

INCREASING PROVIDERS' SCREENING, DIAGNOSING, AND MONITORING OF
METABOLIC SYNDROME IN PSYCHIATRIC PATIENTS:
A QUALITY IMPROVEMENT PROJECT

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Dedication

This project is dedicated to Almighty God, my creator, who is in his infinite mercy gave me the knowledge, wisdom, understanding, and strength for completion.

To my darling husband, Gbade Olayiwole, who has been a source of inspiration, strength, and encouragement throughout this program. He has continually provided moral, spiritual, emotional, and financial support. I also dedicate this project to my wonderful children, Temiloluwa, Oluwatojumi, and Oluwatade Olayiwole. Thank you all for understanding, perseverance, and being there for me throughout this program.

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Abstract

Metabolic syndrome is a significant health issue and the use of antipsychotics increases its risk. However, monitoring metabolic syndrome in patients using antipsychotics is irregular. This quality improvement project aimed to increase evidence-based screening, diagnosis, and monitoring of metabolic syndrome in patients prescribed antipsychotic medications while ensuring providers are satisfied with the criteria provided for metabolic syndrome screening. The introduction of three evidence-based strategies helped to achieve the project's aims that included (a) introduction of the NCEP-ATP III screening tool, (b) use of a metabolic monitoring form, and (c) educational or training sessions for the providers. Patient-based metabolic monitoring data were collected and analyzed using descriptive analysis of project variables and a run chart based on statistical control methodology. Analysis of the provider-based project data used descriptive analysis of the survey items, including each survey item's count. The project outcomes showed an increase in the assessment and accurate diagnosis of metabolic syndrome in patients using antipsychotics.

Keywords: Antipsychotics, metabolic syndrome, NCEP-ATP III, metabolic monitoring

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Section I: Increasing Providers' Screening for Metabolic Syndrome in Psychiatric Patients

Introduction

Mental health illnesses affect a significant proportion of the United States population. According to the National Alliance on Mental Illness, NAMI (2018), one or more mental health illnesses afflict 19.1%, or approximately 48 million, American adults with 4.6%, or 11.4 million, experiencing serious mental health illnesses. Furthermore, 7.7 million children aged 6–17 (NAMI, 2018) have a diagnosis of a mental health issue. As with most health issues, the prevalence of mental health illnesses varies. For example, 19.1% of American adults have anxiety disorders, and 7.2 % have a diagnosis of major depression (NAMI, 2018). Post-traumatic stress and bipolar disorders affect 3.6% and 2.8% of the population, respectively. The least prevalent conditions were obsessive-compulsive disorders and schizophrenia, 1.2% and less than 1%, respectively (NAMI, 2018). These prevalence rates (NAMI, 2018) substantiate the significance of mental health illnesses in the country that are associated with multiple implications. In Texas, the prevalence of mental illness between 2017 and 2018 was 16.2%, lower than the United States prevalence of 19.1% (KFF, 2020). The practice setting for this project is part of a system that serves more than 60,000 adults with mental illnesses in North Texas. The identified prevalence and high number of patients served by the facility provides evidence on the significance of mental illness in Texas. Thus, skilled healthcare providers, including psychiatrists and nurse practitioners, are essential for effectively managing patients with these widespread mental health illnesses. Providers can reduce the prevalence and multiple societal and financial implications by using evidence-based practices in engaging patients in diagnosing, treatment, and management of this complex experience.

Background

Pharmacological therapy is frequently a cornerstone along with therapy/counseling for effective management of mental health issues. Atypical or second-generation antipsychotic medications are recommended as appropriate therapeutic options in treating schizophrenia and other psychotic disorders (del Campo et al.,2018). However, use of these drugs is associated with metabolic derangements that increase the risk of morbidity and mortality (Cason et al., 2019). The most notable and serious side

effects, or adverse reactions, associated with the prescription of antipsychotics is the increased risk of metabolic syndrome (del Campo et al., 2018).

Metabolic syndrome is a global problem defined as the pathologic conditions that manifest in abdominal obesity, hypertension, insulin resistance, and dyslipidemia. The syndrome increases the risk for different chronic diseases, including cardiovascular disease and type 2 diabetes (Moore et al., 2017). Persons with mental health illnesses are considered a vulnerable population. It is estimated that the prevalence of metabolic syndrome is 1.5-2 times higher in individuals with serious mental illness than in the general population (Riordan, Antonini, & Murphy, 2011). Additionally, Penninx & Lange (2018) research shows that this population has an increased risk of premature mortality. Compared to the general population, 60% of excessive mortality in persons with mental health illnesses is linked to metabolic syndrome's physical comorbidities. Both atypical and typical antipsychotics are used to manage different mental illnesses and have been shown to increase metabolic syndrome risk (Pillinger et al., 2019). Predictors of metabolic disturbance associated with antipsychotics are not well understood. However, these drugs, especially atypical antipsychotics such as clozapine and olanzapine, have been associated with significant metabolic side effects such as weight gain, insulin resistance, and hyperglycemia, which lead to the development of metabolic syndrome (Pillinger et al., 2019). Therefore, there is evidence to support the concern that antipsychotics are associated with an increased risk of metabolic syndrome.

The significance of metabolic syndrome can also be assessed from the basis of the significant financial burden due to management and the loss of potential economic activity (Saklayen, 2018). For example, in 2007, the direct cost of diabetes in the United States was \$116 billion. This figure increased to \$237 billion in 2017 (Riddle & Herman, 2018). One in every four dollars spent on healthcare in the United States goes for treating and managing persons with diabetes. According to the CDC (2020), the estimated direct cost of cardiovascular disease between 2014 and 2015 was \$219 billion annually. The cost includes lost productivity and the cost of healthcare services. The American Heart Association estimates that the disease's annual total costs stand at \$555 billion (Schade et al., 2019). Therefore, the prevention of metabolic syndrome is essential to improving the population's general health status and

decreasing the costs of care incurred in managing preventable conditions such as diabetes and cardiovascular diseases that are linked to metabolic derangements.

The identification of metabolic syndrome requires specific criteria. According to Saklayen (2018), metabolic syndrome can be identified through blood glucose levels above 100 mg/dl and blood triglycerides above 150 mg/dl. A waist circumference of 102 cm and above in men, and 88 cm and above in women indicate metabolic syndrome (Saklayen, 2018). HDL cholesterol levels below 40 mg/dl and 50 mg/dl in males and females, respectively, also indicate metabolic syndrome. Other indicators are a BMI of 30 kg/m² and a blood pressure that exceeds 130/85 mmHg (Saklayen, 2018). Therefore, recommendations for identifying and diagnosing metabolic syndrome are available and should be used, especially in patients taking antipsychotics.

A significant problem driving the association of metabolic syndrome and antipsychotics is the lack of priority to monitor the condition. Lui et al. (2016) indicated that metabolic syndrome was an underdiagnosed condition among psychiatric patients. Patients treated with antipsychotics rarely receive comprehensive laboratory tests necessary in making a diagnosis. The assessment of metabolic syndrome in mental health patients is low. When the assessment is conducted, it mainly focuses on height, body mass index, and blood pressure. Inadequate assessment includes lipid panel, waist circumference, fasting blood glucose, and essential metabolic syndrome indicators. (Happell et al., 2016). Evidence in the practice setting considered in the project, confirms the assertion that metabolic syndrome monitoring is significantly lacking despite the widespread prescription of antipsychotics. For instance, from December 2018 through June 2020, 6,350 patients received antipsychotic prescriptions. However, all of these patients were not screened for metabolic syndrome. During this same time period, only 1,972 lipid panels and 2,377 glucose tests were ordered. In addition, more than 50% of patients prescribed antipsychotics who had their vital signs collected had blood pressure readings that exceeded normal parameters. This internal data supports that monitoring of metabolic syndrome in patients prescribed antipsychotics is low and mostly overlooked, which makes it necessary to identify strategies with interventions targeted to improve patients' health outcomes.

Need Assessment

The setting for this quality improvement project is an adult outpatient mental health center, and the author of this paper works at this clinic as a mental health nurse practitioner. The project facility is part of the largest mental health services provider in North Texas, providing treatment to more than 60,000 patients annually. The facility provides different services targeted at patients with mental illness, developmental disabilities, and severe emotional problems. The facility is involved in the provision of primary care for both adults, mental health services for veterans, housing and supportive services, and lastly, accessible pharmacies. Medication management is an essential service in this facility, and antipsychotics are commonly prescribed to manage different mental illnesses. The facility is an adult outpatient mental health center and does not offer in-patient services. Internal baseline data from the facility support a problem associated with lack of effective monitoring, screening, and diagnosis of metabolic syndrome.

From the FMEA tool, the two failure modes with the highest risk priority numbers, were failure to regularly assess and diagnose metabolic syndrome and the prescription of antipsychotics that increase the risk of metabolic syndrome (See Appendix A). Baseline data in the facility shows that the screening of metabolic syndrome in patients prescribed antipsychotics was inconsistent and poorly documented. From December 2018 to June 2020, 6,350 patients were prescribed a total number of 29,143 antipsychotics in the facility. From December 2018 to June 2020, a total of 2,377 glucose tests were ordered, with 22.72% or 540 test results equal to or greater than 110 mg/dl, suggesting a risk of metabolic syndrome. During the same period, the total number of lipid panels ordered was 1,972, with 53.49% of the tests confirming abnormal HDL cholesterol levels and 26.36% abnormal for triglycerides. These data further support the significant risk of metabolic syndrome among the patients. The data also supports that 50.51% of the 6,921 patients had abnormal high blood pressure, which is another criterion of diagnosing metabolic syndrome. Therefore, evidence supports that a significant number of patients are prescribed antipsychotics coupled with abnormal diagnostic values including HDL cholesterol, triglycerides, blood glucose, and blood pressure. This data indicates the need to introduce interventions that will increase the

assessment and appropriate screening of metabolic syndrome. Timely interventions can potentially decrease patient development of high-mortality conditions such as diabetes and cardiovascular diseases. The SWOT analysis (see Appendix B) identifies weaknesses in the project site, which includes the lack of conducting lipid panels and blood sugar labs according to evidence-guidelines, despite evidence of high incidences of dyslipidemia, hypertension, and hyperglycemia. In the facility, baseline metabolic assessment is not conducted for patients receiving antipsychotics, and lipid panels and fasting blood sugar labs are only assessed annually as opposed to following the recommended screening of every three months during the first year after an antipsychotic prescription or for patients at risk (Best Practice, 2007). Additionally, waist measurements are not taken, despite being vital in the screening of metabolic syndrome, which supports the weakness of patients being rarely screened for metabolic syndrome identified in the SWOT analysis. This analysis also revealed another weakness where the facility lacks a standardized system for monitoring metabolic syndrome. For example, this weakness is observed through the fact that there is lack of proper metabolic syndrome documentation for the patients receiving antipsychotics. The lack of this standardized system that requires providers to screen for metabolic syndrome can be viewed as the root cause of the problem identified in this clinical setting. A fishbone diagram summarizes and illustrates the need assessment findings (see Appendix C).

Team Members and Roles

The project implementation team consisted of a psychiatrist, nurse practitioners, and nursing assistants. The psychiatrist enrolled in this project serves as the facility's medical director and has an essential role in providing leadership and guidance on using different strategies to provide clinical care. In this project, the psychiatrist evaluated the recommended interventions and determined appropriateness for implementation as care protocols in the facility. Nurse practitioner's role in this project was to use the provided tools to screen and assess patients for metabolic syndrome. For example, nurse practitioners could order labs and create a screening schedule for a patient. Nursing assistants take patient vital signs and waist measurements.

The team leader was also responsible for the implementation and assessment of project interventions. The team leader conducted individual training sessions for the providers in August 2020. Data collection was conducted between September and December 2020 and focused on obtaining data from the metabolic monitoring forms. The project had a goal of increasing providers' screening, diagnosis, and monitoring of metabolic syndrome in psychiatric patients using antipsychotics. Individual meetings and training sessions with these providers were essential in gaining their support for the project. The facility's clinical manager, an important stakeholder, was tasked with providing the resources needed to implement the project successfully. Explaining the benefits of the quality improvement initiative was vital in getting the support and resources.

Barriers

The providers were hesitant to assess patients for metabolic syndrome regularly. Assessment requires additional time, which may add to their workload. In addressing this barrier, the solution was to ensure that the assessment was simple and straightforward, hence taking the minimum time possible. Another barrier was patients' lack of participation in the screening process for metabolic syndrome. Patients often did not complete the required or ordered labs. Time constraints likely influence this behavior among patients. A walk-in lab implementation ensured that patients could directly access lab testing. Some of these patients were unwilling or unable to make lifestyle modifications to manage metabolic syndrome risk. Patient education may help create the needed shift in patient behavior and solve the identified barrier.

