Primary Care Management of Obesity in Patients with Mental Illness: An Educational Intervention

PRIMARY CARE MANAGEMENT OF OBESITY IN PATIENTS WITH MENTAL ILLNESS: AN EDUCATIONAL INTERVENTION

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ABSTRACT

Obesity is highly prevalent and results in poor health outcomes and increased morbidity and mortality. Mentally ill patients are at increased risk for obesity and other health disparities that result in significantly reduced life expectancy. Primary care providers (PCP's) are first line defense in the obesity epidemic. A brief education intervention on obesity management in patients with mental illness was presented to PCP's at a community clinic to educate them on obesity management in patients with mental illness. A pre-and posttest was devised to assess current practice and intent to utilize knowledge. Results indicate that post intervention all provider agreed or strongly agreed that they felt more confident treating obesity indicating success of the presentation. Short-term implications of this project are better treatment for a high-risk population. More broadly, this project further adds to the current literature another example that brief educational interventions are beneficial for healthcare providers to help enable best evidence based practice.

INTRODUCTION

Obesity is one of the most prevalent but preventable causes of death and health care costs (CDC, 2016) in the United States. Obesity is most often defined as a body mass index (BMI) over 30 (CDC, 2016). According to the Center for Disease Control and Prevention (CDC) over 35% of the U.S. population is obese (2016). The World Health Organization (WHO) notes that worldwide obesity and overweight status is responsible for more deaths than malnutrition (WHO, 2016). Further, while only 13% of the overall worldwide population is obese, that number jumps to 39% in adults or nearly two billion people (WHO, 2016). No state in the United States has an obesity rate less than 20% and only six states boast a rate under 25% (CDC, 2016). Being obese raises the risk of numerous health complications including diabetes, stroke, heart disease and mental illnesses issues such as depression and anxiety, which can lead to poorer outcomes for these illnesses as well as increased overall mortality from all causes (CDC, 2016). When a patient suffers with a mental illness and is obese their mental and physical outcomes are worse (Correll et al., 2015, Depp et al., 2014; Galletly et al., 2016; McElroy et al., 2016; Malhi et al., 2015). The cost of decreased productivity associated with obesity is estimated between 3-6 billion dollars annually; this is noted to be nearly $80-$132 dollars per obese person, per year (CDC, 2016).

Healthy People 2020 is a set of goals laid out by the federal government to improve population health outcomes and reduce health disparities around the country (Healthy People, 2017). Progress is assessed every decade, and new goals are set (Healthy People, 2017). The goal for 2020 is to reduce obesity rates by 10%, from 33.5% to 30.5% by 2020, however, current

statistics indicate that the obesity rate has increased to 36.2% as of 2014, the most recent statistics available (Healthy People, 2017).

As established, obesity is a problem particularly for patients with a mental illness. Primary care providers (PCP's) are the center of care for patients; they serve as the initial point of contact and the gateway for referrals to more specialized care (NIH, 2015). Further, they are the epicenter of coordination for all care parties involved (NIH, 2015). Effective management of obesity needs to be centered in their practice. This project focuses on educating primary care providers on evidence based management strategies to increase obesity intervention and treatment success. Primary care providers are the main line treatment personnel in this epidemic, and therefore an appropriate focus of this intervention.

Background

Obesity is clearly an issue that is increasing in prevalence and severity despite its broad recognition as a problem, consensus on the serious, far-reaching health effects, and coordinated efforts to increase intervention. It is now known as a chronic condition and has its own ICD-10 diagnosis code. Managing obesity is important for patient health outcomes and with a move towards value-based reimbursement in healthcare where patient outcomes factor into provider reimbursement, appropriate treatment is even more salient as the chronic health conditions that result from obesity are closely monitored and highly weighted. Obesity is tracked as part of Healthcare Effectiveness Data and Information Set (HEDIS), under National Committee for Quality Assurance (NCQA) requirements which entail at least yearly monitoring of BMI (NCQA, n.d.). HEDIS is a national set of quality standards that are tracked to assess care given

and compares results across clinics and geographical locations (NCQA, n.d.). Measures are chosen to be clinically relevant, feasible, and scientifically sound (NCQA, n.d.).

There are various clinical practice guidelines (CPGs) to address obesity management that consistently tout regular monitoring of weight, blood pressure, lipids, hemoglobin A1C levels, waist circumference, as well as initiating lifestyle changes, considering pharmacological management, and eventually bariatric surgery (Apovian et al., 2015; Jensen et al., 2015; Mechanick et al., 2013, Gonzalez-Campoy et al, 2013). There is a fair amount of uniformity across CPGs as to management recommendations, yet progress has been slow in successful and sustained management. No area of the world has been able to reverse the obesity epidemic (Roberto et al., 2015). Obesity has increased, not decreased in prevalence (CDC, 2016; Healthy People 2020, 2017).

Recent research has focused on the barriers to obesity management. There are emerging themes of appointment time constraints, provider feelings of helplessness in adequately addressing the issue, patient adherence to the management plan, and lack of information and system supports (Findholt, Davis, & Michael, 2013; Roberto et al., 2015; Rubin et al., 2016).

Mental illness is highly prevalent according to the CDC (2013), which estimates that nearly 1 in 5 people suffer with a psychiatric disorder at any given time and that half of the population will suffer from a mental illness in their lifetime (CDC, 2013). Having a mental illness increases the risk of obesity and often decreases treatment adherence (CDC, 2013). Obesity is prevalent at higher rates in those with severe mental illness than the overall population with estimates of approximately 50% being common (Gardner-Sood et al. 2015; Pratt & Brody, 2014). Interestingly, prevalence of current mental illness (as opposed to those with a history)

varies widely between states and may be influenced by a variety of factors such as a given states' health care access (CDC, 2013). This suggests that local policy and health care access may have a meaningful impact on population health outcomes. As discussed above, obesity is very prevalent and results in increased morbidity and mortality, partially as a function of increased risk for cardiometabolic diseases such as stroke and diabetes (CDC, 2016). Those with mental illness are not only at increased risk for obesity but also face numerous barriers to engagement in care, according to the World Health Organization (2016). Therefore, this population is particularly vulnerable.

There are many barriers to addressing obesity in a primary care setting. Managing weight is longitudinal and complex, and numerous variables need to come together to influence success (Roberto et al., 2015). There are large gaps in research and little translational research to guide successful evidence based practice implementation (Harvey & Ogden 2014). Enabling providers through education on the use of evidenced based interventions to address obesity in patients with comorbid mental illness is an important facet of holistic management in a vulnerable population.

Local Problem

El Rio Community Health Center is certified by the Joint Commission and National Committee for Quality Assurance and a federally qualified health center that has been active in the Tucson area for nearly 50 years (El Rio, n.d.). The organization started in 1970 out of need in the area for access to basic healthcare. El Rio serves nearly 100,000 people in the greater Tucson area and provides primary care, dental, and behavioral health services (El Rio, n.d.). The CDC (2016) estimates the population of Tucson at just over 530,000 people. El Rio serves a significant portion of the area's population, providing care to 1 in every 10 individuals living in

Tucson and surrounding areas (El Rio, n.d.). Its goal is to focus on holistic patient care and it provides many groups and classes for its patients to help promote health including yoga, healthy cooking classes, and diabetes education classes (El Rio, n.d.). It is a medical health home and have on-site services such as x-ray, pharmacy, laboratory, and dental (El Rio, n.d.). El Rio recently expanded its services to include specialty providers to address mental illness and have a growing staff of psychiatric nurse practitioners, therapists, and psychiatrists. It has innovative programs such as Primary Care Behavioral Health Consults which is a team of licensed counselors that can meet with primary care patients for brief interventions to help address issues such as engagement in care, treatment adherence, sleep hygiene, to name a few. Dr. Joy Mockbee is the Medical Director of the family practice program at El Rio and has special training and interest in obesity management. It is a focus of hers and reflected in innovative policies regarding assertive management of obesity and organizational tracking of documented treatment plans for obese and at-risk patients.

Data based on an earlier census for Tucson, with a population of 520,000 people, indicated an overall obesity rate of 24% (CDC, 2016). The rate of mental illness in Pima County, which was subjectively defined as a positive self-report of having 30 or more days in the last year where respondents felt their mental health was not sound, was just over 13% which is higher than or equal to nearly every other measurement area in the state of Arizona (CDC, 2016). Significant limitations of these statistics are that they are self-report and likely resulting in underreporting of prevalence (CDC, 2016). Further, a BMI of greater than 30 ignores the subset of the population in the 25-30 BMI range that is considered overweight. In fact, according to the Behavioral Risk Factor Surveillance System (BRFSS), as reported by the CDC (n.d.), just under

two-thirds of adults living in Arizona are overweight or obese as of 2015, the most recent year this data is available for this measure. Of the total population, just over a quarter of adults in Arizona are identified as obese (CDC, n.d.). Further, according to the CDC (n.d.) BRFSS 2014 data, the most recent year with full information available, Arizona has had a sizable increase in overweight and obese adults as a function of age, possibly indicating that a gap in appropriate management becomes more noticeable as time goes on.

Despite broad recognition of the issue and frequent monitoring of weight within the clinic setting, there is no systematic way for providers to treat obesity with evidence-based interventions. Providers themselves shoulder the burden to establish a management plan for each individual patient at each visit. This current system creates a risk where small trends in weight gain are easily missed until they a serious problem. Without provider knowledge and system level education, consistent evidence based intervention is unlikely. As stated, obesity and mental health are prevalent issues in the Tucson area. Currently clinic system supports are not in place for monitoring of weight changes or easy implementation and tracking of weight management plans. While addressing this issue will need to be longitudinal and multifactorial, the first step is providing education.

Study Question

Obesity is a major issue for patients with mental illness partially because of the increased risk for weight gain associated with many psychopharmacological treatments but also due to the number of obesity related comorbid disorders that this population is also at a high risk for; independent of obesity status (CDC, 2016). However, obesity can be problematic to address for primary care providers beyond vague recommendations for changes and brief coaching

concerning exercise and diet (Findholt et al., 2013). With the increasing prevalence of obesity as well as the emerging literature that continues to vehemently underscore its concurrent physical and psychiatric consequences, increased action needs to be taken to address weight management in those with mental illness. Does an evidence-based educational intervention increase provider knowledge of obesity screening and management in patients with comorbid mental health issues?

Purpose

The purpose of this quality improvement DNP project is to develop and present an evidence-based educational intervention aimed at increasing knowledge of primary care providers at El Rio on the topic of obesity screening and management of patients with comorbid mental health disorders. The first aim is to assess knowledge of primary care providers about the screening and management of obesity in those with mental illness. The second aim is to conduct an educational intervention with best evidence based practice interventions given the current literature and present it to primary care providers at El Rio. The third aim is to assess El Rio's primary care provider's knowledge and intent to utilize best practice interventions.

FRAMEWORK

Theoretical Framework

One framework that is applicable to guide this project is the Logic Model (Zaccagnini & White, 2015). The Logic Model has been around since the 1970s and initially found its way into practice as a framework that moved the focus of program evaluation from activities to outcomes (Zaccagnini & White, 2015). It is a nonlinear, but organized pictorial representation of the variables and steps needed to implement a program and involves several distinct categories: *Inputs*, *Constraints*, *Activities*, *Outputs*, *Outcomes*, and *Impacts* (Zaccagnini & White, 2015).

