4-2014

Outcomes for coexisting diabetes and depression

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PERMISSION

Title: Outcomes for coexisting diabetes and depression

Department: Nursing

Degree: Master of Science

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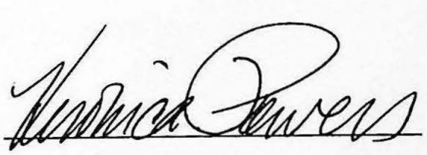
Signature 

Date 4/24/14

Abstract

A bidirectional association has been found between depression and diabetes mellitus. Depression is a risk factor for diabetes, and diabetes increases risk for the onset of depression. Depression commonly accompanies diabetes, resulting in reduced adherence to medications and increased risk for morbidity and mortality (Bogner, Morales, de Vries, & Cappola, 2012). Psychological problems may have an adverse effect on diabetic control, and improvements in depression can lead to clinically significant improvements in glycemic control (Lloyd, Dyer, & & Barnett, 2000).

Patients with multiple chronic diseases experience unfavorable health outcomes and give rise to challenges in patient care and medical costs. Competing demands and fragmented care contribute to poor disease control among patients with multiple conditions (Lin et al. 2012). This independent study will review the internal validity of the relationship between depression and diabetes mellitus. Because of the incidence of poor outcomes when patients have the comorbidities of diabetes and depression, this independent study project will look at factors that contribute to this higher incidence and at ways to improve patient outcomes.

Outcomes for coexisting diabetes and depression

Introduction

Patients with diabetes and comorbid depression have a two to three times increased risk of early mortality compared to non-depressed patients with diabetes. The main goal of controlling diabetes is to avoid urgent and long-lasting complications of the disease and enable patients to have good quality of life (Kucuk, Kaya, Kucuk, Yogun, & Buzlu, 2012).

Psychological problems can occur in patients with diabetes related to perceptions of the disease and its effect on the patient's daily life. Mental disorders, particularly depression and anxiety, are more prevalent in people with diabetes compared to the general population. For the purpose of this paper, the focus will be on the mental health disorder of depression. Patients with diabetes are twice as likely as those without this disorder to experience depressive symptoms (Küçük, Kaya, Küçük, Yoğun, & Buzlu, 2013).

This paper will review the literature and address the question: For adults diagnosed with diabetes and depression, does management by a psychiatric advanced practice nurse and primary care provider in a co-existing clinic improve depression and blood glucose control? For the patient with diabetes and depression, having a primary care provider and psychiatric care provider work together can provide better control of both diseases.

Purpose

Evidence suggests that there is a correlation between patients who have a multidisciplinary team approach, such as with a primary care provider and a psychiatric advanced practice nurse (APN), and increased blood glucose control and improved depressive

symptoms (Antai-Otong, 2007). The purpose of this paper is to examine the evidence related to management of depression and diabetes in primary care clinics. This includes reviewing the literature about psychiatric nurse practitioners and family nurse practitioners managing patients with depression and diabetes.

Barriers to detecting and managing depression in long term conditions relate to patients' and practitioners' failures to recognize depression. They may have a tendency to normalize distress associated with being diagnosed diabetes and might leave out some basic patient education. Improvements in the quality of care for depression in people with diabetes is likely to follow from interventions and service redesign that support and facilitate practitioners to engage patients in more collaborative management strategies (Coventry et al. 2011).

This paper will review the literature to determine the extent of-diabetes, depression, and co-existing diabetes and depression, the cost of care, and what has been done to improve outcomes for the individuals with co-existing disorders. It will also examine the patient outcomes when there is collaboration between healthcare professionals such as primary care and psychiatric nurse practitioner as compared to-patients who receive usual care, such as self-monitoring or the use of non-collaborating health professionals.

Significance

There are many factors in determining the cost of a disease. Diabetes mellitus is a growing financial problem with care costs in 2007 estimated at $174 billion. This included direct medical costs and costs related to decreased productivity. Furthermore, diabetes mellitus is estimated to affect 7.8% of the total United States population and is associated with significant disease burden (Butler, Kaiser, Johnson, Besse, & Horswell, 2010). This is in addition to the

consideration of the cost of diabetes added to the financial impact of depression. In a given year, 18.8 million American adults (9.5% of the adult population) will suffer from a depressive illness, leading to 200 million lost workdays at a cost to employers at $17-$44 billion, and national health expenditures of over $100 million in 2003 (Centers for Disease Control and Prevention, 2013).

