

MANAGING ANTIPSYCHOTIC INDUCED METABOLIC SYNDROME
TO IMPROVE TREATMENT ADHERENCE AND QUALITY
OF LIFE IN GALLATIN COUNTY

by

Shelby Leigh Frye

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DEDICATION

This project is dedicated to my husband, Ian Frye for unintentionally being the source of my inspiration and persistence. My love for you is unwavering; our passions, struggles, and successes so similarly replicate the invigorating strength in the folks I created this project for and I feel so fortunate to share such a beautiful life and family with you. I couldn't have done this without you and I know that together we will continue to flourish on this path of growing old together and making a difference in the world. Thank you.

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NOMENCLATURE

SMI - Serious Mental Illness is a chronic mental illness that causes significant functional impairment such as anxiety, bipolar disorders, major depression, schizophrenia and other psychotic disorders.

EPS - Extrapyramidal Symptoms are a category of side effects from antipsychotic medications caused by dopamine antagonism in the mesocortical pathway of the brain.

FGA - First Generation Antipsychotics also known as typical antipsychotics, typicals, or conventional antipsychotics introduced in the 1950's.

SGA - Second Generation Antipsychotics also known as atypical antipsychotics or atypicals are a class of psychotropic medications introduced in the 1990's characterized by the addition of serotonin antagonism to the pharmacological profile intended to decrease EPS caused by FGAs.

BMI - Body Mass Index is a measure of an adults weight in relation to their height; <25 is considered normal weight, 25-30 is overweight, >30 is obese; respectively.

GMHC - Gallatin Mental Health Center is an affiliate of Western Montana Mental Health Center the location of the 72 hour crisis facility called the Hope House, a community mental health center in Bozeman, Montana.

HIP - Health Improvement Profile is an evidence based intervention that is used in the United Kingdom to assist nurses with general health screenings and interventions for patients diagnosed with a SMI.

MAC - Metabolic Assessment Checklist is the nursing intervention created in this project for the consumers of GMHC taking atypical antipsychotics.

ABSTRACT

Atypical antipsychotics are prescribed for patients suffering from serious mental illnesses. As these medications have become more widely used over the past 3 decades, practitioners have started to become more aware of metabolic side effects caused by them. Metabolic syndrome is a term for alterations in baseline metabolic functioning which result in weight gain, hyperlipidemia, hypertension, insulin resistance, diabetes, and cardiovascular disease. A correlation between obesity and mortality exists within the population of individuals diagnosed with a severe mental illness taking atypical antipsychotics and has been reported as responsible for decreased life expectancy of up to 30 years. However, monitoring the physical side effects has been a significant barrier to successful management for these patients, often due to unclear practice direction between psychiatric and primary care providers. Many patients with metabolic syndrome experience exacerbations in their mental illness such as increased depression, anxiety, and isolation related to discomfort and decreased self-esteem, which can lead to medication nonadherence causing further complications. Patients experiencing emotional decline may be unable to participate in necessary lifestyle modifications without assistance, leading to the progression of metabolic syndrome. Such health related spirals contribute to the development of treatment resistance and poor patient outcomes. At the Gallatin Mental Health Center in Bozeman, MT, 23 patients taking atypical antipsychotics were provided a qualitative satisfaction survey about medications, treatment plans, and adherence, in addition to being offered an opportunity to make recommendations that could improve their overall health. In accordance with research and successful interventions internationally, a significant number of the patients in Bozeman have experienced metabolic changes, have difficulty remembering or understanding treatment goals, and would like assistance with lifestyle interventions. Using evidence based research and recommendations for metabolic syndrome prevention assessments and interventions a physical health assessment checklist for psychiatric nurses at Gallatin Mental Health was created. An assessment key to assist the nurse with the checklist, a prefabricated order set of interventions, and a simple care plan to guide best practice policy implementation will provide for better treatment adherence and improved quality of life for patients taking atypical antipsychotics in Gallatin County.