Though the model does not have to be linear it does proceed from a starting point (inputs) to an ending point (impacts) as a function of time. *Inputs* are defined as the variables needed to start the project (Zaccagnini & White, 2015). *Constraints* are defined as the pieces that prevent the project from moving forward while *activities* are the actual use of the resources (Zaccagnini & White, 2015). *Outputs, outcomes,* and *impacts* are all very similar but subtly and importantly different. *Outputs* are the direct result of the intervention while outcomes are the immediate change that results from the intervention (Zaccagnini & White, 2015). Traditionally *outcomes* are divided up into short-term outcomes or the more immediate effect of the intervention and long-term outcomes which are the longitudinal effect (Zaccagnini & White, 2015). The *impact* is the overall influence all the preceding pieces ultimately have on the population of interest (Zaccagnini & White, 2015).

For this educational intervention, the *inputs* are the scientific evidence surrounding obesity screening and management in a primary care setting, such as clinical practice guidelines, the statistics on morbidity and mortality of the disease processes and their relatedness that highlight the importance of early action, the cost of treatment and the cost of lack of treatment, federal government recommendations, and the empirically identified need for enhanced screening and management. Currently identified *constraints* include provider time and interest, patient appointment time, the longitudinal and complex nature of obesity management as well as patient interest and adherence to treatment, and provider knowledge and education (Findholt, et al., 2013; Roberto et al., 2015, Rubin et al., 2016). See the section entitled “barriers” for a thorough discussion. The DNP student has firsthand experience with the organization and has informally elicited provider feedback and additional constraints identified include serving those

that are low socio-economic status, transportation, and patient health literacy. Activities include literature review and synthesis to create the presentation on obesity management for PCP's and the pretest and actual presentation of information to providers. The *output* will be the presentation of the information to providers. The *outcomes* are what happens because of the training. This is an educational intervention and so the anticipated short-term outcome is increase in provider knowledge in regarding best practices in obesity management of those with comorbid mental illness, as measured by change in scores between a pre- and posttest. The anticipated long-term outcome is increase in provider management of obesity in patients with comorbid mental illness. In this instance, the *impact* will hopefully be implementation into practice of knowledge gained and decreased morbidity and mortality.

Kellogg (2004) notes that Logic Models are helpful because they are not inherently linear, and are therefore adaptable to simple and complex systems. Further, it means that predetermining direct and undeviating stages for the project, which can be a tricky step, is not essential for this framework (Kellogg, 2004). The Logic Model also lends itself to ongoing monitoring, assessment and modification making it highly useful as a planning tool in any new implementation as change is rarely a 'one and done' process (Kellogg, 2004). Further, because it is visual in nature it is highly accessible and easily understood by all stakeholders (Kellogg, 2004). The Logic Model is descriptive of the planned change at each step in the process, allowing stakeholders to prioritize, and target communication throughout the progression of the project (Kellogg, 2004). It helps guide attention to the relationship between action and results which can help facilitate change and trouble shoot problems (Kellogg, 2004). In the assessment phase, it provides an outlet for everyone involved to see the trajectory and provide a schema for

feedback, assessment, and adaptation (Kellogg, 2004). The Logic model is built on the team's initial assumptions or hypotheses about what is going to happen, and as such they are made to be edited as the process evolves. This makes them highly flexible.

The Logic Model is a useful framework to apply to an evidence based educational intervention aimed at primary care providers to assist them in better assessing and treating obesity within the high-risk population of patients with comorbid mental health issues. While beyond the measurement period of this project, the ultimate hypothesized impact will be improved management of obesity and therefore better patient outcomes across a variety of domains thus reducing morbidity and mortality. This plan can be modified as the project progresses and covers goals broader then the scope of this DNP project (Appendix A).

Concepts

Body Mass Index (BMI)

BMI is a frequently used, indirect, inexpensive, accessible way of measuring obesity (CDC, 2015). It is weight in kilograms divided by height, measured in meters squared or $=w/h^2$ (CDC, 2015). It is considered a useful initial screening but is not in itself diagnostic though it does robustly relate to many metabolic disorders (CDC, 2015).

Overweight

Defined as a BMI of 25-29.9 (CDC, 2015). Being overweight also correlates with poor health outcomes (CDC, 2016). Further, when a medical comorbidity is present patients in this bracket are also considered obese (Yumuk et al., 2015). Mental illness is defined by Yumuk et al. (2015) as a comorbid condition.

Obesity

Obesity is defined as a BMI great than 30 (CDC, 2015). This is further broken down into three sub categories: Class 1 is a BMI of 30-35; Class II is defined as 35-39.9; and Class III is above 40 and considered severe (CDC, 2016). Though there are other measures of obesity such as waist circumference, BMI is by far the most prevalent term used in the literature and how all identified clinical practice guidelines on obesity organize their recommendations and therefore will be the focus in this paper. Adiposity is another term for what s colloquially known as fat (Yumuk et al., 2016). Obesity is caused by numerous factors including sedentary lifestyle, high energy density diet, increased portion sizes (Yumuk et al., 2016). Further, there is a reciprocal relationship between many mental health disorders, their treatments and increased risk for obesity (Galletly et al., 2016; Gelenberg et al., 2010; Luppino et al., 2010; Malhi et al. 2015). Obesity status increases morbidity and mortality and this risk is exemplified in those with Mental illness (Correll et al., 2015; Galletly et al., 2016; Malhi et al., 2015).

Cardiometabolic Risk

Obesity is a fundamental component associated with many cardiometabolic diseases (Wilson & Meigs, 2008). Cardiometabolic risk consists of symptoms that generally cluster together and are strongly associated with weight such as impaired insulin function and increased blood glucose, elevated cholesterol and triglycerides, and increased blood pressure (Wilson & Meigs, 2008). The more of these risk factors that are present the higher the risk of diabetes mellitus and cardiovascular disease (Wilson & Meigs, 2008).

Medical Comorbidity

A comorbid condition is the presence on one more concurrent illness that creates worse prognostic outcome for that patient. Comorbid conditions that are intricately linked with obesity status include sleep apnea, dyslipidemia, pre-diabetes, diabetes, GERD, hypertension, and/or mental illness (Garvey et al., 2014). When obesity and mental illness are both present in a given patient, more aggressive management is needed (Garvey et al., 2014).

Mental Illness

The American Psychiatric Association (2013) in the Diagnostic and Statistical Manual defines mental illness as a variant of normative functioning that has become pathological and impairs daily function. , Mental illness, psychiatric disorder, and mental illness are all synonyms Common mental illnesses include mood disorders such as depression and bipolar disorders; anxiety disorders such as generalized anxiety disorder and obsessive-compulsive disorder; psychotic disorders such as schizophrenia; and substance abuse disorders.

Clinical Practice Guidelines

These are defined as systematic peer reviewed and consensus documents that consolidate best practice treatment interventions and recommendations based on the current literature for a given condition (NIH, 2015).

Evidence-Based Practice

This is defined as systematically appraising and integrating current evidence into everyday clinical practice (Evidence-Based Medicine Working Group, 1992).

Primary Care Provider

Primary care providers are the central care figures in outpatient clinics (NIH, 2015). They are the first line medical assessors and link to more specialized care (NIH, 2015). Their role includes medical care and coordinating across disciplines to ensure comprehensive care for patients and serving as the main point of contact for patients' health needs (NIH, 2015).

Synthesis of Evidence

The literature on obesity and health is robust. A search using CINAHL, PubMed, and Google Scholar databases was completed, and articles with full text, in the English language, for the period 2012-2017 were included. The search was completed using the terms "obesity practice guidelines" (nearly 800 results), "obesity and mental illness" (nearly 3,000 results), "mood disorders practice guidelines" (nearly 19,000 results), and "barriers to obesity treatment" (nearly 80 results) and "primary care" and "obesity management" (nearly 6,000 results). Articles were reviewed for content. When more than one guideline on a topic was identified, those that were the most recent were included. For clinical guidelines regarding mental health, the most recent ones that had comprehensive sections on obesity were used, which were also the most current. Research that focused on barriers in primary care specifically and recent systematic reviews were chosen. Articles not originally published in English and outside this period were excluded. Articles that did not address obesity, mental illness, barriers to obesity treatment in some combination were not included. There is one exception to the rules outlined above. Depression is one of the most prevalent mental illness. The most recent clinical practice guideline dedicated to depression was in 2010 and was included. Overall, 36 articles were included in this synthesis based on level of evidence and assessment of content fit for the topic of this paper. Levels of

evidence defined by Ackley, Swan, Ladwig, and Tucker, (2008) were used. Within that construct Level 1 evidence is the highest consisting of clinical practice guidelines, systematic reviews or meta analyses based on randomized control trials (RCT) or at least three well designed RCT studies on the same topic (Ackley et al., 2008). Level II is evidence based on only one well-designed RCT, while Level III is based on well-done control trials that lacked randomization (Ackley et al., 2008). Level IV is cohort or case control studies, where groups of people are compared to "healthy controls" to assess group difference, there is no randomization, strict controls, or blinding (Ackley et al., 2008). Level V evidence is based on meta-analyses and systematic reviews of these lower quality qualitative and descriptive studies (Ackley et al., 2008).

For this review level V and above evidence were included with preference for level III and above whenever available. Higher levels of evidence, even if older, was chosen for inclusion over more recent but lower levels as long as they were published prior to 2012. Lower levels of evidence were included as many studies in psychology are case or cohort designs.

Obesity and Mental Illness

Mental illness can predispose patients to obesity and the interaction of the two can result in worse physical and psychological outcomes for patients. Research indicates that obese patients who are also diagnosed with a severe mental illness (SMI) carry a significantly higher cardiometabolic risk compared to non-SMI obese patients (Correll et al., 2015; Galletly et al., 2016; Malhi et al., 2015). Further, there are group differences in obesity status between patients experiencing first episode psychosis versus healthy peers such that those with psychosis are more

at risk than their peers without psychosis and this trend worsens over a two year follow up period (Bioque et al., 2017).

Practice guidelines on the treatment of depression, mood disorders, and schizophrenia contain sections that address weight gain (Galletly et al., 2016; Gelenberg et al., 2010; Malhi et al., 2015). Obesity increases risk for depression and vice versa, having depression increases risk for obesity (Gelenberg et al. 2010; Luppino et al., 2015). Nearly half of patients with depression are classified as obese, this is greater than the rate of obesity in the general population (Carey et al. 2014; Pratt & Brody 2014). Further, as depression severity worsened, obesity severity increased (Pratt & Brody 2014). Atypical depression- depression that presents with emotional reactivity to environmental stimuli as well as changes in appetite and sleep- further increases the risk of obesity (Lasserre et al., 2014; Łojko, Buzuk, Owecki, Ruchała, & Rybakowski, 2015). Of those receiving treatment with an antidepressant, a relationship exists such that over half who continued to report significant depression symptoms were obese (Pratt & Brody 2014). However, not all research finds this link and there may be other issues such a reverse causality that are influencing this finding given the independently strong relationship of depression status and weight (Hung et al., 2014).

Non-pharmacological interventions for mood disorders such as cognitive behavioral therapy are recommended before starting medications as many psychotropic medications carry a risk of weight gain, which can lead to obesity if unmanaged (Gelenberg et al., 2010). Once pharmacological intervention is started, weight should be monitored carefully and the most weight neutral medications (i.e. medication that have little effect on weight) that are appropriate for the patient should be chosen (Gelenberg et al., 2010). If weight gain is noted during

treatment, early intervention is important (Gelenberg et al., 2010). Wurtman and Wurtman (2015) state that obesity in depression is a function of three major mechanisms: *iatrogenic* mechanisms such as pharmacological interventions which can decrease satiety, lessen physical activity, and promote increased calories rich consumption; *physical mechanisms* such as isolating, unemployment, and poor self-esteem; and *metabolic mechanisms* through serotonin pathways and impaired insulin resistance.

