at the primary care office. A total of 1,558 subjects were enrolled with an age range from 30 to 96 years. The depression prevalence was 33.3% (n=498), that comprises 1/3 of patient population. Quantitative and qualitative variables including mean, standard variation, absolute/relative frequencies, along with chi-square test for association were analyzed. The prevalence matches other studies done globally, showing that depression is under recognized, undertreated, underdiagnosed, and underestimated. The PHQ screening tool was utilized for screening purposes. This was a cross-sectional study with utilization of epidemiological screening scales.

The center where the study was conducted is for patients with chronic diseases, so the causal effect of chronic diseases on depression could not be understood. People with depression and chronic diseases are 5 times more likely to visit outpatient center or become hospitalized (Banhato, 2016).

PHQ-9 and Depression Screening

Hyphantis and his team (Hyphantis et al., 2015), in a cohort study, conducted screening of 349 patients with chronic medical illnesses such as diabetes, chronic obstructive pulmonary disease (COPD), chronic inflammatory rheumatic diseases, etc. The team visited accident and emergency departments using the Patient Health Questionnaire (PHQ). Out of 434 eligible patients, 349 patients were recruited who had at least one chronic medical illness over the duration of 18 months. The Likert-type scale PHQ-9 was utilized to screen for depression. The target was to check diagnostic accuracy of the PHQ-9. The diagnosis of depression was confirmed using the Mini International Neuropsychiatric Interview (MINI), the Symptom Distress Checklist, the Brief Illness Perception Questionnaire (B-IPQ), and the World Health Organization Quality of Life Instrument Short-Form (WHOQOL-BREF). The age range of the participants was 18 to 92 years. Using the MINI, 27.2 % (N=95) of patients were diagnosed with depression. The mean PHQ-9 score was 14.1 with standard deviation (SD) of 5.0. The higher PHQ-9 score was correlated with higher severity of depression ($p<0.001$). Using a cut of point of 8 on the PHQ-9, sensitivity was 90.5% with specificity of 89.4%, which is significantly reliable. The authors also described that the higher PHQ-9 score was related to the higher frequency of emergency department visits. The strength of this study was that the diagnosis of depression was confirmed using the MINI structured interview.

Chen at al. (2016) conducted a study enrolling 634 participants from the primary care settings to test reliability and validity of Public Health Questionnaire-9, and its subscales (PHQ-2, PHQ-1). There are a variety of screening tools available for depression, including the Beck Depression Inventory (BDI), Center for Epidemiologic Studies Depression Scale (CES-D), Geriatric Depression Scale (GAD-7), Hamilton Rating Scale (HAMD-17), Schedule for Clinical Assessments in Neuropsychiatry (SCAN), but the PHQ-9 and PHQ-2 are very popular due to the comparably fewer number of items. Fewer items are timesaving and less overwhelming to both the patient and the provider. In this study, researchers were blinded to PHQ-9 results and patients were interviewed by trained staff using the SCAN and HAMD-17. The Cronbach's alpha coefficient 0.77 showed acceptable internal reliability of PHQ-9. With cut of point of >6, PHQ-9 showed 100% sensitivity and specificity of 85.0%. The area under the ROC curve was 0.97 (95% CI=0.94-0.99). The Bartlett test showed statistically significant (p<0.001) with a Kaiser-Meyer-Olkin value of 0.835. The concurrent validity was examined. The PHQ-9 and HAMD-17 correlations were moderate. Thus, while some variability was demonstrated, the PHQ-9 and PHQ-2 were shown to be reliable tools to screen depression at primary care settings (Chen et al., 2016).

Depression Screening in Primary Care Settings

Evidence collected by the U.S. Preventive Services Task Force showed that the prevalence of major depressive disorder ranges from 4.8% to 8.6% with a lifetime prevalence of 4.9% to 17.1% ("Screening for depression", 2002). Altogether, depression costs $43 billion annually with $17 billion worth of lost workdays, as per economic perspective. Even with such significant effects, diagnosis of depression at primary care settings has been suboptimal. The authors reviewed randomized controlled trials (RCTs) performed at many primary care clinics to

determine the effectiveness of such screening, and whether routine screening can lead us to improve outcomes, lower health care costs, and improve patient satisfaction. A total of 14 RCTs were reviewed and compared. These RCTs included a study of 1,093 patients done by Johnstone and Goldberg 800 veterans administration patients done by Magruder-Habib and associates, 116 patients by Dowrick, 358 patients by Reifler and coworkers. The members of the Task Force noticed an increase in the diagnosis of depression from 10 to 47%, along with increased recognition of depression by 2-3-fold. Routine screening provided 13% reduction in relative risk. Routine screening of depression can lead to patient achieving remission by 9% at 6 months ("Screening for depression", 2002). Screening was found to be more effective in those patients who are not high utilizers of health care, which will ultimately lead to better outcomes. The proper use of a routine screening depression model can lead to better cost-effectiveness ratios similar to other preventative services, such as annual mammogram and/or treatment of mild to moderate hypertension.

A standardized 12-year longitudinal cohort study was performed in Korea using the data provided by the Korean National Health Insurance Service (Kim et al., 2018). The study was conducted from 2002 to 2013, consisting of 1,025,340 participants using a stratified random sampling method. Data collection was robust including demographic characteristics, socioeconomic status, health insurance claims data, and national health check-up data. The study was designed to establish a relationship between chronic medical conditions and major depressive disorder (MDD). Cohort members were followed up to 2007, followed by an extended observation period until 2013. Sample control was matched with another cohort in manner of socioeconomic status, geographical location, and healthcare service utilization pattern. During this duration, a total 10,299 new diagnoses of major depressive disorder were made.

Newly diagnosed people were analyzed using 15 different chronic medical conditions including, but not limited to, chronic kidney disease, chronic obstructive pulmonary disease, diabetes mellitus, and hypertension. Confounding variables were adjusted. An important finding was that depression, along with comorbid medical conditions, is more likely to be treatment resistant. Patients with depression had many prodromal symptoms for many years before they were diagnosed with MDD. Study findings were consistent with other studies in a manner that newly diagnosed patients tend to have other chronic medical conditions as baseline. Vice versa, patients with MDD are more vulnerable to developing chronic medical conditions (Kim et al., 2018). Symptoms of depression include low energy, feeling depressed, low motivation, not feeling well overall (American Psychiatric Association, 2013). These symptoms can be seen in chronic medical illness as well. Furthermore, authors could not include patients who were being treated with antidepressants without having diagnosis of depression. This limitation could impact the outcomes. The authors also had limitations in identifying chronic medical conditions. Due to the presence of multiple relationships between various disorders, the possibility of false positives could not be ruled out.

A systematic review conducted by Menear et al. in 2015 included analysis of 13 studies to examine a relationship between chronic physical comorbidities and depression. A total of 5817 citations were reviewed, and 13 studies were selected. More than 50% of patients who were diagnosed with depression showed presence of chronic medical conditions (Menear et al., 2015). All randomized controlled trials who reported depression were included. Data collection from included studies covered years between 1986 to 2009. Sample size of the studies ranged from 53 to 824 participants. An important finding was that the burden of chronic medical conditions prevented the primary care providers from diagnosing or identifying depression symptoms

(Menear et al., 2015). That finding makes it necessary to do routine screening of depression using a proper screening tool. Chronic medical conditions were identified as barriers for primary care providers to recognize depression. Please refer to Appendix B for table of evidence.

Theoretical Framework

The theoretical framework guiding this project was the Ottawa Model of Research Use (OMRU) model. The OMRU is a context-focused model and a knowledge translation theory (Appendix C). This model can address a gap in practice along with change in practice for early detection of depression in a primary care setting. Since its development, the model has been revised multiple times. Key elements of the model include evidence-based innovation, potential adopters, the practice environment, implementation, adoption, and outcomes. The elements are interconnected. The OMRU model includes use of existing research (Center on Knowledge Translation for Disability and Rehabilitation Research [CKTDRR], 2015).

The OMRU was developed by Ian Graham and Jo Logan in 1998. A core component of the knowledge translation theory is to understand engagement of patients and other stakeholders, such as the provider, along with identification of a connection which will help in determination of the outcome. The OMRU views the research process slightly differently. In the research dynamic process, multiple elements are interconnected and run by different individuals as a part of the whole project (CKTDRR, 2015). The OMRU model is a planned change theory with a six-step approach. The aim is to effect change at an organization level or at a system level. There are three assumptions made here of knowledge translation: changing processes in research development constantly with mirroring the nature of knowledge translation; the central point is always the patient throughout the processes with evidence-based practice focus; both external

and health care environments can affect the processes (National Collaborating Centre for Method and Tools, 2017). The sole focus of the whole process is the outcome improvement. The OMRU model starts the process by focusing on the individuals. Graham believes that any intervention at an individual level will ultimately change the system or the whole process. The OMRU model has been used many times before, including with skin care issues at a tertiary care hospital, a pilot innovation for transporting neonates, and pressure ulcer prevention bundle implementation (Graham & Logan, 2004).

