

**Gender-specific Waist Circumference Measurements in Patients Taking Atypical  
Antipsychotics**

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### **Abstract**

Atypical antipsychotic agents are associated with cardiometabolic complications that contribute to a higher risk of cardiovascular disease, type 2 diabetes, and stroke. The American Diabetes Association and the American Psychological Association developed practice guidelines for metabolic monitoring of patients taking atypical antipsychotics; however, evidence demonstrates adherence to monitoring guidelines remain low. This quality improvement project sought to determine the feasibility of incorporating waist circumference measurements for patients taking atypical antipsychotics in a primary care setting. The timeframe for this project was from September 2022 through December 2022, and involved care coordinators and health educators at a federally qualified health center in southeastern Pennsylvania. The project consisted of two parts: 1) evaluation of pretest and posttest results to evaluate whether there was an increase in participant knowledge and awareness of metabolic syndrome, atypical antipsychotics, metabolic monitoring recommendations, and gender-specific waist circumference parameters and 2) evaluation of the pretest and six-week posttest results to identify current metabolic monitoring practices and whether there was a change in self-reported practices to incorporate waist circumference measurements into clinical practice. Analysis of results revealed that care coordinators and health educators demonstrated an increase in knowledge and awareness of atypical antipsychotics, metabolic syndrome, and gender-specific waist circumference parameters. Furthermore, results revealed that participants did have an increase in self-reported practices to incorporate waist circumference measurements during patient encounters.

*Keywords:* Atypical antipsychotics, metabolic syndrome, waist circumference, metabolic monitoring, practice guidelines

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## **Introduction**

Antipsychotic medications are an important component in the management of many psychotic conditions including schizophrenia, bipolar mania disorder, and other related disorders. Antipsychotic medications are divided into two classes, typical antipsychotics, (or first-generation antipsychotics [FGAs]), and atypical antipsychotics (or second-generation antipsychotics [SGAs]). FGAs continue to be used extensively even though they are associated with significant extrapyramidal symptoms, and they do not adequately alleviate the negative symptoms commonly seen in psychotic illnesses. The effort to find antipsychotic medications that are more effective and with less side effects lead to the development of atypical antipsychotics (American Diabetes Association [ADA] & American Psychological Association [APA], 2004). Despite their well-known benefits in managing psychiatric symptoms, large-scale studies have shown that atypical antipsychotics are associated with increased risk of cardiometabolic effects such as weight gain, high blood pressure (BP), alternations in glucose metabolism, and lipid dysregulation, which are all well-known risk factors for cardiovascular disease (CVD) and diabetes (Abosi et al., 2018; Azfr Ali et al., 2021; Barton et al., 2020; Bernardo et al., 2021; Correll et al., 2017; Garrido-Torres et al., 2020; Hammoudeh et al., 2019; Hirsch et al., 2017; Mitchell et al., 2013).

### **Atypical Antipsychotics**

On September 26, 1989, the first atypical antipsychotic, clozapine (Clozaril), was approved by the U.S. Food and Drug Administration (FDA) for the treatment of schizophrenia. The term “atypical” describes an antipsychotic medication that treats both positive and negative signs and symptoms of schizophrenia, produces minimal extrapyramidal side effects (EPS) at clinically effective doses, and has low tendency to cause tardive dyskinesia (TD) with long-term

treatment (Freedman, 2003). Other atypical antipsychotics currently available and approved by the FDA include aripiprazole (Abilify), risperidone (Risperdal), olanzapine (Zyprexa), quetiapine (Seroquel), ziprasidone (Geodon), paliperidone (Invega). Some of the newer atypical antipsychotics include asenapine (Saphris), iloperidone (Fanapt), and lurasidone (Latuda). As a result of their effectiveness and better tolerance, they have become first-line agents for their intended use.

In addition to being prescribed for the management of schizophrenia and bipolar mania symptoms, some atypical antipsychotics are also commonly prescribed for off-label uses. The FDA defines off-label use of an approved drug for treatment as one “that is not included in the product’s approved labeling or statement of intended uses” (FDA, 2018). In 2006, the Agency for Healthcare Research and Quality (AHRQ) published a systematic review of clinical trials on the comparative effectiveness of off-label uses of these agents. The review found that the most common off-label use for these medications included major depressive disorder (MDD), obsessive-compulsive disorder (OCD), post-traumatic stress disorder (PTSD), personality disorders, Tourette syndrome, autism spectrum disorder, and agitation in dementia patients (Shekelle et al., 2007). By 2006, nine atypical antipsychotic medications were approved by the FDA for indications that were previously considered off-label. For example, the use of aripiprazole (Abilify) as augmentation treatment for MDD; and asenapine (Saphris), clozapine (Clozaril), and olanzapine (Zyprexa) in combination with fluoxetine (Prozac) for treatment of MDD and bipolar depression. Findings from the review demonstrated that there was no significant evidence to support the efficacy for off-label uses of atypical antipsychotics. However, there was strong evidence to support the increased risk of adverse events with off-label use, such as weight gain and increased mortality among older adults (Shekelle et al., 2007;

Maher & Theodore, 2012).

Since AHRQ's initial review in 2006, multiple studies have been published evaluating new off-label uses of atypical antipsychotics including insomnia and anxiety, two very common complaints in primary care. In 2011, they provided an updated review with these significant findings: 1) quetiapine found to have superior effect on generalized anxiety disorder (GAD) when compared to placebo; 2) inconclusive data for the use of atypical antipsychotics for insomnia, 3) statistically significant benefits for the use of olanzapine, aripiprazole, and risperidone for elderly patients with dementia; 4) use of atypical antipsychotics have increased significantly; and 5) increased risk of adverse events with the use of these agents without FDA approval for the indication (Shekelle et al., 2007). Because these drugs are increasingly used to manage other conditions including neurodevelopmental disorders, anxiety disorders, and behavioral symptoms in older adults with dementia, there is a resulting increase in numbers of people in the general population who are at risk for the cardiometabolic disturbances these drugs can cause (Abdulhaq et al., 2020).

The degree of cardiometabolic disturbances of atypical antipsychotics depends on their mechanism of action at the receptor level. All the atypical antipsychotics exert their antagonistic effects on dopamine 2 (D<sub>2</sub>) and serotonin type 2-A (5-HT<sub>2A</sub>) receptors. However, there are considerable differences with respect to their activity at other receptors within the central nervous system. For example, clozapine (Clozaril), olanzapine (Zyprexa), and risperidone (Risperdal) are most likely to cause weight gain due to their effect on the serotonin 1-C (5-HT<sub>1C</sub>) and histamine-1 (H<sub>1</sub>) receptors, while aripiprazole (Abilify) is least likely to cause weight gain as it exerts its antagonistic effect on serotonin 1-A (5-HT<sub>1A</sub>) receptors (Dayabandara et al., 2017). Because of their varying degree of function at different receptor sites, atypical antipsychotics

have marked differences in their risk of inducing metabolic disturbances. It is important to note that the presence of one metabolic disturbance (e.g., weight gain) acts as a risk factor for other metabolic disturbances such as insulin resistance, abnormal glucose levels, elevated blood pressure, and abnormal lipids, all of which lead to the development of metabolic syndrome.

### **Metabolic Syndrome**

Metabolic syndrome (MetS), also known as syndrome X or insulin-resistance syndrome, is a cluster of conditions that occur together, increasing risk for heart disease and stroke. In 2004, the International Diabetes Federation (IDF) held an expert workshop to examine how various definitions of MetS could be improved with the goal of introducing a new and unifying world-wide definition of MetS for use as a diagnostic tool in clinical practice. Using the National Cholesterol Education Program's Adult Treatment Panel III (NCEP-ATP III) definition of MetS as a starting point, the IDF developed a consensus statement with clear criteria for MetS diagnosis and to clarify the nature of the syndrome (Alberti et al., 2006). According to the IDF, a person is considered to have MetS if they have central obesity, assessed by gender-specific waist circumference measurement cut-points, accompanied by at least two of the following: 1) elevated triglyceride level greater than or equal to 150 mg/ml (1.7 mmol/L); 2) reduced high-density cholesterol of less than 40 mg/dL (1.03 mmol/L) in males, and 50 mg/dL (1.20 mmol/L) in females; 3) elevated blood pressure greater than or equal to 130/85 mmHg, or treatment of previously diagnosed hypertension (HTN); and 4) elevated fasting plasma glucose (FBG) greater than or equal to 100 mg/dL (5.6 mmol/L), or previously diagnosed type 2 diabetes (Alberti et al. 2005). The American Heart Association (AHA) has also adopted these diagnostic criteria for MetS. Although each condition alone is considered an independent risk factor for cardiovascular disease (CVD), meeting more than one diagnostic criterion significantly increases risk of



developing a serious cardiovascular condition (AHA, 2021).

### **Weight Gain**

Antipsychotic-induced weight gain (AIWG) is a common side effect of atypical antipsychotic treatment (Alberti et al., 2006; Dayabandara et al., 2017; Hirsch et al., 2017; Abosi et al., 2018; Hammoudeh et al., 2019; Barton et al., 2020; Bernardo et al., 2021). For patients taking atypical antipsychotics, clinically relevant weight-gain (CRWG) is considered 7% or greater from baseline weight prior to treatment to post-treatment (Barton et al., 2020). Results from randomized control trials (RCTs) have found that most antipsychotic-induced weight gain (AIWG) occurs in the first 6 months of treatment and is more prominent in those who are already overweight or obese. Additionally, AIWG continues beyond the initial six months of treatment with olanzapine (Zyprexa), clozapine (Clozaril), quetiapine (Seroquel), and risperidone (Risperdal) causing more weight gain after thirty-eight weeks or more of treatment (Abosi et al., 2017; & Barton et al., 2020). The concern for AIWG is significant as atypical antipsychotics can cause patients to become overweight or obese. The World Health Organization (WHO) defines overweight and obese as abnormal or excessive amounts of fat accumulation that may impair health (WHO, 2021). Being overweight or obese can lead to type 2 diabetes, CVD, and stroke, the leading causes of preventable and premature death. These obesity-related conditions cost the United States \$147 billion annually in health care costs (Centers for Disease Control and Prevention [CDC], 2022).

### **Abdominal Obesity and Insulin Resistance**

Body mass index (BMI) is the most used anthropometric measure in clinical practice to determine risk of developing obesity-related health conditions. The WHO categorizes overweight and obesity as having a BMI of 25-29 kg/m<sup>2</sup> and BMI of 30 kg/m<sup>2</sup> or more,

respectively (WHO, 2021). Although BMI is used most often in clinical practice, its use in isolation does not sufficiently capture distribution of body fat which is significant in determining risk for MetS. Abdominal (visceral) obesity, also known as central obesity, is identified as having excessive visceral adipose tissue that surrounds organs in the abdomen. Adipose tissue, particularly visceral adipose tissue, is thought to be responsible for the release of pro-inflammatory substances that cause atherosclerotic plaque formation and impairment of insulin sensitivity (Alberti et al., 2006). Although studies have shown increased prevalence and incidence of CVD and type 2 diabetes among individuals who meet criteria for being overweight or obese, it is important to note the heterogeneity in abdominal fat amongst those individuals with same or similar BMI values. Visceral adiposity as a risk factor for insulin resistance is believed to be predominant feature and risk factor for MetS, CVD, and type 2 diabetes (Alberti et al., 2006; Paley & Johnson, 2018).