The relationship of obesity and mental illness is not just true for depression. Depp et al., (2014) report that patients with bipolar disorder are less likely to be obese than those with schizophrenia, but when obesity is present, patients fair worse in terms of cognitive function. Further, in patients diagnosed with bipolar disorder, obesity also correlates with poorer health outcomes in general (McElroy et al., 2016). Importantly, monitoring of downstream consequences of obesity such as dyslipidemia and other factor involved in cardiometabolic disorder, as well as timely intervention can improve patient outcomes (McElroy & Keck Jr., 2014).

Numerous psychiatric medications cause weight gain (Leucht et al., 2013; Saunders, Igel, Shukla, & Aronne, 2016). Research indicates that of the 15 most common antipsychotics only three do not cause significantly more weight gain than placebo namely haloperidol, lurasidone, and ziprasidone (Leucht et al., 2013). However, it is important to note that among other serious side effects, haloperidol carries the highest risk of extrapyramidal side effects and all cause discontinuation rate of all the antipsychotics in the meta-analysis (Leucht et al., 2013). The other antipsychotics all carry a notable risk of weight gain compared to placebo with olanzapine carrying the highest risk (Leucht et al., 2013). Antipsychotics have common use not only in

treating psychosis but also bipolar disorder and adjunct treatments in anxiety and depressive disorders. No antipsychotic is entirely weight neutral and all result in more weight gain than placebo (Correll et al., 2015).

Clinical practice guidelines for mood and psychotic disorders note the independent and interdependent risk of obesity that also increases with many common pharmacological treatments (Galletly et al., 2016; Malhi et al., 2015). Further, there is a high cardiometabolic risk in this patient population, regardless of obesity status, but that obesity also increases this risk significantly (Correll, et al., 2015; Galletly et al., 2016; Malhi et al., 2015).

Obesity Management

It has been resoundingly established that obesity underlies risk for cardiometabolic disorders such as cardiovascular disease, stroke, and diabetes through physiological mechanisms of obesity that result in high cholesterol and impaired insulin resistance (Galletly et al. 2015; Malhi et al. 2015; National Institutes of Health [NIH], 2014; Ogden et al., 2015; Wilson & Meigs 2008). Further, it is known that obesity increases risk of both morbidity and mortality and that weight loss is often an effective intervention (Galletly et al., 2015; Malhi et al., 2015; NIH, 2014; Ogden et al., 2015). Clinical guidelines exist for the treatment of obesity. They indicate that early screening and intervention are important and that behavioral interventions are favored over pharmacological choices though pharmacological intervention can be an important support for management (Jensen et al., 2014; Fitzpatrick et al. 2016; NIH, 2014). Recommendations strongly supported by high quality research include measuring height, weight, and BMI at least annually (Galletly et al. 2015; Jensen et al., 2014; Malhi et al. 2015; NIH, 2014).

Obesity is defined as a BMI over 30 kg/m^2 and this identifies those with increased risk of all-cause mortality and specifically cardiovascular disease (Galletly et al., 2015; Jensen et al., 2014; Malhi et al., 2015; NIH, 2014). However, even a BMI over 25 kg/m^2 still places patients at risk for obesity associated disorders such as diabetes according to the National Institutes of Health (Jensen et al., 2014; NIH, 2014). In fact, when medical comorbidities are considered, the consensus is that BMI > 25 is considered obese and psychological conditions are a qualifying comorbidity (Garvey et al., 2014). Though obesity can also be defined in terms of waist circumference as well as the emerging measurement of waist to height ratio, BMI is by far the most prevalent measurement and therefore will be used for the purposes of this review.

As mentioned, weight loss is a very effective intervention for most of the downstream consequences for obesity (Galletly et al., 2015; Jensen et al., 2014; Malhi et al., 2015; NIH, 2014; Soleymani, Daniel, & Garvey, 2016). Weight loss can have a favorable effect on lipids, blood sugar and blood pressure (Galletly et al., 2015; Jensen et al., 2014; Malhi et al., 2015; NIH, 2014; Soleymani, et al., 2016). This truly underscores its utility as highly desirable intervention that targets multiple chronic, co-occurring, disorders. Evidence suggests that patients should be advised that the higher their BMI the higher their risk of cardiometabolic issues including cardiovascular disease, diabetes, hyperlipidemia, hyperglycemia, and death from all causes; coupled with this, patients should be counseled about lifestyle interventions (Jensen et al., 2014). Risk status such as level of obesity and comorbid medical conditions should be assessed and considered in deciding a treatment plan (Galletly et al., 2015; Jensen et al., 2014; Malhi et al., 2015; NIH, 2014).

The National Institutes of Health (2014) outlines three goals of management. The first is to stop weight gain, at the very least (NIH, 2014). The next goal is to reduce body weight (NIH, 2014). Lastly, weight loss needs to be maintained (NIH, 2014). With regards to weight loss, patients should be advised that weight loss as little as 3-5% can have clinically significant impact on their health and the greater the weight loss the less need for pharmacological interventions to control the downstream disease processes such as hypertension, diabetes, and high cholesterol (Jensen et al., 2014). However, the NIH (2014) contends that the initial goal for management is 10% total body weight loss over a period of six months. Research suggests that sustained weight loss of 5-10% of starting weight for a period greater than one year can alleviate many comorbid conditions (Jensen et al., 2014; NIH, 2014; Soleymani, et al., 2016).

To help patients reduce weight, a restricted calorie diet appropriate for gender and biometrics should be encouraged. For most patients, this can be accomplished with a calorie reduction of 300-500 calories a day though more severally obese patient may need to drastically reduce their caloric intake by 500-1000 calories. Providers should encourage diets that utilized evidence based methods such as limiting high-carbohydrate and high fat but low fiber foods (Jensen et al., 2014; NIH, 2014). Saturated fats should be limited and total fat consumed should be under 30% of total calories (Jensen et al., 2014; NIH, 2014). Providers should consider a referral for nutritional counseling to help support this (Jensen et al., 2014, NIH, 2014). As severely restricted diet of less than 800 kcal/day should only be done under the supervision of a trained provider (Jensen et al., 2014; NIH, 2014). A comprehensive and multimodal program of diet, exercise, and behavioral changes for at least 6 months is best practice (Jensen et al., 2014; NIH, 2014). Weight loss is the result of reduced caloric intake, but sustained weight loss is

achieved with physical activity (Jensen et al., 2014; NIH, 2014). Patients should engage in high-intensity weight loss interventions, at least every two weeks (goal of over 14 sessions in six months) completed on site (Jensen et al., 2014; NIH, 2014). Research indicates that weight loss will not be sustained unless maintenance measures are taken (Jensen et al., 2014; NIH, 2014).

Regardless of psychological comorbidity therapy may be helpful in supporting weight loss (Fitzgerald, 2016; Jensen et al., 2014; NIH, 2014). Therapy should focus on reinforcing tools to overcome behavioral barriers to diet and exercise adherence with a focus on self-monitoring strategies, managing stress, stimulus control, cognitive restructuring, engaging in social support and problem solving (Jensen et al., 2014; NIH, 2014). For patients who have been successful in their weight loss, providers should encourage at least one year of participation in a weight loss program to help maintain their success. This can take place face-to-face or through telephonically delivered programs (Jensen et al., 2014; NIH, 2014). However, there is a moderate level evidence to suggest that electronically delivered weight loss programs are less successful than face to face programs in the acute phase of weight loss (Jensen et al., 2014; NIH, 2014). The best results are achieved with a multifaceted approach of low calorie diet, therapy, and increased physical activity (Jensen et al., 2014; NIH, 2014; Soleymani et al., 2016). For patients who have a BMI over 40 kg/m^2 regardless of medical comorbidity or over 35 kg/m^2 with obesity related comorbid condition, consider bariatric surgery (Jensen et al., 2014; NIH, 2014;). Treatment algorithms are complicated, longitudinal, multistep, and time intensive (Jensen et al., 2014; NIH, 2014; Soleymani et al., 2016). Though lifestyle modifications are effective they are difficult and necessitate long term support and intervention (Jensen et al., 2014; NIH, 2014; Soleymani et al., 2016).

There are several new pharmacological agents to treat weight loss that target satiety and appetite such as phentermine and topiramate combination, liraglutide, and naltrexone and bupropion combination. Research indicates that the addition of pharmacological therapy to lifestyle intervention helps increase and sustain weight loss (Jensen et al.; Soleymani et al., 2016). Howland (2015) notes that bupropion should be used with caution in those with schizophrenia and bipolar due to its activating features. In addition to the medications named above, melatonin is appropriate for most patients started on psychotropic treatment with a noted risk for weight gain (Howland, 2015). The exact mechanisms are not clearly elucidated yet, but may related to supporting healthy sleep (Howland, 2015).

Support seems to be very important. In a sample of overweight adults, the majority report insurance provided weight loss benefits were helpful, but approximately only a third of the sample was willing to pay for the benefit (Jarlenski, Gudzune, Bennett, Cooper, & Bleich, 2013). Those with insurance through Medicaid programs were more likely to find these benefits helpful (Jarlenski et al., 2013). Regardless of exactly how weight loss is supported, interventions need to be tailored to special populations (NIH, 2014, Jarlenski et al., 2013). There are numerous age, gender, and cultural differences that need to be taken into consideration when making a management plan and there is no 'one size fits all' approach (NIH, 2014). At the very least there needs to be an emphasis on preventing further weight gain (NIH, 2014).

In patients with severe mental illness, research indicates the need for yearly monitoring of lipids and hemoglobin A1C in all patients; labs that are closely associated with weight gain but that this is not done routinely (Galletly et al., 2016; Griebe, Caniff, & Bostwick, 2016; Malhi et al., 2015, Mitchell et al. 2012). Research indicates the system level support of screening of when

labs are due, calls and emails through the electronic health record (EHR) and reminders to the provider increase adherence in patients with mental illness (Galletly et al., 2016). Importantly early intervention upon initiating antipsychotic treatment with education, peer support, medical assessment and medication review can help deter weight loss (Curtis et al., 2016).

Intensive behavioral interventions by the PCP team have been found to be effective in supporting weight lost (Brauer et al. 2015; Fitzpatrick et al. 2016; Wadden, Butryn, Hong, & Tsai, 2014). This specifically consists of reducing calories by 500 calories a day, getting at least 150 minutes total of activity a week, and using behavioral strategies to increase treatment plan adherence (Wadden et al., 2014). One technique that has been effective in supporting this is the Five A's: Assessment, Advise, Agree, Assist, Arrange (Fitzpatrick et al. 2016). Providers should assess obesity status and comorbidities including those that correlate with poor treatment response such as many psychological conditions, sleep apnea, insomnia, and inflammatory bowel disease, as well as patient's readiness to change (Fitzpatrick et al., 2016). Next providers should advise their patients to set a goal of 5-10% of total body weight loss and educate of various diets to support patients in this goal (Fitzpatrick et al., 2016). It is important that provider provide education on several diets and not just focus on personal favorites (Fitzpatrick et al., 2016). Patients should be agreeable to the goals set and goals should be SMART-specific, measurable, attainable, relevant, and timely (Fitzpatrick et al., 2016). Providers should assist their patients in identifying and addressing barriers to care and arrange for regular follow up (Fitzpatrick et al., 2016). One identified barrier is appointment time. Behavioral therapy is an effective intervention, resulting in clinical significant weight loss for many patients (Fitzpatrick et al., 2016). Centers for Medicare and Medicaid Services (CMS) and many private insurances have

started to reimburse PCP's for visits to support implementation of intensive behavioral counseling by PCP's for overweight and obese patients (Fitzpatrick et al., 2016). For the first month, weekly face-to-face visits are covered, after that, for up to six months, biweekly visits are reimbursed. For seven months to one-year time monthly face to face visits are covered if that patient has lost 6.6 pounds in the preceding six-month period (Fitzpatrick et al., 2016).