While working with individuals who have diabetes or depression independently or congruently, it is important to remember the significance of both disorders and the impact it has on society, and the individual's health and wellbeing. Providers for these individuals may be able to recognize risk factors, screening for and prevention of complications of either diabetes or depression. With early detection, treatments can help reduce possible long term complications. It is important for a person who has diabetes to do regular blood sugar readings and have lab work completed, such as Hemoglobin A1C. They should also have an annual eye exam and screenings for diabetic neuropathy. The provider should also initiate having the patient complete a depression screening such as a PHQ-9 at regular intervals (Antai-Otong, 2007).

Consequently, if a person has symptoms of depression, lab work should be obtained at least annually including a comprehensive metabolic panel (CMP) as well as assess for lifestyle risks for the development of diabetes type 2. If there is an increased risk, or if the patient has elevated blood sugar readings, the patient should receive a referral to their primary care provider or to have their case discussed during the team collaboration (Antai-Otong, 2007

This literature reviewed in this paper will explore the extent of-diabetes, depression, and co-existing diabetes and depression, the cost of care, and what has been done to improve patient outcomes for individuals with co-existing disorders. Research supports that there is a relationship

between both diabetes and depression (Katon et al., 2013). There is also research that supports that collaborative care between providers can improve the outcomes of patients as evidenced by improvement in levels of Hemoglobin A1C and depression questionnaire scores (Butler, Kaiser, Johnson, Besse, & Horswell, 2010).

As more nurse practitioners are entering the area of health care, they are adding to the list of resources available for patient care and joining in with existing collaborations. Whether in private practice or in a group setting such as a hospital or clinic, nurse practitioners are a quality and cost effective choice for patients (Parrish & Peden, 2009). Psychiatric and mental health nurse practitioners can be a key in caring for patients with depression and screening for diabetes as well as referring or collaborating with primary care providers in ensuring that the patient needs are being met.

Theoretical Framework

The theoretical framework for this study is based on disease management, which incorporates attributes from the medical care model and the chronic care model. There was not a shared definition for disease management taxonomy, so a writing group within the American Heart Association was assembled. They compiled a system to review articles from 1987 to 2005 and developed a conceptual model as the organizational framework for disease management (Krumholz et al., 2006).

Krumholz et al. (2006) reported that the final taxonomy includes eight domains. These domains are that

- the patient population is characterized by risk status, demographic profile, and level of comorbidity;
- the patient describes the primary targets of disease management intervention and includes patients and caregivers, physicians and allied healthcare providers, and healthcare delivery systems;
- intervention content delineates individual components, such as patient education, medication management, peer support, or some form of post-acute care, that are included in disease management;
- the delivery personnel describe the network of healthcare providers involved in the delivery of disease management interventions from all areas of healthcare providers;
- communication methods may include in-person visitation, audiovisual information packets, and some form of electronic or telecommunication technology;
- the intensity and complexity distinguish between the frequency and duration of exposure, as well as the mix of program components, with respect to the target for disease management;
- the context in which disease management interventions are typically delivered and include inpatient or hospital-affiliated outpatient programs, community or home-based programs, or some combination of these factors; and
- the clinical outcomes include traditional, frequently assessed primary and secondary outcomes, as well as patient-centered measures, such as adherence to medication, self-management, and caregiver burden.

The framework for this literature review is based on patients who had coexisting diabetes and depression that had a harder time managing their diabetes. The interventions by psychiatric mental health nurse practitioners can impact the outcomes for patients with diabetes and depression through medication management and patient education. The psychiatric mental health nurse practitioner can work with a collaborative team to determine appropriate interventions for the patient. The patient then can work toward their objective of improving their own outcome through medication adherence and self-management (Antai-Otong, 2007).

Providers should have a basic understanding of their role so that they will work within the scope of their practice. They should also understand disease management so that screening can be completed to detect complications. Patients with diabetes have an increased risk of the development of depression and should complete a simple screening for depression at regular intervals of care in the outpatient clinic or other setting where their diabetes is managed (Acee, 2010). Likewise if a patient has depression and is seen in an outpatient setting, lab work should be obtained at least annually which includes the Hemoglobin A1C (Antai-Otong, 2007).

Definitions

Depression or Major Depressive Disorder: a patient has symptoms of a depressed mood and/or loss of interest or pleasure in life activities for at least two weeks and at least five of the following symptoms that cause clinically significant impairment in social, work, or other important areas of functioning almost every day. These symptoms include (a) depressed mood most of the day, (b) a diminished interest or pleasure in all or most activities, (c) significant weight loss that is unintentional or weight gain, (d) insomnia or sleeping too much, (e) agitation or psychomotor retardation observed by others, (f) fatigue or loss of energy, (g) feelings of

worthlessness or excessive guilt, (h) diminished ability to think or concentrate, or indecisiveness, and (i) recurrent thoughts of death including suicidal ideation with or without a plan or a suicide attempt (American Psychiatric Association, 2000).