The OMRU was developed and modified over the period by various theorists. Initially Lewin introduced three stages which include unfreezing, moving and refreezing. Rogers modified it more and introduced five stages: awareness, interest, evaluation, trial and adoption. Lippitt modified this and proposed seven stages. Tomey, finally, combined all the stages (Mitchell, Fisher, Hastings, Silverman, & Wallen, 2010). After 20 years of the development, OMRU is still being used widely. This model can provide step by step guidance in the research project.

Strategic change theory to promote uptake and adoption of new knowledge is a thematic area which explains the OMRU model. It explains any kind of steps/interventions, outcomes with evaluations and feedback. It involves the use of opinions from stakeholders with real time feedback. The thematic area of OMRU considers views of all stakeholders in order to achieve the optimum outcome (Mitchell, 2013).

Knowledge Translation Strategy

The Ottawa Model of Research Use model describes the process in six steps which includes, setting the stage, defining the innovation, checking the innovation for obstacles, selecting and guiding knowledge translation strategies, monitoring innovation acceptance, and evaluating the outcomes (Graham & Logan, 2004). We explained each step separately incorporating in our project of implementation of Public Health Questionnaire (PHQ) -9 for early detection of depression.

Setting the Stage

The first step was to set the stage to identify individuals who have the authority or power to authorize the change or to give permission for the pilot project. This step provided the opportunities to the investigators to discuss the project and available resources to be utilized. It helped to identify persons directly responsible for the change (Graham & Logan, 2004). Using this step, primary stakeholders were identified. Primary stakeholders were the provider and the administrative director.

Defining the Innovation

This step gave an opportunity to specify the intervention in detail. The innovation or change can be viewed by different stakeholders in different views and/or acquired for different benefits (Graham & Logan, 2004). Our project aimed to set up a system to identify depression early in patients with chronic medical illness. First, potential participants will be identified. On their first encounter with the investigator, PHQ-9 will be applied and a brief questionnaire about the experience of doing PHQ-9 on every follow up visit. According to this change, after a

successful outcome is achieved, medical assistants will continue to provide self-administered

screening tool PHQ as part of the patient's paperwork while waiting in the waiting room.

Assessing the Innovation, Potential Adopters and the Environment for Barriers and

Facilitators

This step was being practical. It guided the investigator to conduct a realistic assessment

of the situation and whether the project was feasible practically or not. The step helped to

address potential barriers and facilitators. If there were any barriers than we had an opportunity

to overcome them. This step helped to address attitudes and perceptions of the practice. It helped

to identify gaps between current practice and recommended evidence-based change (Graham &

Logan, 2004). Primary stakeholders agreed with potential benefits to the patient but raised

concern about continuation of the project and potential benefits to the practice. This could be

solved by billing PHQ to the insurance, but at this time, we were uncertain whether insurances

will reimburse or not. All stakeholders were on the same page that even if insurance will not

reimburse, there will be an increase in patient satisfaction.

Selecting and Monitoring the Knowledge Translation Strategies

Selecting appropriate strategies and interventions was important for successful outcome

of the project. Selecting appropriate screening tool helped us to increase awareness and

understanding along with confidence of the adopters (Graham & Logan, 2004). Available

research and evidence were discussed with the provider. We developed strategies to follow up

after intervention. The Provider agreed to utilize the PHQ as it is research proven and use of it in

a primary care setting is feasible.

Monitoring Innovation Adoption

This step guided us to determine how much our project was being adopted. This was important because it helped us to assess whether adopters were adopting the change or not. Do we need to change our project implementation style (Graham & Logan, 2004)? For our project, we screened all consented participants for depression using PHQ. The provider had option to ask patient whether they participated in the study or not. In the primary care setting, participants were identified after registration in exam room by asking if they have any chronic medical illness. After obtaining consent with proper explanation, project questionnaires were administered.

Evaluating Outcomes of the Innovation

This was last step, measuring the outcomes which can impact the patients and the provider (Graham & Logan, 2004). We collected data using self-administered scales to screen depression with conduct a post-scale brief interview. The robust data collection sheets were helpful us to analyze the data and determine whether our intervention can lead the provider to early detection of depression or not. After de-identification of the data, data analysis was performed without utilizing any identified data in aggregate only.

Methodology

Design of Project

The proposed pilot project was a hybrid project including quantitative as well as qualitative design. The project used a descriptive approach with paper surveys administered to the participants in the form of the Patient Health Questionnaire (PHQ) along with targeted qualitative question.

Setting

The setting of this project was a solo primary care practice in a suburban area in southern New Jersey. The participants in this setting were multi-cultural including American, African, Hispanic, and Asian individuals. The primary care provider examines approximately 20 patients per day, which comes to approximately 4000 patients a year. More than 50% of the patients were identified as having one or more chronic medical illness.

Study Population

This project included a voluntary convenience purposeful sampling method of participants of any gender at a primary care practice in the south New Jersey region who was diagnosed with chronic medical illness. Chronic medical illness includes any illness that lasts 1 year or longer requiring ongoing medical attention or limits daily activities of daily living (Center for Disease Control and Prevention, 2018). The sample size desired was approximately 40 participants. Inclusion criteria for participants included English speaking patients of any gender over the age of 18 years and older with a diagnosis of at least one chronic medical illness. Exclusion criteria were as follows: anyone without a diagnosis of chronic medical illness; non-English speaking patients; anyone with self-reported history of cognitive disorder or blindness.

Subject Recruitment

Information about the DNP project related to depression and chronic medical illness was shared via recruitment flyers displayed in the office waiting area as well as in each examination room. Efforts to recruit were also be made via in-person recruitment during office visits by the project manager (PM). Recruitment of the participants took place in a consultation room by the PM before the patient's meeting with the provider. Recruitment continued for 8 weeks. Access to potential participants was achieved by asking each patient about having a chronic medical illness after registration in the examination room, along with the staff identifying patients with chronic medical illness. All participants were provided a handout summarizing the project as well as PM contact information (email and phone number) for any questions or concerns. Potential participants were informed that participation in the project was a completely voluntary, supplemental service and that the participant's decision about participation would not affect the usual care provided the primary care office. Copies of the recruitment material can be found in Appendix D.

Consent Procedure

After obtaining approval from the Rutgers Institutional Review Board (IRB), the consent procedure took place in a consultation room. Consent was obtained by PM only after detailed explanation of the purpose of the project to the potential participants. The PM answered all questions that the participants had to improve his/her comprehension related to the project. Participation was 100% voluntary. The consent was obtained in-person after face to face interaction only. Participants were asked to fill out a self-administered questionnaire (Patient Health Questionnaire, PHQ-9) and a demographic sheet including a qualitative interview question. It took approximately 5 minutes to fill out questionnaires. While obtaining consent, all

participants were notified that participants have the right to withdraw from the study without any

obligation at any time without issue. Benefits/Risks were explained. After obtaining the consent,

each participant was assigned a random number. Demographic data was collected without name

or date of birth. Collected data was held confidential in a secure 65 Bergen Street, Newark, NJ

07107 as per Rutgers IRB policy. Contact information of IRB and the PM were provided to the

participants. Copy of consent can be found in Appendix E.

Risks/Harms/Ethics

The proposal was submitted to the Rutgers University IRB for approval after obtaining

approval from the chairperson. The project was initiated once the approval from IRB has been

received. Participation in this study posed minimal risk. There were demographic data, collected

during data collection along with PHQ-9. All answers were kept confidential and reported in the

aggregate only. The participants were assigned a random number without any link to them. This

allowed the data to be reviewed without direct link to a person's name. There was minimal

anticipated discomfort for participants in this project, so risk to participants was minimal.

Participants could experience mild discomfort from the questions that would be asked; answering

could cause participants to think about feelings or experiences that make the participants sad or

upset.

Results of the PHQ-9 screening tool were handled as per PHQ-9 scores and proposed

treatment actions. PHQ-9 score can range from 0-27 as each question has a score value 0-3. A

score of 0-4 is considered as minimal to no depression. Participants with score of 5-9 can be

considered mildly depressed and those with score of 10-14 are moderately depressed. A score of

15-19 suggests moderately severe depression and 20-27 is severe depression. Based on treatment

recommendations previously used with the PHQ-9, minimal to no depression required no

treatment. Mild depression could be monitored closely with follow up. Moderate depression

required treatment with medications or psychotherapy. Moderately severe depression required

treatment with medications and psychotherapy. Severe depression required treatment with

medications and psychotherapy. Referral would also be made to a mental health specialist or to a

crisis center. (Kroenke & Spitzer, 2002; Select a Screener, 2019).

Subject Costs and Compensation

There was no cost to participate in this project. Participants did not receive monetary

compensation for their participation in the project; however, light refreshments were being

provided by the primary care office during the consent process as office's norm. Participants

could be benefited by participating in this project an in indirect manner as this project screened

participants for depression.