Barriers

Though the management of obesity can be complicated and longitudinal, the evidence is clear that weight loss is important. The question becomes 'what is preventing it?' While research indicated that behavioral interventions work, there is little research on how to implement and apply these strategies in an outpatient setting (Harvey & Ogden 2014). There is less research on minority and disadvantaged populations and the research that does exist has subpar results and studies had high attrition rates (Harvey & Ogden, 2014). There has been no intentional manipulation and testing of perceived barriers to obesity management (Harvey & Ogden, 2014).

Low-income patients, a particularly vulnerable group, face further barriers to obesity management including lack of knowledge of the far-reaching consequences of obesity, transportation, language and time barriers, and childcare issues. One can infer that provider knowledge and ability to address these patient barriers is going to be key to management. Research indicates that screening for obesity in primary care settings increased from 2008-2013 and weight counseling decreased in the same time (Fitzpatrick & Stevens 2017). Those at highest risk were most likely to receive counseling (Fitzpatrick & Stevens 2017).

Other barriers revolve around ingrained beliefs concerning obesity and that are often binary concerning either personal factors or the environment (Roberto et al., 2015). This is going

to be true on both the patient and provider side within a treatment setting. Provider negative assumptions about patients with obesity as well as difficulties in past treatment experiences may result in avoidance of care (Fitzpatrick et al. 2016; Phelan, Burgess, Yeazel, Hellerstedt, & Ryn, 2015). Even with appropriate intervention, stigma can create a barrier in patient follow through (Phelan, et al., 2015).

Weight loss is a long-term process and there needs to be system level and multifaceted fixtures and supports in place to support it (Roberto et al., 2015). Once weight is lost, there is also the risk of regaining weight through a variety of system and biological level variables (Roberto et al., 2015). Barriers outside the control of the primary care office include systems level issues such as governmental policies surrounding food (Roberto et al., 2015). Further, there are biological processes at work that can create challenges to losing weight and sustaining the weight loss (Roberto et al., 2015). These all combine to make addressing obesity in busy clinic settings difficult. It is not a health condition that will be fixed pharmacologically or in a single visit. Social, psychological, and systems level variables come together to influence obesity (Roberto et al., 2015). Functionally, this means that these factors are acting on the provider and patient individually and likely interacting in a treatment setting.

More recent research indicates that obesity counseling can be effective but occurs infrequently and is of poor quality because of inadequate training, appointment time constraints, and inadequate reimbursement (Rueda-Clausen et al., 2014). Recent research trialed using supports for provider and patient education and a reminder and feedback system to help increase adherence to obesity practice guidelines (Barnes, Theeke, & Mallow, 2015). In implementing the obesity clinical practice guideline education, providers were given training on how to approach

patients, educational materials, physical reminders where placed strategically throughout the office, and a packet of evidenced based interventions was given to the provider with a goal to increase the management of obesity (Barnes et al., 2015). Results indicate that there was an increase in documentation of BMI by the medical assistants but not a documented diagnosis or management plan by the provider (Barnes et al., 2015). Obesity is not currently independently reimbursable as a treatment condition, but many conditions stemming from obesity are (Barnes et al., 2015). It is believed that this is one substantial barrier to proper obesity intervention (Barnes et al., 2015).

Recent research looked at implementing system level changes to support the adaptation of obesity practice guidelines to help address barriers (Erickson et al., 2015). They focused on designating accountable departments, including systems meant to support quality improvement such as risk assessments, clinical decision support tools, flow sheets, patient education materials, allocating responsibilities, etc., also creating a uniform protocol, integrating teams, developing skills, and creating an implementation strategy that fits the practice (Erickson et al., 2015). Results of this intervention indicate increased success in systemically implementing obesity clinical practice guidelines (Erickson et al., 2015). Another qualitative study based on the same samples indicates that providers may feel uncomfortable addressing obesity in the context of their own weight struggles (Monsen et al., 2015). However, the intervention allowed the primary care team to report that they felt more aware and better able to respond to obesity, they felt more positive in addressing the condition, they felt ownership of their role, and the felt there was a sense of collaboration and importance to what they were doing (Monsen et al., 2015). Research on barriers in obesity management in children indicates that appointment time, poor screening of

obesity, lack of reimbursement, family/patient barriers such as lack of motivation, lack of integrated/multidisciplinary services, overall prevalence and lack of community resources, have a notable impact on weight loss and sustainability (Findholt, Davis, & Michael, 2013). An educational intervention will seek to address these barriers to increase intervention.

Strengths

There is broad recognition of the issue of obesity and this is a strength because it is well recognized and studied. There are numerous clinical practice guidelines and well conducted randomized control trials speaking to the management of obesity in the outpatient setting. There is consensus across guidelines that monitoring for weight gain, early recognition, and intervention is important in managing obesity and preventing associated metabolic and mental health consequence's is another key goal (Jensen et al., 2014; Fitzgerald et al. 2016; NIH, 2014). Further, there is agreement that preventing weight gain and non-pharmacological/behavioral interventions for management are preferred as first line options for obesity management and prevention, especially in the psychiatric population. Even modest weight loss can result in clinical significant improvement in cardiometabolic diseases and improve patient outcomes. However, intervention in obesity and resulting weight loss is nonetheless key, and this goal should be pursued with all methodologies at provider's disposal.

Weaknesses

Though there is significant agreement about obesity management strategies, a major weakness is the complex, lengthy, and time intensive nature of the management plans. Many guidelines include detailed flow charts that can be overwhelming and difficult to follow. Further, all interventions are highly reliant on patient effort and adherence across a long span of time as

well as providers continued investment. Comorbidities and socio-economic disparities can create further barriers that make a difficult problem even more difficult to address and there is little literature on this issue. Though many barriers have been identified, there have not been systematic evidenced based interventions to address barriers to care.

Gaps

As recently as 2016, researchers are calling for more data on the translation of current evidence into practice (Soleymani et al., 2016). Further, some of the most at-risk groups for obesity and health disparities, such as low income and minority patients also lack research and evidence specific to their needs in obesity management and barriers (Harvey & Ogden 2014). There are no pharmacological interventions for weight loss specific to a disorder or medication or any identified empirical decision tools to help providers easily understand how and when to intervene.

METHODS

Project Design

The design of this study is descriptive with a one-group pretest-posttest in the setting of a community health center. The goal was to provide a brief evidence based education intervention to primary care providers at the El Rio Community Health Center on the best practices of screening and managing obesity in patients with comorbid psychiatric disorders as this is a particularly vulnerable and at-risk population. This project was implemented at a monthly provider meeting.

Intervention

The educational intervention and decision support tool handout were developed based on a needs assessment of the community and provider needs. The first step was assessing knowledge gaps in management of patients with mental illness in primary care. This was accomplished by working with primary care providers at integrated care clinics who work with patients with mental illness and obesity both at clinical sites as a student and professionally as a registered nurse for several years prior to this project. Further this was also accomplished via clinical experience as a psychiatric nurse practitioner student in these same settings. Overall, a holistic view of gaps in care from both primary care provider and BHMP perspective was developed over years of direct clinical experience and collaboration with practicing providers. Gaps of focus included focal deficits in PCP's in knowledge regarding common psychotropic medications and risks of weight gain verses efficacy and the need for information on resources for obesity treatment and common pharmacological interventions for weight loss. Information provided was tailored to knowledge of El Rio's structure and culture gained from working as a registered nurse on staff prior to this program.

Next PCP preferences for an informational presentation were assessed through informal interview by this DNP student. The overarching feedback received was that short presentations were preferred as it was felt by that these made the most relevant information easily identifiable and increased provider ability to implement information. Longer presentations were considered overwhelming and resulted in difficulty identifying salient information. They also reported that having a handout was helpful after presentations to reference to help them utilize new

information. Providers agreed that they would like to learn more about treatment of obesity in patients with mental illness as they felt a lack of knowledge in this area.

The presentation and tool were developed to address the identified gaps, using current evidence that was aggregated and synthesized across research domains of psychiatry and primary care regarding managing obesity. Specific gaps addressed were PCP's lack of knowledge of common mediations used to treat mental illness, the risk of weight gain associated with the majority of psychotropics, and those associated with highest risk of weight gain. The increased risk of obesity associated with mental illness and that that mental illness is considered a high-risk co-morbidity that necessitates early intervention in weight gain. The common pharmacological interventions used to manage obesity in patients with mental illness. The presentation and hand out collated clinical practice guidelines and current research from the fields of obesity and psychiatry to form a presentation that specifically addressed these gaps. The tool was developed to give easy reference to the areas providers indicated they were most interested in. Specifically, pharmacological interventions, local resources to support weight loss, and evidence based steps to guide treatment were a focus. The hand out includes a table from Fitzpatrick et al. (2016) that was identified as easy to utilize guide to obesity management treatment decisions that was relevant to PCP's. Local and company and area specific resources to support obesity intervention, as well as a short table of common medications to aid weight loss were also included. Supports within El Rio were highlighted in the tool and presentation. This knowledge comes from first hand work experience with the company as a registered nurse. Please see Appendix A for the decision support tool.

Sample

Sample included El Rio Community Health Center providers including Certified Nurse Midwives, Behavioral Health Consultants, family nurse practitioners (FNP's) and physicians (MD's, DO's). The preponderance were primary care providers, either FNP's or physicians. There are no physician's assistants at El Rio. Attendance at the monthly meeting is strongly encouraged by all these personnel but not mandatory. Attendance at the monthly meeting was 35 providers out of over 150 total providers. Some providers attended via teleconference technology but there is no official record or way to estimate total remote participation, but the majority of provider attend this way. Those who attended remotely were not able to participate due to limitations of the poling software, only those who attended in person were able to participate. Participation in the survey questions was also not mandatory; participation in the project was limited to those who attended in person due to constraints of the polling software.

Institutional Review Board Process

This project did not directly involve interaction with patients or patient level data collection. It was a quality improvement project aimed at providing education on the current best practices in obesity management in a primary care setting. It was considered exempt per IRB regulations and was approved October 2, 2017 (Appendix E). A letter of approval from El Rio was received (Appendix D).

Data Collection

A brief 15-minute evidence based Power Point presentation was given. A total of 35 providers attended in person. There were also some providers who connected through teleconferencing technology (e.g., Zoom©). The presentation discussed why obesity is an issue

in those with comorbid mental illness, what the major risk factors are, why this is an important issue for patients and providers, and evidence based treatment recommendations with a focus on early intervention. Providers were given a decisional support tool handout with simple evidence based interventions (Appendix B). A three question pre-and post-test survey embedded into the presentation was given to assess change in provider knowledge and intent to use learned knowledge and tool in practice for patients with mental illness (Appendix C). Questions were adapted from Minnesota's Vision Statewide Health Improvement Program provider questionnaire assessing attitudes and barriers to adoption of obesity clinical practice guidelines (n.d.). There is no validation information available for the tool, but the questions provided a base to guide the current poll. Questions were administered within Power Point using interactive survey software Poll Everywhere that collected, displayed, and saved the anonymous results. Providers participated by joining the survey though their phone with a text message access code or online with a presentation specific URL that was generated when the survey was activated at the time of the presentation. Survey settings ensured results were collected anonymously and at no point was identifying data linked to responses. However, settings within the Poll Everywhere software only allowed each participant to answer a single time for each question. As mentioned provider responses were archived in PowerPoint and downloaded post presentation for analysis by this DNP student. Of the six pre and post test questions, Questions #2 and #3 were presented before and after the presentation, to assess knowledge change (Appendix C). As data collection was anonymous there is no ability to perform within subjects' analysis, because pre and posttest responses cannot be matched. Therefore, group level change was assessed pre and post

intervention. Each question was presented for 15 seconds. Those not physically present during the presentation were excluded from data collection due to limitations of the survey software.