Purpose/Aim of the Project

The PICOT question for this project was, for psychiatric providers prescribing antipsychotic medications (P), does using a standardized, evidence-based screening tool that includes a metabolic monitoring form (I), compared to standard care (C), increase the screening, diagnosis, and monitoring of metabolic syndrome in patients, as well as providers satisfaction (O) within four months (T)? The project population will be nurse practitioners, psychiatrists, and nursing assistants who provide mental health services in a mental health outpatient facility. The project aims were to:

- Increase evidence-based screening, diagnosis, and monitoring of metabolic syndrome in patients prescribed antipsychotic medications as evidenced by the number of metabolic monitoring forms completed by providers
- Increase provider satisfaction with the metabolic syndrome screening process for patients prescribed antipsychotic medications as evidenced by the findings of a provider satisfaction questionnaire

By meeting the aims of the project, the organization will experience quality improvement. The Institute of Medicine (IOM) suggests ways to achieve improvement in healthcare systems. The IOM provides six domains or aims that improved healthcare systems must meet. These six aims are: (a) safe, (b) effective, (c) timely, (d) patient-centered, (e) equitable, and (f) efficient (AHRQ, n.d.). By focusing on the screening and monitoring metabolic syndrome, the project expected to ensure that patients are safe by eliminating health risks associated with antipsychotic use. By eliminating these risks, the project contributed to increasing the effectiveness of using antipsychotics to manage patients.

The project's recommended screening aimed to detect the risk or presence of metabolic syndrome. Early detection is necessary to achieve the timeliness needed to prevent developing conditions such as type 2 diabetes and cardiovascular disease. The project showed that it helped standardize the facility's screening and monitoring process to ensure equitable patient care. Engaging patients achieved patient-centeredness in making decisions about whether they would take the required labs or not. Patients received education about lifestyle changes and other health-promoting behaviors that they can engage in to reduce the risk of metabolic syndrome.

Theoretical/Conceptual Frameworks

Kurt Lewin's change model (Lewin, 1947) provides the theoretical foundation for this project (see Appendix D). The model purports that change is achieved through three steps: unfreezing, changing, and refreezing. In the unfreezing stage, a change agent focuses on creating awareness of problems linked to a persisting way of doing things. In this project's case, the author was the change agent. The problem was the continued prescribing of antipsychotics without regular screening for metabolic syndrome.

The first step in the model is to unfreeze the status quo. The unfreezing step required creating awareness of a particular practice and challenging it. It was necessary to provide evidence on problems associated with the lack of monitoring metabolic syndrome. The model assumes that the status quo is maintained by equilibrium, where driving forces are equal to restraining forces (Lewin, 1947). The driving forces support the use of the current practice, while the restraining forces oppose this status. Change becomes possible when the driving forces exceed the restraining forces. In this case, lack of prioritizing metabolic syndrome screening was the restraining force that maintained the unwanted equilibrium. Convincing the providers to adopt the intended change helped in creating greater driving forces. This goal was achieved by introducing a standardized screening tool and a metabolic monitoring form for the facility. Screening using these two tools is straightforward and not time consuming. These factors may motivate the providers to adopt the needed change. Additionally, the providers' training or educational sessions improved knowledge about metabolic syndrome and applying the provided screening criteria. The training may foster the adoption of changes that will increase the providers' satisfaction and knowledge about the recommended new practices.

The second step in the model is changing. It is necessary to reduce the restraining force. It becomes essential to demonstrate how appropriate alternatives to the status quo can be adopted (Lewin, 1947). In this stage, it also becomes necessary to demonstrate the benefits associated with the identified change. In the project, the training program was important in reducing the restraining force. The training helped create the providers' appreciation of the benefits of regular and improved screening of metabolic syndrome. Additionally, the health outcomes realized after translating the training knowledge to practice will be essential in demonstrating the benefits of the recommended screening for metabolic syndrome, thus creating more appreciation for the needed change.

The third step in the model is refreezing. The refreezing goal is to ensure the maintenance of the introduced change becomes a new norm. Refreezing aims to establish a new equilibrium based on a change that proved to be effective (Lewin, 1947). In the project, refreezing ensured that the screening and monitoring of metabolic syndrome in patients receiving antipsychotic medications became standard

practices in the organization. The new standard will ensure that care providers are regularly re-trained to possess the knowledge and skills needed for screening patients for metabolic syndrome. Assessing patient health outcomes and the rate of appropriate screening before and after the project revealed success. This success may promote the practice's integration, making it more resistant to future change.

Section II: Presentation of Evidence

PICOT

For psychiatric providers prescribing antipsychotic medications (P), does using a standardized, evidence-based screening tool that includes a metabolic monitoring form (I), compared to standard care (C), increase the screening, diagnosis, and monitoring of metabolic syndrome in patients, as well as providers satisfaction (O) within four months (T)?

Review of Evidence

Search Methods

A selective search was conducted on PubMed, Medline, Cochrane Library, Google, and Google Scholar in reviewing the evidence. The search was limited to English language literature published between 2007 and 2020. The timeline was chosen as a preliminary search on Google and Google Scholar had revealed some articles older than 10 years that were relevant to the PICOT question. The evidence and strength of the provided information and recommendations were determined using a critical appraisal tool, the John Hopkins Nursing Evidence-based Practice (JHNEBP) Rating Scale (The Johns Hopkins Hospital, n.d.). The tool is appropriate as it outlines the levels of evidence as well as an appraisal of the quality of the selected research articles. The tool identifies four evidence levels and rates quality as high (A), good (B), or low quality (C). Level I consist of experimental studies, randomized controlled trials (RCTs), and systematic review of randomized controlled trials. Level II consist of quasi-experimental studies, and systematic review of a combination of RCTs and quasi-experimental studies. Level III consist of non-experimental studies, qualitative study, and systematic reviews of a combination of RCTS, quasi-experimental studies, non-experimental studies, and qualitative studies. Level IV consists of opinions of nationally recognized committees or consensus panels, and respected authorities, provided it is based on

scientific evidence. The quality is determined by the extent to which the findings are consistent with well-designed studies, the documentation of a search strategy, overall scientific strength, definitive conclusions, and the sponsors of the material. For the tool see Appendix E.

Three searches were conducted in this review. The first search was in PubMed using the search terms *metabolic syndrome* and *antipsychotics* in the advanced search field. A total of 419 articles were obtained after filtering for full text, publication date, and article type to exclude books and documents. From the 419 articles, six are included in this review based on their relevance to the topic and the fact that they were Level II and Level III articles with either a high or good quality. The second search was in Cochrane Library using the four search terms *metabolic syndrome*, *metabolic monitoring*, *antipsychotics*, and *screening*. When filtering for language and publication date, a total of 12 articles was obtained. However, only one was relevant based on the critical appraisal tool, as it was a Level II article with a good quality. The third search was in Google Scholar and Google to help build on the evidence already obtained in the other two searches. General phrases such as the *prevalence of metabolic syndrome*, *management of metabolic syndrome*, and *interventions for metabolic syndrome* were used in conducting searches in these two platforms. Five articles were included from this search as they were relevant and satisfied the criteria of the critical appraisal tool. The articles were a mixture of Level II, Level III, and Level IV, with a high or good quality. After completing the three searches, a total of 12 research articles were appraised and included in the evidence synthesis. Three of these articles were systematic reviews with meta-analysis, and they provide strong evidence rated Level II. Two of the articles were cross-sectional studies, which are non-experimental and are therefore rated Level III. Five of the articles were classified as reviews and non-experimental and were therefore rated as Level III. Two articles were expert opinions based on scientific knowledge and were rated as Level IV. The Level II and Level III articles were of high or good quality, while all Level IV articles were of a high quality. See Appendix F for the evidence matrix. Two themes were identified from the research evidence, and these are prevalence and disparities, and interventions.

Theme 1: Prevalence and Disparities

Available literature provides insight into the prevalence and disparities of patients diagnosed with metabolic syndrome. Hussain et al. (2017) considers the prevalence of metabolic syndrome in a hospital-based cross-sectional study that focuses on in-patient psychiatric patients and concluded that the prevalence rate was 34.74%. Additionally, the study revealed some disparities in the prevalence. There is a disproportionately higher prevalence in females (43.3%) when compared to males (28.5%). Moreover, there is a higher prevalence in patients taking atypical antipsychotics (64.64%). Alosaimi et al. (2017) further posited the prevalence of metabolic syndrome and its associated components among patients with psychiatric diagnoses. Out of the 922 study participants, 41.2% were positive for metabolic syndrome. The prevalence of components of metabolic syndrome was: 52.5% for low HDL cholesterol, 47.8% for high fasting blood sugar, 42.5% for high blood pressure, 42.2% for large waist circumference, and 32.8% for high triglycerides. The study also identified disparities in the prevalence, where the metabolic syndrome diagnosis was higher in the following groups: elderly, illiterate, divorced, widowed, individuals with old age onset of psychiatric illness, a history of diabetes and hypertension, and long-duration psychiatric diseases. A meta-analysis of 18 studies by Vancampfort et al. (2014) reviewed 18 studies. It determined that the overall prevalence of metabolic syndrome was 30.5% using any standardized metabolic syndrome criteria. The meta-analysis noted that the prevalence was not affected by age, gender, psychiatric comorbidity, antidepressant use, smoking, or geographic area. However, some disparities were observed where the prevalence was higher in patients with major depressive disorder and significantly higher in those using antipsychotics. A systematic review and meta-analysis by Mitchell et al. (2013) found that the prevalence of metabolic syndrome in adults with schizophrenia and related disorders was 32.5%. Age had some influence on the prevalence of this condition. Disparities in prevalence were observed in patients taking the antipsychotic, clozapine, where the prevalence for clozapine was 51.9% and 20.2% for those who were unmedicated.

Overall, metabolic syndrome has a significantly high prevalence across different populations associated with mental illness. Evidence demonstrates that the prevalence of the metabolic syndrome is

high in patients with mental illness, especially those receiving antipsychotics. Understanding the disparities in the prevalence of metabolic syndrome is also essential for identifying other specific subgroups at high risk for the condition. Therefore, under the theme of prevalence and disparities, there is moderate to high evidence highlighted by the fact that two of the articles were Level II with a good quality, while the other two were Level III with a good quality.

Theme 2: Interventions

The articles provide evidence on interventions such as metabolic monitoring, patient education, prescription of safer drugs, behavioral interventions, baseline screening, educational opportunities to improve providers knowledge, risk benefit analysis, and the use of a standardized criteria or protocol to guide metabolic monitoring. These interventions are useful in addressing the problem of metabolic syndrome, especially in patients at a high risk of the condition. Riordan et al. (2011) recommended the prescription of antipsychotics while increasing the monitoring of laboratory and clinical measures associated with metabolic syndrome. Chee et al. (2017) highlights the need for mental health nurses to spearhead initiatives that promote metabolic monitoring and preventive health to patients taking antipsychotics. Patient education is also essential for physical health necessary to achieve mental recovery. Correll (2007) recommends that psychiatric care should adopt an integrated mental and physical health management approach. Additionally, routine monitoring for metabolic syndrome risk factors and prescription drugs with a safer profile should be part of such a care plan. Papanastasiou (2012) identifies behavioral interventions such as nutritional education, well-being programs, psychoeducation, and weight management as being important interventions. Marvanova (2013) identifies a significant intervention when prescribing antipsychotics. That intervention is conducting baseline screening with a structured metabolic abnormality monitoring plan maintained throughout the treatment. Ho et al. (2014) indicate that a risk-benefit profile or analysis should occur. The intent is to (a) guide the initial selection of antipsychotics for patients and (b) reduce prescription drugs with higher metabolic derangement risks. Waterreus and Laughame (2009) recommend that the clinical facility have clarity on who has the clinical responsibility to monitor patients for metabolic syndrome. Additionally, a standardized system, criteria,

or protocol should be in place to facilitate the regular monitoring of metabolic syndrome for all patients receiving antipsychotics. The criteria will be beneficial when used together with a uniform metabolic monitoring form to be used by all providers. Melamed et al. (2019) recommend educational interventions that improve providers' knowledge and skills in metabolic risk screening. Additionally, patients should be empowered and educated to seek metabolic risk screening, which is essential in reducing patients' reluctance to take ordered labs. Lastly, an organizational culture that promotes metabolic screening can serve by having a metabolic champion and the necessary leadership support and involvement.

The evidence in this theme was also moderate to high. One of the Article was Level II and had a good quality. Five of the articles were Level III, and two had a high quality while three had a good quality. Two of the articles were Level IV, and both were of a high quality.