Study Intervention

After identifying participants by inclusion and exclusion criteria, participants were

approached by the PM to explain the DNP project. Participants' identification process took place

in an examination room, as well as with the use of the electronic medical record by the office

staff. Consent was obtained after answering any questions by the participants. The consent

process took place in a consultation room in a private area of the office. After obtaining consent,

the PHQ questionnaire, along with the demographic sheet and targeted qualitative question sheet,

were provided to the participant for completion. Results of the PHQ-9 were made available to the

provider by PM during the participant visit to address any related concerns as per PHQ

guidelines for treatment. There were no identifiers collected. At the end of the day, obtained

consent were locked in a locked cabinet on site by the PM until completion of data collection.

Please refer to Appendix F for demographic sheet. Copy of the PHQ-9 can be found in Appendix G.

Outcomes Measured

The Patient Health Questionnaire (PHQ) -9 Likert-type tool was used to screen patients with chronic medical illness for depression; the tool was developed in 1999 for use in primary care settings. The PHQ-9 consists of 9 questions asking patients to report concerns consistent with depression over the previous 2 weeks. The internal validity of this tool is excellent with Cronbach's alpha of 0.89. PHQ-9 score can range from 0-27. Score of 5 and above is considered as positive as described prior in risk/harms/ethics section. PHQ-9 with cut of point of 10 has overall sensitivity of 88% and a specificity of 88%. Test-retest reliability was excellent as well. High reliability and validity of the PHQ-9 has demonstrated excellent psychometric properties of this screening tool. The Demographic sheet and PHQ-9 are included as Appendixes D and E. At the end of PHQ-9, a specific question was added, "How do you feel about doing this (PHQ-9) questionnaire on every visit to identify depression early if any?" (Kroenke, Spitzer, & Williams, 2001).

Project Timeline

Project timeline of the planning, implementation, and evaluation of the project is attached as an Appendix H.

Resources Needed/Economic Considerations

The costs associated for this project were the sole responsibility of the PM. Costs included printing cost of recruitment materials and consent forms. There were also other project related expenses that were included in the budget for this project. A project budget details can be found in Appendix I.

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Results

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The results section discusses data analysis including descriptive statistics of collected variables and themes of qualitative questions' responses. Over the course of an eight weeks recruitment period, a total of 30 participants were recruited. The data collection process began on September 27th, 2019 and ended on October 31st, 2019. At the end of the data collection, the data was manually entered in SPSS analyzing software, version 26 released in 2019. After the collection of PHQ-9 scores, various demographic variables in conjunction with PHQ-9 scores were analyzed using descriptive non-parametric testing. Scores were compared between age range, gender, ethnicity, and level of education. From a qualitative perspective, an open-ended question was asked in the demographic sheet to describe feelings about filling the depression questionnaire frequently.

The total targeted sample size was 40 participants. After utilizing office resources and in-person approaches in the exam room, the total number of participants enrolled was 30 (n); 18 males (60%) and 12 females (40%). Out of n=30, most of the participants were married (n=20, 66.7%), Asian (n=24, 80%), middle-aged (age 45-54, 20%; age 55-64, 30%) and holding a Bachelor's degree (n=19, 63.3%). Only one participant was on disability. Those who screened positive for depression, whether minimal, mild, or moderate, were interviewed by their primary

care provider (MD) on-site during the same visit and findings were documented in their chart to

continue to follow up. See Appendix J for charted breakdowns of the demographics.

All 30 participants were able to complete the PHQ-9 questionnaire along with the

demographic sheet with targeted qualitative question. The PM did not need to reject any

questionnaires due to missing data. For the purpose of this project, the term "depression" is being

used in a generic sense. The presumption of diagnosable Major Depressive Disorder (MDD) is

being defined using a cutoff score of 10 with the PHQ-9. A total of 6.7% percent of the

participants were positive for depressive symptoms based on the PHQ-9 scoring guidelines with

cut off ≥10 per PHQ-9 guidelines. Per PHQ-9 guidelines; 40% (n=12) minimal, 53.3% (n=16)

mild, and 6.7% (n=2) participants had moderate depression. None of the participants were

screened positive for moderately severe or severe depression. See Appendix K for the PHQ-9

screening analysis. Only one participant was diagnosed with depression prior to the project but

was not receiving treatment of depression due to a personal decision. Based on PHQ-9 scoring

guidelines, out of 18 male participants, 44.4% (n=8) minimal and 50% (n=9) had mild

depression. Out of 12 female participants, 22.2% (n=4) minimal and 38.8% (n=7) had mild

depression. Out of n=24 Asian participants, 33.3% (n=8) minimal and 62.5% (n=15) had mild

depression. Out of n=4 White participants, 75% were minimal and none were positive for

depression. Out of n=6 participants who are >65 years old, 85.7% were positive for mild

depression. There were approximately 10 patients who refused to participate in the project. We

did not inquire further about the reason as per protocol approved.

The 12 patients showing minimal symptoms did not indicate a need for follow-up or

treatment. Sixteen patients were positive for mild depression. These participants will be followed

by the provider (family physician) during their upcoming visits to monitor their depression

symptoms. Depression was present (n=2, 6.7%) among Asian ethnicity, age range of 45-64 years, and male gender.

While looking at the question's breakdown of the PHQ-9 questionnaire, out of 30 participants, 24 (80%) were positive for little interest or pleasure in doing things, 23 (76.6%) were positive for trouble falling or staying asleep, and 25 (83.3%) were positive for feeling tired or having little energy. Out of all these, 14 (46.6%) participants reported having difficulty doing their work, taking care of things at home, or getting along with other people. These findings are consistent with the DSM-5 criteria for the diagnosis of depression.

The study also included a targeted qualitative question. "How do you feel about filling out the (PHQ-9) questionnaire on every visit to identify depression, if any?". This was included to understand participants'/patients' perception of frequent questioning. Out of 30 participants, a total of 23 participants replied to the qualitative question. Some of the responses were as follows.

"I don't mind doing this every visit"

"It does not bother me. I know I am not depressed"

"I think, it's good idea to do that"

"Good idea so suicide can be prevented"

"Definitely worth to do it so treatment can be started. It's free anyways"

"I like it because it is for my own health"

"I would appreciate the change to reflect on how I am doing at the moment, had soo if I need to make adjustment in my mental status"

"It's alright. It's good to get it checked. You will never know who is depressed"

"It makes me feel more depressed"

"I don't like to talk about it"

There is no correlation identified between positive or negative responses about depression screening and level of depression if any. One of the responses with "soo" showed uncertainty in interpreting the client's own mental status. Another response was "it makes me feel more depressed". The participant was later interviewed by the on-site provider about change in mood due to the questionnaire. The participant was not depressed as per the PHQ-9 questionnaire; his opinion was that this questionnaire could make people feel depressed by questioning about depression. Overall, the participants were happy with the care provided at the clinic and some of them appreciated that their primary care provided in the project addressed their depression along with their chronic illnesses. There were some responses such as, "I don't like to talk about it", "it's alright" or no responses at all. These responses exemplified the theme of avoidance. The two themes present among the responses were the theme of avoidance and the theme of appreciation. A total of 23 responses were recorded. Out of 23, 17 responses were included in the theme of appreciation, and six were in the theme of avoidance.

Data Maintenance/Security

Participants were provided with a randomly assigned ID number by the PM to use on both the demographic data collection sheet and PHQ-9 questionnaire. The PHQ-9 questionnaire is a self-administered questionnaire. The consents with collected data sheets were stored in a locked cabinet at the provider's office and were only accessible by the PM and the on-site provider.

Upon completion of the project, closure of the IRB, and final writing of the manuscript, all data will be maintained in accordance with Rutgers University guidelines. Hard copies of consents and aggregate data were housed in the School of Nursing at 65 Bergen Street, Newark NJ 07107. In compliance with the Rutgers policy, all project-related information such as the consent forms and the PHQ-9 questionnaire will be destroyed six years after the completion of the project.

Discussion

Overall, the intervention of screening depression among patients with chronic medical illness was successful in the primary care setting to identify undetected, untreated depression. Initially, when the project was presented to the provider and office staff, they were confident of their current practice of screening depression on an as-needed basis. However, after the project was completed, the results were eye opening, as 60% of participants were screened for mild and moderate score per PHQ-9 guidelines. In order to be diagnosed for depression, patients should fulfil the criteria of DSM-V. A total of 6.7% of the participants were positive with depression. We were addressing Major Depressive Disorder as per the DSM-V. Out of three objectives, two objectives were achieved at the end of the project. The goal was to enroll 40 participants, but we were able to enroll 30 participants during eight weeks of the recruitment period. We were able to identify the prevalence of depression among this group of consenting participants, which was 6.7%. Symptoms reported by the participants in the PHQ-9 scale were consistent with DSM-5 criteria which are used for the diagnosis of depression by health care providers as per the guidelines of the American Psychiatric Association.

The participants were a strong representation of the primary care office patient population. The majority of participants reported having diabetes and/or hypertension as their

existing chronic medical illnesses, which are very common chronic medical illnesses. The majority of participants' pool was of Asian origin. Indirectly, it did affect the outcomes of the project compared to the national average and other studies, performed previously. The majority of participants who were screened positive for depression belong to the elderly population and of Asian origin. Gender wise, distribution of cases that screened positive was more in male than female.