CHAPTER 1

INTRODUCTION TO THE PROJECT

Introduction

The specialty of psychiatric nursing provides an opportunity for a nurse to work with clients experiencing a multitude of mental health challenges. Depression, bipolar disorder, schizophrenia and other psychotic disorders, anxiety disorders, posttraumatic stress disorder, attention deficit hyperactivity disorder, and personality disorders (National Alliance for the Mentally Ill [NAMI], 2014) are among many of the diagnoses for which the psychiatric nurse will need to be competent and proficient in her care. In addition to the psychological symptoms that clients experience with each diagnosis, many physical complications co-occur and can be detrimental to quality of life and successful adherence to treatment.

Specific educational programs to provide psychiatric proficiency to nurses trained in general caregiving can be initiated by the nurse or provided by the employment facility at any time in their career to assist with competency required to work in a behavioral health facility. Such programs often focus on safety management and may include Crisis Prevention Interventions (CPI, 2014) or Mandt (The Mandt System, 2014) with focus on non-violent verbal de-escalation and crisis management techniques. Additionally, restraint and seclusion use, suicide prevention, mental status assessments, and psychotropic medications are integral parts of a psychiatric nurse's education and career.

Psychiatric nurses are expected to understand the side effects of many different classes of psychotropic medications such as antidepressants, stimulants, mood stabilizers, anxiolytics, and antipsychotics and their side effect profiles. However, unless working in an outpatient community setting, addressing long term side effects and resulting co-occurring conditions may not be pertinent or applicable to their nursing care plans. The client's physiological wellbeing could become gradually compromised by side effects of long term use of psychotropic medications.

There are many reasons long term side effects may go unmanaged. Clients may not have a primary care physician (PCP). The PCP might not be familiar with psychotropic medications and/or might believe the psychiatric provider is managing potential repercussions from mental health medications. On the contrary, the psychiatric provider may believe the client's PCP is addressing physical health needs and any co-occurring physical complications. Any combination of this break in continuity of care can prevent successful health outcomes for the patient. This is often the case at Gallatin Mental Health Center (GMHC) in Bozeman, Montana, especially for clients taking second generation antipsychotics (SGAs).

Atypical antipsychotics (or SGAs) in particular can slowly alter baseline metabolic functioning resulting in weight gain, hyperlipidemia, hypertension, insulin resistance, diabetes, and cardiovascular disease; a suite of pathologies collectively termed metabolic syndrome. Metabolic syndrome is not as easy to detect as some of the immediate adverse effects caused by the other medication classes listed but can be just as life threatening. Therefore, the nurse in the behavioral health environment needs a tool

for better tracking that will assist with the necessary assessments, actions, and education to decrease the prevalence of metabolic syndrome when initiating SGA treatment.

Background and Significance

Antipsychotics are prescribed primarily for patients diagnosed with schizophrenia who experience symptoms such as hallucinations and delusions. However, they can also be effective in treating the manic and depressed phases of bipolar disorder as well as augmenting treatment for resistant depression and anxiety (Stahl, 2013). Previous to the development of SGAs, first generation antipsychotics (FGA) were introduced in the 1950's. Although effective in treating schizophrenia, FGAs were noted to have multiple, severe, and sometimes permanently debilitating side effects caused by blocking dopamine D₂ receptors in the brain. The side effects, termed neuroleptosis presented as psychomotor slowing, anhedonia, apathy, and withdrawal from social interactions and interests. Also common with this class of drugs is hyperprolactinemia and a Parkinson's-like appearance collectively named extrapyramidal symptoms (EPS) that can become a permanent hyperkinetic movement disorder called tardive dyskinesia, which consists of jerking movements, facial grimacing, and unintended chewing motions (Stahl, 2013).