Summary of the Evidence

There is moderate to high evidence on the topic that was revealed through the synthesis. In the theme of prevalence and disparities, it is clear that metabolic syndrome has a high prevalence in the different populations associated with mental illness. The evidence also reveals that the prevalence of metabolic syndrome is disparately higher in patients using antipsychotics. This evidence is relevant and provides a rationale for the project, which aims at increasing providers screening, diagnosis and monitoring of metabolic syndrome in mentally ill patients using antipsychotics. The evidence has also identified important interventions for managing metabolic syndrome, which include metabolic monitoring, educational opportunities to improve providers knowledge, baseline screening, and the use of a standardized criteria or protocol to guide metabolic monitoring. These interventions are consistent with the evidence-based interventions introduced at the project site in this quality improvement initiative.

Section III: Methodological Framework (Quality Improvement)

Describing Quality and Evidence-Based Practice

The definition of quality related to practice and this project plan is the attainment of improved knowledge and increased monitoring of metabolic syndrome among mental health providers. The attainment of this quality allowed providers to effectively screen, diagnose, and monitor for metabolic

syndrome in patients using antipsychotics. This project's quality improvement framework is the Model for Improvement (Langley et al., 2009), which consists of four phases. The first phase in the Model for Improvement is establishing the aim one is trying to achieve through the quality improvement initiative (Langley et al., 2009). In this intervention, the needed improvement was to increase the screening of metabolic syndrome in patients using antipsychotics. The second phase in the Model for Improvement is deciding on the measures used to determine whether the change was achieved (Langley et al., 2009). The measurement methods section of this paper identified these measures. The third phase in the Model for Improvement is deciding on the changes that can be implemented to realize the intended improvement outcome (Langley et al., 2009). The identified evidence-based interventions or changes were identified and discussed in the evidence-based interventions sub-section of the plan's outline. Once an appropriate idea has been identified, it is time to move to the fourth phase in the Model for Improvement. The fourth phase incorporates the PDSA cycle, where the improvement idea can be tested. Following the four steps of the PDSA cycle, if the idea is found appropriate, it is incorporated into the organization's standards.

The first step of the PDSA cycle is the plan step. This step involves creating a plan to test the identified improvement idea (Langley et al., 2009). In this step, the change agent created a team and identified their roles and responsibilities in the improvement initiative. The step is also important in identifying the major steps in the improvement process and the needed resources and timelines necessary in implementing the identified action plan. In this project, the plan step included forming a team that consisted of two nurse practitioners, two nursing assistants, and a psychiatrist. The project's needed resources and timeline were determined, provided, and approved (see Appendices L and N). The metabolic monitoring forms, the screening criteria, and the educational programs were some of the resources that helped to successfully implement the plan to improve metabolic monitoring in patients receiving antipsychotics.

The second step of the PDSA cycle is the do step. This step is where the action plan determined in the previous step begins to be implemented (Langley et al., 2009). In this step, it is essential to make observations and collect data. In this project, the implementation of step 2 was handled by the providers.

The providers completed the metabolic monitoring forms for the patients who received antipsychotics. This role by the providers happened after they had undergone the training or educational sessions. Data from the metabolic monitoring forms and the questionnaires completed by the providers was also included in this step.

The third step of the PDSA cycle is the project's study step. Data were analyzed to determine if the intended outcomes were achieved (Langley et al., 2009). Completing this step required analyzing data from the metabolic form and comparing responses from the providers' pre-questionnaires and post-questionnaires.

The fourth step of the PDSA cycle is the act step. During the act step, one reflects on the outcomes. The objective is to determine if the improvement initiative is worthy of being standardized or if further improvement is needed. Where improvement is needed, one returns to the first stage and repeats the whole cycle. The retrospective analysis of data in this project allowed for repeated PDSA cycles.

Detailed Outline of Plan

Evidence-Based Interventions

This project employed three evidence-based interventions. The first evidence-based intervention was administering a screening tool to assess patients for metabolic syndrome. Different organizations have criteria or tools to screen for metabolic syndrome (Ho et al., 2014). These organizations include the European Group for the Study of Insulin Resistance (EGIR), the World Health Organization (WHO), the International Diabetes Federation (IDF), and the National Cholesterol Education Program (NCEP). A review of the criteria supports some shared consistency by assessing for obesity, glucose metabolism, hypertension, and dyslipidemia (Ho et al., 2014). The screening tool used in the project was the NCEP-ATP III which is the most widely used criteria for diagnosing metabolic syndrome. Tool criteria focus on measures and laboratory results that providers can readily obtain while assessing for all the condition's key features (Huang, 2009). This tool's screening for metabolic syndrome includes assessing for waist circumference, fasting plasma glucose, blood pressure, triglycerides, and HDL cholesterol. Patients are

diagnosed with metabolic syndrome if their results satisfy at least three of these five measures (Ho et al., 2014). Appendix G provides diagnostic values for these measures.

The second evidence-based intervention was introducing a metabolic monitoring form. This intervention's choice recognizes the emphasis by Wattereus and Laugharne (2009) that using a single monitoring form is effective in the screening of metabolic syndrome and in tracking changes in the patients over time. The metabolic monitoring form was developed by the project author. The form was evaluated and found appropriate by a psychiatrist, a team member. The psychiatrist was also the medical director in the practice setting. The metabolic monitoring form (see Appendix H) is appropriate for all patients receiving antipsychotics. The metabolic monitoring form can either be used by providers by integration into the electronic medical record, or as a physical copy, handwritten or typed. This project used a physical metabolic monitoring form.

The third evidence-based intervention was educational or training sessions for the project's team members or participants provided by the author of this project. The first aspect of these sessions focused on training the providers on how to complete the metabolic monitoring forms and how to use the NCEP-ATP III screening criteria to accurately diagnose patients with metabolic syndrome. The participants in these sessions were two nurse practitioners, one psychiatrist, and two nursing assistants.

Tools and Materials Used During the Sessions

The metabolic monitoring forms (see Appendix H), the NCEP-ATP III diagnostic criteria (see Appendix G), a schedule for monitoring metabolic syndrome (see Appendix I), the questionnaire on providers' knowledge (see Appendix J) and a tape measure were essential materials provided to all participants during the training. The pre-post-test questionnaire about providers' knowledge (see Appendix J) was developed by the project author and authorized by the medical director. Both the pre and post versions had the same questions to assess the participants' knowledge before and after the training.

Teaching/Training Sessions

Prior to the introduction of the metabolic monitoring forms and the metabolic monitoring screening protocol, all participants underwent a 30 minutes training session on assessing and

documenting patients for metabolic syndrome using the identified screening tool and the metabolic form. The training format was individual face-to-face sessions. Each participant met with the project author to undertake the training for the identified time. The training focused on using the metabolic monitoring form, the screening criteria, the screening schedule, and how to measure waist circumference accurately. Appendix K illustrates the waist measurement procedure. In this case, the teaching method was the classroom didactic or stand-alone teaching, which is appropriate in teaching evidence-based practice (Horntvedt et al., 2018). This approach is simple and allows for the presentation of information directly from the instructor to the student. The instructor directs all the actions undertaken in the teaching session. The materials and tools discussed were educational materials distributed during the training sessions. A “provider knowledge” questionnaire was administered before and after the training session to identify the participants' baseline knowledge strength and improvements after the training (see Appendix J). This knowledge is essential in enabling the providers to carry out the project’s evidence-based practices.

Measurement Methods/Tools

Various measures were used in assessing the success or outcomes of implementing the identified change (see Appendix L for the measurement grid). The first outcome indicator was the number of patients using antipsychotics screened for metabolic risk. The number of completed metabolic monitoring forms was an important measurement metric for this indicator. This outcome is important in measuring the achievement of the screening and monitoring goals of the project.

The second outcome indicator was the accurate diagnosis of metabolic syndrome. This outcome was measured by considering the number of patients using antipsychotics who were diagnosed with metabolic syndrome using the evidence-based screening criteria. The diagnosis was made by considering different measures or risk factors including the patient’s waist circumference, triglycerides, HDL cholesterol, blood pressure, and fasting plasma glucose. An accurate metabolic syndrome diagnosis was confirmed if the patient's tests were abnormal for at least three of these five measures. This outcome will help determine the diagnosis goal of the project.

Process measures were also considered in this project to determine if the intended improvements were being observed. An important process measure is providers' satisfaction. Satisfaction was measured using a questionnaire derived from the short version of the physician work-life survey discussed in de Oliveira Vasconcelos Filho et al. (2016). The survey considered ten satisfaction domains. Those domains include (a) autonomy, (b) career, (c) expertise, (d) relationship with colleagues, (e) relationship with patients, (f) personal time, (g) relationship with staff, (h) the characteristics of work, (i) income, and (j) resources. The survey has a Cronbach's alpha of 0.82 and is considered reliable in assessing satisfaction and producing stable and consistent results over time. The tool has high content validity as the questions are representative of aspects that are important to the satisfaction of healthcare providers such as physicians (Oliveira Vasconcelos Filho et al., 2016). Appendix M provides a sample questionnaire used in the project.

Providers who are confident and possess the required skills to provide health services are better prepared to provide health services safely and effectively. The project's balancing measure was the level of provider dissatisfaction. The recommended interventions can increase the providers' workload, which may be considered a negative outcome.

The project took place in a local clinic during regular business hours. The data gathering tools used in the project were integrated into the clinic providers' workflow as they interacted with patients.

The two primary considerations were:

- As part of increasing the chances of buy-in from administration, this project and its associated activities were conducted during clinical hours to protect the facility from incurring costs associated with working overtime.
- The improvement initiatives should also be considerate of the patient's choice. If a patient declines the labs, that decision should be respected.

Budget, Time, and Resources Plan

The time required for the project was six months, as shown on the Project Timeline chart (see Appendix N). An essential resource needed in this project was time from the five participants. The project

had approval from the administration to use this resource. No additional labor costs occurred because all project activities were completed during the clinical hours to avoid overtime hours. The additional resources needed for each of the five providers were tape measures, weighing scales, and blood pressure machines. These were readily available in the facility. The project author's expense was \$50.00 for printing 500 copies of the metabolic monitoring forms.

Evaluation Plan

The evaluation plan included the three intended outcomes of the project: (a) the number of completed metabolic monitoring forms, (b) the number of patients accurately diagnosed with metabolic syndrome, and (c) the providers' satisfaction levels and knowledge levels.

Data Collection Process and Planning

Data on Metabolic Monitoring

The project's author had the task of collecting data and providing overall oversight of the project. The objective was to ensure the project's long-term sustainability. Based on the completion of a quality improvement checklist (see Appendix O), the project qualified as a quality improvement. Consequently, there was no requirement for Internal Review Board (IRB) approval. The data collection focused on obtaining data about the providers' screening of metabolic syndrome. The goal was achieved by collecting and considering the number of completed metabolic monitoring forms. The NCEP-ATP III (see Appendix G for details) was essential in determining the screening measures used for metabolic syndrome. The choice of this tool is that it is the most widely used criteria in diagnosing metabolic syndrome. The tool also uses measures and laboratory results that providers can easily obtain while assessing for all the condition's key features (Huang, 2009). The metabolic monitoring forms are used to record data and facilitate accurate diagnoses. The diagnoses are based on the measures, risk criteria, and diagnostic criteria provided in the NCEP-ATP III. The completed metabolic monitoring forms will provide data that helps to determine the accurate diagnosis of metabolic syndrome. One particular consideration in collecting data was demographics. Demographics consider factors such as the gender and ethnicity of the patients receiving antipsychotics while being assessed for metabolic syndrome. The data

from the metabolic monitoring forms were collected in four intervals. Appendix H provides a sample manual metabolic monitoring form. Data from Group 1 were collected between September 1 and September 30, 2020. Group 2 data were collected between October 1 and October 31, 2020. Group 3 data were collected between November 1 and November 30, 2020. Group 4 data were collected between December 1 and December 31, 2020. Operation definitions for the project were critical to accurately identifying metabolic syndrome. Appendix P details the operational definitions and their associated parameters.

The first step in evaluating and analyzing data from the metabolic monitoring forms was to enter that data into Excel columns and rows based on the relationships detailed in Appendix P. The next step was to import the Excel-formatted data into IBM SPSS (see Appendix Q). The data included demographic factors such as the gender, age, and race of the patients. The data considered the indicators of metabolic syndrome and identify the patients who had normal and abnormal values of the indicators recommended in the NCEP-ATP III (Ho et al., 2014). Patients with three or more abnormal values were identified as being positive for metabolic syndrome.

Once the patient-based project data were collected, this part of the analysis plan began. The analysis plan relied on the project's PICOT question and involved descriptive analysis of project variables. The process included chi-square comparisons of key variables (Pallant, 2020). The PICOT question also directed using a run chart based on statistical process control methodology (Institute for Healthcare Improvement, 2021) for the proportion of screening forms completed during the project's period.