A total of 23 participants responded to the qualitative question. Our goal was to identify feelings that arose within the participants when answering the questionnaire. With the responses of the qualitative question, the themes of appreciation and avoidance were evident. Many of the participants thought that it is a good idea and worthy to perform screening. We also received some negative responses as well. There were some participants who did not appreciate the depression screening and stated, "I don't like to talk about it; it makes me feel more depressed". These responses were evidence of the avoidant coping mechanism being utilized. In order to elicit proper responses and identify depression on time, proper education should be provided without being judgmental. Mental health stigma also plays a key role here. These cases were evaluated separately by the on-site provider along with the education-related to depression. Efforts by the on-site provider were made to ensure that responses were not related to the underlying depression. Resources were provided in case any concerns arise. We were unsure whether these responses were due to prior experiences or ongoing life circumstances, as clients did not share such things.

There were some patients who refused to participate in the research project. We did not inquire about the reasons behind their decision. A variety of reasons discussed with the on-site provider which included but were not limited to: the stigma related to the word 'research', the

stigma related to depression, time constraints related to the project participation, lack of compensation for participation.

The findings from quantitative data suggested that one of the major reasons for underdiagnosis and undertreatment of depression is the lack of frequent screening of depression. These findings validate the position that screening of depression should be done on a regular basis. After identifying depression among patients with chronic medical illness using PHQ-9, the relationship between depression and CMI was established, as also demonstrated by Ghanmi et al. (Ghanmi, Sghaier, Toumi, Zitoun, Zouari, & Maalej, 2017).

Unintended Consequences

There were many unintended consequences noted during the eight-week period. The first existed among the office staff. Even though office staff education was not a part of the project, implementation of it created a positive wave of discussion about depression among them. The staff was wholly involved in spreading awareness of the importance of depression screening. As many of the patients visit the office frequently, they were found discussing the effects of depression among themselves. These were positive consequences.

Another question that arose from many patients was the cost of screening of depression if it was done on a routine basis. "Will it be covered by my insurance?". Participants were educated with the current depression screening recommendation. Reimbursement of the same varies according to coverage of their insurance. Currently it is being paid by the insurance once a year during the annual wellness visit.

Key Facilitators

Key facilitators included the involvement of the Institutional Review Board (IRB) and IRB approval, consistently organized office flow during the day, the office staff, the participants, and the easy screening tool of depression. IRB approval served a key role as it provided a safety net over the participants, which was appreciated by the participants and the project team. The office staff was helpful in providing the space and the privacy to discuss the project with the potential participants. Surprisingly, the participants were excited about their depression screening which was free of cost and did not take a long time.

Provider-related Barriers

As previously discussed in the literature review, the main concern for the provider was time allotment for depression screening and assessment. After the completion of the project, it was evident that the whole process of utilizing the PHQ-9 for depression screening took approximately 5 minutes. Time could vary to address those who screen positive depending on the level of severity of depression. The on-site provider agreed with the conclusion that minimal time commitment is required. The provider is in the process of making this screening part of his routine practice.

Patient-related Barriers

As a result of including the qualitative question, we were able to identify patients' perceptions of frequent depression screening during every follow-up visit. It helped us to identify patient-related factors related to culture and ethnicity, willingness to participate in self-care, etc. Asian participants were not ready to discuss the depression-related symptoms during their regular visits, but when the opportunity was provided to participate in depression screening free

of cost, they did. Although participants provided short answers, they were appreciative of the depression screening.

System-related Barriers

We also identified system-related barriers such as lack of knowledge of the office staff and personal preconceptions. These issues were observed and noted due to the questions of the office staff including office manager, medical assistant, and phlebotomist. Some of the questions were "my father has diabetes and hypertension, but he is not depressed; why do we need to screen depression?" Such questions provided the insight related to personal preconceptions/thinking related to depression

Project Limitations

Although there were benefits to depression screening, there were some limitations to this approach with a focus on chronic medical illness. The sample size was not enough to establish the validity and generalizability of the result. The project was a cross-sectional design. Studies related to depression among the patients with chronic medical illness are many in research database but generally focus on specific illnesses. Some limitations of this study include the limited time period of participants' enrollment, which was during the winter season. The majority of the site participants were Asian in origin. Cultural bias was not separately addressed. Variation due to seasonal effect was not assessed separately.

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Implications/Recommendations for Practice

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The results from this hybrid project demonstrated that combined efforts of the office staff and the provider could bring forth undiagnosed and untreated depression among patients with chronic medical illness. The findings from the qualitative question also provided valuable

information to the project team about the feelings and views of the primary care patients related to depression screening.

The theoretical framework that we used, the Ottawa Model of Research Use (OMRU), could be utilized for implementation of this new process of depression screening (CKTDRR, 2015). The OMRU model can assist the primary care office to optimize the process initiated by this project so that the patients can receive improved depression care along with other routine care. Further work is needed for the provider to incorporate smooth integration of depression screening in routine visits. Concerns from the on-site provider were the integration of the PHQ-9 in electronic health records and the scanning of the tool if being done on paper. Regardless of the results of the screening, all patients with chronic medical illness should receive screening of depression with the central aim of improving the quality of services being provided. Early detection of depression can lower the healthcare cost with long-term improved management of chronic medical illness. The result of the project supported the need to implement screening at a national level.

Suggestions for Improvement

The keys to improving depression screening are that the provider must be vigilant to utilize the PHQ-9 screening tool and the patient must be willing to answer the questions. Patients with chronic medical illness are vulnerable to depression and should be screened on a regular basis in order to avoid consequences. It may be easy to simply ask someone whether he/she is depressed or not, but that does not do the job well, nor does it provide a metric for ongoing comparison. Most of the time, patients in the early stages of depression are not aware of their depressed state of mind, which is affecting their overall quality of life unknowingly and the management of their chronic medical illness. The symptoms of depression such as fatigue and

low energy were taken as granted due to chronic medical illness (Kouwenhoven et al, 2011).

This hybrid project was an attempt to demonstrate the point to the provider and the office staff.

Clinical Practice

The most important aspect of this DNP project was to identify undiagnosed untreated

depression among the current population at the primary care office. The intervention of the

project had a positive impact on the quality of clinical practice. The provider documented results

of the depression screening in the patient's electronic chart and addressed the findings as per the

guidelines of the PHQ-9. The project also recognized the patients' perceptions related to

depression screening. Answers of the qualitative question and the result of this project provided

the insight to the provider to make a change in the practice of depression screening and make it a

routine during every visit. The project site staff was involved in spreading awareness related to

depression; additional training and education should be provided to the staff to continue the same

after the project is completed.

Healthcare Policy and Funding

Recommendations for policy changes are organizational as well as national. There is no

existing policy related to mandatory screening of depression during routine sick visits to primary

care offices, which are the main gateway to detecting depression in a timely manner. Primary

care offices will also need to create policies for those who screen positive, whether to refer to an

appropriate facility or to the mental health provider, how to affect the initiation of

psychological/psychiatric care. From a national perspective, making a policy change will be an

upstream intervention to address undiagnosed, undertreated depression, which can affect a large

population nationwide through regulation. Policy should be made to mandate the reimbursement

of the same by any insurance provider in order to avoid the patient's burden. It would be ideal if

it will be covered 100% even if done frequently or as-needed basis. Thus, it will decrease the

cost of maintenance related to chronic medical illnesses along with improve quality of life. At

this time, there is tremendous variation between primary care offices and hospitals related to

routine depression screening. Federal policy and funding can be the greatest levers that can

encourage primary care providers to integrate depression screening and utilize referral resources.

Quality & Safety

This was a hybrid project combining descriptive statistics with a qualitative angle to the

intervention. The project focused on improving the quality of services provided to the patient

population. With the use of depression screening, we had an idea of the severity of existing

depression so that action could be taken appropriately. The safety of the patient is served if we

can detect depression in the early stage before it reaches the point of suicide, which can leave

long-lasting effects on the patient's family and friends.

Education

Both the provider and the patients must understand the importance of screening of

depression along with the effects of depression overall. To date, there is no such educational

activity at the primary care office. In the current age of technology, a variety of educational

modalities should and can be utilized to disseminate information on the need for depression

screening. By providing basic educational material related to depression, the primary care

provider can increase the satisfaction of patients and improve their quality of life. There should

be nursing education during the school as well as a part of annual mandatory education in the

workplace with an emphasis on mental health issues.

Economic

As described in the review of the literature section of the project, the economic effects of

unidentified untreated depression along with existing chronic medical illnesses are tremendous.