Nearly 40 years after the original antipsychotic medication breakthrough, atypical antipsychotics were introduced with equally effective antipsychotic action by D₂ antagonism but with the addition of a serotonin (5HT_{2A}) receptor antagonism that increases mood regulation and comparatively very few EPS side effects (Stahl, 2013). The atypicals currently used in the US are clozapine (Clozaril), olanzapine (Zyprexa),

quetiapine (Seroquel), asenapine (Saphris), risperidone (Risperdal), paliperidone (Invega), ziprasidone (Geodon), iloperidone (Fanapt), lurasidone (Latuda), and aripiprazole (Abilify). Of the medications listed, only iloperidone (Fanapt) is not utilized at GMHC in Bozeman, Montana.

As SGAs have become more widely used over the past 3 decades, practitioners have started to become more aware of the metabolic side effects caused by them. Usually beginning with increased central or abdominal obesity as the hallmark of metabolic syndrome, this increased weight gain then causes dyslipidemia, insulin resistance, and hypertension thus predisposing the client to cardiovascular disease and type 2 diabetes (Scott & Happell, 2011). An international study of individuals with serious mental illnesses (SMI) showed an obesity rate twice that of the general population. Clearly, there is a significant co-occurrence of physical health complications for folks with a SMI diagnosis (Scott & Happell, 2011).

A correlation between obesity and mortality exists within the population of individuals diagnosed with SMI. Mortality ratios are up to five times higher than expected in the US and an increase in life years lost from nine years between 1989-1994 to up to 30 years from 1997-2002 is noted (Scott & Happell, 2011). Cause of death in this population due to suicides and accidents accounts for less than one third of their premature deaths around the world, implying that the other two thirds are related to cardiovascular disease, cancer, respiratory diseases, ischemic heart disease, or natural causes that may all be preventable through lifestyle changes (Scott & Happell, 2011).

Looking at people diagnosed with SMI around the world, a similar trend in obesity is observed. A Canadian study of 183 people with schizophrenia reported 42% prevalence of obesity (BMI>30), 3.5 times greater than a National Population Health Survey from 15 years prior (Scott & Happell, 2011). For adults living with SMI in the US, 80% consider their health as poor or fair while there is 46% prevalence of obesity in patients with schizophrenia or other mood disorders (Scott & Happell, 2011). In the UK a sample of 600 individuals with schizophrenia was 35% obese compared to 19% in the general public. Nearly all other countries in the world also report a two-fold increase in obesity prevalence compared to the rest of their country for individuals living with SMI (Scott & Happell, 2011).

Obesity is physically and emotionally uncomfortable. Increased body size causes movement limitations and is correlated to a negative body image, which then creates additional challenges such as increased depression and anxiety, increased avoidance of social situations, and decreased self-esteem resulting in decreased quality of life (Meekums, 2005). In a population with ongoing affective challenges, gaining weight adds to the already difficult tasks of appearing in public, participating in exercise regimens, and eating well. Although research shows that physical activity provides a sense of well-being, the social stigma, embarrassment, and expectations from family, friends, and health care providers renders an obese individual even more incapable of adhering to consistent programs necessary for weight loss and improved physical health and quality of life (Wiklund, Olsen, & Willen, 2011).

In 2004, the FDA provided recommendations for routine screening in patients taking atypical antipsychotics. Supported by the American Diabetes Association (ADA) the guidance was requested to specifically monitor for rapid weight gain that could contribute to obesity, diabetes, and heart disease (Phend, 2008). Later in the decade, glucose monitoring rates increased by a modest 20% for blood glucose and 10% for lipids. Physicians were claiming to be aware of the high risk and need to screen, however, of the screening rates presented at an ADA conference in 2008, it was mentioned that a 2006 study found blood sugar screening was 25.6% prior to the initiation of FDA recommendations and only increased to 45.5% the following month. Additionally, lipids were being screened at a consistently lower rate from around 8.9% to 26.9% (Phend, 2008). Self-reported rates of screening was high, however, contrary to the ADA findings, many studies found that psychiatrists did not consider screening part of their responsibilities, most mental health offices are not equipped to draw blood (which creates a low adherence to the recommended monitoring), and tests were believed difficult to interpret and treat (Phend, 2008).