Diabetes: Also called diabetes mellitus or abbreviated DM. Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction, and failure of various organs, especially the eyes, kidneys, nerves, heart, and blood vessels (American Diabetes Association, 2004).

Gestational Diabetes: Gestational diabetes is a condition characterized by high blood sugar (glucose) levels that is first recognized during pregnancy. The condition occurs in approximately 4% of all pregnancies (WebMD, 2013).

Hemoglobin A1C: A lab test that shows the average level of blood sugar (glucose) over the previous three months. It shows how well diabetes is being controlled. An HbA1c of 5.6% or less is normal. The following Hemoglobin A1C levels are used to diagnose diabetes. A normal level is less than 5.7%. Pre-diabetes is determined to exist when the level is 5.7% to 6.4%. Diabetes is diagnosed at 6.5% or higher (American Diabetes Association, 2012).

Perinatal depression: Perinatal depression is defined as depression in the six months before delivery and in the first year postpartum among women with prepregnancy diabetes and gestational diabetes compared to women with no diabetes (Katon, Russo, Gavin, Melville, & Katon, 2011).

Process

The key terms that were used to search for articles include diabetes, diabetes mellitus, metabolism, depression, mood, primary care, mental illness, obesity, childhood, psychiatric nurse practitioners, collaborative, collaborative care, outcome and/or team. Searches were completed by utilizing the Harley E. French Library of the Health Sciences. Through online resources on the library website, the databases that were used were PubMed and CINAHL. Articles were found looking at ways to improve outcomes for individuals with the coexisting conditions of diabetes and depression. The target audience includes primary care providers, mental health providers, and ultimately patients with diabetes and depression.

Additionally, the reference lists from articles obtained were reviewed to find relevant evidence based literature that was appropriate for the paper's problem question. The searches were limited to English and within the past 10 years. This project looks at the importance and researched ways to improve the outcomes for individuals with co-existing diabetes and depression.

The AACN grading tool (Armola et al., 2009) criteria was used to grade levels of evidence for utilizing the study in practice. The level of evidence was based on the types of research conducted within the literature reviewed. The types of literature reviewed included meta-analysis of multiple controlled studies with results that consistently support a specific action, intervention or treatment. There were controlled studies, both randomized and nonrandomized, with results that consistently support a specific action, intervention, or treatment. Some of the studies were systematic reviews, or randomized controlled trials. There were peer-reviewed articles from professional organizations with clinical studies to support recommendations and gave theory-based evidence from expert (Armola et al., 2009).

Review of the Literature

Diabetes mellitus (DM) affects approximately 20.6 million people in the United States of America (Grandy, Chapman, & Fox, 2008). Of these, an estimated 6.2 million, nearly one-third are unaware that they have the disease. DM is the fifth deadliest disease in the USA, and more than a million people develop the disease each year. People with DM live with an incurable disease that requires not only drug therapy and blood glucose control, but also a healthy lifestyle and demanding changes in cultural patterns (Pera, 2011). Diabetes was estimated to have accounted for 987,000 deaths (1.7% of global mortality) in 2002. Because there are several adjustments in the patient's lifestyle for diabetes it has been described as the most complex and demanding of any chronic disease to manage (Grandy, Chapman, & Fox, 2008).

It is estimated that 41% of people with diabetes suffer with poor psychological well-being. There is consistent evidence of elevated rates of depression and anxiety disorders for individuals with diabetes. For example, the rate of depression is doubled in people with diabetes compared with controls. Over and above the severe impact of these psychological problems in their own right, the costs (financial and otherwise) of untreated depression in diabetes are high. This is due to its negative impact on diabetes self-care and medication adherence, leading to hyperglycemia and increased complications and healthcare costs, lost productivity and increased mortality (Trigwell et al., 2008).

Patients with coexisting depression and diabetes, as compared with diabetes alone, have a higher burden of symptoms and diabetic complications. They also have higher unemployment and overall work disability, poorer glycemic control, higher mortality, and higher health care costs. (Kent et al., 2010) In addition, poorer adherence to medications (oral hypoglycemic,

antihypertensive, and lipid-lowering agents) and poorer self-care (ie, more smoking, less exercise, less healthy eating) have been observed in patients with diabetes and major depression versus patients without major depression (Kent et al., 2010).

New research is being done to determine if there is a correlation between diabetes and depression and the extent of that correlation. Hsu et al. (2012) felt that association between diabetes and the risk of depression were contradictory from previous studies. They completed a cohort study to determine whether diabetes is associated with an increased risk of subsequent development of depression, looking at individuals under 20 years of age. They determined that diabetic patients were at a higher risk for subsequent depression. Adequate treatment with insulin reduced the risk of depression by 43%.