Even with an excellent health care system in the United States, we are missing 30-50% of

patients with depression at primary care offices (Agency for Healthcare and Quality, 2013). In

the United States, 80% of the total budget of healthcare is being spent on patients with chronic

medical illness. The chronic medical illness raises many additional issues as described above

including depression which needs to be addressed individually as well as aggregated. Poor

handling of the issues leads to the high expenditure behind CMI (Guthrie et al., 2016). As we all

know, depression is not only related to feeling sad, it also affects the overall motivation and

quality of life. An early detection of depression can have a big impact on lowering the healthcare

costs related to CMI. The presence of depression leads to poor adherence to the treatment plan,

which is much needed in any CMI.

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Sustainability

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A good project must have a plan to sustain the clinical change in the real world. This was

a workable project that can be continued in the same way with little effort. With the proven high

rate of missing depression reported in the literature and the high point prevalence of depression

among the current patient population at the primary care office, attention is needed to address the

occurrence. Screening of depression should be converted to a routine practice. The PHQ-9 is an

effective and proven way to screen depression in a limited timeframe. With the positive findings

from this project, the process can be successfully applied to other primary care offices.

Implementing routine screening of depression during every visit can improve patient outcomes

and satisfaction, decrease errors. and improve patient retention rate. The project site provider is

on board to continue the depression screening as a part of his routine practice. A representative

from the electronic health record provider was contacted to include the PHQ-9 in the list of

available screening tools.

Professional Reporting/Plans for Future Scholarship

The clear-cut next step of the project is to publish the finding. First, the finding of the

project will be displayed at the project site to increase insight and motivate the patients to

participate in depression screening, which will also help to reduce the stigma. Publication in

various journals is still considered an effective way to make research or project data available to

an interested audience. The second step is to involve manuscript submission. The National

League for Nursing recently announced a welcome letter to help novice authors to participate in

a workshop. An application for the same will be submitted. The third step is to develop a poster.

An already developed poster will be presented during Rutgers' annual poster presentation day

along with other DNP students of Rutgers University. Project findings will also be published in

the monthly employee newsletter at Jefferson University Hospital.

Conclusion

The finding of this DNP project clearly demonstrated the high prevalence of depression

among the patient population with chronic medical illness. Awareness of this finding will not

only improve the outcomes of chronic medical illness but also increase satisfaction with care.

The successful treatment of depression will help to lower the burden of the disease which will

ultimately lower healthcare costs related to frequent visits to the emergency room, decrease

suicide rates, and improve outcomes related to chronic medical illnesses as discussed previously.

Finally, there has been no improvement in the application of the previous findings even after the recommendations and policies in by the World Health Organization, the American Academy of Family Physician, and the U.S. Preventive Services Task Force. Depression screenings in primary care offices are not being done effectively. These recommendations and policies have failed to show improvements in the health outcomes of patients with depression and chronic medical illness, seen at primary care offices on a regular basis. Potential barriers to the routine screening include but are not limited to concerns about stigma related to the mental health-related diagnosis, time restrictions for the visit, insurance reimbursement related to the frequent use of screening tools, and limited mental health resources for those who screen positive.

This project supports the following.

1) There is a need for mandatory frequent screening of depression among patients with chronic medical illness

2) Primary care providers should integrate mental health screening tools as their routine part of screening various disorders.

3) Patients should receive education about depression in order to lower stigma. The education should also include the effects of depression symptoms over the quality of life.

In conclusion, even though evidence exists about the health benefits of frequent depression screening, there is a huge gap in real practice. Our statistics may not be generalizable due to some above-mentioned limitations, but they certainly support a further need for research.

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Appendix A

PRISMA diagram
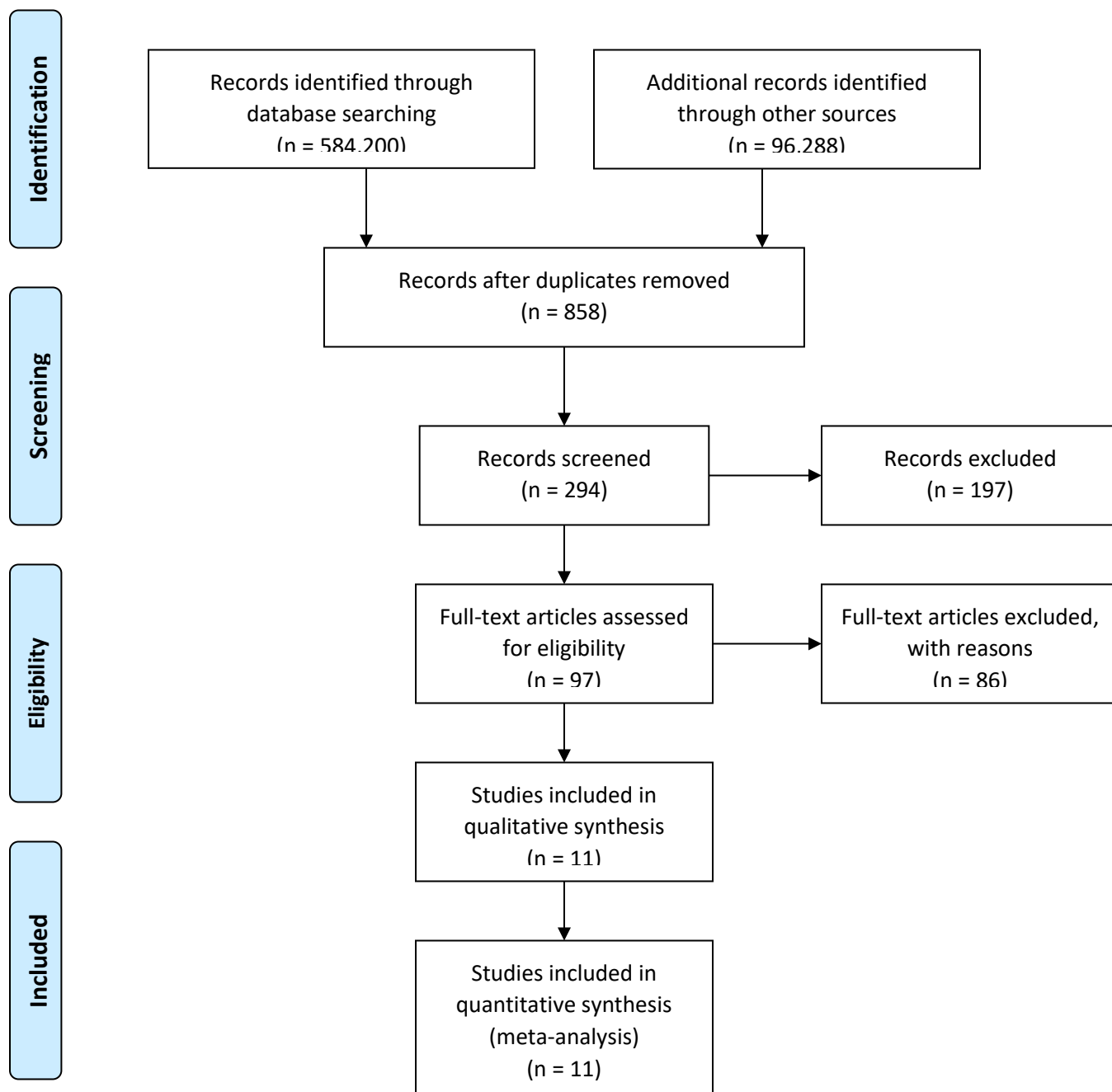
Appendix B

Table of Evidence

Article #, Title, Year	Evidence Type	Evidence Level & Quality	Sample, Sample Size, Settings	Limitations	Study Findings that help answer EBP Question
1. Depression and chronic diseases: It is time for a synergistic mental health and primary care approach, 2013 (Voinov, Richie, Bailey, & Voinov, 2013)	Systematic Review	Level II & High quality	PubMed Articles from 1992 to 2012, Primary Care Settings	- Time of articles published - Only 1 database was searched for this review	- Well established relationship between depression and chronic medical illnesses - Negative influence of depression over prognosis of chronic illnesses - Preference of individual about receiving treatment of depression is at primary care office - Important role of primary care providers in depression diagnosis and treatment - Routine screening should be conducted using PHQ-2 and PHQ-9

					for early detection
2. Screening for depression in adults: A summary of the evidence for the U.S. Preventive Services Task Force, 2002 ("Screening for depression", 2002)	Systematic Review of 14 RCTs – Meta Synthesis	Level I & Good quality	MedLine database from 1994 to 2001, Primary Care Settings	- Data collection done by single reviewer - Many trials had insufficient power to detect clinically significant changes - Large variation in depression detection noted	- Screening of depression provided a 13% reduction in relative risk - Screening of depression can increase number of patients achieving remission - Cost-effectiveness model can produce cost-effectiveness ratios similar to other preventative services such as mammogram
3. Patient experiences of depression and anxiety with chronic disease: A systematic review and qualitative meta-systhesis, 2013 (Dejean et al., 2013)	Systematic Review and Qualitative Meta-Synthesis	Level III & High quality	Literature from January 2002 to May 2012 including 20 qualitative studies	- Very narrow focus of psychiatric illness rather than including broader psychological responses to keep relevancy	- Chronic diseases and depression can be interrelated or independent - Patients may not be able to differentiate symptoms of depression and chronic illnesses due to overlapping - Screening of depression

					earlier can reduce distress and symptoms of chronic diseases - Treatment of depression can lead to better quality of life
4. Validation of the Patient Health Questionnaire for depression screening among the elderly patients in Taiwan, 2016 (Chen et al., 2016)	Randomized Controlled Trial	Level I & Good quality	N=634 participants from the primary care settings	- Study participants were only from northern Taiwan - Validity of instruments related to specific cognitive impairment was not examined - Medical comorbiditie s were not related to depressive symptoms	- PHQ-9, PHQ-2 and PHQ-1 are all reliable tools for detecting major depressive disorder - PHQ-9 showed high sensitivity with cutoff point >6 - One-month prevalence rate was much lower than national average
5. Depression symptoms among patients with multiple chronic conditions, 2016 (Banhato, 2016)	Randomized Controlled Trial	Level I & Good quality	N=1558 participants at a center for treatment (specialists care setting)	- Study was conducted at a specialty care clinic in Brazil - Gender ratio was disproportion ate - Study was cross sectional design	- Prevalence of depression is high among patients with chronic illnesses - Presence of complex relationship between depression and chronic