Data on Provider Satisfaction and Knowledge

The project's objective was to increase the providers' satisfaction with the metabolic syndrome screening process for patients prescribed antipsychotic medications. A self-administered questionnaire based on the physician's work-life survey provided data about the providers' satisfaction (see Appendix M). The questions from this questionnaire were obtained from the physician's work-life survey, which has been shown to be effective in assessing providers' satisfaction and has high reliability characterized

by a Cronbach's alpha of 0.82. The medical director found the satisfaction questionnaire appropriate and authorized its use. The "provider knowledge" questionnaires provided information that helped measure the providers' knowledge pre- and post-training offered to the providers (see Appendix J). This questionnaire was created by the project author and assessed and authorized by the medical director in the facility.

Once the provider-based project data were collected, this part of the analysis plan began. The project's PICOT question drove the analysis plan. The plan involved the descriptive analysis of provider satisfaction survey items, including the count for each of the survey subscales: provider satisfaction, knowledge, and relationships

Section IV: Findings

Data Analysis and Evaluation

In evaluating the data on metabolic syndrome monitoring, a retrospective review approach was used. The number of complete and incomplete metabolic monitoring forms and their respective information were recorded for the four different groups or months of data collection. Data on specific metabolic syndrome indicators were recorded on these forms per the NCEP-ATP III guidelines (Ho et al., 2014). Data included fasting glucose, blood pressure, triglycerides, HDL cholesterol, and waist circumference. Appendix G identifies the industry-standard parameters.

Operational definitions (see Appendix P) were used to guide the assessment and evaluation of data for subsequent classification as normal or abnormal. For instance, waist circumferences greater than 40 inches and 35 inches in men and women, respectively, were considered abnormal and indicative of the risk of metabolic syndrome. At the same time, any lower values were considered typical or normal. Other abnormal values were: fasting plasma glucose greater than or equal to 110 mg/dL; blood pressure greater than or equal to 130/85 mmHg; triglycerides greater than or equal to 150 mg/dL; and HDL cholesterol greater than or equal to 40 mg/Dl or 50 mg/dL in men and women, respectively.

The Excel file data were exported to the IBM SPSS Software version 25 (IBM Corp, 2017) for further analysis (see Appendix Q). The descriptive analysis focused on the demographics to identify patients' differences in metabolic syndrome status regarding gender and race.

Chi-square testing identified frequencies of abnormal and normal occurrences of the different clinical indicators of metabolic syndrome. The frequency of NCEP-ATP III scores was analyzed. A statistical process control run chart (Institute for Healthcare Improvement, 2021) was generated, reflecting the score's trend over time.

The provider surveys were analyzed using a simple review of the responses given by the providers. The analysis considered the number of providers who agreed or disagreed with the prompts given in the survey. A simple review of correct responses helped to understand the providers' responses in the knowledge survey.

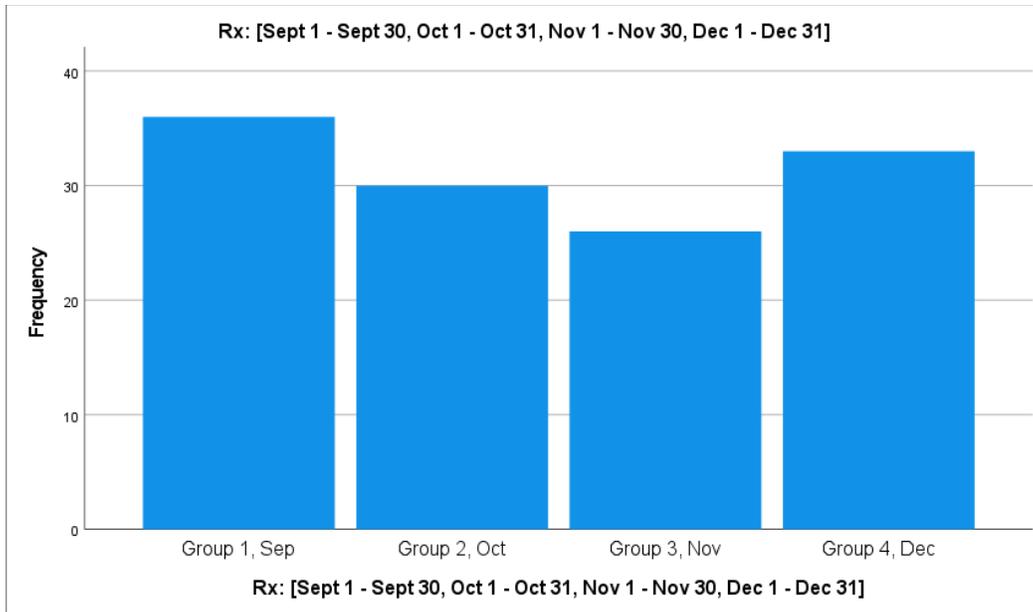
Results

Patient Demographics and Metabolic Syndrome

During the four months when data were collected, 125 patients were assessed for metabolic syndrome. During September, October, November, and December 2020, 36, 30, 26, and 33 patients were assessed, respectively (see Figure 1).

Figure 1

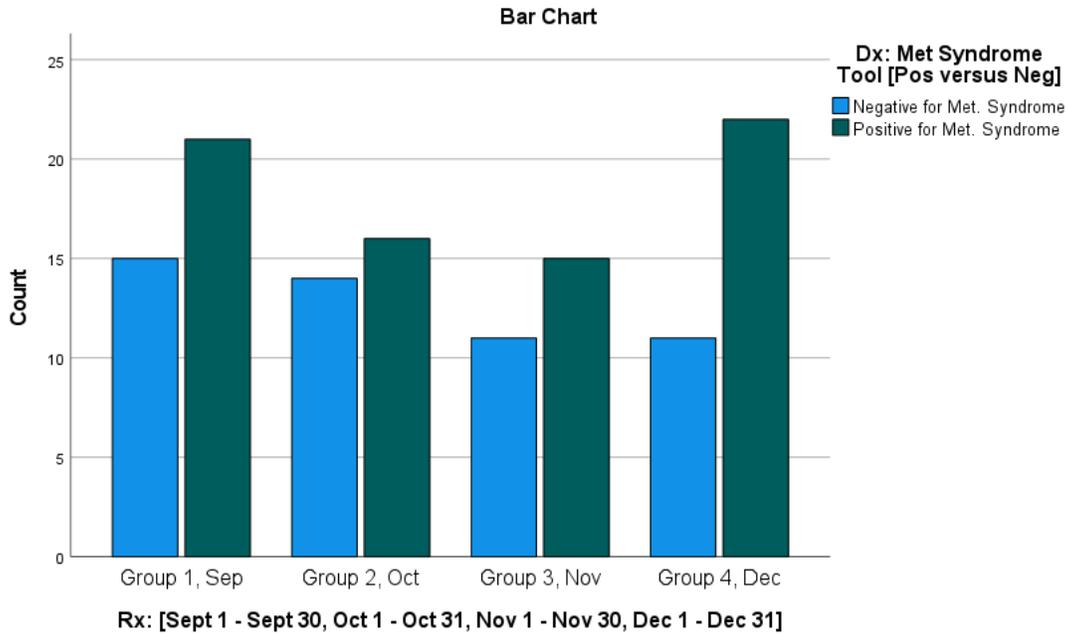
Patients Assessed for Metabolic Syndrome During Data Collection Period



In the patients assessed during the four data collection months, 59.2% tested positive for metabolic syndrome while 40.8% were negative. Differences were also observed in the number of patients testing positive and negative for metabolic syndrome in the four groups representing the data collection intervals. See Figure 2 for differences in positive and negative metabolic syndrome diagnosis in the four groups. The data shows that the patients with positive diagnoses surpassed the patients who tested negative in all four months of data collection.

Figure 2

Positive and Negative Metabolic Syndrome Diagnoses in the Four Groups



The analysis also aimed to analyze the differences in the positive and negative diagnosis of metabolic syndrome across the different demographics considered in data collection. This analysis was critical as it helped to reveal disparities in the diagnosis of metabolic syndrome. Figure 3 illustrates the differences in positive and negative diagnoses across the three races.

The Pearson chi-square test provided a value of 3.949 and a significance of $p = 0.139$, which indicates that the difference across the races was not statistically significant. Figure 4 illustrates the difference in positive and negative diagnoses across the two genders. The difference was not statistically significant at a significance of $p = 0.505$. Negative and positive diagnoses also varied across the different patient ages and age groups. Figure 5 shows the difference across the four age groups. The differences in age groups were shown to not be statistically significant, with $p = 0.369$.

Figure 3

Differences in Positive and Negative Diagnosis of Metabolic Syndrome Across Races

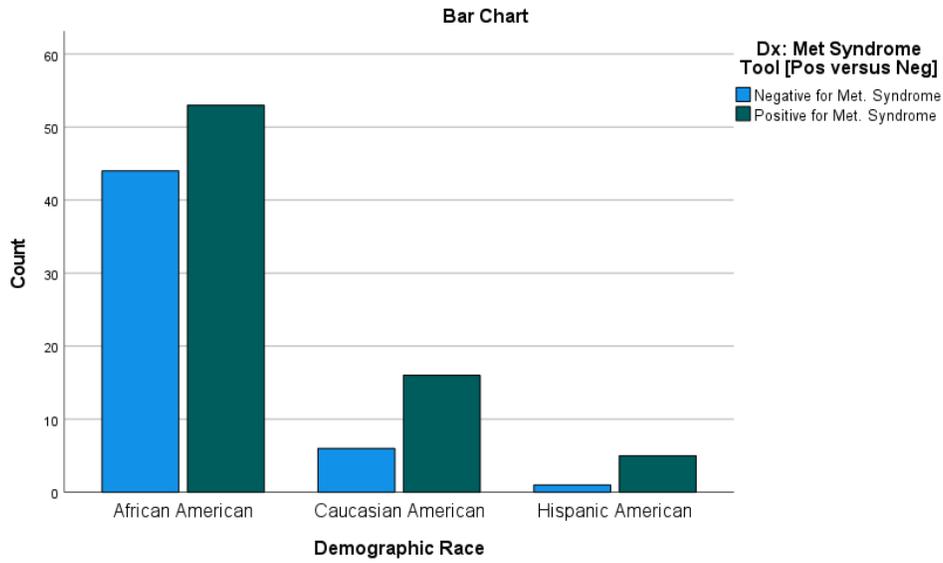


Figure 4

Differences in Positive and Negative Diagnosis of Metabolic Syndrome Across Gender

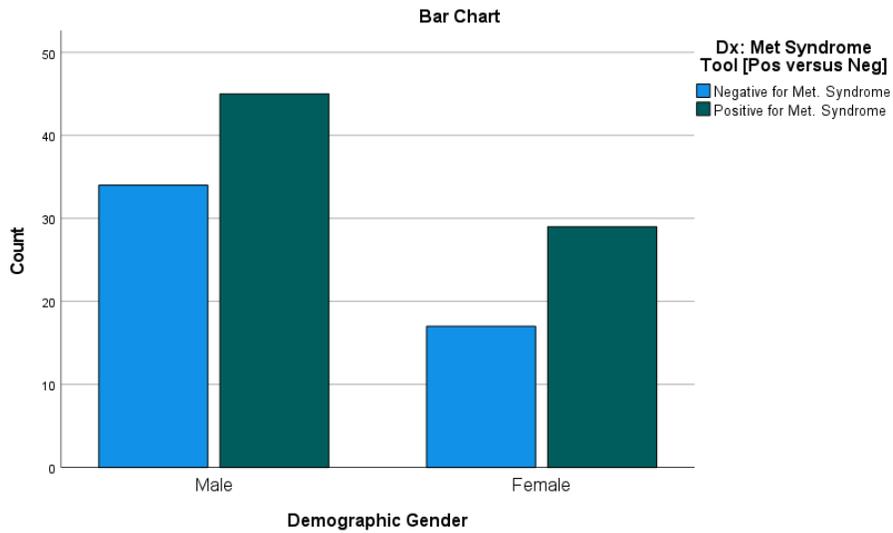
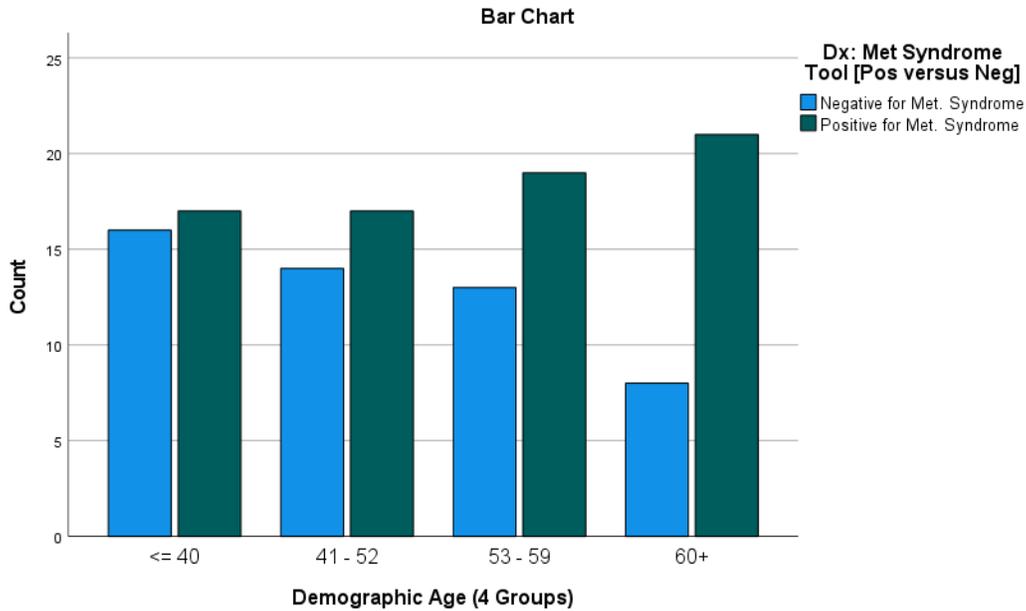