This association between diabetes and depression affects more than the outcomes of diabetes and depression. It has been observed that there is an increased mortality risk in post-myocardial infarction patients with both diabetes and depression. This is beyond the association with mortality of diabetes and depression alone (Bot, Pouwer, Zuidersma, van Melle, & de Jonge, 2012).

Depressive symptoms are associated with several metabolic and behavioral risk factors for type 2 diabetes. First, depressed individuals are less likely to comply with dietary and weight loss recommendations and more likely to be physically inactive, contributing to obesity, a strong risk factor. Participants with more depressive symptoms had poor health behaviors associated with diabetes risk (Golden et al., 2008).

Recent advances in understanding the neurobiology of depression have implicated dysfunction of the hypothalamus–pituitary–adrenal axis, neurotrophins, and inflammatory mediators in the development of this disorder. Similarly, dysregulated facets of both the innate and adaptive immune system have been implicated in the onset of insulin resistance. This is also true for the onset of type 2 diabetes (Stuart & Baune, 2011).

In considering the mechanism for the relationship between depression and diabetes, Stuart & Baune (2011), studied the role of inflammation in the pathogenesis and pathophysiology of each disorder individually. Their review draws upon an emerging body of epidemiological and mechanistic evidence to support the hypothesis that shared inflammatory mechanisms may represent a key biological link in this co-morbidity. Given the shared mechanisms of this co-morbidity, these patients may be excellent candidates for novel immune targeted pharmacotherapy.

Inflammatory markers are consistently elevated in both conditions. Obesity may play a key role in the amplification of inflammatory signaling. Shared inflammatory mechanisms may be the key biological link in the comorbidity (Stuart & Baune, 2011).

Diagnostics. Diabetes is diagnosed with a fasting plasma glucose > 126 mg/dL (7.0 mmol/L) or a two-hour plasma glucose >2(X) mg/dL (11.1 mmol/L) during an oral glucose-tolerance test. This must be observed and confirmed by repeat testing. Due to the variability of measuring glucose, as described above, the ADA recommends that a patient's glucose value be confirmed on a subsequent day. This makes certain that the patient's glucose value exceeded 126 mg/dL on more than one occasion (Molinaro, 2011).

Molarino (2011) surveyed physicians and demonstrated that 93.4% routinely screen for diabetes. Interestingly, 49% of those surveyed reported using Hemoglobin A1C for screening and 58% for diagnosis of diabetes. Forty-nine percent also thought Hemoglobin A1C was an approved test for screening.

It was not until 2010 that the ADA's guidelines for the Diagnosis and Classification of diabetes mellitus recommended the use of the Hemoglobin A1C test to diagnose diabetes. There are several advantages exist when using Hemoglobin A1C as a diagnostic criterion. The main factors in support of using Hemoglobin A1C as a diagnostic test include that it does not require patients to be fasting, it reflects longer-term glycemia than does plasma glucose, hemoglobin A1C laboratory methods are currently well standardized, and errors caused by non-glycemic factors affecting Hemoglobin A1C (e.g.. hemoglobinopathies) are infrequent and can be minimized by confirming the diagnosis of diabetes with a plasma-glucose- (PG-) specific test (Molinaro, 2011).

Treating depression in the diabetic patient is similar to treating other co-occurring chronic diseases. It is imperative to evaluate the patient's physical condition by asking questions about prescribed and over-the-counter medications and adherence to treatment adherence. It is advisable to order blood chemistries, hemoglobin A1C, lipid profile, and drug screens when appropriate. Part of the evaluation should include measuring vital signs, along with obtaining the patients height and weight. The mental health provider should work with the primary care provider to evaluate metabolic/ glycemic control. It is equally important to rule out coexisting psychiatric (e.g., anxiety disorder, substance-related disorders) and medical conditions (Antai-Otong, 2007).

Community health clinics are well positioned to diagnose, treat, and monitor depression, which can contribute to improved treatment adherence and quality of life as well as reduced health care costs for persons with diabetes (Gross et al., 2005). Barriers to screening for depression exist in the community health setting but may be overcome with the use of an easy to use and reliable screening tool for patients at high risk for complications because of co-morbid conditions. The Patient Health Questionnaire (PHQ-9) has been identified as an effective screening tool to assess depression in the primary care setting. The nine item questionnaire is available in 27 languages, can be completed by the patient before or during an office visit. It is important that the clinician review the patient's responses to the questionnaire during the office visit while exploring additional history and other presenting symptoms (Acee, 2010).