Ethical Considerations

Respect

This ethical principal revolves around respect for the autonomy or independence of the participants (HHS, 2016). The goal of this ethical principal is to limit harm and maximize the benefit (HHS, 2016). The population of this study is providers. As a quality improvement project, the risk of harm is minimal. Job status and performance review are in no way tied to participation in the project. The benefits include allowing providers and their teams to identify barriers to treating a prevalent issue using the best EBP care possible. There is always the possibility of unintended consequences but with this intervention the risks are low. This project is grounded in substantial prior research and will not be mandatory but at the providers and the team's discretion. The most salient risks are the investment of time and effort. The intervention is not aimed at patients and should have little direct impact, though drawing the issue to the attention of the provider may impact their practice is a tertiary way. There are no anticipated long-term consequences. The focus of this project is providers and their knowledge. No patient or subject (provider) identifying information will be collected or retained. Patients with Mental illness are considered a vulnerable population and care needs to be taken to make sure that they are not unduly influenced to participate or that their care is not negatively impacted in anyway.

This project does not tout any one intervention or require any treatment action on behalf of the provider but rather provides education on current best practices in obesity management. The study maximally protects subject privacy as at no point will identifying information be

associated with response. There is no requirement or incentive to participate. Employment or compensation is in no way linked to performance on the questionnaires.

Beneficence

This goal of beneficence is that the welfare of participants is a major consideration of the study design (HHS, 2016). Providers are busy and held to high standards of care. This project supports that goal by providing education on the most current, best practice interventions for a common and serious health conditions. There is nominal time involvement on the participants end and no anticipated negative long-term impact. The benefits include educating and supporting providers in giving the best possible care. Any intervention has the possibility of adverse effects. The aim of the study was to educate providers, it is less so focused on how providers intervene but rather supporting them in doing so. There are no identified risks to patients. The largest risks to participants were time and effort.

Justice

The principal of justice revolves around who is affected by the project, who benefits and who is harmed (HHS, 2016). This project benefits provider and patients. When obesity management protocols help patients optimize their health, providers, and patients both benefit. The first step is identifying barriers. All providers were asked to participate and there was no impact outside of the investment of time. Recruitment directly targeted providers. Participation was volunteering.

RESULTS

Data Analysis and Outcomes

Pre-Test

Responses from the pre- and post-test were analyzed to assess impact in knowledge change via matched items on the score pre- versus post-test. One pre-test question assessed baseline familiarity with clinical practice guidelines on obesity treatment. For a list of questions see Appendix C.

Results for pre-test question #1 “I am familiar with current clinical practice guidelines regarding obesity” indicated that 34% (n=12) strongly agreed while the majority, 54% (n=19) agreed. Notably two people did not participate. A total of 80% (n=28) of the sample agreed with the statement in pre-test question #2 “I feel confident managing obesity in patients with comorbid mental illness” but just 2% (n=1) strongly agreed. Eleven percent (n=4) of participants disagreed with the statement and 0% strongly disagreed. Again, two people chose not to participate in the poll. Most participants, 88% (n=31), strongly agreed with pre-test question #3 “I assess weight, frequency of physical activity, & diet at every visit” and 11% agreed (n=4), no one disagreed or strongly disagreed with this statement. See Figure 1.

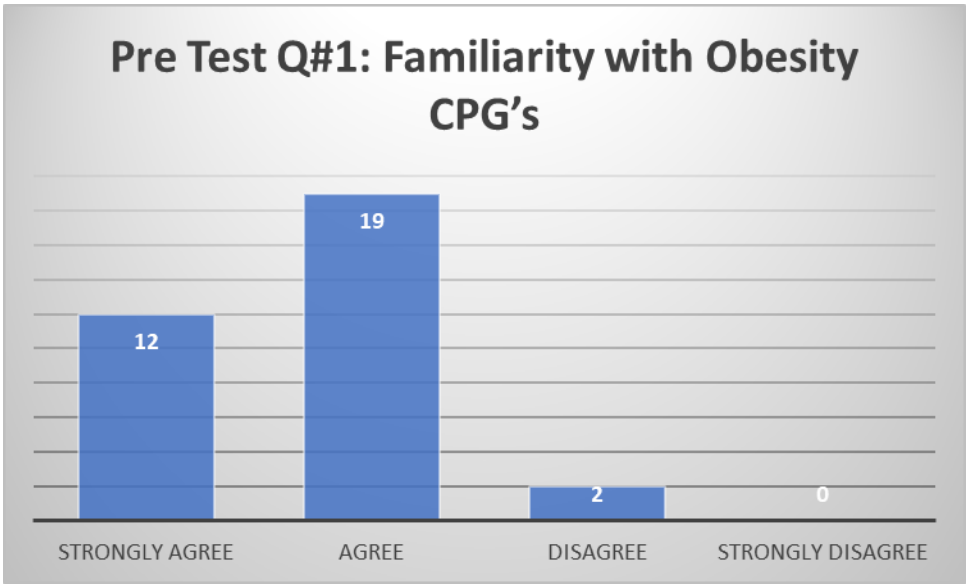


FIGURE 1. Pre-Test Question 1

Post-Test

Results for post-test question #1 indicate that 100% (n=34) of participants strongly agreed or agreed with the statement "I learned something I can apply to my practice." One person did not participate. See Figure 2.

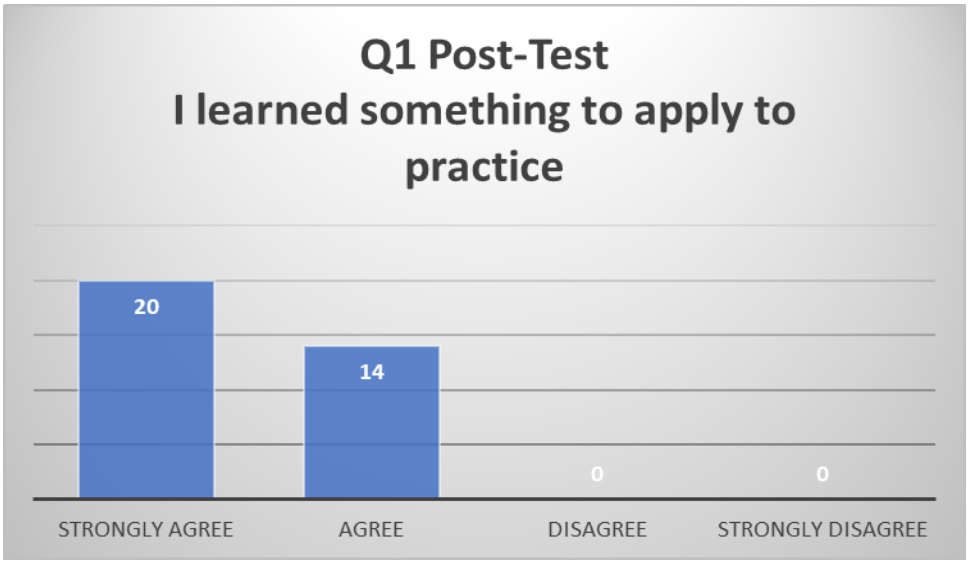


FIGURE 2. Question 1: Post-Test

On re-test for the matched pre/post-test questions, question #2 indicated that 60% (n=20) strongly agreed with the statement "I feel confident managing obesity in patients with comorbid mental illness" and 39% (n=13) agreed, no one disagreed or strongly disagreed. This is a change of 57% over baseline (n=19) for strongly agree. Furthermore, 6% of the sample originally disagreed with the statement originally indicated a meaningful shift in knowledge for this portion of the participant. Two people refrained from participation. See Figure 3.

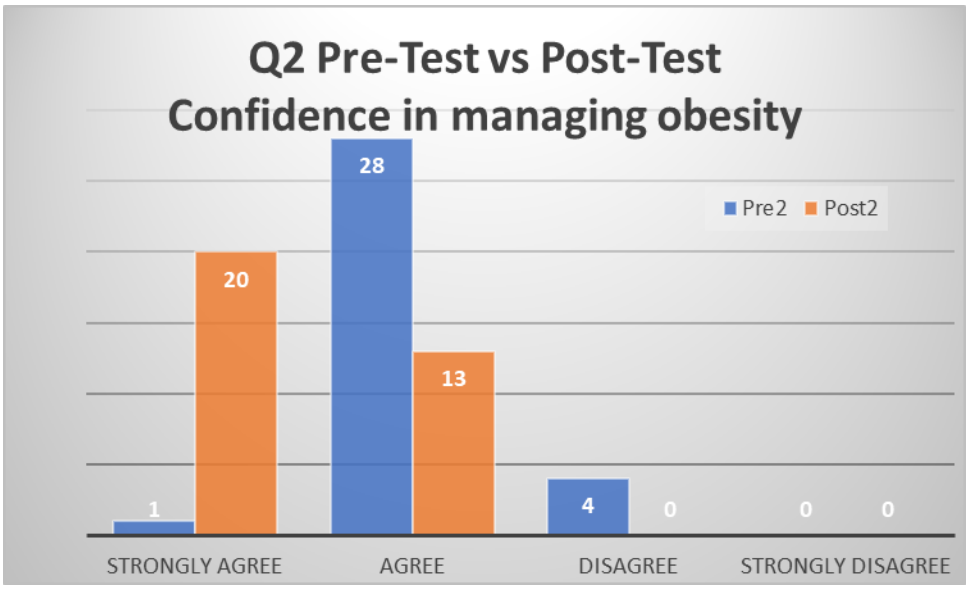


FIGURE 3. Question 2: Pre-Test vs Post-Test

Results for question #3 indicate that 100% (n=35) of participants indicated that they strongly agreed with the statement "I assess weight, frequency of physical activity, & diet at every visit," a change from baseline of 12% (n=4) (Figure 4). Everyone participated in this question. Please see Table 1 for overview of results.

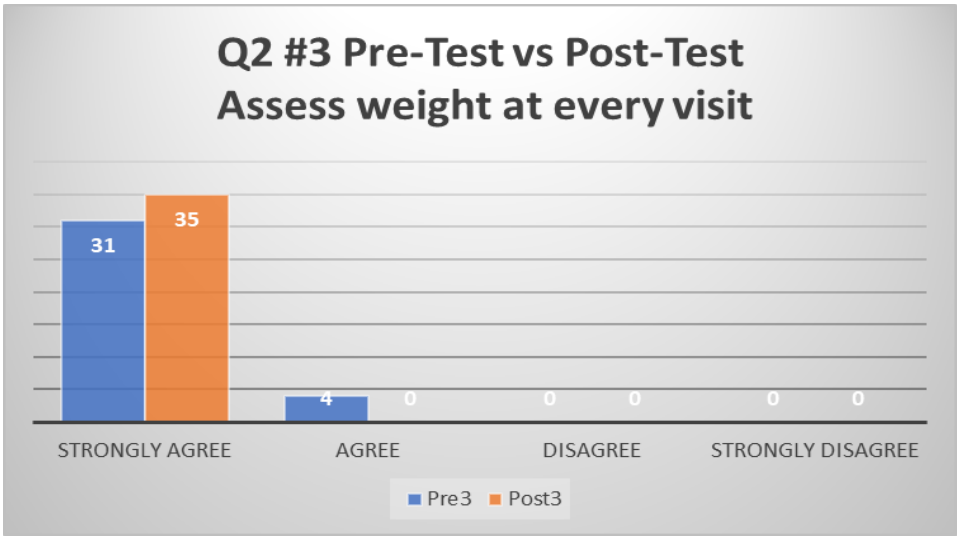


FIGURE 4. Question 2 #3: Pre-Test vs Post-Test

TABLE 1. *Overview of Results*

	Pre-Test						**Post Test**					
	Q1	Q1%	Q2	Q2%	Q3	Q3%	Q1	Q1%	Q2	Q2%	Q3	Q3%
	Familiar with clinical guidelines		Confident in treating obesity		Assess weight at every visit		Learned something to apply to practice		Confident in treating obesity		Assess weight at every visit	
Strongly Agree	12	36.4%	1.0	3.0%	31.0	88.6%	20.0	58.8%	20.0	60.6%	35.0	100.0%
Agree	19	57.6%	28.0	84.8%	4.0	11.4%	14.0	41.2%	13.0	39.4%	0.0	0.0%
Disagree	2	6.1%	4.0	12.1%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
Strongly Disagree	0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%	0.0	0.0%
Total N	33		33		35		34		33		35	

DISCUSSION

Impact of Results on Practice

The results indicate that the intervention was successful. Providers responded that they learned something that they can apply to practice and reported intent to implement interventions. Importantly, all providers indicated that they felt confident in treating obesity in this population, post intervention. This is a meaningful change that speaks to the goal of this work. This is consistent with our initial goal. Overall, this project is part of a quality improvement effort to better address obesity at the clinic level. Despite ending at the educational phase, it is possible for the organization or a future DNP student to continue the project by following up with providers to see if there were changes in practice. Furthermore, it is possible to have continuing education on the topic and possibly assess efficacy to allow for targeted education and possibly even adaptation provider's workflow.