Figure 5

Differences in Positive and Negative Diagnosis of Metabolic Syndrome Across Age Groups

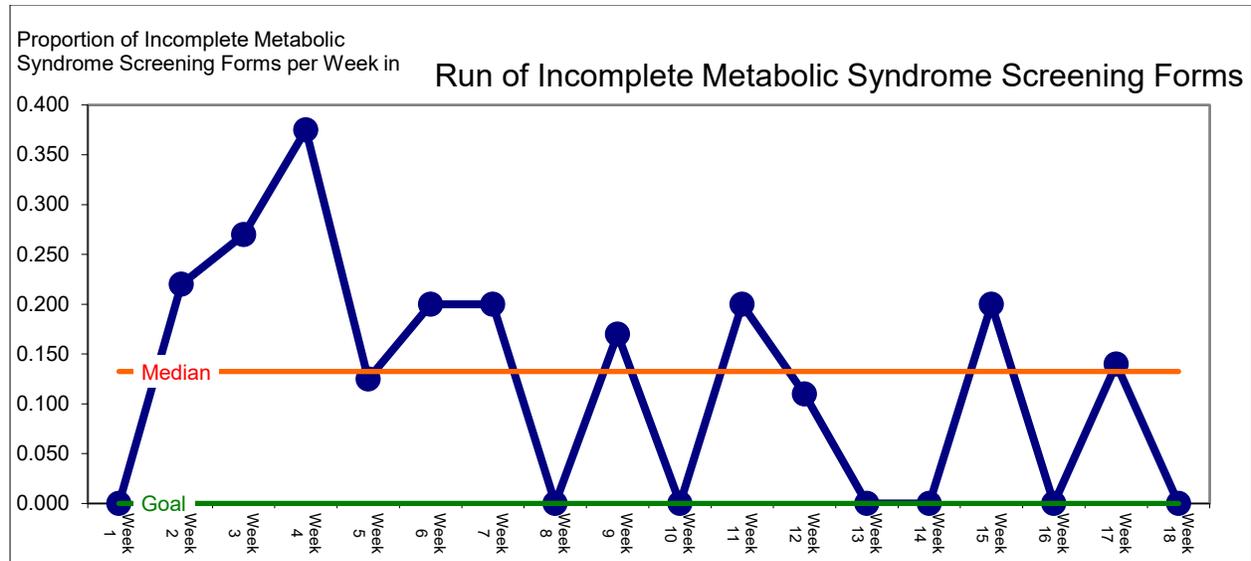


Standardized, Evidence-Based Screening Tool with Metabolic Monitoring Form

Data analysis using a statistical process control run chart (Institute for Healthcare Improvement, 2021) determined the proportion of screening forms (NCEP-ATP III) completed by providers during 18 weeks (see Figure 6). This trend highlights the providers’ behavior change characterized by screening patients for metabolic syndrome demonstrated by completed forms. The project goal was to reach a 100% proportion of compliance. The number of patients with incomplete metabolic monitoring forms decreased over time and reflected a moderately consistent pattern.

Figure 6

Project 18-Week Run Chart: Proportion of Incomplete Metabolic Monitoring Forms per Week



Note: Median = .1325, with 7 out of 18 weeks below the median, and one run of 3 weeks below the median. For an 18-week process measurement, a maximum of 6 runs was expected (Institute for Healthcare Improvement, 2021).

Provider Satisfaction

The form illustrated in Appendix M assessed the providers' satisfaction. The first question in the form asked if the provider's work situation was a major source of frustration. Three of the five providers were satisfied with their work situation. They asserted it was not a source of frustration. The second question asked whether the providers were overwhelmed with the recommended screening of metabolic syndrome and meeting other patients' needs. Three of the five providers showed dissatisfaction with the recommended project screening requirement as they found it overwhelming. The third question asked whether work encroached on the provider's personal time. Only one of the five providers were satisfied with the balance between work and their personal time. The fourth question asked whether the recommended interventions restricted the provider's freedom to practice. All five providers were satisfied with this aspect of the project interventions. They felt it did not restrict their practice autonomy or their freedom. The fifth question asked whether the provider's practice met their expectations. Four of the five providers were satisfied. The sixth question asked whether the providers were satisfied with their current place of work. Four of the five providers were satisfied. A majority of providers showed overall

satisfaction with their work. The majority exception was dissatisfaction with the balance between work and personal time. The seventh question asked whether the providers have a problem getting along with colleagues. All five providers were satisfied and they had no problem relating to colleagues. The last question asked whether they had a problem feeling a strong personal connection with patients. All five providers were satisfied they had no problem when they felt a strong personal connection with patients.

Provider Knowledge

The "provider knowledge" questionnaires about the pre- and post-training were essential in assessing the training's effectiveness or educational sessions (see Appendix J). The questionnaire revealed an overall improvement in the providers' knowledge. Question 1 focused on assessing the providers' understanding of the link between antipsychotics and metabolic syndrome. One of the five providers had excellent knowledge in the pre- and post-questionnaire. However, the other four providers showed an improvement in this understanding after the training. The second question showed that four of the five providers had no knowledge of the NCEP diagnostic criteria. The providers' knowledge of the criteria improved after the training. The questionnaire also showed improvement in the providers' knowledge of different screening measures for metabolic syndrome and how often this screening should occur. Lastly, the providers' knowledge improved for identifying the major health risks associated with the development and progression of metabolic syndrome.

Discussion/Conclusions

The project goal was achieved, as evidenced by the analysis of retrospective data. That goal was to increase the appropriate screening of metabolic syndrome by providers, as evidenced by the increased completion of metabolic monitoring forms and metabolic syndrome diagnosis. Across the four months of data collection, there was a consistent assessment of metabolic syndrome. The effort resulted in the assessment of 125 patients who received an antipsychotic prescription. Among this sample, 18 patients had incomplete metabolic monitoring forms. Incomplete forms resulted from their failure to return to the facility to take the ordered labs for fasting plasma glucose and a full lipid panel. During September 2020,

10 patients out of 36 had incomplete metabolic monitoring forms. This poor completion rate was a threat to the project's success.

The problem of incomplete forms was overcome. The use of a walk-in lab led to a sharp decline in the number of incomplete metabolic monitoring forms in subsequent data collection months. Use of the NCEP diagnostic criteria with data from the completed metabolic monitoring forms allowed appropriate diagnosis of metabolic syndrome. Using the NCEP diagnostic criteria, 59.2% of the 125 patients received a positive diagnosis for metabolic syndrome. In all four data collection points, the positive diagnoses were higher than the negative diagnoses. The results supported the notion that antipsychotics increase the risk of metabolic syndrome. Hence, there is a need to monitor the patients receiving these drugs.

There were some differences in the diagnosis of metabolic syndrome. The sample was predominantly African American when compared to Caucasian and Hispanic Americans. Of the 97 African Americans, 53 (54.6%) were positive for metabolic syndrome. Of the 22 Caucasian Americans, 16 (72.7%) were positive for metabolic syndrome. Of the 6 Hispanic Americans, 5 (83.3%) were positive for metabolic syndrome. These observations were consistent with research findings indicating that the prevalence of the metabolic syndrome is highest in Hispanics and lowest in African Americans. The prevalence of metabolic syndrome in Whites falls between the other two groups (Lear & Gasevic, 2020). The sample had a higher number of males when compared to females.

However, when considering the proportion of positive diagnosis in each gender, 45 (57%) of the 79 males were positive. Moreover, 29 (63%) of the 46 females were positive. These findings are consistent with research that shows that the prevalence of the metabolic syndrome is higher in women when compared to men. In a comparative study by Beigh and Jain (2012), the prevalence of metabolic syndrome was 29% and 23% in women and men, respectively. Aguilar et al. (2015) found that the prevalence of metabolic syndrome increases with age. The prevalence is highest in those aged 60 years and above. These findings were consistent with this project's observation where positive metabolic syndrome diagnosis was higher in the 60+ years group and for those aged 60 years, specifically. Therefore, the findings of the project are consistent with research findings in this area of study.

The project goal of achieving providers' satisfaction in screening for metabolic syndrome was mostly achieved. The provider satisfaction questionnaire shows that the providers were satisfied in most aspects. For example, the providers fully agreed that the recommended screening practices do not infringe on their freedom and autonomy to practice. Additionally, providers were confident of their ability to maintain good relationships with their colleagues and develop strong personal connections with patients. Both positive perspectives are necessary for improving the delivery of care and patients' health outcomes. Training or educational sessions are appropriate. These sessions improved the providers' knowledge about metabolic syndrome and screening for the condition using appropriate evidence-based tools or diagnostic criteria.

Limitations

A significant limitation identified in this project was the inability to conduct a training session for all providers simultaneously. The risk posed by COVID-19 made it necessary to provide training sessions separately for each participant. Joint training sessions would have been beneficial to the participants as they could have interacted and shared knowledge. COVID-19 also prevented most patients from coming to the clinic. This problem reduced the potential number of patients receiving antipsychotics or metabolic syndrome screening. From the self-administered questionnaires, providers found the recommended screening criteria overwhelming. It increased their already stretched workload. As it currently stands, providers see approximately 27 patients per day. Metabolic screening may further overwhelm them. The last barrier is associated with the fact that some patients may decline to take the labs that are necessary to complete the metabolic monitoring forms.

Section V: Recommendations and Implications for Practice

Implications in Relationship to DNP Essentials and Practice

The DNP Essentials II, VI, and VIII were relevant and guided the project and demonstrated the importance of applying these essentials to practice (Chism, 2015). The project reinforced DNP graduates' importance in providing leadership for quality improvement by evaluating, translating, and disseminating research findings. By evaluating and translating the available research findings, appropriate interventions

that help decrease the risk and impact of metabolic syndrome in patients using antipsychotics were identified. The implication is that DNPs should adhere to Essential II and provide leadership for quality improvements in their organizations or systems (Chism, 2015). Inter-professional collaboration served to create a team-based evidenced-based project that effectively enhanced patients' well-being and safety during the project. This approach was in tandem with the DNP Essential VI (Chism, 2015). The project team included a psychiatrist, nurse practitioners, and nursing assistants. The clinical practice implication is that a team consisting of different professionals led by DNP nurses can effectively achieve intended patient outcomes. This interprofessional approach to care satisfies the DNP Essential VIII, which highlights the importance of advanced nursing practice.

The project has relevant implications for the clinical site. First, it highlights the critical need to engage in evidence-based practice (EBP). Nurses use scientific evidence to make clinical decisions or drive quality improvement initiatives. The retrospective data suggested that the completion of metabolic monitoring form effectively increased the screening of metabolic syndrome and should be sustained in the clinical site. Maintaining the introduced screening protocol will ensure that the risk of metabolic syndrome progression is reduced in patients prescribed antipsychotics. It will also be vital to ensure that all providers receive training at the clinical site. The training should increase their confidence and knowledge about appropriately screening and diagnosing patients with metabolic syndrome. They should receive training to use the recommended evidence-based screening criteria (Melamed et al., 2019). With approval from the administration the use of the metabolic monitoring forms and the screening protocol will be embedded into the standard of care or practice present at the clinical site. The rationale behind such an approval will be based on the project's findings, which have shown that the interventions led to an increase in the screening, diagnosis, and monitoring of metabolic syndrome by providers.