Children. The rising levels of overweight and obesity among children and adolescents is of major concern as childhood obesity has adverse physical and psychological consequences (Rabbitt & Coyne, 2012). Depression earlier in life increases the risk for development of type 2 diabetes, and diabetes-specific complications are associated with a higher risk of subsequent depression (Katon, Russo, Gavin, Melville, & Katon, 2011). As the rate of childhood obesity becomes more prevalent, healthcare providers have seen the increase in long-term illnesses such as diabetes type 2 and depression (Rabbitt & Coyne, 2012).

Primary prevention of obesity decreases the development of serious secondary complications in adulthood. Providers can help parents and children by providing nutritional advice and, through weight management programs, offer strategies for decreasing caloric intake and increasing physical activity. The providers' actions should always take a whole-family approach because it is challenging for obese children to alter their dietary or physical habits if

not supported by their families. The collaborating team approach can be used so the team can address childhood obesity as it is a major health issue with long-term disorders (Rabbitt & Coyne, 2012).

De Beaufort, Jarosz-Chobot, Frank, de Bart &, Deja, (2009) surveyed 578 members of the International Society for Pediatric and Adolescent Diabetes. The 21-item questionnaire was designed to collect information about the health discipline of those completing the questionnaire. The survey also looked at the setting in which they work, the age range of the patients followed up in their center, and the type of physician specialist who is most often responsible for caring for adolescents in their practice. Several of the survey questions addressed the transition process. For example, where and at what age are youth transferred to adult care, who initiates the referral, how formalized is the process and how many teens make a successful in transitioning into adult care.

Ninety-two questionnaires (16%) from members representing 36 countries were included in the analysis. The results from these surveys determines that youth with type 1 diabetes often struggle to keep diabetes management a priority and find it challenging to maintain optimal metabolic control. When they graduate from pediatric care, some of these young people opt out of care altogether. Eventually they will resurface in the medical system when they develop complications which may have been prevented, including depression (De Beaufort, Jarosz-Chobot, Frank, de Bart &, Deja, 2009).

Minorities. Compared with Caucasians, US racial/ethnic minority groups have a greater prevalence of diabetes. They have greater concerns about medication use and are more likely to have poorly controlled diabetes. Racial/ethnic groups in the US experience greater incidence of

some of the major complications related to diabetes. These groups may also receive less adequate treatment for comorbid depression. Depression is underdiagnosed in general and may be even more so in some racial/ethnic minority groups (Hudson et al., 2013).

Hudson et al. (2013) explored the extent of the gap between need and care for depression among patients with diabetes and how this differs across racial/ethnic groups. The likelihood of clinical recognition of depression was compared in patients who reported depressive symptoms in a well-characterized community-based population with diabetes. After adjusting for sociodemographics, limited English proficiency, and depressive symptom severity, racial/ethnic minorities were less likely to be clinically recognized for depression compared with Caucasians. Because there are gaps in clinical recognition of comorbid depression and diabetes among patients within certain minority groups, there is evident improvement within the healthcare delivery system that can be made. This includes educating providers of this disparity (Hudson et al., 2013).

Huang, Chung, Kronenke, and Spitzer (2006) studied the association between depression severity and functional status among non-Hispanic white, African Americans, and Latino. The utilization of mean PHQ-9 scores and functional status at varying degrees of depression severity in the groups were compared. Individuals from a racial/ethnic minority with depression reported a greater burden of depressive symptoms and felt that their severity of depressive symptoms was greater than non-Hispanic whites in general. Functional impairment increased with increasing levels of depression severity in all three racial or ethnic groups, although Latinos consistently reported fewer functional disturbances compared with non-Hispanic whites.

Pregnancy. The prevalence of diabetes in pregnancy has risen 122% in the last 20 years, largely due to increased prevalence of gestational diabetes (GDM). Katon, Russo, Gavin, Melville, & Katon, (2011) found that diabetes that precedes pregnancy is associated with depression among pregnant women. Using a sample of pregnant women enrolled in Medicaid, it was reported that there was a two-fold increase in odds of receiving a diagnosis of perinatal depression. Because major depression is unlikely to remit without treatment, understanding whether or not diabetes, in particular GDM, is associated with antenatal major depression is paramount.

Katon, Russo, Gavin, Melville, & Katon (2011) studied 2398 women screened for depression. There was no detectable independent association of diabetes and antenatal depression in pregnancy after accounting for the presence of other chronic medical conditions. Although diabetes may not independently increase the risk of antenatal depression, the presence of one or more chronic medical conditions significantly increased a woman's risk of antenatal depression, highlighting the importance of depression screening among pregnant women with chronic medical conditions. Future research needs to replicate these findings and should also focus on the potential impact of antenatal depression in patients with diabetes in pregnancy on glycemic control, birth outcomes, and infant health. Among women with GDM, poor glycemic control may be associated with greater psychological distress, and poor glycemic control is, in turn, associated with increased maternal and neonatal morbidity (Katon, Russo, Gavin, Melville, & Katon, 2011).