				- Study pattern was limiting the ability to understand casual effect	medical illnesses - Collected data reinforced need of routine screening, early diagnosis and management of depression - Study found strong association between smoking and depressive symptoms
6. Depression, chronic diseases, and decrements in health: Results from the World Health Surveys, 2007 (Moussavi et al., 2007)	Cross sectional Observational Study	High quality	N= 245404 participants from all regions of the world who had diagnosis of chronic medical illness	- Participants were recruited from all different variety of settings in health care - Cross-sectional study and it did not include questions about onset of chronic illnesses	- Relationship of depression and chronic physical diseases was well established. - Depression has the largest effect on worsening mean health scores - Consistency across the regions and demographics was established. - Impact of depression over health state is substantially greater than

					- other disease states
7. Association between chronic physical conditions and the effectiveness of collaborative care for depression, 2016 (Panagioti et al., 2016)	Meta-analysis	Level I & High quality	N=10962 participants from 31 RCTs and 36 comparisons of collaborative care	- Bias can be present in individual participant data meta-analysis - No funnel plot asymmetry was detected - Overall effect size was smaller than previous review - The evaluation of physical conditions was not consistent	- Collaborative care proved significant short-term improvements in depression. - There were no long-term effects noticed on depression outcomes. - Collaborative care was equally effective in providing care for depression to those with or without chronic illnesses.
8. Epidemiology and treatment of depression in patients with chronic medical illness, 2011 (Katon & Katon, 2011)	Peer Reviewed article	Low quality	None	- Expert personal opinion - Random studies were reviewed without checking consistency and/or validity	- Proved bidirectional relationship between depression and chronic medical illness from various studies - Comorbid depression is associated with increased medical symptoms - Depression

					can worsen the course of medical diseases
					- Collaborative depression care showed effective way of achieving optimum outcomes
9. Lower PHQ-9 cutpoint accurately diagnosed depression in people with long-term conditions attending the Accident and Emergency Department, 2015 (Hyphantis et al., 2015)	Randomized Controlled Trial	Level I & Good quality	N=349 participants at Accident and Emergency Department	- Sample consisted multiple diseases - Study was not disease specific - Study conducted at an Emergency department	- PHQ-9 cut off >8 showed 90.5% sensitivity and 89.4% specificity - Strong association between PHQ-9 and functional status was established - Depression is frequently present among patients with chronic medical conditions - PHQ-9 is valid and reliable tool for depression screening
10. Association networks in a matched case-control	Case-control cohort study	Level I & High quality	N= 1,025,340 individuals from Korean National	- Authors lack consistency in identifying diagnosis codes	- Newly diagnosed patients with MDD tend to have chronic

| design – Co-occurrence patterns of preexisting chronic medical conditions in patients with major depression versus their matched controls, 2018

(Kim et al., 2018) | | | Health Information Database | - Authors could not identify patients who received antidepressants without diagnosis of depression
- More complex relationships could not be analyzed due to multiple interrelationships | medical conditions exist already.
- Patients with depression are more prone to develop chronic medical conditions.
- Early diagnosis of depression could help to lower chronic medical symptoms |
| 11.
The influence of comorbid chronic physical conditions on depression recognition in primary care: A systematic review, 2015

(Menear et al., 2015) | Systematic review | Level II & Good quality | 13 studies including RCTs, cross-sectional studies and cohort studies | - Only English and French language articles were included.
- Out of 13, only 1 study had high quality analysis
- Only studies included who examined relationship between depression and chronic medical conditions | - Presence of chronic medical conditions makes it difficult to recognize depression in primary care settings.
- Other than medical comorbidity, provider's eligibility also plays role in detecting depression
- Severity of depression can be considered as strong predictor of timing of |