Addressing the providers' workload problems may prove effective in improving their satisfaction and acceptance of the recommended screening. Griffiths et al. (2020) say that most American states have implemented mandatory staffing minimums to balance nurses' workload to improve patients' health outcomes. However, the authors also note that the required minimum staffing levels cannot meet some

patient care needs. In such cases, the staffing levels should be adjusted accordingly (Griffiths et al., 2020). The scenario in the project setting fits the case description where the adjustment of staffing levels is necessary. A proposal to the management outlining the project's overall benefits and reducing the providers' workload may help get additional providers in the facility, eliminating the workload barrier. A walk-in lab may increase the screening by reducing the number of patients who fail to come back to take their labs. Overall, the metabolic monitoring form will remind the providers to screen for metabolic syndrome. This approach will allow for early diagnosis of metabolic syndrome, which will improve patient health outcomes, especially in populations at the highest risk of developing the condition.

Dissemination of the DNP Project

The dissemination of the project findings will be necessary for improving its usefulness. Antipsychotics are effective and appropriate in managing different mental health illnesses and significantly increase the risk of developing metabolic syndrome. Metabolic syndrome is linked to serious health illnesses such as type 2 diabetes and cardiovascular diseases (del Campo et al., 2018). The project provided information about strategies useful for improving the screening and monitoring of metabolic syndrome in patients receiving antipsychotics. Effective dissemination of these research findings can improve the health outcomes of this group of patients. Providers can learn to make an early diagnosis of metabolic syndrome. Then, the introduction of appropriate interventions can mitigate the progression toward serious health conditions.

Dissemination in the project setting is important. The project's findings should be shared. However, different strategies to achieve the goal of dissemination are possible. The poster and PowerPoint presentation may aid in presenting the project findings to staff members during a meeting. An alternative strategy is to provide the staff members and the management with a written executive summary that gives an overview of the project and its overall findings. Scala, Price, and Day (2016) note that nurses at the clinical site or the bedside can identify and ask clinically relevant research questions. These questions allow for nursing research that informs professional practice. Disseminating the project findings in the clinical facility may help achieve this goal by motivating other staff members to appreciate

the importance of quality improvement initiatives. They can actively identify and pursue quality improvement opportunities in the clinical setting.

The poster presentation offers an additional dissemination option, where the project findings can be presented at the Nurse Practitioner conference. Additional dissemination options are available to help share the project findings with other health professionals and the general public. For example, it may be possible to present the project and its findings in a refereed publication. The process would involve creating and formatting a manuscript that would be reviewed and published in a refereed journal. The project's dissemination will also involve the submission of the project in the e-repository. The sharing of the published journal article will be helpful in disseminating the project findings to other branches of the organization or other facilities treating mental health patients either within or outside the United States.

Sustaining the Project

The project's sustainability is essential. According to Fleiszer et al. (2015), many healthcare initiatives do not persist over the long term in clinical facilities. Failure to sustain leads to wasting the implementation efforts and costs incurred in achieving the initial improvement. Sustaining the project will ensure that the positive outcomes are replicated in the facility, significantly increasing the screening of metabolic syndrome in all patients receiving antipsychotics. Project sustainability occurs by ensuring that all care providers in the facility undergo the training or educational sessions introduced for the project's original participants. It is possible to further refine the training sessions. An example is to introduce interactive teaching strategies that include sharing information, discussion, and group work. These activities have been effective in teaching evidence-based practice (Horntvedt et al., 2018). These training sessions will ensure the effective use of evidence-based screening criteria and metabolic monitoring forms to screen patients regularly. New employees should receive training during orientation. This training will prepare them for their role in the organization. The use of these interventions will ensure a standardized procedure for screening patients for metabolic syndrome. They will also increase the probability of this practice continuing over the long term. Continuing the run chart assessment will help in providing proof on whether the improvement in metabolic monitoring is being sustained over the long

term. For example, the run chart may reveal the achievement of a positive trend or shift in the screening of metabolic syndrome in patients using antipsychotics. Such a finding from the run chart will be essential in ensuring that the project receives the needed support to be sustained over time in the facility.

Support is needed to sustain the project. Consequently, it may be necessary to consider assessing additional outcomes. For example, it may be necessary to assess if the implementation of the project's interventions is linked to improved patients' health outcomes using antipsychotics. An improvement of health outcomes will buy support for a project. For example, the facility management is more likely to approve a request for more providers if the increased metabolic syndrome monitoring effectively improves patient health outcomes. Additionally, there may be a need to assess whether the patients are satisfied with metabolic monitoring in the facility. If there is high patient satisfaction and improved health outcomes, the staff members and the facility management will be more supportive of sustaining the project over the long term. The data also revealed a reduction in patients with incomplete metabolic monitoring forms after introducing a walk-in lab. The maintaining and refining of this laboratory model may be necessary for sustaining the project. Therefore, project sustainability is a huge concern. It is necessary to ensure the efforts made in implementing the quality improvement initiative do not go to waste.

In conclusion, screening for metabolic syndrome should occur for all patients receiving antipsychotics. The introduction of a metabolic monitoring form and an evidence-based screening tool can help increase the screening of metabolic syndrome in a clinical site. To enhance these interventions' effectiveness, providers' training or educational sessions may increase their knowledge and satisfaction with the recommended metabolic screening criterion. Implementation of these interventions in the project resulted in increased screening and diagnosis of metabolic syndrome as evidenced by the number of completed metabolic monitoring forms and the patients diagnosed with the condition. The improvement is especially significant considering that the screening was initially absent in the facility before the project initiation.

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Appendix A

Failure Mode Effect Analysis

	System function/Item	Failure mode	Failure potential cause	Failure effect/consequences	S	O	D	RPN
1.	Assess for patients' risk of metabolic syndrome.	Failure to regularly assess for and diagnose metabolic syndrome	Lack of an appropriate metabolic screening tool that providers in meeting this goal can use.	Inappropriate metabolic risk screening as providers use different screening techniques that do not necessarily capture all evidence-based assessment criteria.	9	8	8	576
			Providers can easily forget to assess for metabolic screening. This assessment is not prioritized in the mental health practice setting.	Metabolic syndrome is not detected in the patients, increasing their risk for physical comorbidities and adverse health outcomes.	9	7	8	504
			Mental health providers may have inconsistent knowledge needed to assess for the risk of metabolic syndrome appropriately.	Inappropriate metabolic screening, as knowledge is needed to accurately screen for criteria such as waist circumference.	9	5	8	360
2.	Prescription of psychotropic medications.	Prescription of psychotropic medications such as antipsychotics drugs significantly increases the risk of metabolic syndrome.	Failure to conduct baseline screening of metabolic syndrome to help prescribe an appropriate psychotropic hinders metabolic syndrome progression in patients already at risk. Increased prescription of antipsychotics due to their	Patients already at risk of metabolic syndrome will receive the antipsychotic prescription, which increases the risk of the syndrome progressing to physical comorbidities. Continued prescription of antipsychotics will increase	4	8	3	96

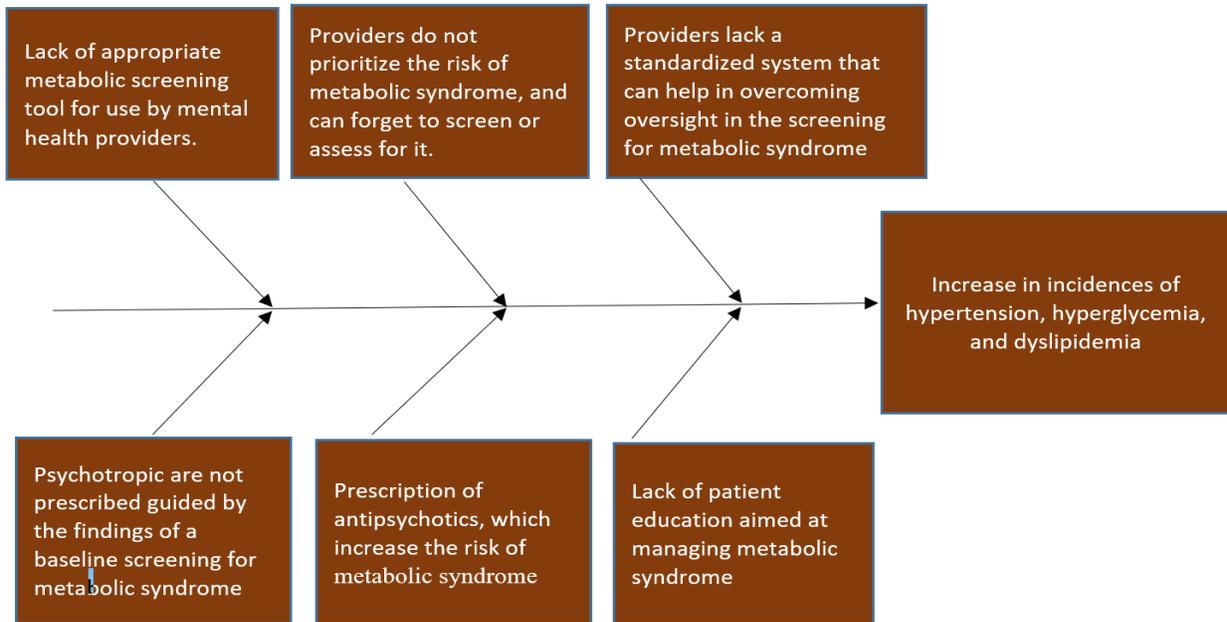
	System function/Item	Failure mode	Failure potential cause	Failure effect/consequences	S	O	D	RPN
			proven effectiveness in managing the symptoms of different psychotic conditions.	the patients' risk of metabolic syndrome, negatively affecting patients' health outcomes, especially if metabolic syndrome is not regularly screened.	3	8	3	72
3.	Patient education on strategies to reduce the risk of metabolic syndrome.	Failure to provide patients with education on strategies necessary in minimizing the risk of metabolic syndrome.	Providers do not prioritize assessing for metabolic syndrome and are unlikely to provide patient education.	Patients are not empowered to initiate lifestyle changes necessary to prevent metabolic syndrome and its related comorbidities.	3	8	8	192

Appendix B
SWOT Analysis

Strengths	Weaknesses
<ul style="list-style-type: none"> • Access to resources needed in completing the quality improvement project. • Evidence-based criteria available that can help in developing a screening tool. • Well qualified, experienced, and dedicated providers who can drive the needed quality improvement changes. 	<ul style="list-style-type: none"> • High prescription of antipsychotics. • Lipid panels in the facility are not conducted according to evidence-based guidelines. • Patients are rarely screened for metabolic syndrome due to providers’ oversight. • High incidences of dyslipidemia, hyperglycemia, and hypertension in patients
Opportunities	Threats
<ul style="list-style-type: none"> • Implementation of a screening tool and monitoring form will improve the monitoring of metabolic syndrome in the facility. • Increased confidence and incidences of metabolic syndrome screening among the care providers 	<ul style="list-style-type: none"> • Patients may fail to play their role in preventing the development of the metabolic syndrome. • If the screening requirements are time-intensive, providers may show resistance toward adopting the recommended plan due to an increased workload. • Undetected metabolic syndrome may lead to chronic health conditions that are costly to manage and have high mortality rates.