Elderly. Almost all older adults who develop diabetes have type 2 diabetes, and older adults with diabetes often have comorbid conditions such as high blood pressure, high

cholesterol, infections that heal slowly and which place them at an increased risk for heart attack, stroke and kidney failure. Seniors with diabetes are also more likely to have memory problems and depression. Awareness and education is critical in helping seniors to lead healthier lives (American Diabetes Association, 2012).

Bogner, Morales, Post, & Bruce (2007) reported that depressed, older adults with diabetes live longer when they are treated for depression. They completed a randomized controlled trial of a depression treatment program for older adults, which followed primary care patients in the New York City, Philadelphia and Pittsburgh areas for five years. This study showed that implementing depression care management in elderly diabetic patients reduced mortality rates when compared to individuals who did not receive usual care practices over a five year interval. The results led researchers to conclude that better models of care should be developed that integrate depression management into the treatment of people with diabetes (American Diabetes Association, 2007).

Sexuality. Küçük, Kaya, Küçük, Yoğun, & Buzlu (2013) completed a descriptive study to investigate the relationship between depression and perception of sexuality in people with type II diabetes. Information was gathered through a questionnaire which included 16 questions concerning sexuality. The sample population comprised 100 patients who met the following participant criteria: no difficulty hearing or understanding, a history of type II diabetes, and agreement with participation in the study.

There was no correlation between depression score and duration of diabetes. There was a positive correlation between age at diabetes diagnosis and depression score. However, this

correlation was not statistically significant ($p>0.05$) (Küçük, Kaya, Küçük, Yoğun, & Buzlu, 2013).

The main goal of controlling diabetes is to maintain and/or improve the quality of life and to avoid urgent and long-lasting complications of the disease. Recognizing psychiatric aspects of diabetes can make overcoming problems much easier. The mental disorder encountered most among physical diseases is depression. Problems related to sex, one of the basic needs of humans, can occur with depression and diabetes. Diabetes can adversely affect an individual's sex life, which can negatively affect quality of life and psychological state (Küçük, Kaya, Küçük, Yoğun, & Buzlu, 2013).

People with type II diabetes report symptoms of depression and an adverse effect on perceptions of sexuality. Thus, diagnosing sexual problems in patients and noticing underlying depressive symptoms during treatment can lead to improved sexual function. It is vital to take this issue seriously and adopt a multi-disciplinary approach to prevent severe psychological problems in patients with diabetes. Patients should be treated holistically, and psychiatric support should be provided for those considered at risk, apart from metabolic control of the disease. (Küçük, Kaya, Küçük, Yoğun, & Buzlu, 2013).

Medication Considerations. When medications are indicated for the treatment of any disorder/disease, the prescribing clinician needs to make the selection after careful assessment of the patient. After a definitive diagnosis is confirmed, treatment options must be discussed with the patient and family to determine a plan of care. Collaboration between with the primary care provider and mental health provider is crucial throughout treatment to ensure continuity care for the patient. One of the reasons this is important is because of potential drug interactions between

medications used to treat diabetes and co-occurring medical conditions and antidepressants (Antai-Otong, 2007).

Due to potential negative consequences of untreated depression (e.g., suicide, impaired functioning) and diabetes it is critical to initiate treatment as soon as possible. Significant challenges for mental healthcare providers prescribing medications include choosing an antidepressant with a safe side-effect profile, length of treatment to sustain remission, and parallel glycemic control. Relative to choice of antidepressant and duration of treatment, research indicates that selective serotonin reuptake inhibitors (SSRIs) have proven efficacy and are the first-line treatment of depression in diabetes. Sertraline, fluoxetine, and paroxetine demonstrated equal efficacy in most findings (Antai-Otong, 2007).

Various forms of medications can be used to treat type 2 diabetes. These include alpha-glucosidase inhibitors that work to decrease the absorption of carbohydrates from the digestive tract to lower after-meal glucose levels. Biguanides (Metformin) acts on the liver to produce less glucose and help muscle, fat cells, and the liver absorb more glucose from the bloodstream, thereby lowering blood-sugar levels. Meglitinides and sulfonylureas act on the pancreas to produce more insulin in response to the level of glucose in the blood. Thiazolidinediones act on the liver to absorb more glucose when insulin is present (Molinaro, 2011).

Maintenance therapy with sertraline sustained symptom remission in depressed diabetic patients for at least 12 months. It is beneficial to maintaining antidepressant treatment for at least a year to prevent depression recurrence. Despite substantial improvement from antidepressants regardless of duration of treatment, findings are inconsistent regarding a parallel to glycemic control (Antai-Otong, 2007).