### **Gender-specific Waist Circumference**

Computed tomography (CT) and magnetic resonance imaging (MRI) are considered the gold standard for accurately measuring visceral fat (Min & Stephens, 2015). However, their use in clinical practice is neither practical nor cost-effective. Amongst other anthropometric measures used for risk stratification, waist circumference (WC) is considered an easy and better predictive measure, when compared to BMI, to quantify central obesity and identify obesity-related morbidity and mortality (Alberti et al., 2006; Ness-Abramof & Apovian, 2008; Paniagua et al., 2008; & Ross et al., 2020). The National Institute of Health (NIH) clinical guidelines for obesity has adopted the NCEP ATP III gender-specific cut-off values for central obesity as 40 inches (102 cm) or greater for men and 35 inches (86 cm) or greater for women (Ross et al., 2020). The International Atherosclerosis Society (IAS) and the International Chair on

Cardiometabolic Risk (ICCR) developed a consensus statement in March 2020 with recommendations and scientific updates regarding the use of WC measurement as an important vital sign in clinical practice. (Ross et al., 2020).

### **Clinical Guidelines**

Because of the strong evidence that exists supporting the relationship between antipsychotic use and their effect on weight gain, BP, glucose, and lipid dysregulation, multiple monitoring guidelines have been developed internationally. Currently, there are seven national guidelines available for cardiometabolic screening and monitoring of patients treated with antipsychotic medications (ADA & APA, 2004; Best Practice Advisory Center, 2007; Hasan et al., 2012; National Institute for Health and Care Excellence, 2014; Galletly et al., 2016; Taylor et al., 2018; & Scottish Intercollegiate Guidelines Network, 2013). These clinical practice guidelines were developed in countries around the world including New Zealand and United Kingdom. Although each guideline differs in the timing and extent of cardiometabolic monitoring, the consensus between them emphasizes the importance of screening and monitoring for metabolic disturbances in high-risk populations, including patients with serious mental illness prescribed atypical antipsychotics.

In 2004, the FDA required manufacturers of atypical antipsychotics to include warning labels about the risks of hyperglycemia and diabetes. They also suggested that regular monitoring of clinical measures such as weight and glucose be included in their labeling (Riordan et al., 2011). In response to the FDA's decision, the ADA, APA, along with the American Association of Clinical Endocrinologist (AACE), and the North American Association for the Study of Obesity (NAASO) published a consensus guideline specifically for monitoring the metabolic side effects of atypical antipsychotics (ADA & APA, 2004). Whether patients are

prescribed an atypical antipsychotic for management of a serious mental illness or for an off-label use, the 2004 ADA/APA guidelines give prescribing providers recommendations for baseline and follow-up monitoring of specific clinical measures to mitigate cardiometabolic disturbances that can lead to CVD and diabetes. The screening and monitoring measures include family and/or personal history of CVD, diabetes, hypertension, and dyslipidemia; weight and height for BMI calculation; waist circumference; BP; fasting plasma glucose; and fasting lipid profile (ADA & APA, 2004). For each measure in their protocol, specific guidance is given on how often each measure should be assessed:

1. Family and/or personal history of risk factors to be assessed at baseline and annually.
2. BMI to be assessed at baseline, then weeks 4, 8, 12, and then quarterly.
3. Waist circumference to be assessed at baseline, then annually.
4. BP to be assessed at baseline, at week 12, then annually.
5. Fasting plasma glucose (FPG) at baseline, at week 12, then annually.
6. Fasting lipid profile at baseline, at week 12, then every 5 years if no significant abnormalities are present. If abnormalities are noted at baseline or at week 12, monitor annually.

In 2010, the ADA updated their guidelines to include hemoglobin A1c (HbA1c) as a screening and monitoring measure to replace FPG given the challenges and barriers that arise with obtaining fasting sugar levels (Cohen, 2013; & Hanas & John, 2010). Soon after its publication in 2004, the ADA & APA screening and monitoring guidelines become the standard of care in the United States. Its use in clinical practice is essential to ensuring metabolic disturbances are identified, addressed, and treated if needed in a timely manner.

### **Scope of the Clinical Problem**

Atypical antipsychotics are widely used to treat symptoms of schizophrenia and other related disorders. Evidence has demonstrated the prevalence of their off-label use, despite evidence of ineffectiveness and well-known cardiometabolic risks (D'Agostino et al., 2022; Horvitz-Lennon et al., 2021). Because of this, more people in the general population are subject to their metabolic side effects such as weight gain, insulin resistance, lipid dysregulation and elevated BP all of which are components of MetS. The development of MetS is a significant risk factor for CVD, type 2 diabetes, and stroke.

Screening and monitoring guidelines have been developed in the United States and internationally to mitigate these risk factors; however, evidence demonstrates that despite the availability of these practice guidelines, screening and on-going monitoring of patients prescribed atypical antipsychotics is suboptimal in primary care and outpatient psychiatry clinics (Azfar Ali et al., 2021; Lydon et al., 2021; Hammoudeh et al., 2019; Mitchell et al., 2012; Riordan et al., 2011; & Soda et al., 2021). Screening and monitoring practices are especially low as it relates to assessment of central obesity, determined by waist circumference measurement. Given the identified gap that exists between guideline-recommended care and clinical practice, there is a need to increase awareness of such guidelines, and to institute a change in clinical practice that will identify high-risk patients in the primary care setting.

### **Review of the Literature**

The focus of the literature review was three-fold: 1) prevalence of metabolic disturbances leading to MetS in patients prescribed atypical antipsychotic medications; 2) the association between weight gain, central obesity and MetS as indicators that predict risk for CVD and type 2 diabetes; and 3) evidence-based screening and monitoring guidelines for MetS and lack of adherence, specifically with measurement of waist circumference.

A selective search was conducted using various databases and websites including PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Medline, Agency for Healthcare Research and Quality (AHRQ), Google Scholar, and Web of science. Search terms included: *atypical antipsychotics, second-generation antipsychotics (SGAs), MetS, waist circumference, diabetes, clinical practice guidelines, obesity, and CVD*. Inclusion criteria for the initial search included articles published in peer-reviewed journals within the past 10 years; however, there are articles included in the literature review that were published over ten years ago due to their relevance to the scope of the problem. Additional inclusion criteria included articles written in English and studies with subjects over the age of eighteen years old.

The evidence level, strength, and quality of the literature, guidelines and recommendations were determined using the Johns Hopkins Nursing Evidence-Based Practice (JHNEBP) evidence level and quality guide (Johns Hopkins Medicine, n.d.). Using the JHNEBP hierarchy of evidence guide and the evidence appraisal tool, the project leader was able to categorize the literature using the four levels of evidence, and rate the literature as high quality, good quality, or low quality.

Correll et al. (2017) conducted a large-scale meta-analysis of 92 studies to assess the prevalence of CVD in 3,211,768 patients with pooled and specific severe mental illness (SMI), versus 11,383,386 controls. Patients were found to have significantly higher incidence of CVD versus controls in cross-sectional studies (odds ratio, OR= 1.53, 95% CI: 1.27-1.83; 11 studies). Patients with SMI in the longitudinal studies were also found to have higher CVD incidence than controls (hazard ratio, HR= 1.78, 95% CI: 1.60-1.98; 31 studies). Additionally, CVD incidence was found to increase in all patients prescribed antipsychotics ( $p= 0.007$ ), those with higher BMI ( $p=0.008$ ), and those with higher baseline CVD prevalence ( $p=0.03$ ) when compared to controls.

The results from this meta-analysis confirmed that antipsychotic use and increased BMI in patients with SMI significantly increases the risk of CVD and CVD-related mortality (Correll et al., 2017). In another systematic review and meta-analysis that sought to identify the prevalence of MetS in 25,692 patients with schizophrenia and other related disorders, Mitchell et al. (2013) found that the overall rate of MetS was 32.5% (95% CI= 30.1%-35.0%) with the highest rate of MetS seen in those prescribed clozapine (Clozaril) (51.9%), and the lowest rate of MetS in those who were unmedicated (20.2%). Both reviews underscored the high-risk for MetS and CVD within this patient population, as well the need for regular monitoring for cardiometabolic disturbances.

In their systematic review and meta-analysis of 27 RCTs that focused on AIWG, Barton et al. (2020) found that compared to placebo, antipsychotics led to significantly more weight gain (mean difference= 0.86 [CI= 0.65; 1.07],  $p < 0.001$ ) and to a significantly higher risk of gaining greater than or equal to 7% of the baseline weight (RR= 2.04 [1.54; 2.71],  $p < 0.001$ ) after three to twelve weeks of treatment; the average increase of 0.86 kg in three to twelve weeks, which corresponds to an effects of approximately 3.5 kg after one year of treatment. Furthermore, Barton et al. (2020) found that most CRW was caused by olanzapine (Zyprexa), followed by risperidone (Risperdal), aripiprazole (Abilify), quetiapine (Seroquel), and asenapine (Saphris). Similarly, in their systematic review of fifteen RCTS, Hirsch et al. (2017) found that olanzapine (Zyprexa) and quetiapine (Seroquel) were significantly associated with an increase in BMI of at least 7%, and an obesity diagnosis. Moreover, Hirsch et al. (2017) found that olanzapine (Zyprexa) and clozapine (Clozaril) were strongly associated with increased risk of type 2 diabetes, while olanzapine (Zyprexa), quetiapine (Seroquel), and ziprasidone (Geodon) were strongly associated with HTN. Bernardo et al. (2021) found similar results in their systematic

review with their findings applied to the general population regardless of diagnosis.

Given the high propensity for metabolic dysregulation with atypical antipsychotic use, there is overwhelming evidence that supports the importance of following recommendations for regular monitoring of BMI, waist circumference, blood pressure, fasting plasma glucose and lipids. According to Mitchell et al. (2012), a priori standard for successful implementation of guideline concordant standards using quantitative scores is: less than 50% monitored as “inadequate”; 50% or more, but less than 70% as “suboptimal”; 70% or greater, but less than 80% as “adequate”; 80% or more, but less than 90% as “good”; and anything greater than 90% as “optimal”. Studies show screening and monitoring for MetS in patients taking atypical antipsychotics remain inadequate or suboptimal even after wide dissemination of the ADA & APA monitoring guidelines. In their systematic review and meta-analysis of forty-eight studies (n= 290, 534) conducted between 2000 and 2011 in 5 countries, Mitchell et al. (2012) found that although monitoring improved after guideline implementation for weight (75.9%, 95% CI= 37.3-98.7), BP (75.2%, 95% CI= 45.6- 95.5), glucose (56.1%, 95% CI= 43.4- 63.3), and lipids (28.9%, 95% CI= 20.3- 38.4), metabolic monitoring of all parameters is not where it should be according to guideline concordant standards. Lydon et al. (2021) conducted a cross-sectional study on routine screening in patients treated with clozapine (Clozaril) versus various long-acting injectable (LAI) antipsychotics in the United States, and they found that although the difference in the rate of MetS between the two groups were statistically insignificant ( $X^2=0.54$ ,  $p= 0.46$ ), the rate of monitoring for metabolic disturbances using the 2004 ADA & APA guidelines was significantly lower in the LAI group (blood pressure, weight, lipid and glucose levels,  $p< 0.001$ ). This finding demonstrates the need for robust screening and monitoring regardless of route of administration, and the importance of including all aspects of the ADA & APA guidelines,



including waist circumference measurement (Lydon et al., 2021).