Among the psychiatric patient community, there exists a significant issue with treatment adherence resulting in "...unnecessary disease progression, disease complications, reduced functional abilities, lower quality of life, and even death" (Worley & McGuinness, 2010, p.19). The National Council on Patient Information and Education (NCPPIE) called the medication nonadherence problem "America's other drug problem" (Worley & McGuinness, 2010, p.20). Barriers to medication adherence include cost, attitudes and beliefs, acceptance of diagnosis, dosing schedules, stigma, medication side

effects, deficits in continuity of care, and advertisements that broadcast competing and conflicting information (Worley & McGuiness, 2010). Not only does nonadherence pose complications for reestablishment of treatment later on due to the development of treatment resistance but it causes poorer treatment outcomes (Laakso, 2012). The destabilization of the patient's independent functioning can provide a catalyst for co-morbid conditions such as self-medication through drug/alcohol use, physical deteriorations resulting from lack of self-care, and increased risky behaviors that are a signature of SMI, resulting in symptom exacerbation, suicidal ideation and attempts, and re-hospitalization (Laakso, 2012). Studies have shown that current medication adherence rates among mentally ill patients of all ages is around 50% (Laakso, 2012) for which the ultimate costs weigh heavily on patients and society as a whole. Recommendations for specific interventions to increase medication adherence are not unanimous, however, the best evidence points to the use of motivational interviewing, improved communication, patient education programs, and behavioral strategies to break through some of the aforementioned barriers.

The problem with adherence underscores the need for health care professionals in the mental health field to increase their focus on medical co-morbidities through assessment and primary prevention interventions. Nurses are in a position to influence preventable contributing factors to poor health conditions related to minimal physical activity, poor diet, risky sexual behavior, and increased smoking and substance abuse among clients taking antipsychotic medications (Scott & Happell, 2011). By focusing on co-morbidities the nurse will be able to close the gap between obesity and age of death

for individuals with and without SMI. Therefore, it is essential that mental health nurses in the community systematically address the potential for metabolic syndrome and initiate a plan of care that will outline and provide management based on the individual needs of each client starting on antipsychotic therapy.

Purpose of the Project

The delivery of psychiatric care today in the outpatient setting is a different mental health environment than what inpatient psychiatric care has looked like in the past. The focus of nursing care needs to change to meet patients where they are from a community based approach. Emphasis is now put on long-term care to increase independence, provide health maintenance, education and collaboration, and teaching patients prevention interventions to improve overall quality of life. Due to overwhelming evidence pertaining to compromised physical health around the globe, the contemporary psychiatric nurse must be equipped to address the prevalence of atypical antipsychotic induced metabolic syndrome. Therefore, the two aims of this project are to: 1) assess and determine the needs of clients who meet criteria for the targeted at-risk population and receive services at GMHC 2) create a comprehensive screening process and order set for the GMHC nurse to provide the client with a care plan listing specific education strategies and management interventions based on personalized risk factors.

The results of this project will provide the GMHC nursing department with a simple assessment tool for preventative management of SGA induced metabolic changes. The tool will be used to implement a care plan with interventions specific to resources at

GMHC. Short term goals consisting of lifestyle modifications, education opportunities, and coordination of care for clients will provide for the long term goal of increasing treatment adherence and subsequently improving quality of life.

Organization of the Remainder of the Project

Chapter 1 discussed the pertinent background related to the development of metabolic syndrome for patients with SMI taking antipsychotic medications. Chapter 2 will review literature on the physical side effects of psychotropic medications, prevalence of metabolic syndrome, current management recommendations, and SMI clients served in Gallatin County, Montana. Chapter 3 will discuss the SMI Health Improvement Profile (HIP) tool recommended for national use by mental health nurses for identification of physical health conditions in patients with serious mental illnesses and compare to a client knowledge and satisfaction survey implemented at GMHC in Bozeman, Montana. Chapter 4 will provide a summary of findings from the collected qualitative survey results, implementation objectives of a working order set for best practice, and training and application recommendations at GMHC. Chapter 5 will discuss and summarize implications and challenges to the policy development in community mental health settings.