Continued monitoring of blood sugar levels should be done as indicated at least daily. Even though with SSRI's there is proven efficacy, there still may be some amount of concerns with taking dual medications. For example taking fluoxetine with Metformin can have an additive effect and may increase the risk of hypoglycemia (Metformin, 2014). Of course when other medications are indicated for more complex patients with more comorbidities or those who have other mental health issues other than depression alone, any particular drug interactions of special precautions should be noted and adhered.

There are a couple of different approaches to making changes in the practices to usual care for those individuals who have both diabetes and depression. One possible change is for educating healthcare providers with a more broad base of knowledge so that they would be able to in turn provide more complete care to patients. Katon et al. (2010), compared usual care with an intervention involving nurses who provided guideline-based, patient-centered management of depression and chronic disease significantly improved control of medical disease and depression. Golden et al. (2008) recognized that clinicians should be aware of increased risk of elevated depressive symptoms in individuals with treated type-2 diabetes and consider routine screening for depressive symptoms among these patients.

Collaborative care has emerged as a promising intervention to improve primary care and patient outcomes. In this model, the patient chooses treatment in consultation with providers, who may include a primary care physician, depression care manager, and consulting psychiatrist. Katon et al. (2004) reported on the Pathways Study, a randomized trial of collaborative care for patients with coexisting diabetes and depression. The treatment protocol consisted of behavioral activation/pleasant events scheduling, a choice of either antidepressant medication or problem-

solving treatment, and a maintenance/relapse prevention plan for patients in remission. The results showed improved depression care and patient outcomes, although improved depression care alone did not result in glycemic control (Kent et al., 2010).

The utilization of a multidiscipline approach for better outcomes is the essence of collaborative care, which is the second approach in changing the type of care an individual, receives who has in the instance of this paper, the comorbidities of depression and diabetes. Katon et al. (2004) reviews whether enhancing quality of care for depression improves both depression and diabetes outcomes in patients with depression and diabetes. A sample of 329 patients with diabetes mellitus and co morbid major depression and/or dysthymia baseline randomly assigned to psychiatric and medicine interventions or primary care only . The rates of satisfaction in the intervention and usual care groups were very similar, but at six and 12 months, the intervention group reported significantly greater satisfaction than the usual care group although depressive outcomes were improved, no differences in hemoglobin A1C outcomes were observed. The collaborative care model used in this study seems to be a feasible and effective approach for improving the quality of care and outcomes of depression in primary care patients with diabetes mellitus.

Discussion

There are many aspects to consider when looking at the best means to care for patients. When there are patients who have such complex diseases as diabetes and depression concurrently, it stands to reason their care will be more involved than if a patient has one disease or the other. On one hand practitioners are trained to be able to handle many of the patient conditions that they are presented. However, each practitioner needs to be able to work within

the scope of their practice or to know that there are others who have spent time specializing in areas outside their own. In this case, it makes sense to either refer the patient to that specialization or to utilize that specialization within the collaborative team.

In order for a collaborative approach to work, an employer needs to agree to the idea so that time can be allowed for the collaborators to meet with their mutual patient (Butler, Kaiser, Johnson, Besse, & Horswell, 2010). In looking at how this is implemented within a particular rural inpatient setting, providers meet during a treatment plan meeting on a weekly basis for each individual patient. They also will use a time when pharmacy will review medications with the same team. The only way this could be done more efficiently is if there were a pharmacist in house and not one that traveled a distance on a weekly basis. This does however, allow for each discipline to be the expert in their own area for the better outcomes for patients.

In ways, this type of active treatment is what drives certain insurance companies to pay for the care their client is receiving. It is expected for there to be individualized care provided based on the current treatment plans. Each discipline is allowed to do what they were trained to do instead of trying to do hap hazard multitasking. It is more cost effective for one healthcare provider who is involved in diabetes and another who is involved in primary care to get more current evidence based training for their discipline to add that education to their current knowledge base, and put it into practice.

The timeline of change depends on the individuals involved in the collaborative or the company that they work. There are places that are currently implementing a multidisciplinary team approach to patient care. It is perhaps easier to do this within a smaller setting, although to

have a collaborative team approach could have more disciplines involved within a larger healthcare setting.