Evidence further supports a common theme of inconsistent measurement of waist circumference, or complete lack thereof in patients taking atypical antipsychotics (Abosi et al., 2017; Azfar Ali et al., 2021; Lydon et al., 2021; Mitchell et al., 2013; & Riordan et al., 2011). In their study on the prevalence of MetS, Mitchell et al. (2013) found that waist size, assessed by measurement of waist circumference, was the most useful predictive measure of MetS with a sensitivity of 79.4% and specificity of 78.8%. Similarly, Riordan et al. (2021) found that among the five measures to predict MetS, abdominal obesity had the highest sensitivity, correctly identifying 92% of patients with MetS. Additionally, elevated FPG had the highest specificity, with normal glucose values correctly ruling out 95.2% of patients who do not have MetS. When both predictive measures, waist circumference measurement and FPG, are used in combination, 100% of patients with MetS are correctly identified (Riordan et al., 2011). In their study of 1,010 Black and Caucasian adult participants in the Coronary Artery Risk Development in Young Adults (CARDIA) study, Shen et al. (2006) reported that waist circumference was more strongly associated with CVD risk factors than BMI. Likewise, Zhu et al. (2005) reported similar results in their study of 10,969 participants from three different ethnic groups, stating that measures of central obesity (i.e., waist circumference, waist-to-hip ratio, and waist-to-height ratio) are better indicators of health risk indicators than overall BMI adiposity measure. With regards to central obesity and the risk of developing type 2 diabetes, a meta-analysis of 32 published reports noted that central obesity was a stronger predictor of type 2 diabetes incidence than measures of total body fat, and that waist circumference is a better predictor of CVD risk (Vazquez et al., 2007).

Despite this available knowledge, studies suggest that a lack of awareness may be a contributing factor of suboptimal screening and on-going monitoring of patients taking atypical

antipsychotics. In an anonymous survey completed by one hundred sixty-four physicians, nurse practitioners, and physician assistants, 40% (n= 66) were not aware of the ADA & APA consensus guidelines for metabolic screening and monitoring (Mangurian et al., 2013). Abdulhaq et al. (2020) conducted a cross-sectional survey to determine awareness, knowledge, and practices of ninety-one psychiatrists regarding metabolic monitoring. Their results revealed that 74% stated they were aware of the consensus guidelines, 17% were somewhat aware, 5% were not aware, and 4% answered they were aware of the guidelines but do not agree with them.

### **Project Site & Setting**

The setting for this Doctor of Nursing (DNP) project is Delaware Valley Community Health (DVCH), a non-profit health care organization that operates nine federally qualified health centers (FQHCs) throughout southeastern Pennsylvania. Their focus is high quality, community-based services with specialized care in primary care for adults and families, women's health, pediatrics, dental and vision, as well as behavioral health services. They accept all insurances and care is provided to patients regardless of their ability to pay at the time of service, through a sliding fee discount scale (SFDS), according to income and family size. The SFDS program was instituted to minimize financial barriers to care for patients at or below 200% of the federal poverty guidelines (DVCH, n.d.).

The project was implemented at one of DVCH's locations, Norristown Regional Health Center (NRHC), which provides health care services to primarily Black and Hispanic patients. Members of the primary care team at NRHC include physicians, nurse practitioners (NPs), physician assistants (PAs), registered nurses (RNs), licensed practical nurses (LPNs), registered dietitians (RDs), social workers (SWs), and behavioral health consultants (BHCs).

### **Gap Analysis of Project Site**

According to the University of Toronto Faculty of Medicine (2016), a gap analysis is a tool used to identify and define current issues in healthcare. Performing a gap analysis sheds light on a discrepancy that exists between current reality in healthcare and the desired or optimal healthcare situation, while also identifying an opportunity to address a healthcare concern using a continuing professional development intervention (University of Toronto, 2016). The literature has demonstrated the discrepancy that exists between evidence-based clinical guidelines for metabolic screening and monitoring of patients taking atypical antipsychotics and the reality of current clinical practice. To obtain a better understanding of current practices at NRHC, a retrospective chart review was done on patient charts with an atypical antipsychotic listed as an active medication. The data from the electronic health record (EHR) was then analyzed to determine current practices and whether there is a need for change.

The project leader worked closely with Kimberly Allen, the Chief Quality and Innovation Officer at DVCH on this QI improvement project. The information technology (IT) team at DVCH was also instrumental in assisting the project leader obtain access to the EHR. The IT team provided the project leader with reports of patients with at least one atypical antipsychotic as an active medication in the EHR. The reports included patients first name, last name, and date of birth. The initial report obtained by the project leader contained a total of 611 charts with the inclusion criteria of having at least one atypical antipsychotic as an active medication in the chart and meeting the age criteria of least 19 years old. A third inclusion criteria was then applied to include charts of patients seen within the past year from September 2021 to September 2022, which yielded a total of 146 charts. Due to database limitations, the exclusion criteria could not be applied; therefore, the project leader reviewed active diagnoses and medications of 146 charts and excluded those with an active diagnosis of diabetes and/or hyperlipidemia or those with

active diabetes and/or lipid lowering medications. Two additional charts were excluded after reviewing provider notes that confirmed discontinuation of atypical antipsychotic medication despite being listed as an active medication. After inclusion and exclusion criteria were met, 104 charts were reviewed individually to determine the rate of monitoring for each metabolic parameter according to ADA & APA screening and monitoring guidelines.

The gap analysis revealed that 92% of patients were assessed for BMI (n= 96), 98% assessed for BP (n= 102), 85% assessed for FPG or HbA1c (n= 88), 89% assessed for FLP (n= 93), and 0% assessed for waist circumference (n=104). Furthermore, the most common diagnosis was found to be schizophrenia (54%, n= 56), followed by bipolar disorder (23%, n= 24). Other diagnoses included borderline personality disorder, depression and anxiety, PTSD, and autism spectrum disorder all of which accounted for the remaining 23% (n= 24). A total of six different atypical antipsychotics were prescribed with risperidone (Risperdal) being the most common (87%, n= 90), followed by olanzapine (Zyprexa), and quetiapine (Seroquel) which accounted for the remaining 13% (n= 14). The percentage of patients noted to be prescribed more than one atypical antipsychotic was 10% (n= 10).

### **Project Question, Purpose, and Goals**

The gap analysis demonstrated that of all monitoring parameters, waist circumference measurement at NRHC for patients prescribed atypical antipsychotics is inadequate, per guideline concordant standards (Mitchell et al., 2012). Therefore, the purpose of this quality improvement (QI) project was twofold: 1) increase care coordinators and clinical educators' awareness and knowledge of atypical antipsychotics, their metabolic effects, and gender-specific waist circumference measurements parameters per the 2004 ADA & APA guidelines; and 2) evaluate perceptions, willingness, and self-reported practices of care coordinators and clinical

educators to incorporate gender-specific waist circumference measurements for patients prescribed atypical antipsychotics at NRHC. To address the gap that exists between guideline-recommended practice and current clinical practice at NRHC, the practice change question is: Will increasing knowledge and awareness of the effects of atypical antipsychotic medications on MetS, tailored towards care coordinators and health educators at a FQHC, influence their perceptions, readiness, and self-reported practices to incorporate gender-specific waist circumference measurements as part of metabolic screening in their clinical practice? On-going monitoring of laboratory as well as clinical measures is imperative to early detection and treatment of cardiometabolic disturbances in patients taking atypical antipsychotics, thus improving patient quality of life, and reducing healthcare costs. Moreover, care coordinators and clinical educators at NRHC are uniquely positioned to educate and influence the health behaviors of this patient population, consequently mitigating cardiovascular risks.

### **Conceptual Frameworks**

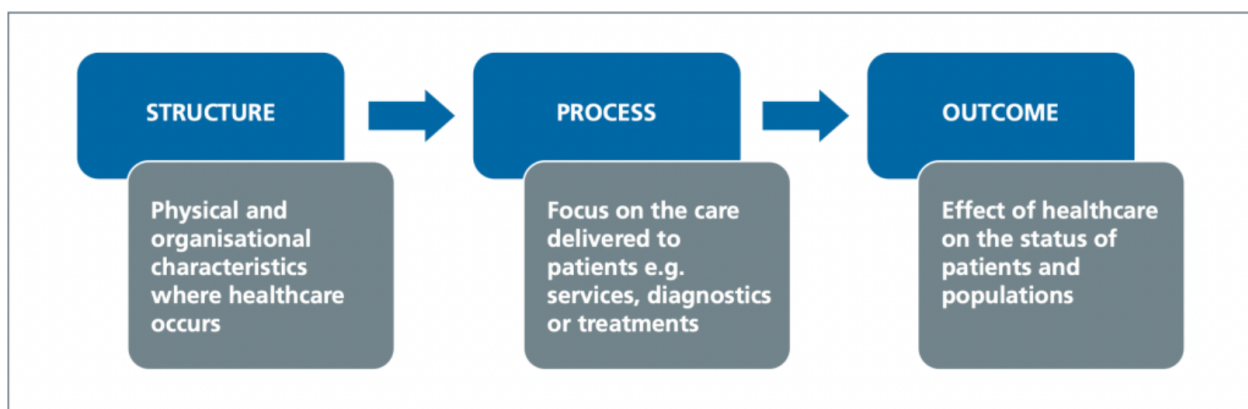
Implementing change in clinical practice can be challenging and complex. Therefore, conceptual frameworks have been developed to systematically guide the application of evidence-based practice (EBP). This DNP project is guided by two conceptual frameworks, the Donabedian conceptual framework and the Transtheoretical Model of Health Behavior Change. The Donabedian conceptual model was used to examine health services and the quality of care at the project site. The Transtheoretical model (TTM) was utilized to guide and influence the behaviors of care coordinators and health educators to implementation waist circumference measurement into clinical practice.

The Donabedian model of care, created by Avedis Donabedian in 1966, is composed of three components, structure, process, and outcomes, which are used to evaluate quality of care

and validate measurements for improvement. Furthermore, he proposed that structure measures impact process measures, which in turn affects outcome measures (Ayanian, 2016). Structure measures, also known as input measures, reflect what an organization needs to have to provide care. These measures include facilities, equipment, human resources, and qualified providers. Process measures are the technical and interpersonal actions taken by providers and clinical staff such as meeting quality measures and providing care that adheres to established guidelines and recommendations. Lastly, outcome measures are the end results of the care provided including preventable comorbidities, mortality, quality of life, and satisfaction (Donabedian, 2005). Within the context of this QI project, the structure is identified as providers, care coordinators, and health educators who are qualified to provide care based on their knowledge of atypical antipsychotics, MetS, monitoring guidelines, and recommendations. The process is the action of incorporating the acquired knowledge into clinical practice, with the outcome measure of reducing morbidity, improving outcomes of patients taking atypical antipsychotics, and decreasing overall healthcare costs.