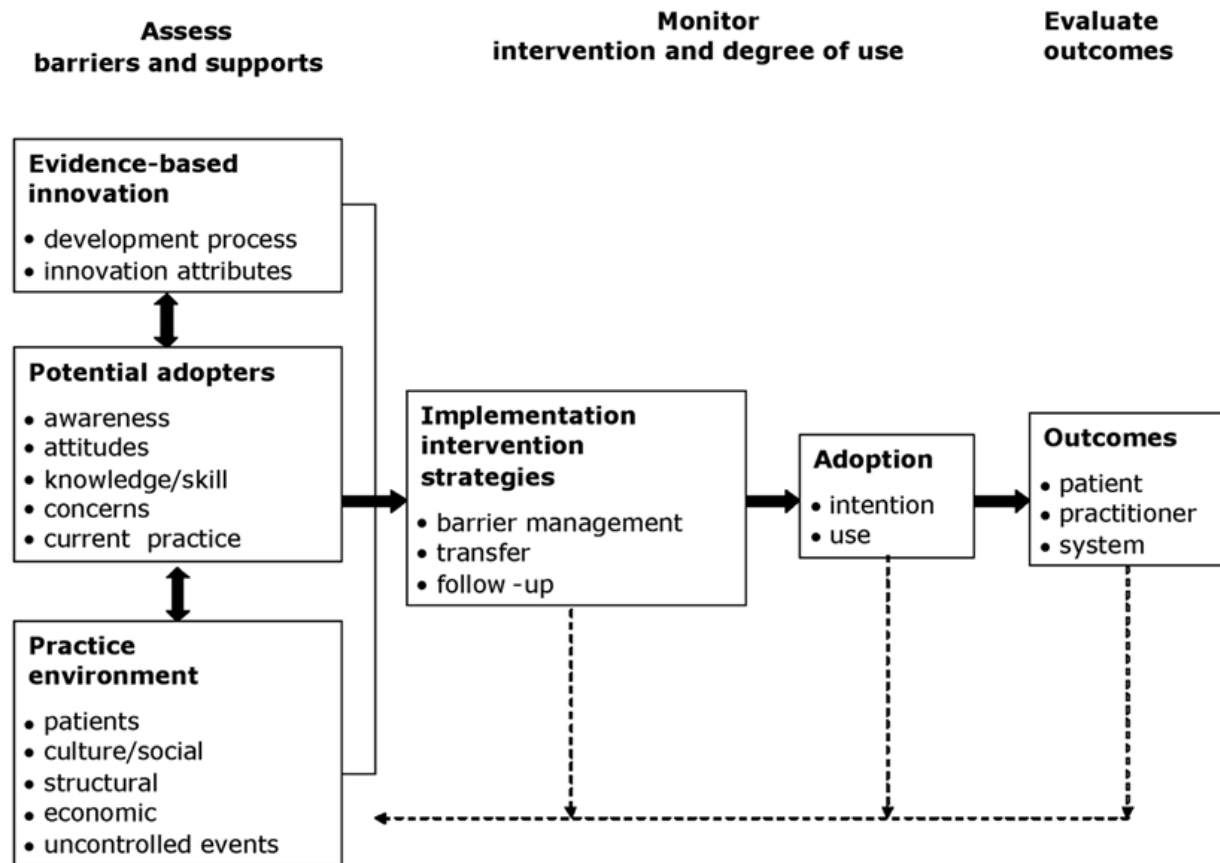|					diagnosis

Appendix C

Concept Map

Figure 1. Original Ottawa Model of Research Use Framework (KTDRR, 2015)
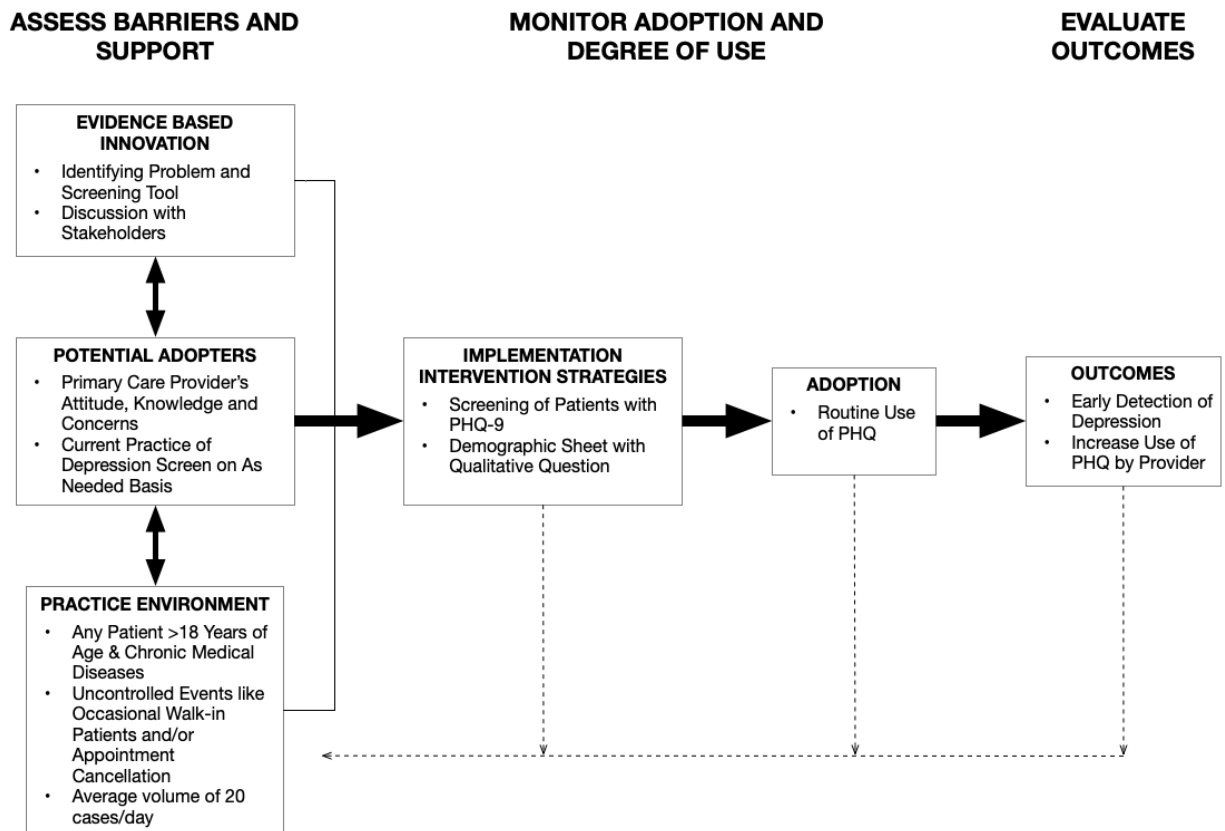
Figure 2. Adopted Modified Conceptual Framework (KTDRR, 2015)

Appendix D

Recruitment Flyer

Appendix E

RUTGERS
School of Nursing

Department
School of Nursing - DNP PMHNP
Jaykumar Maradia
65 Bergen St
Newark, NJ 07107

Email Address:
jm2029@sn.rutgers.edu

p. 856-308-1432 (cell)

CONSENT TO TAKE PART IN A RESEARCH PROJECT

TITLE OF STUDY: Implementation of Patient Health Questionnaire (PHQ) in a primary care setting
Principal Investigator: Jaykumar Maradia BS, RN

This consent form is part of an informed consent process for a research project and it will provide information that will help you decide whether you want to take part in this project. It is your choice to take part or not. After all of your questions have been answered and you wish to take part in the research study, you will be asked to sign this consent form. You will be given a copy of the signed form to keep. Your alternative to taking part in the research is not to take part in it.

Who is conducting this research study and what is it about?
You are being asked to take part in research being conducted by Jaykumar Maradia who is a graduate nursing student at Rutgers University, Newark in the Department of Psychiatry. The purpose of this study is to increase the depression screening rate in a primary care setting.

What will I be asked to do if I take part?
You will be asked to complete a questionnaire and answer one additional question. The questionnaire will take about 5 minutes to complete it. We anticipate approximately 40 subjects will take part in the study.

What are the risks and/or discomforts I might experience if I take part in the study?
Breach of confidentiality is a risk of harm but a data security plan is in place to minimize such a risk. Also, some questions may make you feel sad or uncomfortable. The questions may create psychological stress. If that happens, you will be evaluated by your primary care provider for the same. If that happens, you can skip those questions or withdraw from the study altogether. If you decide to quit at any time before you have finished the questionnaire your answers will NOT be recorded.

Are there any benefits to me if I choose to take part in this study?
There no direct benefits to you for taking part in this research. You will be contributing to knowledge about screening of depression at a primary care office.

Will I be paid to take part in this study?
You will not be paid to take part in this study.

How will information about me be kept private or confidential?
All efforts will be made to keep your responses confidential, but total confidentiality cannot be guaranteed.

We will ask you to provide information about your age, gender, ethnicity and medical diagnosis when you complete the questionnaire. Your responses will be assigned a subject number so others will not know which responses are yours. No identifiable data will be collected.

No information that can identify you will appear in any professional presentation or publication. Any report of the findings will be made in the aggregate, meaning that numbers for the group will be reported, but your responses cannot be identified as yours.

What will happen to information I provide in the research after the study is over?
The information collected about you for this research will not be used by or distributed to investigators for other research.

What will happen if I do not want to take part or decide later not to stay in the study?
Your participation is voluntary. If you choose to take part now, you may change your mind and withdraw later. You may leave without turning in a completed form or by turning in a blank or incomplete form. However, once you turn in the form, you can no longer withdraw your responses as we will not know which ones are yours.

Who can I call if I have questions?
If you have questions about taking part in this study, you can contact the Project Manager: Jaykumar Maradia, DNP PMHNP Student, ████████████████████████ You can also contact my faculty advisor Dr. Kathleen Patusky, ████████████████████ If you have questions about your rights as a research subject, you can call the IRB Director at Newark HealthSci (973)-972-3608 or the Rutgers Human Subjects Protection Program at (973) 972-1149.

Please keep this consent form if you would like a copy of it for your files.

AGREEMENT TO PARTICIPATE

1. Subject consent:

I have read this entire consent form, or it has been read to me, and I believe that I understand what has been discussed. All of my questions about this form and this study have been answered. I agree to take part in this study.

Subject Name (printed):_____

Subject Signature:_____ Date:_____

2. Signature of Investigator/Individual Obtaining Consent:

To the best of my ability, I have explained and discussed all the important details about the study including all of the information contained in this consent form.

Investigator/Person Obtaining Consent (printed):_____

Signature:_____ Date: _____

Version 1.0 (04/07/2019)

Appendix F

Demographic Sheet

Complete the blanks/check the boxes that best describes your situation.

1. Participant ID number (this is the number assigned to you by the PM): _____

2. Today's Date: __ __/__ __/__ __ __ __

3. What is your gender?

   ☐ Male
   ☐ Female
   ☐ Transgender Female
   ☐ Transgender Male
   ☐ Another (please specify) _____

4. Do you have disability?

   ☐ No
   ☐ Yes

5. What is your racial or ethnic background? (Please check all that apply)

   ☐ White
   ☐ Native American
   ☐ Black or African American
   ☐ American Indian/Alaska Native
   ☐ Asian
   ☐ Hawaiian/Other Pacific Islander
   ☐ Other (please specify) _____

6. What is your age?

   ☐ 18-24
   ☐ 25-34
   ☐ 35-44
   ☐ 45-54
   ☐ 55-64
   ☐ 65-89

7. What is your marital status?

☐   Single
☐   Married
☐   Divorced
☐   Separated
☐   Widowed
☐   Unmarried

8. What is your highest level of education?

☐   Less than high school degree
☐   High school degree or equivalent (GED)
☐   Some college but no degree
☐   Associated degree
☐   Bachelor's degree
☐   Graduate degree
☐   Doctoral degree

9. Have you ever been diagnosed with depression before?

☐   No
☐   Yes

Please answer the following question in the best way you can describe

How do you feel about filling out the (PHQ-9) questionnaire on every visit to identify depression early if any?

_____

_____

_____

_____

_____

_____

Appendix G

Patient Health Questionnaire (PHQ) – 9

PATIENT HEALTH QUESTIONNAIRE-9 (PHQ-9)

Over the last 2 weeks, how often have you been bothered by any of the following problems? (Use "✔" to indicate your answer)	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	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 ___0___ + _____ + _____ + _____

=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
☐	☐	☐	☐

Developed by Drs. Robert L. Spitzer, Janet B.W. Williams, Kurt Kroenke and colleagues, with an educational grant from Pfizer Inc. No permission required to reproduce, translate, display or distribute.