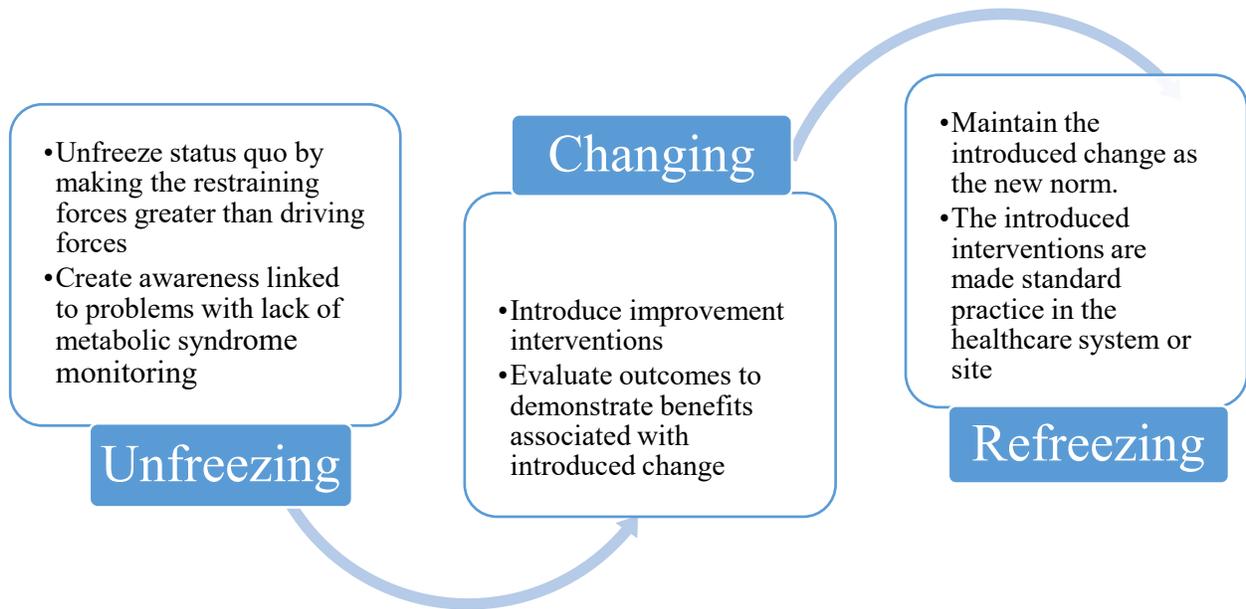
Appendix C

Need Assessment Fishbone Diagram



Appendix D

Lewin's Change Model



Appendix E

John Hopkins Nursing Evidence-based Practice Rating Scale

Evidence Levels	Quality Guides
<p>Level I Experimental study, randomized controlled trial (RCT) Systematic review of RCTs, with or without meta-analysis</p>	<p>A High quality: Consistent, generalizable results; sufficient sample size for the study design; adequate control; definitive conclusions; consistent recommendations based on comprehensive literature review that includes thorough reference to scientific evidence</p>
<p>Level II Quasi-experimental study Systematic review of a combination of RCTs and quasi-experimental, or quasi-experimental studies only, with or without meta-analysis</p>	<p>B Good quality: Reasonably consistent results; sufficient sample size for the study design; some control, fairly definitive conclusions; reasonably consistent recommendations based on fairly comprehensive literature review that includes some reference to scientific evidence</p>
<p>Level III Non-experimental study Systematic review of a combination of RCTs, quasi-experimental and non-experimental studies, or non-experimental studies only, with or without meta-analysis Qualitative study or systematic review with or without a meta-synthesis</p>	<p>C Low quality or major flaws: Little evidence with inconsistent results; insufficient sample size for the study design; conclusions cannot be drawn</p>

Appendix F

Evidence Matrix Table

Author (Year).	Purpose	Evidence Type/Sample	Results/Findings	Implications	Level of Evidence/ Quality of Evidence
Alosaimi et al. (2017).	The study aimed at investigating metabolic syndrome and its prevalence in patients with different psychiatric diagnostics.	Cross-sectional study. 966 participants	41.2% of the study sample had metabolic syndrome. This high prevalence of the condition was consistent across all psychiatric disorders. The different components of the metabolic syndrome had varying prevalence across the population. For example, the prevalence of reduced HDL cholesterol, high fasting blood sugar, high blood pressure, large waist circumference, and high triglycerides was 52.5%, 47.8%, 42.5%, 42.2%, and 32.8%, respectively.	The prevalence of the metabolic syndrome is high among all patients with psychiatric disorders, regardless of the specific diagnoses. Therefore, clinicians need to monitor and devise different preventive and management strategies to address this population's metabolic disorders.	III B
Chee et al. (2017).	The study aimed to provide information on different interventions that can be used to improve the monitoring of metabolic syndrome in young people undergoing treatment using metabolic syndrome.	Review	Mental health nurses should be in the frontline in driving initiatives for improving the monitoring of metabolic syndrome. Role confusion can hinder the monitoring of this syndrome in patients using antipsychotics. Patient education on the importance of screening can help in achieving the intended goal	Confusion on who is responsible for screening and monitoring patients for metabolic syndrome predisposes patients to this syndrome's health risk. Nurses should be metabolic syndrome monitoring champions in their clinical sites. Educating patients can be considered an appropriate intervention.	III B
Correll (2007)	The review aimed at providing insight on how a balance between safety and efficacy can be achieved when treating patients using antipsychotics.	Expert review or opinion	The review found that psychiatric care providers should be on the front line to achieve this goal by creating management plans that integrate the provision of both mental and physical health. Psychoeducation can also help create the needed balance and other strategies such as the careful selection of antipsychotics and routine screening	Providers can increase the screening, monitoring, and prevention of metabolic syndrome by considering both the benefits and safety risks posed by antipsychotics. Oversight on monitoring metabolic syndrome is because	IV A

Author (Year).	Purpose	Evidence Type/Sample	Results/Findings	Implications	Level of Evidence/ Quality of Evidence
			and monitoring of measures associated with metabolic syndrome.	most providers do not provide the risk posed by antipsychotics.	
Ho, Zhang, Mak, & Ho (2014).	The authors aimed at identifying an appropriate diagnostic criterion for metabolic syndrome and different strategies that can be used in managing the condition.	Review	<p>Diagnostic criteria should give equal attention to five major risk factor areas: fasting plasma glucose, blood pressure, triglycerides, HDL cholesterol, and central obesity/waist circumference.</p> <p>Factors causing metabolic syndrome have been identified as genetics, lifestyle factors, chronic inflammation, and the use of antipsychotic medication.</p> <p>Patients with chronic psychiatric illnesses should have a schedule to monitor metabolic syndrome. The monitoring should include assessments at baseline, 6 weeks, 12 weeks, 52 weeks, and 1 year.</p> <p>Management includes lifestyle modification and pharmacological agents to target the specific component of the patient's syndrome.</p>	<p>One should choose an appropriate diagnostic criterion in assessing the risk for metabolic syndrome, provided it covers the five essential aspects.</p> <p>A specific schedule should also be created for efficient monitoring of metabolic syndrome.</p> <p>Different management or treatment options can be used in patients with metabolic syndrome to improve health outcomes.</p>	III A
Hussain et al. (2017).	The study aimed at looking at psychiatric inpatients and the prevalence of metabolic syndrome in this population.	Cross-sectional study 213 inpatients	Metabolic syndrome was present in 34.74% of all participants. Females had a higher prevalence than males at 43.3% and 28.5%, respectively. This condition's prevalence was also higher in patients using second-generation antipsychotics, who accounted for 63.64% of all metabolic syndrome diagnoses.	The study shows a need to address the problem of metabolic syndrome in psychiatric inpatients to reduce the high prevalence and minimize the risk of cardiovascular disease conditions.	III B

Author (Year).	Purpose	Evidence Type/Sample	Results/Findings	Implications	Level of Evidence/ Quality of Evidence
Marvanova (2013).	To review the different strategies used in the management and prevention of atypical antipsychotic-induced metabolic side effects.	Review	<p>Baseline screening for metabolic syndrome and the selection of an appropriate atypical antipsychotic is an appropriate prevention strategy. Management is achieved through structured metabolic monitoring during treatment.</p> <p>Non-pharmacologic interventions such as nutritional counseling, physical exercise programs, and cognitive behavioral therapy can help manage weight, hyperglycemia, and dyslipidemia.</p> <p>Pharmacological interventions such as adjuvant medication and changing to a new antipsychotic medication can be considered.</p>	Different strategies can be considered in managing the risk of metabolic syndrome in patients using secondary generation antipsychotics. Screening for metabolic syndrome has been identified as an appropriate prevention and management strategy in achieving this goal.	III B
Melamed et al. (2019).	The study aimed to investigate different strategies that can be used to improve the screening of the risk for metabolic syndrome in patients undergoing treatment using antipsychotic medication.	Systematic review.	<p>Over 30 interventions were identified that fall into 3 different categories.</p> <p>The first category considers improvement strategies and interventions targeting providers and focused on providing providers with adequate skills and knowledge to change their practice and attitude toward metabolic risk screening.</p> <p>The second category considers improvement strategies that are aimed at patients. Interventions aim to provide patients with adequate education on the importance and skills needed in metabolic risk screening. The interventions were patient-centered and solely targeted patients.</p>	In addressing metabolic syndrome screening, healthcare providers have an important role to play. Additionally, patients should also be included and empowered to engage in this process. Lastly, system-wide changes in healthcare organizations may be necessary for creating a culture that supports screening.	II B

Author (Year).	Purpose	Evidence Type/Sample	Results/Findings	Implications	Level of Evidence/ Quality of Evidence
			The last category focuses on improvement interventions that target systemic issues. The strategies in this case have the objective of creating an organizational culture that prioritizes metabolic risk screening.		
Mitchell et al. (2013).	The study aimed at investigating the prevalence of metabolic syndrome among patients with schizophrenia and other related conditions.	Systematic review and meta-analysis	A systematic search and meta-analysis of 126 analyses in 77 publications was conducted. Overall, the prevalence of metabolic syndrome was 32.5%. The prevalence was not affected by factors such as gender, treatment setting, or country of origin. Older age had a modest effect on prevalence. A longer mental illness duration had the strongest influence on the prevalence of metabolic syndrome. The use of antipsychotics such as clozapine was associated with the highest prevalence when compared to unmedicated patients.	The overall prevalence of metabolic syndrome is high in patients with mental illness. Old age, longer duration of illness, and antipsychotics increase the risk of developing metabolic syndrome.	II B
Papanastasiou (2012).	The study's purpose was to identify interventions for managing metabolic syndrome in patients with schizophrenia or other mental illnesses.	Review	The study identified that clinicians have an important role in preventing metabolic syndrome by using a rigorous monitoring plan to detect early detection. Different recommendations and criteria for monitoring can be considered. Screening should focus on fasting plasma glucose, fasting plasma lipids, blood pressure, and BMI. This screening should be combined with standard psychiatric evaluation during regular follow-ups.	A care provider should prioritize screening for metabolic syndrome. It should be used together with standard psychiatric evaluation during regular follow-up for patients using antipsychotic medication.	III B

Author (Year).	Purpose	Evidence Type/Sample	Results/Findings	Implications	Level of Evidence/ Quality of Evidence
Riordan et al. (2011).	To review and summarize the literature for metabolic syndrome induced by antipsychotics and provide interventions for surveillance.	Review	There is sufficient evidence that shows a link between metabolic syndrome and antipsychotics. Owing to the effectiveness of antipsychotics in managing symptoms of conditions such as schizophrenia, the use of antipsychotics should be maintained while ensuring there is regular monitoring of metabolic syndrome measures in patients using this drug.	The use of antipsychotics is beneficial in mental healthcare. Regular monitoring of metabolic syndrome in patients using the drug can help in balancing its benefits and risks.	III A
Vancampfort et al. (2014).	The article aimed at investigating the prevalence and correlates of metabolic syndrome in patients with major depressive disorder.	Meta-analysis	From 18 studies, the overall prevalence of metabolic syndrome was 30.5% when using any standardized metabolic screening criteria. Factors such as age, gender, antidepressant use, psychiatric comorbidities, or geographical area did not affect the prevalence. The use of antipsychotics was linked to a significantly higher prevalence.	The prevalence of metabolic syndrome is considerably high in patients with major depressive disorder. The use of antipsychotics significantly increases the risk of developing the syndrome when.	II B
Waterreus & Laughame, (2009).	To introduce an algorithm and metabolic monitoring form that can help screen this condition in patients taking antipsychotics.	Expert Opinion	Monitoring of metabolic syndrome can be hindered by factors such as role confusion, time pressures, equipment availability, and inadequate patient cooperation. A predetermined clinical algorithm or criteria for monitoring metabolic syndrome can help in reducing these constraints.	The use of standardized criteria and metabolic monitoring form can be beneficial in simplifying and increasing the screening and monitoring of metabolic syndrome by providers.	IV A

Appendix G**Diagnostic Tool Used in Screening for Metabolic Syndrome**

NCEP-ATP III Diagnostic Criteria for Metabolic Syndrome	
Waist Circumference	Greater than 102 cm (40 inches) in men and greater than 88 cm (35 inches) in women
Fasting plasma glucose	Greater than 6.1 mmol/l or 110 mg/dL
Blood pressure	Greater than 130/85 mmHg
Triglycerides	Greater than or equal to 1.7 mmol (150 mg/dL)
HDL cholesterol	Less than 1.04 mmol (40 mg/dL) in men, and less than 1.29 mmol (50 mg/dL)

Appendix H

Metabolic Monitoring Form

Metabolic Monitoring Form							
Office Measurements							
<u>Measure</u>	<u>Risk Criteria</u>	<u>Date</u>	<u>Date</u>	<u>Date</u>	<u>Date</u>	<u>Date</u>	<u>Date</u>
Waist Circumference	>40 Inches in Men > 35 Inches in Women						
Blood Pressure	≥130/85 mmHg						
Weight							
Height							
BMI*	≥30						
Lab Results							
Fasting Plasma Glucose	≥110 mg/dL						
Triglycerides	≥150 mg/dL						
HDL Cholesterol	<40 mg/dL in Men <50 mg/dL in Women						