**Figure 1.**

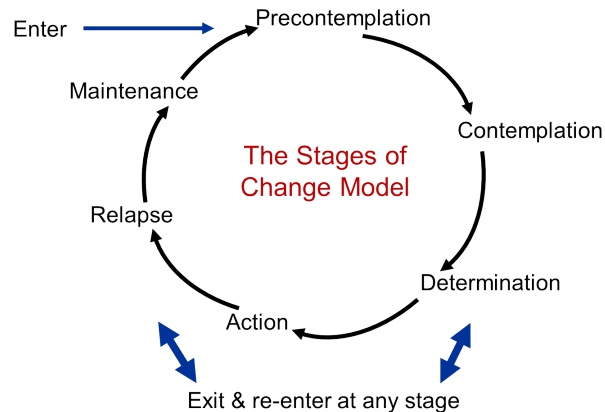
*Donabedian Model for Quality of Care (Ayanian & Markel, 2016).*



For the past 2 decades, the TTM has been accepted as the most influential approach to explain behavior change in patients. In recent years, the TTM has been used in the field of organizational change, specifically to guide organizational change implementation in the healthcare setting (Prochaska et al., 2001). There are a series of five stages that people progress through when attempting to modify behavior on their own or with the help of formal interventions: 1) precontemplation – individuals do not intend to take action in the next six months; 2) contemplation – individuals intend to take action within the next six months; 3) preparation – individuals plan to take action within the next thirty days; 4) action – overt changes made less than six months ago; and 5) maintenance – overt changes made more than six months ago (Prochaska et al., 2001). The extension of this conceptual model to health care organizations and health care providers serves as a framework for the implementation of waist circumference measurements as part of metabolic screening at NRHC. Furthermore, its application provides a framework for stimulating change in practice based on evidence and helps with guided interventions to influence attitudes and behaviors of individuals. The transition from precontemplation to contemplation requires specific strategies and interventions to ensure successful transition and self-efficacy of participants (Prochaska et al., 2001). Increasing awareness and knowledge of care coordinators and health educators through education and providing the necessary tools for successful implementation of evidence-based practice is one goal of this DNP project.

**Figure 2.**

*TTM of Health Behavior Change* (Boston University School of Public Health, 2022).



### Project Participants and Their Roles

Care coordinators and health educators at NRHC were identified as the target population for recruitment for this project, as their scope of practice and clinical roles uniquely positions them to influence patient behaviors through health education and health promotion. Care coordinators consists of RNs and LPNs who work collaboratively with providers at NRHC. DVCH describes the care coordinator role as “patient advocates and navigators who support better health outcomes for our patients. Their roles involve clinical responsibilities, customer service, and administrative duties” (DVCH, 2021, para. 4). Clinical roles include medication reconciliation, medication education, and promotion of overall well-being through various strategies. Health educators are registered dieticians (RDs) who “promote health and disease prevention through education-driven voluntary behavior change activities. Other health services include one-on-one group health education-base counseling; diabetes, nutrition education (related to specific health conditions), and smoking cessation classes” (DVCH, 2021, para. 8). Patients can be scheduled individually with care coordinators and/or health educators at the clinic for any of the services previously described without seeing their provider.

### Project Design



This DNP project utilized a descriptive statistical design to determine whether there was an increase in care coordinator and health educator knowledge of atypical antipsychotics, MetS, and gender-specific waist circumference measurement parameters according to the ADA & APA guidelines. A descriptive design was also used to determine whether there was an increase in care coordinator and health educator self-reported practices to incorporate waist circumference measurements as a part of standard clinical practice. Evidence demonstrates that when patients engage in lifestyle modifications, their risks for developing CVD and type 2 diabetes decrease (Kariuki et al., 2019; & Masana et al., 2017). Therefore, this DNP project creates an opportunity for care coordinators and health educators to initiate dialogue with patients taking atypical antipsychotics regarding lifestyle interventions to mitigate their cardiovascular risks.

### **Methodology**

Inclusion criteria for project participation included those who fill the role of health coordinator and health educator. There are a total of seven care coordinators and health educators at NRHC who were recruited to be a part of this DNP project. There were no exclusion criteria for participation. Project participants completed a pretest, posttest, six-week posttest and participated in an educational intervention via PowerPoint presentation presented by the project leader. The pretest, developed by the project leader, consisted of questions to determine participant knowledge and awareness of atypical antipsychotics, MetS, metabolic screening guidelines, current practices related to identifying central obesity, and perceived barriers to incorporating gender-specific waist circumference measurements into clinical practice. The pretest questions were sent to each participant's NRHC email using the free online survey tool, SurveyMonkey. Immediately following the pretest, project participants joined a "Lunch and Learn" Zoom session where an educational presentation was presented by the project leader. A

discussion was held after the presentation, facilitated by the project leader. Following the educational session, the project leader distributed educational handouts that were professionally printed and laminated, one for project participants and another for patients they interacted with during their patient encounters. After the “Lunch and Learn” educational session and distribution of educational materials, the posttest questions were sent to participants in the same fashion as the pretest. The posttest evaluated whether there was an increase in knowledge from the pretest based on the information presented in the educational session. Finally, the six-week post-test, also sent to participants’ NRHC email, was used to determine care coordinator and health educator attitudes, readiness, and self-reported practices to incorporating waist circumference measurements as a clinical practice change. The six-week posttest also asked about any barriers participants may have encountered while attempting to implement the practice change.

### **Project Tools**

The pretest tool (Appendix A) consisted of fifteen questions with different styles of questioning including multiple-choice, true/false, yes/no, and open-ended questions. Six questions were developed to assess baseline knowledge related to atypical antipsychotics, MetS, ADA/APA monitoring guidelines, and waist circumference measurements. The next seven questions were developed to determine current practices, and the last question inquired about participant attitudes and anticipated barriers to incorporating gender-specific waist circumference measurements into clinical practice. The posttest tool (Appendix B) consisted of the same six questions in the pretest. Pretest and posttest results were compared and analyzed to determine whether there was an increase in knowledge from baseline. The PowerPoint presentation (Appendix C) presented to project participants delineated atypical antipsychotics, MetS and diagnosis, metabolic monitoring guidelines, and recommendations for practice change based on

the gap analysis performed by the project leader.

The first educational handout tool (Appendix D) distributed to project participants was developed by the project leader to increase participant awareness and knowledge of gender-specific waist circumference parameters and serve as a reference guide during patient encounters. The second educational handout (Appendix E) was obtained from the American Council on Exercise (ACE), a non-profit organization committed to empowering people to live healthy and active lifestyles (ACE, 2013). This second handout tool was placed in all fourteen patient exam rooms. Copies were also given to project participants, and they were encouraged to share the handouts with patients during care encounters. In addition to the educational handouts, abdominal girth-measuring tools in the form of tape measures were distributed to each participant to encourage the assessment waist circumference measurements. Lastly, the six-week posttest (Appendix F) tool was developed by the project leader and consisted of nine Likert-scale, yes/no, and open-ended questions. Eight questions were the same as the pretest questions and were used to determine any changes from current practice. The last question asked on the six-week posttest was asked to determine whether participants encountered any barriers during the transition of incorporating waist circumference measurements into practice.

### **Project Budget**

There were some costs associated with this DNP project. The project leader spent \$64.15 to color print and laminate the education sheets that were distributed to project participants and displayed in patient exam rooms. An additional \$28.89 was required to purchase abdominal girth-measuring tools (i.e., tape measures) which were also distributed to project participants. Therefore, the project leader spent a total of \$94.04 on all materials needed for this project.

### **Protection of Patient Data, Participants and Ethical Considerations**

This DNP project did not meet the regulatory definition for human subjects research. Approval was granted for implementation by the Temple University institutional review board (IRB). All patient health information collected and analyzed during chart reviews for the gap analysis were deidentified in concordance with the Health Insurance Portability and Accountability Act (HIPAA) of 1996. No demographic information was asked of project participants to ensure confidentiality, and the information obtained from the pretest, posttest, and six-week posttest tools was not shared with anyone else besides the project leader. All electronic files containing deidentified health information were kept and stored in password-protected computer accessible only to the project leader. Consent for participation in this DNP project was obtained by successful completion of the pretest, posttest, and the six-week follow-up posttest by project participants.

### **Evaluation Plan and Data Analysis**

Quantitative data was collected prior to and following the educational session and distribution of educational materials. Quantitative data was also collected from the six-week posttest upon completion by all project participants. Statistical analysis of the pretest tool and posttest tool was completed by the project leader using descriptive statistics. Comparison of the pretest and posttest tools statistical analysis was performed to determine whether there was an increase in care coordinator and health educator awareness and knowledge of regarding MetS, atypical antipsychotics, ADA/APA metabolic monitoring guidelines, and gender-specific waist circumference parameters. After completion of the pretest and posttest by project participants, the project leader conducted chart reviews for a six-week period to identify patients with an atypical antipsychotic medication listed as an active medication in their chart. Comparison of the pretest and six-week posttest tools was used to ascertain care coordinator and health educator

attitudes and perception, and whether they had any self-reported changes in their practice.

### Evaluation of Results

Participant responses from the pretest, posttest, and six-week posttest tools were used as data to answer project questions. The first section of the analysis will compare pretest and posttest responses, and the second portion will compare pretest and six-week posttest responses.

#### Analysis of Pretest and Posttest Questions

There were a total of seven care coordinators and health educators recruited to participate in this DNP project. Seven participants completed the pretest, and six completed the posttest. Table 1 shows pretest and posttest results from question number one which is a multiple-choice question. Results showed that only 29% (n= 2) had a baseline understanding of the four conditions needed for MetS diagnosis, compared to 100% (n=6) after attending the educational session.

**Table 1.**

*What are the four conditions that must occur as a common feature to meet the requirement for metabolic syndrome (MetS)?*

Testing Tool	Correct Reponses	Incorrect Responses	Total Reponses	Percentage Correct
Pretest	2	5	7	29%
Posttest	6	0	6	100%

Question number two of the pretest and posttest was a yes/no question that asked about gender-specific waist circumference parameters based on baseline understanding of MetS diagnosis. As outlined in Table 2, care coordinators and health educators had an increase in knowledge of MetS diagnosis and parameters for gender-specific waist circumference measurements and MetS diagnosis (100%, n= 6), compared to pretest results (43%, n= 3).

**Table 2.**

*To meet the criteria for MetS, all three must be true except?*

<b>Testing Tool</b>	<b>Correct Responses</b>	<b>Incorrect Responses</b>	<b>Total Responses</b>	<b>Percentage Correct</b>
<b>Pretest</b>	3	4	7	43%
<b>Posttest</b>	6	0	6	100%

Question number three, a true/false question, assessed participants' knowledge of atypical antipsychotics and their causal effect on MetS. Analysis of the pretest results demonstrated that 86% (n =6) of care coordinators and health educators had correct baseline knowledge of atypical antipsychotics and their metabolic side effects, compared to 100% (n= 6) after attending the education session.

**Table 3.**

*The prevalence of MetS is higher in patients taking atypical antipsychotics compared to the general population?*

<b>Testing Tool</b>	<b>“True” Responses</b>	<b>“False” Responses</b>	<b>Total Responses</b>	<b>Percentage Correct</b>
<b>Pretest</b>	6	1	7	86%
<b>Posttest</b>	6	0	6	100%

Awareness of the 2004 ADA/APA metabolic screening and monitoring guidelines was assessed at baseline and after education by asking for a “yes” or “no” response in question number four. The results in Table 4 demonstrate that all participants had no baseline knowledge or awareness of the guidelines (100%, n= 7), compared to 100% (n=6) of participants acknowledging that the educational session increased their awareness and knowledge of the

guidelines.