Most healthcare institutions are vested in ensuring their employees are educated with new and pertinent knowledge. They can do this in the form of internal and external training opportunities, such as workshops, sending people to conferences, or promoting journal clubs. It would be costly, time consuming, and impractical to send all employees to get the level of knowledge beyond sufficient let alone expert. It is however, prudent for a healthcare provider to know where to refer a patient to get the level of knowledge and care that is expected for the issue (Butler, Kaiser, Johnson, Besse, & Horswell, 2010). For instance, if a patient is having persistent problems maintaining their hemoglobin A1C at an acceptable level, a primary care provider could refer that patient to a diabetes educator if one is not already on the collaborating team. This would improve the patient outcome.

Recommended interventions should alter the trajectory of the disease in the patient population with diabetes and depression (such as to reduce or slow the progression of complications and ultimately reduce mortality). A set of interventions provided a cultural setting and infrastructure for behavioral changes on the part of the hospitals, providers, and patients that would lead to improved guideline adherence and disease control. These interventions included provider education, patient education, patient medication assistance programs, web-based quarterly feedback, case management, and reward and recognition programs (Butler, Kaiser, Johnson, Besse, & Horswell, 2010).

Advanced practice psychiatric nurses must perform a comprehensive psychiatric evaluation that should include the patient and family's perception of the mental health consult or

referral, expectations from treatment, and motivation to participate and adhere to treatment. Included in the evaluation are health behaviors and lifestyles, and treatment adherence, suicide and homicide risk, glucose self-monitoring, exercise schedule, diet, quality of interpersonal relationships and leisure time, spiritual and religious beliefs, stress management skills, and tobacco use. Along with the PHQ 9, other standardized tools and instruments, such as the Beck Depression Inventory (BDI), Hamilton Depression Rating Scale (HDRS), and a more recently developed tool, the Depression Interview and Structured Hamilton (DISH) scale, can be used to gather baseline data about the severity of depressive symptoms and a means to determine the percentage of symptom reduction or remission. The DISH scale was designed specifically to evaluate and diagnose depression in patients with medical conditions (Antai-Otong, 2007).

Stuart & Baune (2011) reported that research needs to be conducted in both understanding the correlation between diabetes and depression as well as finding ways to continue improving patient outcomes through evidence based means. Currently, there is an urgent need for more prospective studies of this co-morbidity including the assessment of inflammatory biomarkers. Further prospective studies on the relationship between depression and inflammation are also needed to strengthen this evidence base. The co-morbidity of depression and T2DM presents not only a significant challenge, but also a significant opportunity to healthcare professionals in both clinical and research domains. Through advancing the understanding of the mechanistic links that mediate this relationship, new avenues for research, treatment, and prevention of these conditions may become clear.

The literature reviewed indicates that there is evidence of the correlation between diabetes and depression. It also reveals that those patients with these coexisting conditions have

better outcomes when their providers utilize a collaborating team approach. Individuals who have coexisting diabetes and depression who are under the care of collaborating healthcare professionals as compared to individuals who rely only on self-monitoring or the use of non-collaborating health professionals will have better managed diabetes (Hemoglobin A1C), improved depression scores (PHQ 9), and report an improved quality of life.

Summary/Conclusions

Major depression occurs in one in four patients with diabetes mellitus. It is associated with poor diabetes control, negative clinical outcomes, reports of reduced quality of life and level of function, and diabetic-related mortality. When patients' depression is managed ~~their~~ there will be improvements in glycemic control. When patient with diabetes have their blood sugars regulated over a period of time, the risk for depression is reduced. For individuals diagnosed with diabetes and depression management by a psychiatric advanced practice nurse and primary care provider in a co-existing clinic improves depression and blood glucose control (Antai-Otong, 2007).

The decision for an individual to seek a psychiatric evaluation and treatment can be unsettling to the patient who may deny the distress associated with diabetes and depression. Providers should establish therapeutic rapport with patients. Patient education is then given to improve self-management and symptom control. Patient education also can help explain medications and screening procedures. It is an integral part of treatment for individuals with depression and diabetes (Antai-Otong, 2007).

Psychiatric nurses are poised to collaborate with primary care providers and reduce complications associated with co-occurring diabetes and depression. Collaborative relationships with the other providers help to ensure there is holistic support including mental health treatment to go along with the patients' medical health. Open communication about the patient's medical problems and history, including adherence to treatment, quality of support systems, cultural perceptions of diabetes and depression (e.g., gender, generational), and coping styles is helpful in co-collaborating (Antai-Otong, 2007).

Through education of providers and patients of the bidirectional association between depression and diabetes, risk factors can be identified, screening can be conducted, and proper treatment can be made. This includes treatment through a team approach with collaboration of healthcare providers and the patient. With this in mind, outcomes for those patients improve. For psychiatric nurse practitioners, collaboration with primary care providers and diabetic educators provides a holistic treatment plan to improve mood, facilitate glycemic control, promote adherence to treatment, prevent complications, and improve functional status and quality of life.

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