CHAPTER 2

REVIEW OF LITERATURE

The literature review utilized Montana State University's online library resources with a specific delineation of Nursing & Medicine Resources chosen through electronic databases including CINAHL, PubMed, MEDLINE, Academic Search Complete, Academic Search Elite, Health Source: Nursing Academic Edition, Psychology & Behavioral Sciences Collection, Health Source – Consumer Edition, UpToDate, and Global Health. Peer reviewed journal articles were chosen from the last ten years (with emphasis on the last five years) based on a combination of the following key words: metabolic syndrome, atypical antipsychotic, second generation antipsychotic, mental health, mental illness, serious mental illness, lifestyle, lifestyle modifications, interventions, pharmacology, multidisciplinary, collaboration, treatment, adherence, compliance, satisfaction, quality of life, health promotion, health improvement, health improvement profile, and prevention.

Atypical Antipsychotics

Atypical antipsychotics are a class of pharmacologically complex psychotropic drugs intended to target receptors in the brain thought to be responsible for a variety of severe mental illnesses such as schizophrenia, bipolar disorder, and treatment resistant depression (Stahl, 2013). Unlike previous (typical) antipsychotic medicines, atypicals are better at balancing extreme side effects. They exhibit a unique ability to decrease EPS

and hyperprolactinemia while equally managing positive (outward or obvious) and negative (inward or without) symptoms of psychosis (Stahl, 2013). Among the positive symptom profile are disorders of thinking; grandiose, religious, or persecutory delusions, auditory, visual, or tactile hallucinations; and disorganization of behavior and speech such as incoherence or illogicality, catatonia, and socially inappropriate bizarre behaviors (Stuart, 2009). In contrast, a flat affect, limited emotional expression, loss of thought, speech, motivation, pleasure, focus, and goal direction are among the negative symptoms (Stuart, 2009). In addition to psychosis, atypicals can be effective in managing mood symptoms, cognitive impairments, hostility, suicidal behavior, violence, and difficulty with socialization (Stuart, 2009).

Typical antipsychotics decrease dopamine action in the brain. Excessive dopamine in the mesolimbic pathway is responsible for positive psychotic symptoms, a major symptom target for FGAs. Unfortunately, many typicals cause excessive dopamine antagonism in the mesocortical pathway responsible for intolerable negative side effects such as the previously mentioned EPS in addition to catatonia, anhedonia, apathy, alogia, and affective flattening in patients suffering from schizophrenia (Mandal, 2014). In contrast, the new generation of antipsychotics are pharmacologically different with very minimal side effects. The difference is related to the serotonin-dopamine antagonistic pharmacological confluence prevalent in all atypicals, with the exception of Abilify (Stahl, 2013). The addition of a greater receptor binding capacity by 5HT_{2A} is responsible for stimulating downstream dopamine release in the striatum mitigating EPS and prolactin production and is the signature for why these medications are ‘atypical’

(Stahl, 2013). There are several other types of serotonin receptors affected by atypicals throughout the brain; 5HT_{1A}, 5HT_{2C}, 5HT_{1B/D}, 5HT₃, 5HT₆, and 5HT₇ each with varying degrees of receptor agonism or antagonism and a wide range of pharmacologic properties such as antidepressant, pro-cognitive, learning/memory, circadian rhythm regulation, anti-nausea/vomiting, bowel regulation, and weight gain (Stahl, 2013). In summary, each of the atypicals are chemically composed of properties that agonize and antagonize dopamine and serotonin, which compared to typical antipsychotics provide a more balanced dopamine stimulation and blockade in the brain responsible for providing the atypical therapeutic window.