Relationship of Results to Aims and Other Evidence

The purpose of the project was to improve evidenced based intervention in patients with comorbid mental illness and obesity. The results fulfill the *apriori* aims to assess baselines knowledge of primary care providers about the screening and management of obesity in those with mental illness as well as change in knowledge as a function of educational intervention. It expands the on the current literature regarding obesity management by trying to aid the application of best practices and demonstrating that an educational intervention aimed at PCP's can be efficacious in producing knowledge change. This project can be expanded to assess if this effects practice, not just a knowledge. This project is important because obesity has been identified as a large concern in healthcare that underlies many poor health outcomes. Further,

many barriers to successful management have been identified. Any intervention that supports effective management is something that would beneficially support and even expand the current body of literature.

This project fits within the logic model framework discussed. Inputs were the knowledge the project was based on. The activity was the presentation itself. The outcome was the knowledge change described in the results section. The impact is still pending but is hopefully improved obesity management in patients with mental illness at El Rio Community Health Center. The logic model provided a useful framework from inception of this project to its completion and beyond. Its impact will not be measured and is beyond the scope of this current paper, but the logic model allows of the assessment of results beyond the time constraints of its implementation and is a strength of utilizing this framework.

Strengths and Limitations

Limitations include the small number of questions used to assess baseline knowledge and effectiveness of the presentation. There is no formal verification of implementation of knowledge in practice habits of providers. Results are entirely self-report and may not reflect actual change in knowledge. There were some electronic issues during the presentation. The software did not load as efficiently during the presentation as anticipated. Future studies can learn from this and make testing software prior to implementation a priority. Most providers initially responded positively to pre-test question #3 that the assess weight and frequency of physical activity at every visit. This likely reflects the strong organizational emphasis on obesity management and the fact that obesity measurement is both a tracked Healthcare Effectiveness Data and Information Set (HEDIS) measure and an organizational quality of care measure.

Nonetheless, only one person strongly agreed that they felt comfortable treating obesity in patients with psychiatric disorders and a meaningful 11% disagreed altogether with the statement indicating that there was need for education. Further, results indicate that just under 6% of the sample disagreed with the statement that they were familiar with current clinical practice guidelines regarding obesity management showing room for knowledge growth. s. Though this presentation relied on current best evidence, it did collate information across fields as there is little translational research specific to this issue.

A major limitation of this project is that there was an error in transcription of the final questions for the repeated pre/posttest. Specifically question # 3 “I assess weight, frequency of physical activity, & diet at every visit” was not intended to be a repeated question as it does not measure intent to treat or knowledge change. Additionally, not enough time passed between the original presentation of the question and the posttest to assess any change. Therefore, while there was a change in number of participants who strongly agreed with this question, the results are overall not a strong reflection of impact.

Strengths include the topical relevance and translational nature of the project. It is important to translate research into practice and is something where nurse leaders excel. One of the barriers noted in treating obesity was merging evidence based best practices with the realities of short appointment times and poor patient adherence. In providing accessible information, this barrier was addressed. Anecdotally, the feedback from PCP’s was positive. They reported the information on the management strategies for a patient with mental illness from the perspective of a psychiatric provider very helpful. Some noted a lot of misunderstanding of the subtle but important differences in the treatment practices of psychiatric providers the presentation

addressed. A major strength of this study is the holistic needs assessment that allowed the intervention and decision support tool to uniquely suit the El Rio provider needs. The presentation and tool took specifically identified gaps into account and addressed them with local and organization specific resources highlighted as supports. Again, obesity management is relevant to many providers in an era of outcome-based reimbursement and within El Rio improving obesity treatment fits with many of their stated core values of valuing patients, health, and the 'bottom line.' Another strength of this project is that it could be easily implemented in a wide variety of settings.

Dissemination and Future Implications for Practice

The implications of this project to the Advanced Practice Nursing (APRN) community include enhancing knowledge which will create increased recognition that individuals with mental illness are at high risk for obesity, allowing for better treatment in the future.

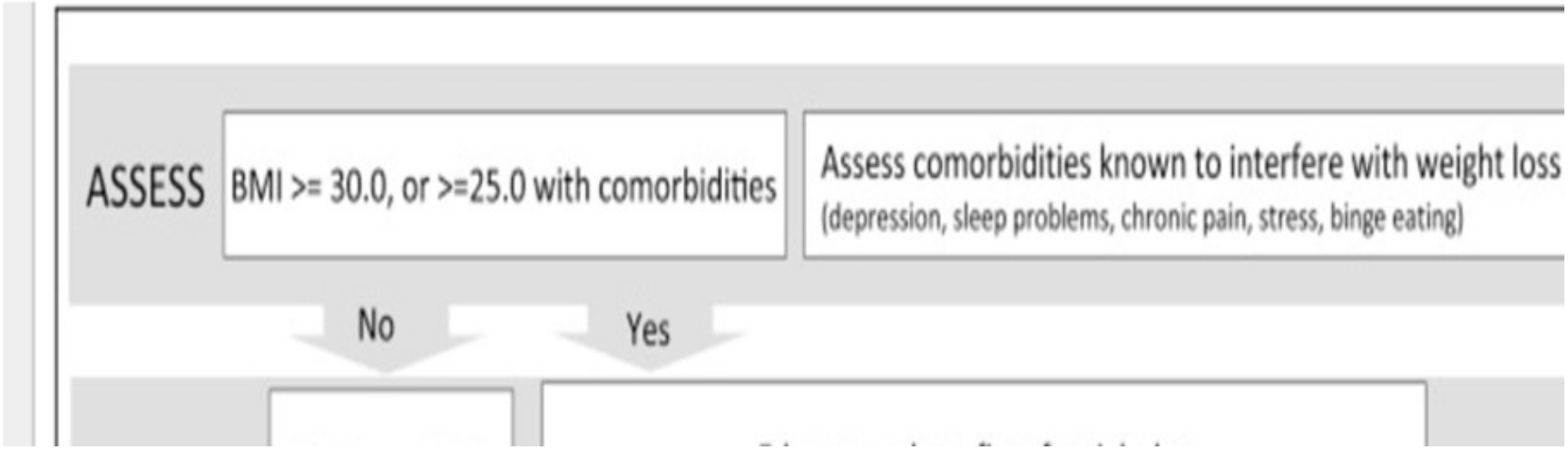
Showing the success of an initial educational intervention may pave the way for nurse leaders to use this format to allow for better treatment of obesity in a high-risk patients and possibly other areas of focus. Having a successfully implemented intervention lead by doctorally prepared nurse also adds to the growing body of quality improvement and translational research in a wide variety of areas in healthcare that helps establish nurses as leaders in this area. Implications for the community of Tucson include better health outcomes for those with mental illness who are part of the nearly 100,000 patients that El Rio Community Health Center services, which is nearly one-fifth of the Tucson community. El Rio Community Health Center is a forerunner in many areas of health and participates in advocacy on a national level; because of this, a successful program can have national effects. Based on the outcomes of this project other

health clinics may wish to provide brief opportunities for educational interventions to providers about managing obesity in patients with mental illness to help support use of evidence based interventions in this particularly vulnerable population. This project supported the need for translational research specific to the primary care management of obesity in patients with mental illness. Future work should build on this to identify common gaps and test efficacious interventions so expand and disseminate these initial findings.

APPENDIX A:

DECISION SUPPORT TOOLS

Early management of overweight patie



El Rio Groups

Diabetes Education and Exercise

Free for El Rio Patients

- NO NEED TO REGISTER
- Walk-ins welcome

30 Minutes of Education

- Diabetes
- Medications

60 minutes of exercise

Matter of Balance

- >50 years
- Has condition that effects balance
- Designed to increase confidence
- 4 week program

Pima Personal Exercise Program

- Need to pre-register
- Goal to manage blood sugar

Groups/Class (no pre-registration, no specific length)

Barre
*Yoga, Pilates, ballet

Zumba
*Dance
*also has low intensity class option

Tai Chi
*Balance, flexibility, stress reduction

Yoga For Health
*Chair yoga available

Get Strong
*Resistance training
*"short bursts of aerobic activity“

Enhance Fitness
*Beginner Level
*Focused on Older Adults

Family Cooking Class
*For Patients with kids between 5-17 yr
*Healthy eating
*meal planning

More information available on El Rio website at http://www.elrio.org/health-wellness/

APPENDIX B:

SURVEY QUESTIONS – PRE-TEST AND POST-TEST

Survey Questions

Pre-Test

1) I am familiar with current clinical practice guidelines regarding obesity
   Strongly agree (ordinal data)
   Agree
   Disagree
   Strongly disagree

2) I feel confident managing obesity in patients with comorbid mental illness (Ordinal data)
   Strongly agree
   Agree
   Disagree
   Strongly disagree

3) I assess weight, frequency of physical activity, & diet at every visit (Ordinal data)
   Strongly agree
   Agree
   Disagree
   Strongly disagree

Post-Test

1) I learned something I can apply to my practice (impact, Ordinal data)

Strongly agree
Agree
Disagree
Strongly disagree

2) I feel confident treating obesity in patients with comorbid Mental illness (impact, Ordinal data)

Strongly agree
Agree
Disagree
Strongly disagree

3) I assess weight, frequency of physical activity, & diet at every visit (Ordinal data)

Strongly agree
Agree
Disagree
Strongly disagree

APPENDIX C:

EL RIO COMMUNITY HEALTH CENTER APPROVAL LETTER

EL RIO
HEALTH

September 6, 2017

University of Arizona Institutional Review
1401 E. University Blvd.
Administration Building, Room 601
PO Box 210066

APPENDIX D:

THE UNIVERSITY OF ARIZONA INSTITUTIONAL REVIEW BOARD APPROVAL LETTER

Human Subjects
Protection Program

1618 E. Helen St.
P.O.Box 245137
Tucson, AZ 85724-5137
Tel: (520) 626-6721
http://rgw.arizona.edu/compliance/home

Research
Office for Research & Discovery

Date:	October 02, 2017
Principal Investigator:	Jamie Velo
Protocol Number:	1709857741
Protocol Title:	Primary care management of obesity in patients with mental illness
Determination:	Human Subjects Review not Required

The project listed above does not require oversight by the University of Arizona because the project does not meet the definition of 'research' and/or 'human subject'.