Appendix H

Project Timeline

Activity	Plan Start	Plan Duration (in month)	Periods												
			May-19	Jun-19	July-19	Aug-19	Sept-19	Oct-19	Nov-19	Dec-19	Jan-20	Feb-20	Mar-20	Apr-20	May-20
Presentation of Proposal to Team	May-19	1													
IRB Submission	Jun-19	3													
Participant Recruitment and Data Collection	Sep-19	2													
Data Analysis	Nov-19	1													
Evaluation/	De	1													

Writing	c-19										░	░	░			
Presentation of Final Project	Mar-20	1												░	░	
Graduation	May-20	1														░

Appendix I

Table
Cost of the Project

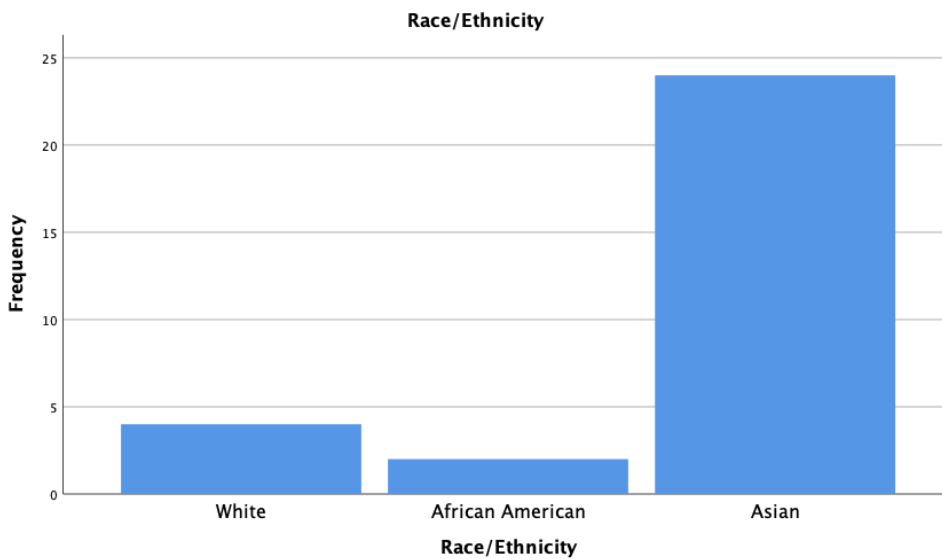|	Cost	Total Cost
Recruitment Fliers	6 @ .15	$1
Statistician Consultant	$50/hr x 1 hrs	$50
Dissemination Poster	$75	$75
Printing of Consent	100 @ .10	$10
Total Budget		$136

Appendix J

Figure 1: Ethnicity distribution. This figure shows the distribution of participants according to their Ethnicity. Four participants (13.3%) were white, 2 (6.7%) were African American and 24 (80%) were Asian ethnicity.
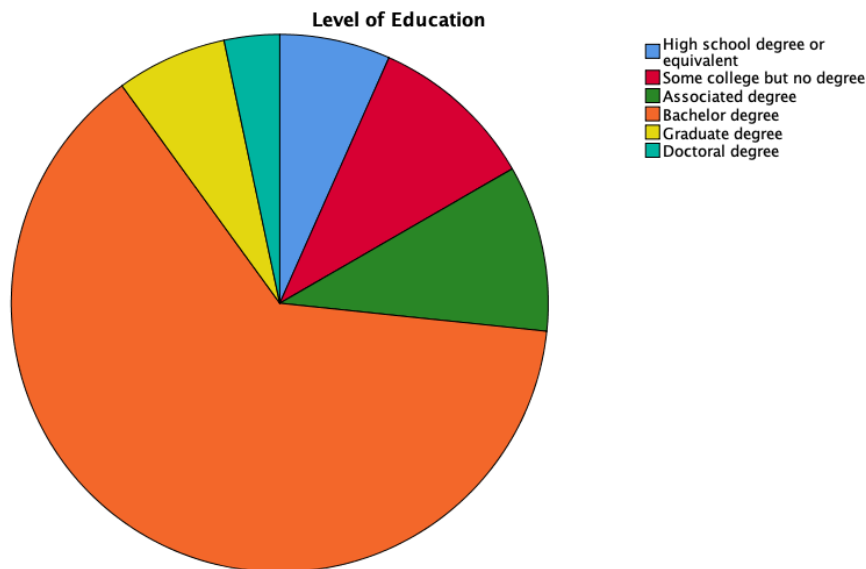

Figure 2: Level of education distribution. This figure shows the distribution of participants according to their level of education. 63.3% a Bachelor's degree, 20% an Associate's degree or some college level.
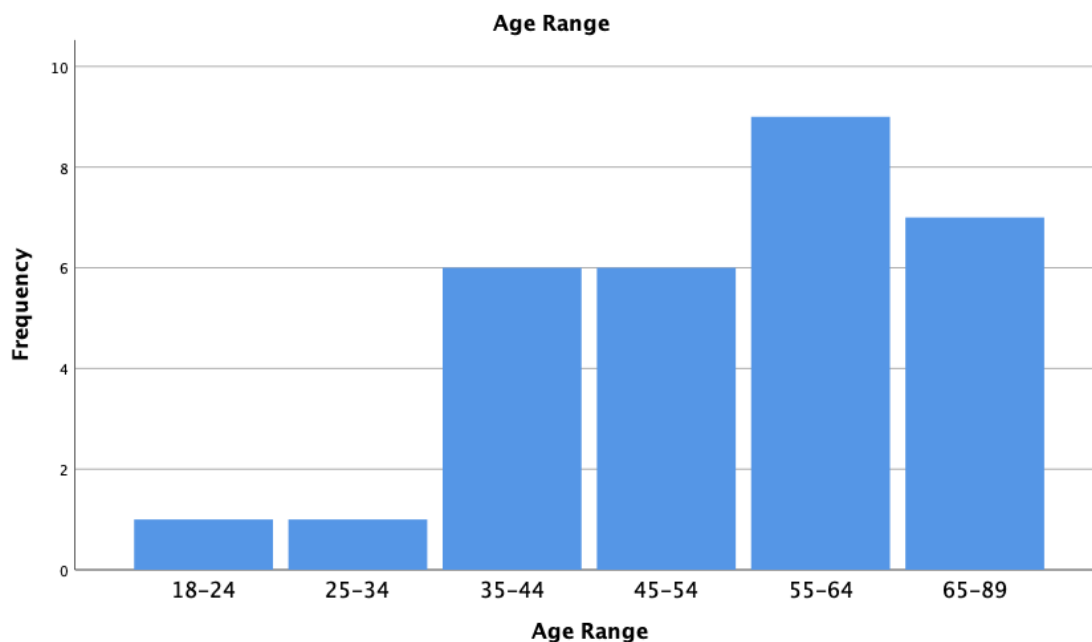
Figure 3: Age-range. This figure shows the distribution of participants' age range. 6% in 35-44, 20% in 45-54, 30% in 55-64 and 7% in 65-89 years.
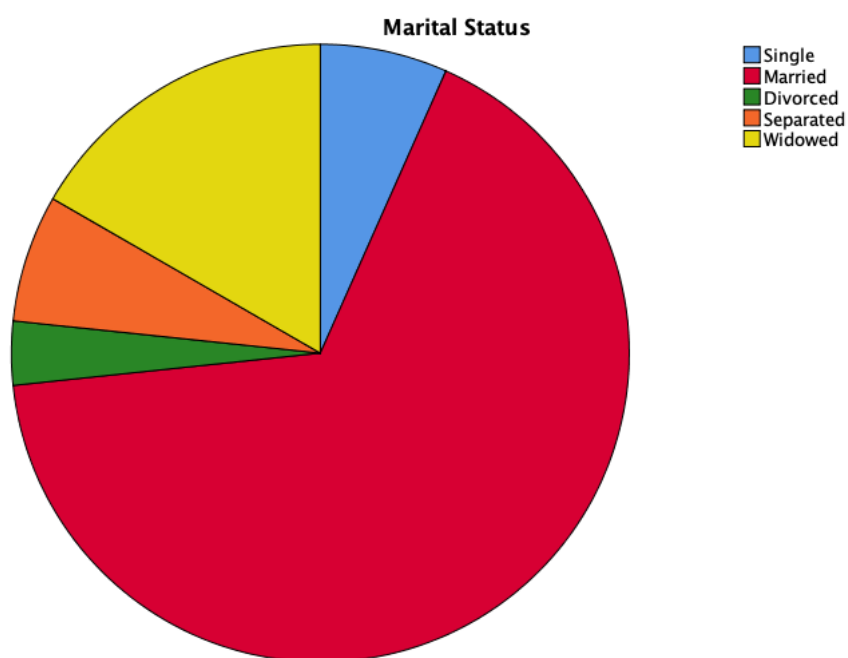

Figure 4: Marital Status. This figure shows the distribution of participants' marital status. 20 (66.7%) married, 2 (6.7%) single, 1 (3.3%) divorced, 2 (6.7%) separated and 5 (16.7%) widowed

Appendix K

Table
PHQ-9 screening analysis

Category Scale	PHQ-9 Screening					
	Minimal (0–4)	Mild (5–9)	Moderate (10-14)	Moderately Severe (15-19)	Severe (20-27)	Total
# of patients	12	16	2	0	0	30
% of patients	40	53.3	6.7	0	0	100

Note: Depression category division according to # of patients and % of patients