Clozapine (Clozaril)

Clozapine was the first antipsychotic to be recognized as atypical because of its low side effect profile. It has few if any extrapyramidal symptoms and it rarely causes tardive dyskinesia or elevated prolactin (Stahl, 2013). The pharmacologic profile of clozapine is extremely complex. As a serotonin-dopamine antagonist (SDA) the presence of 5HT_{2A} antagonism combined with the D₂ antagonism is why it is atypical yet it also binds with up to 20 more receptors of unknown significance (Stahl, 2013). Clozapine can cause discouraging side effects such as sedation related to potent M₁-muscarinic, H₁-histaminic, and α_1 -adrenergic receptor antagonism; weight gain associated with the blockage of H₁-histamine and 5HT_{2C} receptors; excessive salivation, constipation, myocarditis, seizures, and especially agranulocytosis that requires frequent and regular blood draws and monitoring (Stahl, 2013). Clozapine is primarily metabolized by the CYP450 1A2 pathway, an important dosing consideration with the common habit of

smoking among the mentally ill population. Smoking can induce metabolism of clozapine and may alter serum concentration, requiring a higher daily dose (Singh, Ketter, & Chang, 2010). Even though clozapine is considered the ‘gold standard’ for schizophrenia because of efficacy and the potential for an Oliver Sachs type “awakening” it is usually the last line of defense due to its complexities and side effects (Stahl, 2013, p.182).

Olanzapine (Zyprexa)

Pharmacologically similar to, and a more potent SGA than clozapine, olanzapine is also atypical without the conventional side effects of EPS at low and high doses and is rarely responsible for increasing prolactin levels (Stahl, 2013). Although it has a higher probability of inducing weight gain, insulin resistance, and triglycerides, olanzapine can be less sedating than clozapine and it is very effective for psychotic symptoms and mood regulation in schizophrenia, bipolar disorder, and treatment resistant depression, especially when combined with fluoxetine (Stahl, 2013). Olanzapine is often used at higher doses in clinical practice than was originally studied resulting in greater efficacy as well as increased side effects (Stahl, 2013). The 10-15mg daily recommendation is pushed up to 40mg in special cases both inpatient and outpatient. Similar to clozapine, olanzapine is metabolized by the CYP450 1A2 pathway and can exhibit reduced serum drug levels when metabolism is induced by cigarette smoking through the same pathway (Jibson & Hermann, 2014). In 2004, olanzapine was approved for treatment of mania in adults and in 2009, the FDA added manic or mixed episodes of bipolar I in adolescents age 13-17 (Singh *et al.*, 2010). Olanzapine has a rapid onset, is available in orally dissolving tablets (ODT) and intramuscular injections (IM) for acute management, and a

long acting formulation for monthly maintenance (Stahl, 2013). It has a high response rate in adults and adolescents and therefore, unless increased weight or cardiometabolic risks are present, olanzapine should be considered an appropriate first line of pharmacologic management for patients over age 13 with psychotic and manic symptoms of schizophrenia (including acute agitation) and bipolar disorder (Stahl, 2011). Monitoring BMI, waist circumference, triglycerides, fasting glucose and lipids, and BP prior to olanzapine therapy and every three months for the first year is recommended (Jibson & Hermann, 2014). Prescribers are advised to consider changing agents if weight gain occurs (Stahl, 2011).

Quetiapine (Seroquel)

Norquetiapine, the active metabolite in quetiapine is responsible for the unique pharmacologic properties of this SGA. The clinical profile, including a robust antidepressant effect, is very complex in its capability to bind less to the D₂ receptors than the previous medications but to numerous other neurotransmitter receptors providing action beyond that of other antipsychotics (Stahl, 2013). Available in immediate release (IR) and extended release (XR) formulations, the drug has very different actions based on the binding profile at different formulations and dosages from 50-800mg (Stahl, 2013). For example, a lower dose of 25-50mg IR formulation at bedtime has a prominent quick peak sedative-hypnotic effect for rapid onset of sleep due to H₁-histamine antagonism. Antagonism of 5HT_{2A} takes priority at a 300mg dose to provide excellent antidepressant action and at 600-800mg increased norepinephrine transporter inhibition, 5HT_{2C} and D₂ receptor blockade (especially the XR formulation which utilizes full D₂ occupancy for 24