**Table 4.**

*Are you aware of the 2004 ADA/APA guidelines for metabolic screening and monitoring of metabolic side effects of atypical antipsychotics?*

<b>Testing Tool</b>	<b>“No” Responses</b>	<b>“Yes” Responses</b>	<b>Total Responses</b>	<b>Percentage</b>
<b>Pretest</b>	7	0	7	100%
<b>Posttest</b>	0	6	6	100%

Knowledge of how often waist circumference should be measured according to the ADA/APA guidelines was assessed at baseline and after the educational intervention. Responses to this multiple-choice question are reflected in Table 5. The results of the pretest show that 14% (n= 1) answered correctly at baseline, while the posttest revealed an increase in knowledge with 100% (n= 6) participants demonstrating knowledge and awareness of how often waist circumference should be measured according to the guidelines.

**Table 5.**

*According to the 2004 ADA/APA consensus guidelines, how often should waist circumference be measured?*

<b>Testing Tool</b>	<b>Correct Responses</b>	<b>Incorrect Responses</b>	<b>Total Responses</b>	<b>Percentage Correct</b>
<b>Pretest</b>	1	6	7	14%
<b>Posttest</b>	6	0	6	100%

Knowledge of specific gender-specific waist circumference parameters required for central obesity classification was assessed with question number six, another true/false question.

Results from the pretest demonstrated that only 71% (n= 5) of care coordinators and health educators had baseline knowledge of gender-specific waist circumference parameters required for central obesity classification, and the posttest showed that after the educational intervention 100% had acquired that knowledge.

**Table 6.**

*To meet the requirement for central obesity, men must have a waist circumference of 40 cm or more and 35 cm or more for women.*

Testing Tool	“True” Responses	“False” Responses	Total Responses	Percentage Correct
Pretest	5	2	7	71%
Posttest	6	0	6	100%

The last question on the pretest asked project participants about any anticipated barriers related to incorporating waist circumference measurements into their clinical practice. This question was an open-ended question, allowing participants to provide a brief explanation about their perceived barriers to this practice change. The results of their explanation can be found in Table 7 below.

**Table 7.**

*Perceived barriers to practice change implementation.*

Anticipated Barrier	Number of Responses
1. Not enough time during patient encounter	3
2. Lack of patient interest/motivation	1
3. Complication of the clinical workflow	1
4. Difficult follow-up with patients	2



Project participants' responses to the first six questions on the pretest demonstrated that care coordinators and health educators at NRHC had a lack of knowledge and awareness about MetS, atypical antipsychotics, gender-specific waist circumference parameters and metabolic monitoring guidelines. Participant responses on the posttest reflected an increase in awareness and knowledge in all these areas, which supports the effectiveness of the educational session and the educational materials provided to project participants.

### **Analysis of Pretest and Six-week Posttest Questions**

The second part of this scholarly project analyzed questions eight through fourteen on the pretest and all eight questions on the six-week posttest to determine care coordinator and health educator behaviors and readiness to incorporate waist circumference measurements in their clinical practice. The pretest and six-week posttest questions were analyzed and compared to answer these two questions: 1) are care coordinators and health educators at NRHC willing and prepared to incorporate gender-specific waist circumference measurements into their clinical practice? and, 2) is there a change in care coordinator and health educator self-reported practice to incorporating gender-specific waist circumference screening into practice? Questions eight through fourteen on the pretest are identical to questions one through seven on the six-week posttest. The last question on the six-week posttest asked participants about barriers they may have encountered during the implementation phase.

Seven participants completed the pretest and answered all pretest questions, and six participants answered the six-week posttest with all questions answered. Table 8 shows results from data collected on question eight of the pretest and question one of the six-week posttest. This question was a multiple-choice frequency question for which there was no correct answer.

Results show that in the pre-implementation phase, 43% (n= 3) of participants answered “never” when asked how often they measure BMI during patient encounters. Three project participants (43%) answered “sometimes” and 14% (n= 1) answered “often”. The six-week posttest revealed that during the six-week implementation period, four participants (67%) reported they often measured BMI during their patient encounters.

**Table 8.**

*How often do you measure BMI during your patient encounters?*

	<b>Pretest</b>	<b>Pretest</b>	<b>Six-week Posttest</b>	<b>Six-week Posttest</b>
<b>Responses</b>	<b>Frequency</b>	<b>Percentage</b>	<b>Frequency</b>	<b>Percentage</b>
“Never”	3	43%	0	0%
“Rarely”	0	0%	0	0%
“Sometimes”	3	43%	2	33%
“Often”	1	14%	4	67%
“Always”	0	0%	0	0%
<b>Total</b>	7	100%	6	100%

Question number nine of the pretest and question number two on the six-week posttest asked participants how often they measure gender-specific waist circumference during patient encounters. As outlined in Table 9, pretest results reveal that 100% (n= 7) of project participants reported they never measure waist circumference during patient encounters. In comparison to the six-week posttest results which show that after the implementation phase, 50% (n= 3) of participants reported measuring waist circumference “sometimes”, while the remaining 50% (n= 3) reported measuring waist circumference “often” during the implementation phase.

**Table 9.**

*How often do you measure gender-specific waist circumference during your patient encounters?*

	<b>Pretest</b>	<b>Pretest</b>	<b>Six-week Posttest</b>	<b>Six-week Posttest</b>
<b>Responses</b>	<b>Frequency</b>	<b>Percentage</b>	<b>Frequency</b>	<b>Percentage</b>
“Never”	7	100%	0	0%
“Rarely”	0	0%	0	0%
“Sometimes”	0	0%	3	50%
“Often”	0	0%	3	50%
“Always”	0	0%	0	0%
<b>Total</b>	7	100%	6	100%

Assessing participants’ level of confidence with waist circumference measurements was asked in question number ten of the pretest and question number three of the six-week posttest. Participants were asked to indicate their level of confidence on a five-point Likert-scale from “very confident” to “not at all confident”. As seen in Table 10, 14% (n= 1) of participants indicated they were “confident” in measuring waist circumference, while 29% (n= 2) indicated they were “somewhat confident”, 43% (n= 3) indicated they were “not so confident”, and the remaining 14% (n= 1) indicated they were “not at all confident”. After the six-week implementation phase, 100% (n= 6) of participants stated they were “very confident” in their ability to measure waist circumference during patient encounters.

**Table 10**

*Please indicate you level of confidence in measuring gender-specific waist circumference?*

	Pretest	Pretest	Six-week Posttest	Six-week Posttest
Responses	Frequency	Percentage	Frequency	Percentage
“Very confident”	0	0%	6	100%
“Confident”	1	14%	0	0%
“Somewhat confident”	2	29%	0	0%
“Not so confident”	3	43%	0	0%
“Not at all confident”	1	14%	0	0%
<b>Total</b>	7	100%	6	100%

Question number eleven on the pretest and question number four on the six-week posttest asked participants to indicate their level of confidence in being able to identify a patient with central obesity according to practice guidelines. Participants’ level of confidence on the pretest and six-week posttest are outlined in Table 11. Data collected on the pretest shows that 29% (n= 2) of project participants were “not so confident”, and 71% (n= 5) were “not at all confident” in their ability to identify patients with central obesity. Compare that to the six-week posttest results which reveal that after the implementation phase, 88% (n= 5) of participants indicated their level of confidence in identifying patient with central obesity as “very confident”, and 17% (n= 1) indicated they were “confident” in their ability to identify a patient with central obesity.

**Table 11.**

*Please indicate how confident you are in your ability to identify a patient with central obesity.*

	Pretest	Pretest	Six-week Posttest	Six-week Posttest
Responses	Frequency	Percentage	Frequency	Percentage
“Very confident”	0	0%	5	83%

“Confident”	0	0%	1	17%
“Somewhat confident”	0	0%	0	0%
“Not so confident”	2	29%	0	0%
“Not at all confident”	5	71%	0	0%
<b>Total</b>	7	100%	6	100%

Participants’ level of confidence in addressing abnormal gender-specific waist circumference measurements was asked in question number twelve of the pretest and question number fifteen of the six-week posttest. Details of their responses is presented in Table 12 below. Pretest data reveals that prior to the implementation phase, 14% (n= 1) of participants stated they were “not so confident”, while 86% (n= 6) of participants stated they were “not at all confident” in their ability to address abnormal waist circumference measurements during patient encounters. Data collected on the six-week posttest revealed that 100% (n= 6) of participants indicated they were “very confident” in their ability to address abnormal waist circumference measurements with patients.

**Table 12.**

*Please indicate your level of confidence in addressing an abnormal gender-specific waist circumference measurement during a patient encounter?*

	<b>Pretest</b>	<b>Pretest</b>	<b>Six-week Posttest</b>	<b>Six-week Posttest</b>
<b>Responses</b>	<b>Frequency</b>	<b>Percentage</b>	<b>Frequency</b>	<b>Percentage</b>
“Very confident”	0	0%	6	100%
“Confident”	0	0%	0	0%
“Somewhat confident”	0	0%	0	0%

“Not so confident”	1	14%	0	0%
“Not at all confident”	6	86%	0	0%
<b>Total</b>	7	100%	6	100%

Pretest question number thirteen and six-week posttest question number six were both “yes” or “no” questions, inquiring whether participants if they recommend lifestyle modification interventions to patients who meet at least one criterion for MetS diagnosis. The pretest question asked whether lifestyle intervention was recommended for patients found to have elevated BP, FPG, or those who meet obesity criteria based solely on BMI. Question number six of the six-week posttest asked whether the same lifestyle modification interventions were recommended for patients found to have abnormal gender-specific waist circumference measurements. Analysis of the pretest question demonstrated that 100% (n= 7) of participants recommend lifestyle modification interventions to patients who met at least one criterion for MetS diagnosis. Six-week posttest results revealed that 100% (n= 6) of project participants recommend lifestyle changes to patients found to have abnormal waist circumference measurements. Pretest and six-week posttest results can be found in Tables 13 and 14, respectively.

**Table 13.**

*Do you recommend lifestyle modification interventions to patients who you’ve identified to have elevated BP (above 130/85 mmHg), elevated FPG or HbA1c (above 100 mg/dL or above 5.7%), or BMI greater than or equal to 30.00 kg/m<sup>2</sup>?*

Testing Tool	“No” Responses	“Yes” Responses	Total Responses	Percentage
Pretest	0	7	7	100%

**Table 14.**

*Do you recommend lifestyle modification interventions to patients who you've identified to meet criteria for central obesity (waist circumference measurement of 40 inches or greater for men, and 35 inches or greater for women)?*

<b>Testing Tool</b>	<b>“No” Responses</b>	<b>“Yes” Responses</b>	<b>Total Responses</b>	<b>Percentage</b>
Six-week Posttest	0	6	6	100%

Pretest question number fourteen and six-week posttest question number seven was a “yes” or “no” question inquiring whether project participants whether they educate their patients about the association between increased waist circumference measurement and the risk of CVD, type 2 diabetes, and stroke. Pretest data shows that before the implementation phase, 100% (n= 7) of participants did not educate patient about increased waist circumference measurement as a risk factor for disease development. Data from the six-week posttest shows that after implementation, only 17% (n= 1) reported they did not educate patients about waist circumference measurement as a risk factor for CVD, type 2 diabetes, and stroke, while the remaining 83% (n= 5) reported that they did. Table 15 outlines participant responses.