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

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

The University of Arizona maintains a Federalwide Assurance with the Office for Human Research Protections (FWA #00004218).

APPENDIX E:

LITERATURE REVIEW AND SYNTHESIS

Reference	Research Question/ Hypothesis	Study Designs	Sample/Setting	Methods for data collection/data analysis	Findings
Apovian, C. M., Aronne, L. J., Bessesen, D. H., McDonnell, M. E., Murad, M. H., Pagotto, U., ... & Still, C. D. (2015). Pharmacological management of obesity: an Endocrine Society clinical practice guideline. *The Journal of Clinical Endocrinology & Metabolism*, *100*(2), 342-362.	What does the current literature say about best practice pharmacological intervention for obesity	CPG	Sample: Systematic reviews, RTC concerning apriori established list of 54 drugs used for longer than 30 days	Methods: GRADE system. Analysis: Peer consensus	Weight loss is an important. Many Psychotropic medications can affect weight positively or negatively. Prescribing medications and monitoring weight is important
Barnes, E. R., Theeke, L. A., & Mallow, J. (2015). Impact of the Provider and Healthcare Team Adherence to Treatment Guidelines (PHAT-G) intervention on adherence to national obesity clinical practice guidelines in a primary care centre. Journal of evaluation in clinical practice, 21(2), 300-306.	Investigate a systematic way to increase adherence to obesity treatment guidelines	Clinical Change Project using the theory of planned behaviors	Sample: Primary care providers Setting: Primary Care at a state university in West Virginia	Provider and Healthcare Team Adherence to Treatment Guidelines (PHAT-G) intervention includes education sessions, additional provider resources for patient Methods: education, a provider feedback, and reminders/ Data Analysis: descriptive and comparative data analyses	PCP's did not increase their documentation of obesity, but medical assistants increased documentation of BMI following intervention
Correll, C. U., Detraux, J., De Lepeleire, J., & De Hert, M. (2015). Effects of antipsychotics, antidepressants and mood stabilizers on risk for physical diseases in people with schizophrenia, depression and bipolar	Describe the effect of antipsychotics and antidepressants on development of physical disease	Systematic Review	MEDLINE articles between 20092011 including MeSH terms of physical disease with mental illness and associated psychotropic medication	literature review	Many psychotropics cause weight gain to varying degrees and this impacts physical health. This needs to be considered when starting medications

Reference	Research Question/ Hypothesis	Study Designs	Sample/Setting	Methods for data collection/data analysis	Findings
disorder. *World Psychiatry*, *14*(2), 119-136.					
Curtis, J., Watkins, A., Rosenbaum, S., Teasdale, S., Kalucy, M., Samaras, K., & Ward, P. B. (2016). Evaluating an individualized lifestyle and life skills intervention to prevent antipsychotic-induced weight gain in first-episode psychosis. Early intervention in psychiatry, 10(3), 267276.	Evaluate lifestyle interventions to prevent antipsychotic induced weight gain in patients with first episode psychosis	prospective, controlled study	Sample: Patients suffering early psychosis seeking community treatment Setting: two community mental health agencies with a focus on early intervention	Methods: Baseline measures collected at the start of treatment and repeated after 12 weeks. Patients were assigned to treatment as usually or intervention. Analysis: repeated measures ANCOVA to assess differences between site, during the study period, Baseline measures of weight, BMI, waist circumference, blood pressure, labs	Intervention with individualized plans that included input from dietitian, nursing staff, peer support, exercise physiologist resulting in significantly more weight loss than standard treatment
Depp, C. A., Strassnig, M., Mausbach, B. T., Bowie, C. R., Wolyniec, P., Thornquist, M. H., ... & Harvey, P. D. (2014). Association of obesity and treated hypertension and diabetes with cognitive ability in bipolar disorder and schizophrenia. *Bipolar disorders*, *16*(4), 422-431.	Describes the relationship of obesity to HTN, DM, in patients with bipolar and schizophrenia	cohort study	Sample: outpatients diagnosed with bipolar disorder (n = 341) schizophrenia (n = 417)	Methods: between 2007-2012 BMI, neurocognitive tests, psychiatric symptoms, HTN, DM, HDL collected Data Analysis: chi-square or t-tests	obesity is associated with bipolar and schizophrenia though more significantly associated with the later. In bipolar disorder, obesity is associated with worse cognitive performance, independent of symptom severity
Erickson, K. J., Monsen, K. A., Taltson, I. S., Radosevich, D. M., Oftedahl, G., Neely, C., & Thorson, D. R. (2015).	Describing evidence based ways to implement obesity practice guidelines	retrospective,	Sample: hospital administrators and clinicians Setting: county level public health agencies	Data Collection: semi structured interviews using the Omaha System Problem Rating Scale for Outcomes Knowledge, Behavior, and	The Omaha system can aid in adopting obesity practice guidelines at the system level to sustain change

Reference	Research Question/ Hypothesis	Study Designs	Sample/Setting	Methods for data collection/data analysis	Findings
Translation of obesity practice guidelines: Measurement and evaluation. *Public Health Nursing*, *32*(3), 222-231.				Status. Analysis: descriptive analysis of change score between baseline and follow up	
Galletly, C., Castle, D., Dark, F., Humberstone, V., Jablensky, A., Killackey, E., ... & Tran, N. (2016). Royal Australian and New Zealand College of Psychiatrists clinical practice guidelines for the management of schizophrenia and related disorders. *Australian & New Zealand Journal of Psychiatry*, *50*(5), 410-472.	Clinical practice guidelines on the management of schizophrenia	Clinical Practice guideline	all relevant literature identified regarding schizophrenia and related disorders	peer consensus (11-member panel)	updated recommendations on the best practice treatment guidelines for schizophrenia and related disorders
Garvey, W., Garber, A., Mechanick, J., Bray, G., Dagogo-Jack, S., Einhorn, D., ... & McGill, J. (2014). American Association of Clinical Endocrinologists and American College of Endocrinology position statement on the 2014 advanced framework for a new diagnosis of obesity as a chronic disease. *Endocrine Practice.*	Diagnosing and managing obesity as a chronic disease- position statement	peer consensus	AACE/ACE Consensus Conference on Obesity	N/A	obesity is a chronic disease that needs to be diagnosed carefully
Gardner-Sood, P., Lally, J., Smith, S., Atakan, Z.,	Evaluating base rates of	RTC	Sample: Patients with psychosis (n=450) Setting:	Student's t test	cardiometabolic risk is much higher in patients with psychosis

Reference	Research Question/ Hypothesis	Study Designs	Sample/Setting	Methods for data collection/data analysis	Findings
Ismail, K., Greenwood, K. E., ... & Papanastasiou, E. (2015). Cardiovascular risk factors and metabolic syndrome in people with established psychotic illnesses: baseline data from the IMPaCT randomized controlled trial. *Psychological medicine*, *45*(12), 2619-2629.	cardiometabolic risk in patients with psychiatric illness		community mental health centers across England		than the general population. Most patients met criteria for central obesity, over half the sample was obese as measured by BMI
Gelenberg, A. J., Freeman, M. P., Markowitz, J. C., Rosenbaum, J. F., Thase, M. E., Trivedi, M. H., ... & Schneck, C. D. (2010). Practice guideline for the treatment of patients with major depressive disorder third edition. *The American Journal of Psychiatry*, *167*(10), 1.	Practice guidelines for the treatment of major depression	Clinical Practice guideline	All relavent articles since 1999 from MEDLINE	peer review and consensus	best practices based on current research for the management of depression
Harvey, J. R., & Ogden, D. E. (2014). Obesity treatment in disadvantaged population groups: Where do we stand and what can we do? *Preventive medicine*, *68*, 71-75.	Describing the management of obesity in disadvantaged patient populations	review	N/A	literature review	more research is needed to address obesity related health disparities in underserved populations
Howland, R. H. (2015). Melatonin, Liraglutide, and Naltrexone/Bupropion for the Treatment of Obesity	Describing pharmacological interventions for medication	Literature review	Current literature on pharmacological management of obesity in patients taking medications	literature review	Melatonin, Liraglutide, and Naltrexone/Bupropion are helpful. Naltrexone/Bupropion should be used with caution in

Reference	Research Question/ Hypothesis	Study Designs	Sample/Setting	Methods for data collection/data analysis	Findings
and Medication Related Weight Gain. *Journal of psychosocial nursing and mental health services*, *53*(6), 19-22.	induced weight gain		that increase risk of weight gain		psychosis
Hung, C. F., Rivera, M., Craddock, N., Owen, M. J., Gill, M., Korszun, A., ... & Rietschel, M. (2014). Relationship between obesity and the risk of clinically significant depression: Mendelian randomisation study. *The British Journal of Psychiatry*, *205*(1), 24-28.	Describing the relationship between depression and obesity	Mendelian	Sample: patients with moderate to severe depression	methods: Secondary data analysis. Analysis: Two instrumental variable analyses of genotype and self-report of BMI	no causal relationship between obesity and depression using
Findholt, N. E., Davis, M. M., & Michael, Y. L. (2013). Perceived barriers, resources, and training needs of rural primary care providers relevant to the management of childhood obesity. *The Journal of Rural Health*, *29*(s1), s17-s24.	Evaluating the barriers and possible interventions to managing childhood obesity in rural settings	qualitative exploratory study	Sample: health care providers/ setting community clinics	Data Collection: semi structured interview guide. Data analysis: focused coding and grounded theory methods	managing childhood obesity in rural areas has many challenges, most notably access to resources. Increased nursing staff may be helpful in addressing some barriers
Jarlenski, M. P., Gudzune, K. A., Bennett, W. L., Cooper, L. A., & Bleich, S. N. (2013). Insurance coverage for weight loss: overweight adults' views. *American journal of*	describing insurance reimbursement for managing obesity	nationwide cross-sectional survey	Sample: overweight or obese adults who had seen PCP in last year.	Data Collection: Internet survey Data Analysis: Multivariable logistic regression	weight loss benefits and resources through insurance were helpful but patients were not willing to pay for them

Reference	Research Question/ Hypothesis	Study Designs	Sample/Setting	Methods for data collection/data analysis	Findings
preventive medicine, *44*(5), 453-458.					
Jensen, M. D., Ryan, D. H., Donato, K. A., Apovian, C. M., Ard, J. D., Comuzzie, A. G., ... & Loria, C. M. (2014). Executive summary: Guidelines (2013) for the management of overweight and obesity in adults. *Obesity*, *22*(S2).	Executive summary regarding the management of overweight and obese adults	executive summary	Peer review/consensus on current literature	Data Collection: Literature review. Data Analysis: peer consensus	describes the most current obesity management strategies support by EBP
Lasserre, A. M., Glaus, J., Vandeleur, C. L., Marques-Vidal, P., Vaucher, J., Bastardot, F., ... & Preisig, M. (2014). Depression with atypical features and increase in obesity, body mass index, waist circumference, and fat mass: a prospective, population-based study. *JAMA psychiatry*, *71*(8), 880888.	Describing the relationship between atypical depression and obesity	prospective	Sample: Randomly selected adults	Data Collection: physical exam, BMI, health behaviors/ data analysis: robust regression	atypical depression strongly predicts obesity status at follow up 5 years later
Leucht, S., Cipriani, A., Spineli, L., Mavridis, D., Örey, D., Richter, F., ... & Kissling, W. (2013). Comparative efficacy and tolerability of 15 antipsychotic drugs in schizophrenia: a multiple-treatments metaanalysis.	evaluating the efficacy and side effects of common antipsychotics medications	meta-analysis	Sample: RTC's	Data Collection: database searches for RTC's related to 15 antipsychotic medications of interest. Analysis: Direct pairwise comparisons using a random-effects model	antipsychotic drugs vary in terms of their efficacy and side effect profile and should be matched to the individual patient needs