Appendix I

Recommended Schedule for Monitoring Patients

Retrieved from https://bpac.org.nz/magazine/2007/february/pdfs/bpj3_antipsychotics_pages28-31.pdf

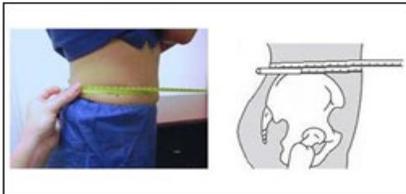
Schedule for Screening and Monitoring Metabolic Syndrome.				
Parameter	Baseline	Monthly	Quarterly	Annually
Weight/BMI	Yes	Yes		
Waist Circumference	Yes	Yes		
Fasting glucose	Yes	For persons at risk of high blood glucose levels, assessments should first be conducted monthly for a total of 3 months.	Yes, should be accessed every 3 months for one year for persons at risk.	Yes, annual monitoring after a lapse of one year.
Lipids	Yes		Yes, should be accessed every 3 months for one year for persons using antipsychotic medications.	Yes, annual monitoring after the first year.
Blood pressure	Yes	Yes		

Appendix J**“Provider Knowledge” Pre-Post Questionnaire**

1. How well do you understand the link between antipsychotics and metabolic syndrome?
2. Are you familiar with the diagnostic criteria for metabolic syndrome provided by the National Cholesterol Education Program (NCEP)? If not, are you aware of an alternative diagnostic criterion?
3. Which are the different measures that should be considered when screening for metabolic syndrome?
4. What are the major treatment or management goals in patients with metabolic syndrome?
5. How regularly should patients receiving antipsychotics be screened for metabolic syndrome?
6. What are the major health risks associated with the development and progression of metabolic syndrome?
7. How well do you understand the link between antipsychotics and metabolic syndrome?
8. Are you familiar with the diagnostic criteria for metabolic syndrome provided by the National Cholesterol Education Program (NCEP)? If not, are you aware of an alternative diagnostic criterion?
9. Which are the different measures that should be considered when screening for metabolic syndrome?
10. What is the major treatment or management goal in patients with metabolic syndrome?
11. How regularly should patients receiving antipsychotics be screened for metabolic syndrome?
12. What are the major health risks associated with the development and progression of metabolic syndrome?

Appendix K**Procedure to Measure Waist Circumference (CDC, n.d.)****How To Measure Your Waist Circumference²**

To correctly measure waist



circumference:

- Stand and place a tape measure around your middle, just above your hipbones
- Make sure tape is horizontal around the waist
- Keep the tape snug around the waist, but not compressing the skin
- Measure your waist just after you breathe out

Appendix L
Measurement Grid

A	B	C	D	E	F	G	H	I	J	K	L	M
Measure of Interest	Measure or Metric Needed	Time Period for Measure	Type of Measure	Operational Definition-Denominator	Denominator Exclusions	Operational Definition-Numerator	Numerator Exclusions	Data elements needed to operationalize the measure (list each data element separately, using	Level of Measure Need for Data	Location of data (clinical system, survey, quality department)	Requires Permission from Data Owner for Use (Y/N)	Data owner
Number of patients using antipsychotics who are screened for metabolic syndrome risk.	Number of completed metabolic monitoring forms	Every month	Outcome	Total number of patients receiving an antipsychotic	Patients using other other psychotropics that are not antipsychotics	Total number of patients receiving an antipsychotic and have been screened for metabolic syndrome evidenced by a completed metabolic monitoring form	Records where the completed metabolic monitoring form does not capture all the data provided in the screening tool	Number of patients using antipsychotics that have been screened for metabolic syndrome during the project period	Count-need ratio level data	Electronic Health Record Written Medical Records	No	Informatics department Medical Records Department
Accurate diagnosis of metabolic syndrome	Number of patients using antipsychotics that are diagnosed with metabolic syndrome using the evidence-based screening criteria	Every month	Outcome	Total number of patients treated by the providers requiring an antipsychotic prescription	Treated patients that were placed on other management plans that do not require antipsychotics	Total number of patients receiving antipsychotics that satisfy three of the five criteria for metabolic syndrome	N/A	*Hypertension *Hyperglycemia *Dyslipidemia *Central obesity	Count-need ratio level data	Electronic Health Record Written Medical Records	No	Informatics department Medical Records Department
Providers dissatisfaction	Rate of negative responses provided by the providers in the satisfaction questionnaire	Pre-post intervention	Balancing	Total number of providers involved in the project	Providers that are not part of the project team members	Total number of providers that report dissatisfaction in the self-administered questionnaire	Total number of providers that report satisfaction in the self-administered questionnaire	Responses provided in the self-administered provider satisfaction questionnaire	Count-need ratio level data	Survey or questionnaire	No	Project author
Providers satisfaction	Rate of positive responses provided by the providers in the satisfaction questionnaire	Pre-post intervention	Process	Total number of providers involved in the project	Providers that are not part of the project team members	Total number of providers that report satisfaction in the self-administered questionnaire	Total number of providers that do not report satisfaction in the self-administered questionnaire	Responses provided in the self-administered provider satisfaction questionnaire	Count-need ratio level data	Survey or questionnaire	No	Project author

Appendix M**Provider Satisfaction Questionnaire**

1. My current work situation is a major source of frustration. (1 yes, 0 no)
2. I am overwhelmed with the recommended screening of metabolic syndrome and meeting other needs of my patients. (1 yes, 0 no)
3. Work encroaches on my personal time. (1 yes, 0 no)
4. The recommended criteria for screening, diagnosing, and managing metabolic syndrome restricts my freedom to practice. (1 yes, 0 no)
5. My work in this practice has not met my expectations. (1 yes, 0 no)
6. Overall, I am not satisfied with my current place of work. (1 yes, 0 no).
7. I do not get along well with my colleagues. (1 yes, 0 no).
8. I do not feel a strong personal connection with my patients. (1 yes, 0 no).

Appendix O

TWU Quality Improvement Checklist

TEXAS WOMAN'S UNIVERSITY		
QUALITY IMPROVEMENT CHECKLIST		
Bolanle Olayiwole		
Date:	05/17/2020	
Department:	Nursing Department	
Project Title:	Increasing Providers' Screening for Metabolic Syndrome in Psychiatric Patients	
Project Leader Name:	Shelley Hawkins, PhD, RN, FNP-BC	
Instructions:	YES	NO
Answer YES or NO to each of the following statements:		
The purpose of the project is to: (mark which is true):		
<ul style="list-style-type: none"> • improve the process or delivery of care with established /accepted quality standards • improve performance on a specific service or program 	<input checked="" type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
The project is <u>NOT</u> designed to:		
<ul style="list-style-type: none"> • develop or contribute to generalizable knowledge • test the effectiveness of a new intervention on clinical quality 	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
The project does <u>NOT</u> follow a research design (such as testing a hypothesis, randomization of patients, or group comparison).	<input checked="" type="checkbox"/>	<input type="checkbox"/>
The project is flexible to make on-going changes as needed to improve the process or delivery of care, activity or program, and is guided by data, actual experiences or clinical results.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
The project does <u>NOT</u> follow a protocol that over-rides individualized clinical decision-making.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
There is <u>NO</u> intention of using the data for research purposes.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
The project is conducted by faculty, staff, and/or students who provide care or are responsible for performance quality at TWU.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
The project involves as 'participants' TWU faculty, staff, students, or patients who are seen by them.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
The project has <u>NO</u> funding from research-focused government agencies, sponsors or organizations, and is not receiving funding for the implementation research.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
The project has <u>NOT</u> been approved by another institution's or agency's IRB as a research study and is not otherwise being conducted under IRB oversight.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
ANSWER KEY:		
<ul style="list-style-type: none"> • If the answer to ALL of the questions is YES, the activity is likely a Quality Improvement/Measurement activity that does not meet the definition of research, and therefore may not require IRB review. • If the answer to ANY of the questions is NO, the project likely <i>does</i> meet the definition of research and will likely require IRB review. 		
<p><i>For verification, submit your completed checklist to the IRB office with any supporting documentation (e.g. project outline/summary, data collection materials, grant/contract, etc.). If you are unsure of any information contained on this form, contact the IRB office: 81-3378 or research@twu.edu.</i></p>		

Appendix P
Operational Definitions

Study Concept [from PICOT question]	Variable	Operational Definition	Data Calculation
Date	Data Collection Date	1 st Sept to 30 th Sept. 2020 = Group 1 1 st Oct to 31 st Oct. 2020 = Group 2 1 st Nov to 30 th Nov. 2020 = Group 3 1 st Dec to 31 st Dec. 2020 = Group 4	Numerator = number of patients screened Denominator = total patients seen that day
Demographic	Gender	Per the EHR: Male = 1 Female = 2	Nominal
Demographic	Race/Ethnicity	1 = African American 2 = Caucasian American 3 = Hispanic American	Nominal
Diagnosis	Metabolic syndrome Diagnosis	Per the screening tool: Positive = 1 [3 or more abnormal measures) Negative = 2 [Less than 3 abnormal measures)	Numerator = number of patients screened positive Denominator = total patients, both positive and negative
Clinical Parameters			
Waist Circumference	Abnormal Waist Circumference	Per the EHR: Yes= 1 [More than 40 or 35 inches in men and women] No - 2	Numerator = number of patients screened Yes Denominator = total patients both Yes and No
Blood pressure	Abnormal Blood Pressure	Per the EHR: Yes= 1 [systolic of more than 130 and diastolic of more than 85] No = 2	Numerator = number of patients screened Yes Denominator = total patients both Yes and No
Fasting glucose		Per the EHR:	

Study Concept [from PICOT question]	Variable	Operational Definition	Data Calculation
Triglycerides	Abnormal Fasting Glucose	Yes= 1 [fasting glucose of 110 mg/dL or more] No = 2	Numerator = number of patients screened Yes Denominator = total patients both Yes and No
	Abnormal Triglycerides	Per the EHR: Yes= 1 [triglyceride of 150 mg/dL or more] No = 2	Numerator = number of patients screened Yes Denominator = total patients both Yes and No
HDL Cholesterol	Abnormal HDL Cholesterol	Per the EHR: Yes= 1 [HDL of 40 and 50 mg/dL or more in men and women] No = 2	Numerator = number of patients screened Yes Denominator = total patients both Yes and No

Appendix Q

Excel File Data Imports into IBM SPSS

Case Num	Demographic Gender [Male 1, Female 2]	Demographic Age	Demographic Race [African American = AA, Caucasian = CA, Hispanic = HA, American = AA]	Dx: Met Syndrome screening tool score [NCEP-ATP III, sum of abnormals]	Dx: Met Syndrome Tool [Pos 1 "3 or more", Neg 2]	Abnormal Waist Circumference	Normal Waist Circumference	Waist Cir [Abnormal Yes 1, No 2]	Abnormal Blood Pressure	Normal Blood Pressure	Blood Pressure [Abnormal Yes 1, No 2]	Abnormal Fasting Plasma Glucose	Normal Fasting Plasma Glucose	Fasting Glucose [Abnormal Yes 1, No 2]	Abnormal Triglycerides	Normal Triglycerides	Triglyceride [Abnormal Yes 1, No 2]	Abnormal HDL Cholesterol	Normal HDL Cholesterol	HDL Cholesterol [Abnormal Yes 1, No 2]
001	1	41	AA	3	1	42		1	101/72		2	113		1		67	2	39		1
002	1	48	AA	5	1	43		1	140/98		1	216		1	152		1	34		1
003	1	52	AA	2	2	42		1	156/89		1		89	2		66	2		50	2
004	2	59	CA	3	1	36		1	101/82		2	142		1		123	2	46		1
005	1	55	CA	4	1	48		1	150/93		1	220		1		149	2	35		1
006	2	43	AA	1	2	46		1	120/90		2									
007	1	40	AA	3	1		37	2	156/94		1	112		1	185		1		60	2
008	1	66	AA	0	2		38	2												
009	1	22	AA	0	2		34	2	121/87		2		87	2		68	2		41	2
010	1	36	AA	0	2		29	2	118/87		2									
011	1	52	AA	3	1	44		1	134/87		1	198		1		138	2		42	2
012	1	60	CA	3	1		34	2	138/105		1	201		1	247		1		64	2
013	1	40	AA	2	2	42		1	112/77		2		86	2	178		1		58	2
014	2	56	AA	4	1	56		1	144/90		1	244		1	179		1		59	2
015	1	62	AA	3	1	37		1	141/98		1		84	2	182		1	39		1
016	1	32	AA	3	1	38		1	138/96		1		99	2	160		1	34		1
017	1	64	AA	1	2		32	2	152/82		1									
018	2	42	HA	5	1	38		1	133/76		1	185		1	152		1	33		1