**Table 15.**

*Do you discuss waist size as a risk factor for CVD, type 2 diabetes, and stoke during patient encounters?*

	<b>Pretest</b>	<b>Pretest</b>	<b>Six-week Posttest</b>	<b>Six-week Posttest</b>
<b>Responses</b>	<b>Frequency</b>	<b>Percentage</b>	<b>Frequency</b>	<b>Percentage</b>
“No”	7	100%	1	17%
“Yes”	0	0%	5	83%

<b>Total</b>	7	100%	6	100%
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The last question on the six-week posttest asked project participants about barriers they may have encountered while incorporating waist circumference measurements in their clinical practice. This was an open-ended question that allowed project participants to briefly describe barriers they experienced. Six project participants provided answers for this question. While some participants reported no barriers to implementing waist circumference measurements into their clinical practice, others reported time limitations during patient encounters, patients feeling overwhelmed with more health information, and needing a reminder within the EHR to ensure follow through. Responses to this question are detailed in Table 16.

**Table 16.**

*What barriers did you encounter while incorporating gender-specific waist circumference measurements into your clinical practice? Please specify.*

<b>Experienced Barrier</b>	<b>Number of Responses</b>
1. No barriers	2
2. Patients overwhelmed with health information	1
3. Need a reminder in the EHR	1
4. Not enough time during patient encounter	2

### **Statistical Analysis of Results**

A paired t-test analysis was conducted to compare pretest and posttest mean scores. Results showed that the difference between pretest and posttest scores is statistically significant based on a significance level of 0.05 ( $t= 4.41$ ;  $p= .00698$ ). Table 17 outlines pretest and posttest



statistical analysis.

**Table 17.**

*Paired t-test Analysis of Pretest and Posttest Mean Scores*

	<b>Number</b>	<b>Mean Scores</b>	<b>SD</b>	<b>SEM</b>	<b>df</b>	<b>95% CI</b>
<b>Pretest</b>	6	40.48	30.21	12.33	5	40.48 +/- 24.17
<b>Posttest</b>	6	100	0	0	5	100 +/- 0

*Note.* SD= standard deviation; SEM= standard error of the mean; df= degrees of freedom; CI= confidence interval.

### **Summary of Results and Discussion**

Atypical antipsychotic medications are effective medications prescribed to manage symptoms of psychiatric illnesses. However, evidence demonstrates that their use is associated with significant weight gain, hyperglycemia, and lipid dysregulation, all of which are risk factors CVD, type 2 diabetes, and stroke. The ADA/APA developed metabolic screening and monitoring guidelines for patients taking atypical antipsychotics, to aid clinicians in identifying and mitigating risk factors. At the participating project site, it was identified that waist circumference measurements were not standard practice in this population. Therefore, the purpose of the DNP project was to determine if an educational session and distribution of educational materials would increase care coordinator and health educators' knowledge of MetS, atypical antipsychotics, ADA/APA metabolic monitoring guidelines, and gender-specific waist circumference parameters. Additionally, the project leader sought to evaluate care coordinators and health educators' perceptions and self-reported practices to incorporate waist circumference measurements for patient taking atypical antipsychotics, and whether recommendations for lifestyle modification interventions were provided to patients.

### **Self-Reported Increase in Knowledge and Awareness**

Pretest and posttest data demonstrates that care coordinators and health educators at NRHC had an increase in knowledge and understanding of MetS, atypical antipsychotics, ADA/APA screening and monitoring guidelines, and waist circumference parameters as evidenced by all participants (100%, n= 6) providing correct answers on five of the posttest questions. Care coordinators and health educators gained knowledge on the four conditions required for MetS diagnosis, the use of atypical antipsychotics and their risk of MetS, frequency of which waist circumference should be measured, and gender-specific waist circumference parameters. When asked about their awareness of the 2004 ADA/APA metabolic guidelines, 100% (n= 7) of participants reported on the pretest they were not aware of such guidelines, compared to 100% (n= 6) of participants reporting on the posttest their awareness of the guidelines on the posttest. The comparative findings of the pretest and posttest tools outlined in Tables one through six indicate that the QI interventions, consisting of an educational session and educational handouts, increased care coordinator and health educator baseline knowledge and awareness of metabolic screening and monitoring. As key members of the healthcare team, care coordinator and health educator expansion of knowledge and awareness of practice recommendations ensures patients taking antipsychotic medications receive appropriate and optimized care.

### **Self-reported Increase in Level of Confidence**

Data from the six-week posttest data also revealed that care coordinators and health educators had an overall increased level of confidence in measuring waist circumference, which can subsequently lead to accurate diagnosis of central obesity. This is supported by results of the six-week posttest replies that revealed 100% (n= 6) of care coordinators and health

educators felt more confident in their ability to measure waist circumference after the educational session, distribution of educational sheets used as a quick reference, and distribution of tape measures needed to perform the task. Given that care coordinators and health educators have an important frontline role to educate patients taking antipsychotics about their risks for cardiometabolic abnormalities, it is imperative that they can confidently and accurately perform waist circumference measurements to identify such risks.

### **Self-reported Increase in Waist Circumference Measurements**

Pretest and six-week posttest data identified that care coordinators and health educators at NRHC had an increase in self-reported practices as it relates to incorporating waist circumference measurements during patient visits. Because measuring waist circumference is not a part of standard practice at NRHC, the project leader was not surprised to find that 100% (n=7) of project participants reported on the pretest that they never measure waist circumference during patient encounters. On the six-week posttest, 50% (n= 3) of care coordinators and health educators reported some level of change in their current practice to indicate they either “sometimes” or “often” measured waist circumference of patients taking atypical antipsychotics during the implementation phase. The measure of height and weight for BMI calculation is part of standard practice at NRHC. In their consensus statement, the IAS and ICCR states that the combination of BMI and waist circumference identifies a high-risk obesity phenotype better than either measure alone. Furthermore, they recommend that waist circumference, in addition to BMI, should be measured in clinical practice as it is a key driver for risk prediction and risk reduction (Ross et al., 2020). Although there were no participants who reported they “always” measured waist circumference of patients taking antipsychotics during the implementation phase, the data shows that care coordinators and health educators have the ability and are willing to

incorporate waist circumference measurements as a clinical practice change.

### **Recommendations for Lifestyle Modification Interventions**

Evidence from systematic reviews and meta-analyses have shown that an increase in energy expenditure through exercise or a decrease in energy intake through diet is associated with a substantial reduction in waist circumference, independent of age, sex, or ethnicity (Gepner et al., 2018; Sabag et al., 2017; Santos et al., 2012; Verheggen et al., 2016;). Some may argue that waist circumference measurement might not meaningfully improve risk prediction for disease. However, according to IAS and ICCR, waist circumference size has greater clinical relevance as a modifiable target for risk reduction (Ross et al., 2020). For this reason, it is important to educate patients taking atypical antipsychotics that reducing waist circumference size through specific interventions is a critical step towards reducing cardiometabolic disease risk. Six-week posttest data revealed that 100% (n= 6) of care coordinators and health educators at NRHC recommend lifestyle modification interventions, such as healthy eating and increased physical activity, to patients whom they've identified to have central obesity.

### **Perceived and Experienced Barriers**

To get an understanding of challenges that arise during clinical practice, the project leader asked care coordinators and health educators about their anticipated barriers to incorporating waist circumference measurements during patient visits. As outlined in Table 7, 43% (n= 3) anticipated time limitations during the patient encounter as a barrier, while the remaining 57% (n= 4) anticipated lack of patient interest, complication of the clinical workflow, and difficult follow-up with patients as barriers. Comparative results from the pretest and the six-week posttest showed that although 43% (n= 3) perceived time limitations to be a barrier, only 33% (n= 2) experienced time limitation as a barrier. Furthermore, some participants reported

they did not experience any barriers during the implementation phase (33%; n= 2). Although project participants had perceived barriers prior to project implementation and experienced some barriers during project implementation, the data show that performing waist circumference measurements is a feasible task that can be incorporated into their current roles.

### **Project Limitations**

Although results showed that the QI implementation was successful, several limitations were identified. The first limitation identified was that one participant did not complete the posttest and six-week posttest tools. Seven participants were recruited for this DNP project, and 100% of recruited participants completed the pretest sent out via email. However, only six participants completed the posttest and the six-week posttest, also sent out electronically. In an effort avoid a delay in the implementation phase, multiple follow-up attempts were made via email and in-person without success. Although the sample size of participants who took part in this QI project does not contribute to its success, input from all participants who were recruited could have provided more insight about incorporating waist circumference measurements into clinical practice at this specific site.

The second limitation was the short amount of time allotted for implementation. After completing the pretest, educational session, and the posttest, project participants were given a six-week timeframe to translate what they learned into clinical practice. It is unclear if the results of this project would be different if participants were given more time. However, allotting more time for implementation could have presented additional barriers or challenges that would provide more insight for sustainability in the long run.

The third limitation is reliance on care coordinators and health educators to self-report changes in behavior and practice, which can lead to potential bias in the data. The project leader

trusted that all project participants would be truthful in their responses to all questions asked. There was no way for the project leader to confirm that waist circumference measurements were done unless the project leader was in the exam room during every patient encounter. Also, project participants were not asked to document waist circumference measurements in the EHR or on paper, thus increasing the project leader's dependence on participants' honesty. If this QI project was to be replicated at another DVCH site or elsewhere, requiring participant documentation of waist circumference measurements and chart reviews of their documentation would ensure unbiased data.

It is also worthy to note that although obtaining weight and height for BMI calculation is standard practice during every patient encounter at NRHC, doing so is not within the role of care coordinators and health educators. Medical assistants are tasked to weight patients at every visit and enter the information into the EHR before every encounter with the provider, care coordinator, or health educator. The project leader views this a limitation as question number one on the pretest and question number eight on the six-week posttest asked participants how often they measured BMI during patient encounters. Based on the varying responses, the question may have been misinterpreted and it was too late to make any changes when it was noticed by the project leader.

### **Significance and Recommendations for Further Practice**

Evidence has shown that there is a direct correlation between atypical antipsychotic use and cardiometabolic disturbances such as insulin resistance and weight gain, specifically excess adipose tissue in and around the abdomen. For this reason, the ADA/APA recommends waist circumference measurements at initiation of an atypical antipsychotic, and annually thereafter. The implications for incorporating waist circumference as an anthropometric measurement in

addition to BMI, into clinical practice is to prevent the development or advancement of cardiometabolic complications. Additionally, waist size can be used a modifiable target for risk reduction with the overall goal of improving health and quality of life of patients taking atypical antipsychotics.