Reference	Research Question/ Hypothesis	Study Designs	Sample/Setting	Methods for data collection/data analysis	Findings
The Lancet, *382*(9896), 951-962.					
Łojko, D., Buzuk, G., Owecki, M., Ruchała, M., & Rybakowski, J. K. (2015). Atypical features in depression: association with obesity and bipolar disorder. *Journal of affective disorders*, *185*, 76-80.	evaluating the relationship of atypical depression, bipolar disorder and obesity	Cohort study	sample: total n= 182 depressed pts. 91 in each group age, gender matched differing on obesity status (BMI>25)	Data Collection: Sample recruited from 512 patient who received treatment for depression in study clinic in the 12 months prior and were matched on age/gender/dx. SCID/ Hamd-D/weight/BMI collected. Data Analysis one-way analysis of variance (ANOVA) test, unpaired t test as well as Pearson's chi-square test and Fisher's exact test to assess differences in percentage distributions	atypical depression more common in patients with obesity
Luppino, F. S., de Wit, L. M., Bouvy, P. F., Stijnen, T., Cuijpers, P., Penninx, B. W., & Zitman, F. G. (2010). Overweight, obesity, and depression: a systematic review and meta-analysis of longitudinal studies. *Archives of general psychiatry*, *67*(3), 220-229.	Evaluating the longitudinal relationship between depression and obesity	Systematic Reviews	literature review of studies meeting inclusion criteria on obesity and depression	Data Collection: PubMed, PsycINFO, and EMBASE databases/Data Analysis odds ratio	Being depression increases the risk of being obese and vice versa
Malhi, G. S., Bassett, D., Boyce, P., Bryant, R., Fitzgerald, P. B., Fritz, K., ... & Porter, R. (2015).	Clinical practice guidelines on managing mood disorders	Clinical practice guidelines	sample: articles from PubMed and EMBASE, MEDLINE, PsycINFO and Google Scholar relating to	data collection: database search of PubMed and EMBASE, MEDLINE, PsycINFO and Google	recommendation on current evidence based practice recommendations for mood disorders

Reference	Research Question/ Hypothesis	Study Designs	Sample/Setting	Methods for data collection/data analysis	Findings
Royal Australian and New Zealand College of Psychiatrists clinical practice guidelines for mood disorders. *Australian & New Zealand Journal of Psychiatry*, *49*(12), 10871206.			mood disorders	Scholar. Data Analysis: peer review and consensus	
McElroy, S. L., & Keck Jr, P. E. (2014). Metabolic syndrome in bipolar disorder: a review with a focus on bipolar depression. *The Journal of clinical psychiatry*, *75*(1), 46-61.	Describing the relationship between bipolar disorder and metabolic syndrome	Literature review	sample: PubMed database articles (2012) and Cochrane Library (2013)	Literature search containing the words bipolar AND either metabolic, weight, obesity, DM, dyslipidemia, OR HTN in the title or abstract. 176 articles evaluated	cardiometabolic risk highly prevalent for a variety of reasons in patients with bipolar including genetics, psychotropic medications and is largely under treated. Increased monitoring of obesity in this population is needed
McElroy, S. L., Kemp, D. E.,Friedman, E. S., Reilly-Harrington, N. A., Sylvia, L. G., Calabrese, J. R., ...& Tohen, M. (2016). Obesity, but not metabolic syndrome, negatively affects outcome in bipolar disorder. *Acta Psychiatrica Scandinavica*, *133*(2), 144-153.	Describing the negative effects of obesity beyond metabolic syndrome in the symptom outcome in patients with bipolar disorder	RTC	n=482 pts with bipolar, 11 outpatient sites. Pts aged 18–68. Conducted between 2011 and 2012	dx determines by Extended Mini-International Neuropsychiatric Interview, pts was excluded if they had failed previous treatment/ Data analysis: chi-square to determine obesity prevalence in sample and t-test to determine group differences as a function of obesity	Nearly 45% of the sample was obese. Obesity correlated with worse treatment outcomes
Mitchell, A. J., Delaffon, V., Vancampfort, D., Correll, C. U., & De Hert, M. (2012). Guideline concordant monitoring of metabolic risk in people	Evaluating the adherence to recommended monitoring of metabolic risk in patients treated	Meta-analysis	48 studies between 20002011 examine pts with schizophrenia examining routine metabolic screening	PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses)	routine/recommend metabolic monitoring rates are very low

Reference	Research Question/ Hypothesis	Study Designs	Sample/Setting	Methods for data collection/data analysis	Findings
treated with antipsychotic medication: systematic review and meta-analysis of screening practices. *Psychological medicine*, *42*(1), 125-147.	with an antipsychotic				
Monsen, K. A., Attleson, I. S., Erickson, K. J., Neely, C., Oftedahl, G., & Thorson, D. R. (2015). Translation of Obesity Practice Guidelines: Interprofessional Perspectives Regarding the Impact of Public Health Nurse System-Level Intervention. Public Health Nursing, 32(1), 34-42.	Describing how to translate obesity practice guidelines into practice	qualitative study	39 clinicians from healthcare organizations participating in an obesity management collaborative	Interview analysis	translational implementation of Obesity CPG resulted in transition to providers feeling more motivation, increased awareness, personal investment in treatment, and increased perceived value in treating obesity
National Institutes of Health. (2014). Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults: the evidence report. *Obes res*, *6*(2), 51S-209S.	Clinical practice guidelines on the management of overweight and obese adults	Evidence based report	articles published	systematic review by experts	treatment guidelines for obesity
Pratt, L. A., & Brody, D. J. (2014). Association of depression and obesity with hypertension, diabetes and heart disease. *Comprehensive Psychiatry*, *55*(8), e56.	Describing the association between hypertension, diabetes, and heart disease	NHANES survey	nationally representative sample	data brief	patients with depression are more likely to be obese.

Reference	Research Question/ Hypothesis	Study Designs	Sample/Setting	Methods for data collection/data analysis	Findings
Roberto, C. A., Swinburn, B., Hawkes, C., Huang, T. T., Costa, S. A., Ashe, M., ... & Brownell, K. D. (2015). Patchy progress on obesity prevention: emerging examples, entrenched barriers, and new thinking. *The Lancet*, *385*(9985), 2400-2409.	Evaluating and elucidating barriers to obesity management and prevention	expert review	Literature on the barriers of managing obesity	Expert literature review and consensus	obesity continues to be problematic, there has not been a reduction in prevalence, more emphasis needs to be placed on diet , obesity is complex, there is still a lot of disagreement about causes and factors
Rubin, J. K., Hinrichs-Krapels, S., Hesketh, R., Martin, A., Herman, W. H., & Rubino, F. (2016). Identifying barriers to appropriate use of metabolic/bariatric surgery for type 2 diabetes treatment: policy lab results. *Diabetes care*, *39*(6), 954963.	evaluating when to consider bariatric surgery in patients with type II diabetes	Expert review	clinicians, scientists, policy-makers	Panel review	1. there needs to be attention to the cost and magnitude of obesity, 2. the role of bariatric/metabolic surgery needs to be clearly defined and communicated and incorporated into clinical practice 3. funding sources need to be identified.
Rueda-Clausen, C. F., Benterud, E., Bond, T., Olszowka, R., Vallis, M. T., & Sharma, A. M. (2014). Effect of implementing the 5As of Obesity Management framework on provider–patient interactions in primary care. *Clinical obesity*, *4*(1), 39-44.	Can using the 5 A's commonly used in addiction counseling help with obesity treatment in the primary care setting	a non-controlled	obese patients receiving care large PCP practice consisting of 33 clinics	training for PCP's, patient surveys before and after training regarding perceptions of obesity management	implementing this method resulting in increase of obesity management and perception of care coordination/follow up
Soleymani, T., Daniel, S.,	Describes	literature review	PubMed search for articles	Articles that matched search	obesity is a large issue, PCP's are

Reference	Research Question/ Hypothesis	Study Designs	Sample/Setting	Methods for data collection/data analysis	Findings
& Garvey, W. T. (2016). Weight maintenance: challenges, tools and strategies for primary care physicians. *obesity reviews*, *17*(1), 81-93.	challenges and strategies for primary care physicians to manage weight		related to obesity management published before 2/2015	criteria were scanned and included if relevant. Single case studies, commentaries, letter and/or interviews were not included	central to management, weight loss of 510% for 1 yr. can have significant positive health outcomes, adding pharmacotherapy to lifestyle interventions increases chances of success,
Wurtman, J. J., & Wurtman, R. J. (2015). Depression can beget obesity can beget depression. *J Clinical Psychiatry*, *76*(12), e1619-e1621.	Describing the relationship between obesity and depression	Literature review	Literature on obesity and depression	Literature review	Obesity in depression relates to several variables. 1. many psychotropic medications affect weight gain. 2. symptoms of mood disorder such as low self-esteem also has a significant impact. 3. Internal metabolic process that are impaired in depression may also increase risk of obesity
Yumuk, V., Tsigos, C., Fried, M., Schindler, K., Busetto, L., Micic, D., ... & Obesity Management Task Force of the European Association for the Study of Obesity. (2015). European guidelines for obesity management in adults. *Obesity facts*, *8*(6), 402-424.	Outlining current best practice guidelines for managing obesity	CPG	literature review and expert consensus	Expert consensus	BMI is the most common metric for obesity measurement; numerous and complex factors underlie obesity, good assessment is needed, realistic goals should be set, comorbidities should be managed, low calorie diets are effective regardless of focus, aerobic exercise is most effective in weight loss

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Ackley, B. J., Swan, B. A., Ladwig, G., & Tucker, S. (2008). *Evidence-based nursing care guidelines: medical-surgical interventions* (p. 7). St. Louis, MO: Mosby Elsevier

Apovian, C. M., Aronne, L. J., Bessesen, D. H., McDonnell, M. E., Murad, M. H., Pagotto, U., ... & Still, C. D. (2015). Pharmacological management of obesity: an endocrine society clinical practice guideline. *The Journal of Clinical Endocrinology & Metabolism*, *100*(2), 342-362.

Barnes, E. R., Theeke, L. A., & Mallow, J. (2015). Impact of the provider and healthcare team adherence to treatment guidelines (PHAT-G) intervention on adherence to national obesity clinical practice guidelines in a primary care centre. *Journal of Evaluation in Clinical Practice*, *21*(2), 300-306.

Bioque, M., García-Portola, M. P., García-Rizo, C., Cabrera, B., Lobo, A., González-Pinto, A., ... & Bobes, J. (2017). Evolution of metabolic risk factors over a two-year period in a cohort of first episodes of psychosis. *Schizophrenia Research*.

Brauer, P., Gorber, S. C., Shaw, E., Singh, H., Bell, N., Shane, A. R., ... & Canadian Task Force on Preventive Health Care. (2015). Recommendations for prevention of weight gain and use of behavioural and pharmacologic interventions to manage overweight and obesity in adults in primary care. *Canadian Medical Association Journal*, *187*(3), 184-195.

Carey, M., Small, H., Yoong, S. L., Boyes, A., Bisquera, A., & Sanson-Fisher, R. (2014). Prevalence of comorbid depression and obesity in general practice: a cross-sectional survey. *Br J Gen Pract*, *64*(620), e122-e127.Centers for Disease Control and Prevention (2015). *Healthy weight*. Retrieved from https://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/index.html

Center for Disease Control (2016). *Obesity*. Retrieved from https://www.cdc.gov/obesity/

Centers for Disease Control and Prevention (2016). 500 cities. https://www.cdc.gov/500cities/measure-definitions.htm

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