Results from this QI project has shown that waist circumference measurements can be integrated into clinical practice in a primary care setting. Evidence demonstrates that it is not only important for patient management, but it is also feasible and cost effective (Ross et al., 2020). Based on known evidence and the results of this project, the main recommendation is that waist circumference should be routinely measured in clinical practice according to the 2004 ADA/APA monitoring guidelines. Care coordinators and health educators at NRHC are key members of the healthcare team that can fill the gap between current practice and guideline recommended care. Therefore, opportunities for continuing education are needed to promote awareness of current and emerging evidence, enrichment of knowledge, and skill improvement.

The DNP project focused on incorporating waist circumference measurements into clinical practice, which is one screening and monitoring parameter of the 2004 ADA/APA guideline. The gap analysis of NRHC's current metabolic screening practices revealed that although guideline concordant standards for monitoring are met for BMI, BP, FPG or HBA1c, and FLP, none of them are met 100% of the time. For this reason, a consideration for future practice would be to implement a standardized metabolic screening protocol (MSP) which includes all metabolic screening and monitoring parameters recommended by the ADA/APA. The addition of a standardized MSP imbedded into their electronic health record (EHR) by way of a best practice alert, will encourage care coordinators, health educators, and providers to make the best decisions within the clinical workflow at the point-of-care. The implementation of an

EHR-based alert system will ensure patients taking atypical antipsychotics are screened timely for metabolic side effects and increase provider and clinical staff compliance to guideline-recommended care.

### **Sustainability**

Although the results of this DNP project shows that waist circumference measurements for patients taking atypical antipsychotics can be incorporated into clinical practice, its adoption has been met with some barriers. To ensure sustainability, stakeholders must be committed to overcoming barriers with specific interventions. On the six-week posttest, project participants reported the main barriers they experienced were time limitations preventing them from performing waist circumference measurements and failure to remember to perform the task. Time constraints will always be an issue in the primary care setting; however, including an alert within the EHR as a reminder, as previously mentioned, can be explored as a solution. In addition to eliminating barriers, sustainability of a clinical practice change of this magnitude requires support and engagement of clinical staff and other vested stakeholders who fill non-clinical roles. Stakeholders at DVCH must have a common understanding and knowledge of the long-term benefits which include reducing costs of care and improve quality measures.

### **Conclusion**

The use of atypical antipsychotics has increased due to their effectiveness at managing symptoms of psychiatric illnesses. However, large-scale studies have demonstrated their association with metabolic abnormalities, such as weight gain. Weight gain specifically in the form of excess adipose tissue in and around the abdomen, predisposes patients to cardiovascular complications, found to be the key cause of death amongst patients taking atypical antipsychotic (Azfr Ali et al., 2021). Obesity in general is a major health concern world, and reliance on BMI



measurements alone has been proven to be inadequate to assist clinicians in assessing and managing obesity-related health risks in this patient population (GBD 2015 Obesity Collaborators et al., 2017 & Ross et al., 2020). The addition of waist circumference measurements in clinical practice accurately predicts the distribution of visceral fat and provides more information of health risks than BMI alone (Ross et al., 2020). The ADA/APA recommends waist circumference be measured yearly for on-going monitoring, in addition to BMI, for patients taking atypical antipsychotics. Based on the results of this DNP project, the recommendation is for waist circumference to be considered as an additional anthropometric measurement in clinical practice. Implementing this practice change now and long-term will improve patient care and quality of life.

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## Appendix A

### Pretest Questions

1. What are the four conditions that must occur as a common feature to meet the requirement for metabolic syndrome (MetS)?
  - A. High blood pressure (BP), abnormal lipids, elevated liver enzymes, and central obesity
  - B. Abnormal lipids, kidney failure, central obesity, and high BP
  - C. Elevated liver enzymes, abnormal lipids, high BP, and kidney failure
  - D. Kidney failure, high BP, central obesity, and abnormal lipids
  - E. Central obesity, high BP, abnormal lipids, elevated glucose
  - F. Elevated glucose, high BP, elevated liver enzymes, and abnormal lipids
  
2. To meet the criteria for MetS, all three must true except?
  - A. Elevated BP of 130/85 mmHg or above
  - B. Elevated fasting plasma glucose (FPG) of 100 mg/dL or above
  - C. Waist circumference of 35 inches or greater for men and greater than 40 inches in females
  - D. Elevated triglycerides of 150 mg/dL or more
  - E. None of the above
  
3. Atypical antipsychotics are medications used to manage symptoms of many psychiatric illnesses. The prevalence of MetS is higher in patients taking atypical antipsychotics compared to the general population.
  - A. True
  - B. False
  
4. Are you aware of the 2004 ADA & APA guidelines for screening and monitoring of metabolic side effects of atypical antipsychotics?
  - A. Yes
  - B. No
  
5. According the 2004 ADA & APA consensus guidelines, how often should waist circumference be measured?
  - A. Once every year after starting an atypical antipsychotic
  - B. At the start of an atypical antipsychotic and every year thereafter
  - C. Every five years
  - D. At the start, eight weeks after starting, and every year thereafter
  - E. Every year
  - F. None of the above

6. To meet the requirement for central (abdominal) obesity, men must have a waist circumference measurement of 40 cm (102 cm) or more and a waist circumference measurement of 35 cm (88 cm) or more for women.
  - A. True
  - B. False
  
7. According to the gap analysis that was presented, which of the 2004 ADA & APA monitoring parameters is not incorporated into daily clinical practice at NRHC?
  - A. FPG or HbA1c
  - B. Lipid panel
  - C. BP
  - D. Waist circumference measurements
  - E. Height/weight (BMI)
  - F. Obtaining family history (CVD, type 2 diabetes, hypertension)
  
8. How often do you measure BMI during your patient encounters?
  - A. Never
  - B. Rarely
  - C. Sometimes
  - D. Often
  - E. Always
  
9. How often do you measure gender-specific waist circumference during your patient encounters?
  - A. Never
  - B. Rarely
  - C. Sometimes
  - D. Often
  - E. Always
  
10. Please indicate your level of confidence with measuring gender-specific waist circumference.
  - A. Very confident
  - B. Confident
  - C. Somewhat confident
  - D. Not so confident
  - E. Not at all confident
  
11. Please indicate your level of confidence in identifying a patient with central (abdominal) obesity.

- A. Extremely confident
  - B. Very confident
  - C. Somewhat confident
  - D. Not so confident
  - E. Not all confident
12. Please indicate your level of confidence with addressing an abnormal gender-specific waist circumference measurement with a patient.
- A. Extremely confident
  - B. Very confident
  - C. Somewhat confident
  - D. Not so confident
  - E. Not all confident
13. Do you recommend lifestyle modification interventions for patients who are identified to have elevated BP (above 130/85 mmHg), elevated FBG or HbA1c (above 100 mg/dL or above 5.7%), BMI greater than or equal to 30.00 kg/m<sup>2</sup>?
- A. Yes
  - B. No
14. Do you discuss waist size as a risk factor for CVD, type 2 diabetes, and stroke during patient encounters?
- A. Yes
  - B. No
15. What barriers do you anticipate as it related to incorporating gender-specific waist circumference measurements as a clinical practice change at NRHC?
- A. Not enough time
  - B. Lack of clinical staff motivation
  - C. Lack of patient interest/engagement
  - D. Complication of clinical workflow
  - E. Lack of identification of patients on atypical antipsychotics

## Appendix B

### Posttest Questions

1. What are the four conditions that must occur as a common feature to meet the requirement for metabolic syndrome (MetS)?
  - A. Elevated BP of 130/85 mmHg or above
  - B. Elevated fasting plasma glucose (FPG) of 100 mg/dL or above
  - C. Waist circumference of 35 inches or greater for men and greater than 40 inches in females
  - D. Elevated triglycerides of 150 mg/dL or more
  - E. None of the above
  
2. To meet the criteria for MetS, all three must true except?
  - A. Elevated BP of 130/85 mmHg or above
  - B. Elevated fasting plasma glucose (FPG) of 100 mg/dL or above
  - C. Waist circumference of 35 inches or greater for men and greater than 40 inches in females
  - D. Elevated triglycerides of 150 mg/dL or more
  - E. None of the above
  
3. Atypical antipsychotics are medications used to manage symptoms of many psychiatric illnesses. The prevalence of MetS is higher in patients taking atypical antipsychotics compared to the general population.
  - A. True
  - B. False
  
4. Did the educational session contribute to your overall knowledge of the 2004 ADA & APA guidelines for screening and monitoring of metabolic side effects of atypical antipsychotics?
  - A. Yes
  - B. No
  
5. According the 2004 ADA & APA consensus guidelines, how often should waist circumference be measured?
  - A. Once every year after starting an atypical antipsychotic
  - B. At the start of an atypical antipsychotic and every year thereafter
  - C. Every five years
  - D. At the start, eight weeks after starting, and every year thereafter
  - E. Every year
  - F. None of the above

6. To meet the requirement for central (abdominal) obesity, men must have a waist circumference measurement of 40 cm (102 cm) or more and a waist circumference measurement of 35 cm (88 cm) or more for women.
  - A. True
  - B. False

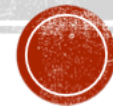


## Appendix C

## “Lunch and Learn” Educational Presentation

# METABOLIC SCREENING & MONITORING PROTOCOL FOR PATIENTS TAKING ATYPICAL ANTIPSYCHOTICS

Wileen Alexis BSN, RN



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## WHAT IS METABOLIC SYNDROME?

- Metabolic Syndrome (MetS), Syndrome X, or Insulin-Resistance Syndrome is a cluster of conditions that occur together as a common feature.

- **Elevated Blood Pressure**
- **Abdominal Obesity (central obesity)**
- **Dyslipidemia**
- **Impaired Glucose Tolerance**

(Abosi et al., 2017)



## HOW IS METABOLIC SYNDROME DIAGNOSED?

- MetS is diagnosed when any three or more of the following are present:
  - Central obesity (measured by waist circumference)
    - Men greater than **40 inches**, women greater than **35 inches**
  - Elevated triglycerides of **150 mg/dL or more**, or taking lipid lowering medications
  - Low HDL cholesterol, or taking lipid lowering medications
    - Men less than **40 mg/dL**, women less than **50 mg/dL**
  - Elevated blood pressure above **130/85 mmHg or more**, or taking anti-hypertensive medications
  - Elevated fasting glucose of **100 md/dL or more**, or taking medications for diabetes

(American Heart Association [AHA], 2021)



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## WHO IS AT RISK FOR METABOLIC SYNDROME?

- MetS has become increasingly common; over 34% of U. S. adults (AHA, 2021)
- Genetics, lifestyle choices, and other circumstances
- Factors that increase likelihood of developing MetS:
  - **Obesity:** excessive fat in and around the abdomen; not fully understood
  - **Insulin resistance:** MetS and insulin resistance are closely associated
  - **Race and gender:** Black men less likely than Caucasian men, Black women have higher rates
  - **Age:** risk of MetS increases with age
- **Second-generation antipsychotics (SGAs)**



## WHAT ARE SECOND-GENERATION ANTIPSYCHOTICS?

- Atypical antipsychotics or SGAs are class of antipsychotic medications that are an important component in the medical management of psychotic conditions (ADA/APA, 2004)
  - Risperidone, Olanzapine, Quetiapine, Clozapine, Aripiprazole
- Mechanism of action: postsynaptic blockade of dopamine D2 receptors (reduces dopaminergic neurotransmission) and 5HT<sub>2A</sub> antagonists (serotonin blockade)
- SGAs are better tolerated and more effective than other antipsychotics; they have become first-line agents for their intended use; they are also prescribed more frequently and often for off-labeled use (Abosi et al., 2017)



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## SECOND-GENERATION ANTIPSYCHOTICS & METABOLIC SYNDROME

- Despite the well-known benefits in managing psychiatric symptoms, evidence demonstrates that SGAs are associated with an increased risk of cardiometabolic effects (Azfr Ali et al., 2021; Pereira et al., 2019)
  - Increased appetite and weight gain
  - Blood glucose abnormalities, lipid dysregulation, and insulin resistance
- As many as 1 in every 3 psychiatric patients has metabolic syndrome and 1 in every 5 is affected by diabetes (Pereira et al., 2019)
- Prevalence of MetS is 2x higher in individuals with Schizophrenia and other serious mental illnesses compared to the general population (Pereira et al., 2019)



## SECOND-GENERATION ANTIPSYCHOTICS & THEIR METABOLIC EFFECTS

**Table 1**  
**Comparison of metabolic effects of atypical antipsychotics**

Drug	Weight gain	Dyslipidemia	Hyperglycemia
Clozapine	+++	+++	+++
Olanzapine	+++	+++	+++
Risperidone	++	+	+
Quetiapine	++	++	++
Ziprasidone	+/0	+/0	+/0
Aripiprazole	+/0	+/0	+/0
Iloperidone <sup>a</sup>	++	+/0	+/0
Paliperidone	+	+	+
Asenapine <sup>a</sup>	+/0	+/0	+/0
Lurasidone <sup>a</sup>	+/0	+/0	+/0

+++; significant; ++; intermediate; +; low; +/0: low or neutral  
<sup>a</sup>Limited data and/or long-term data are not available  
 Source: References 5,7

(De Hert et al., 2021)

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## CONSENSUS GUIDELINE FOR METS SCREENING & MONITORING

- American Diabetes Association (ADA), American Psychological Association (APA), American Association of Clinical Endocrinologist (AACE), and North American Association for the study of Obesity (NAASO) published a consensus screening and monitoring guideline specifically for patients taking SGAs

- Screening & Monitoring Measures:

- **Family history** (CVD, diabetes, HTN, HLD)
- **BMI**
- **Waist circumference**
- **Blood pressure**
- **Fasting plasma glucose** OR A1c level of **5.7% or greater**
- **Fasting lipid panel**

(ADA/APA, 2004)



## ADA/APA GUIDELINES FOR SCREENING & MONITORING

**Table 4 ADA–APA consensus guidelines<sup>a</sup>**

	Base	At 4 weeks	At 8 weeks	At 12 weeks	Every 3 months	Annual	Every 5 years
Medical history <sup>b</sup>	X					X	
Weight (BMI)	X	X	X	X	X		
Waist circumference	X					X	
Blood pressure	X			X		X	
Fasting glucose	X			X		X	
Fasting lipids	X			X			X

<sup>a</sup>From ADA–APA (32)  
<sup>b</sup>Personal and family history of obesity, diabetes, hypertension, and cardiovascular disease

(ADA/APA, 2004)



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## UpToDate: Monitoring for Metabolic Side Effects of Antipsychotic Drugs

**Monitoring for metabolic side effects of antipsychotic drugs**

	Baseline	4 weeks	8 weeks	12 weeks	Quarterly	Annually	At least every 5 years
Personal or family history	X					X	
Weight (body mass index)	X	X	X	X	X		
Waist circumference	X			X		X	
Blood pressure	X			X		X	
Fasting plasma glucose	X			X		X	
Fasting lipid profile	X	*		X			X

\* For patients taking olanzapine, quetiapine, clozapine.

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UpToDate®



## WHY DOES THIS MATTER?

- Although published large-scale research studies have demonstrated the extensive metabolic abnormalities that occur with SGA use, there is evidence that also demonstrate poor screening/monitoring practices in patients with mental health illnesses taking SGAs despite recommendations (Mitchell et al., 2012; Abosi et al., 2017)
- Systematic reviews and meta-analyses show that cardiovascular conditions remain the key causes of death among people using antipsychotic medications, which suggests suboptimal screening and monitoring practices (Azfr Ali et al., 2021)
- With appropriate screening and monitoring practices, MetS can be identified in a timely manner along with timely interventions, leading to improved patient outcomes



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## GAP ANALYSIS

- 611 charts in total of patients prescribed at least one SGA
- 104 charts included in gap analysis data after inclusion and exclusion criteria applied
  - Most common diagnoses: Schizophrenia and Bipolar disorder
- 6 charts found to have more than 1 SGA as an active medication
  - Aripiprazole
  - Risperidone
  - Quetiapine
  - Olanzapine
  - Clozapine
  - Paliperidone



## GAP ANALYSIS RESULTS

- **Compliance with overall monitoring parameters**
  - 98% of patients assessed for blood pressure
  - 89% assessed for BMI
  - 84% assessed for fasting lipid profile
  - 81% assessed for Hgb A1c
  - 0% assessed for waist circumference
- **Overall compliance with monitoring parameters within the recommended time intervals was found to be inconsistent.**
- **54% of patients found to be obese (BMI of 30.0 kg/m<sup>2</sup> or greater)**
- **15% found to have diagnosis of HLD and taking medications (excluded)**
- **7% found to have diagnosis of diabetes and taking medications (excluded)**



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## RECOMMENDATIONS FOR CHANGE

- **Patient is identified as having an SGA on their active medication list**
- **Gender-specific waist circumference measurements per ADA/APA guidelines in addition to other monitoring parameters already incorporated**
- **On-going gender-specific waist circumference monitoring continues according to recommended frequency in ADA/APA guidelines**



## GENDER-SPECIFIC WAIST CIRCUMFERENCE & METABOLIC SCREENING

- What are your thoughts on some ways we can incorporate gender-specific waist circumference measurements as part of metabolic monitoring at DVCH? How can this be implemented? What are some barriers?



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# Thank You!

- Thank you for your time!
- Post-presentation questions sent via email.



## Appendix D

## Gender-specific Waist Circumference Education Sheet for Clinical Staff



# WAIST CIRCUMFERENCE

## What?

Waist circumference measurement provides independent and additive information to BMI, and is used to screen for possible health risks associated with obesity.

**Know the risks:**

A large waist circumference increases risk for heart disease, high blood pressure, high cholesterol, type 2 diabetes, and stroke.

## Who?

Patients taking second-generation antipsychotic medications are at an increased risk for weight gain and subsequent obesity (BMI  $\geq 30.0$  kg/m<sup>2</sup>), thus further increasing their risk for complications.

## Important Numbers

Measurements that increase risk:

Women > 35 inches (86 cm)  
Men > 40 inches (102 cm)

## How?

Using a non-elastic measuring tape, wrap tape around the abdomen at the smallest point at or near the naval (belly button).

Pull tape tight enough to keep in position, but not so tight to cause indentation in the skin.

Measure waist circumference after asking patient to fully exhale.

## Appendix E

### Gender-specific Waist Circumference Education Sheet for Patients



#### Numbers to Know: Waist Circumference

DID YOU KNOW THAT EXTRA ABDOMINAL FAT RAISES YOUR RISK FOR TYPE 2 DIABETES AND HEART DISEASE? MEASURING YOUR WAIST CIRCUMFERENCE IS A QUICK AND EASY WAY TO KNOW IF YOU ARE AT INCREASED RISK FOR THESE LIFE-THREATENING CONDITIONS.

How to determine your health risk using waist circumference:

#### 1. GET THE MEASUREMENT.

- Using a non-elastic measuring tape, wrap the tape around your abdomen at the smallest point at or near the navel (belly button).
- Pull the tape tight enough to keep it in position, but not so tight as to create an indentation in the skin.
- If you do not have a large enough measuring tape, use a piece of string and measure the length of the string with a ruler.

#### 2. LEARN YOUR RISK.

- You are at high risk for heart disease, high blood pressure, high cholesterol, type 2 diabetes, and stroke if:
  - Most of your weight is around your mid-section versus your hips
  - OR
  - Your waist circumference is:
    - Women-greater than 35 inches (86 cm)
    - Men-greater than 40 inches (102 cm)
- If you have a "high-risk" waist circumference, yet still have a normal body mass index, you are considered at high risk for the above conditions.

#### 3. TAKE ACTION.

If you have excess abdominal fat, you can begin to reduce your disease risk by losing just 5-10% of your body weight! Here are a few tips to get started:

- **Start an exercise plan.** It can be as simple as investing in a pedometer and setting a goal number of steps each day. Aim to build up to at least 5,000 steps per day and you'll be well on your way to improve your health
- To effectively lose weight (and keep it off!), you need to make changes to the way you eat. Start with a self-evaluation. What are one or two

- easy and doable changes that you could make (and stick with) to decrease the number of calories in your day? For example, a switch to 2% from whole milk, or forgoing the mayonnaise on your sandwich could get you off to a great start.
- Ask yourself how ready you are to make these changes, and how confident you are that you will be successful? Then, set up a plan to push forward. If you need help to get started, consider talking with your health care provider or a [health coach](#).

#### ADDITIONAL RESOURCES

[American Council on Exercise](#)

[National Heart, Lung and Blood Institute](#)

American Council on Exercise® is a nonprofit organization dedicated to empowering people to live their most fit lives. In addition to offering quality certifications and education for health and fitness professionals, ACE also protects the public against ineffective products, programs and trends by arming them with unbiased, science-based health and fitness information. To learn more about ACE, or how you can use or purchase Fit Facts, visit [ACEfit.com/FitFacts](http://ACEfit.com/FitFacts).

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**Appendix F****Six-week Posttest**

1. How often do you measure BMI during your patient encounters?
  - A. Never
  - B. Rarely
  - C. Sometimes
  - D. Often
  - E. Always
  
2. How often do you measure gender-specific waist circumference during your patient encounters?
  - A. Never
  - B. Rarely
  - C. Sometimes
  - D. Often
  - E. Always
  
3. Please indicate your level of confidence in measuring gender-specific waist circumference.
  - A. Very confident
  - B. Confident
  - C. Somewhat confident
  - D. Not so confident
  - E. Not at all confident
  
4. Please indicate your level of confidence in identifying a patient with central obesity.
  - A. Very confident
  - B. Confident
  - C. Somewhat confident
  - D. Not so confident
  - E. Not at all confident
  
5. Please indicate your level of confidence in addressing an abnormal gender-specific waist circumference measurement with a patient during an encounter.
  - A. Very confident
  - B. Confident
  - C. Somewhat confident
  - D. Not so confident
  - E. Not at all confident

6. Do you recommend lifestyle modification interventions to patients who you've identified to meet criteria for central obesity (waist circumference measurement of 40 inches or more for men, and 35 inches or greater for women)?
- A. Yes
  - B. No
7. Do you discuss waist size as a risk factor for CVD, type 2 diabetes, and stroke during your patient encounters?
- A. Yes
  - B. No
8. Do you recommend lifestyle modifications to patients who you've identified to have central obesity?
- A. Yes
  - B. No
9. What barriers did you encounter while incorporating gender-specific waist circumference measurements into your clinical practice? Please specify.

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