hours compared to the IR formulation at 60% for 12 hours) contribute to antipsychotic action (Stahl, 2013). Safe for children as young as 10 years old, titration is initiated quickly and shown to be effective as monotherapy in the resolution of manic symptoms in less than a week (Singh *et al.*, 2010). Children can tolerate very high dosing (up to 1200mg daily) however, the elderly population should start much lower, 12.5 to 25mg twice daily titrated up to a significantly lower maximum daily dosage than younger adults. Possibly due to M₁ antimuscarinic and α_1 -adrenergic antagonist properties, other notable side effects are sedation (seen to improve with increased titration and time), orthostatic hypotension, and QT prolongation (Jibson & Hermann, 2014). As with the other SGAs, H₁ and 5HT_{2C} antagonism are thought to be responsible for weight gain, fasting triglycerides, and insulin resistance especially at moderate to higher doses, the recommendation is to monitor conservatively (Stahl, 2013).

Asenapine (Saphris)

Antagonism of dopamine, serotonin, adrenergic, and histaminic receptors are similar pharmacologic characteristics of asenapine as with most other SGAs. A unique trait of this newer medication is that it has a similar chemical structure to mirtazapine and its antidepressant action (Stahl, 2013). It has very little muscarinic antagonism without bradycardia or hypotensive side effects, no need for dose adjustments (starting and maintenance dose of 5 or 10mg twice a day), and it is only available in a sublingual formulation because of its poor GI absorption (Jibson & Hermann, 2014). With more potent binding to serotonergic than D2 receptors, asenapine's antidepressant action potentiated by 5HT_{2C}, 5HT₇, 5HT_{1B/D}, and α_2 receptor antagonism releases dopamine and

norepinephrine in the prefrontal cortex, which improves depression and theoretically, negative symptoms of schizophrenia, treatment-resistant depression, and bipolar depression (Stahl, 2013). Similar sedating side effects have been seen in studies on aripiprazole; dizziness, akathisia, oral hypesthesia related to administration, and intermediate weight gain is expected (Jibson & Hermann, 2014). Studies have not been clear yet as to the safety or efficacy in child, adolescent, or geriatric populations (Stahl, 2011).

Risperidone (Risperdal)

Characteristics of risperidone fall somewhere in between first and second generation antipsychotics with its efficacy and side effect profile, similar to a SGA at lower doses, higher doses bring out some of the more conventional properties such as movement disorders and increased prolactin production (Stahl, 2013). Risperidone was approved by the FDA in 1993 and was the most prescribed antipsychotic in America in 2005 (Finkel, 2009). “In 2007, risperidone became the first atypical antipsychotic to receive FDA approval as monotherapy for short-term treatment of acute mania or mixed [bipolar] episodes in youths between 10 and 17 years” (Singh *et al.*, 2010, p.437). Risperidone has a wide range of indications from children with autism, aggression, deliberate self-injury, tantrums, mood lability or childhood bipolar disorder (ages 10-17), and childhood schizophrenia (ages 13-17) to adult schizophrenia, bipolar mania, and agitation and psychosis associated with dementia (Stahl, 2011). Risperidone is available in a variety of formulations including tablet, ODT, liquid, and short and a long acting injections (Stahl, 2013). Patients are typically started at 1-2mg to up to 12mg daily (can

be divided for sedation) with slow titration. Dosage is decreased significantly for the elderly population with a maximum of 2mg daily starting at 0.25-0.5mg (Jibson & Hermann, 2014). Risperidone's SDA pharmacologic profile is similar to other SGAs but without muscarinic activity, anticholinergic effects, and with equal α_1 and α_2 antagonistic properties effective in depression yet also responsible for sedation and orthostatic hypotension (Jibson & Hermann, 2014). Like FGAs, many side effects exist; an increased incidence of hyperprolactinemia and pituitary adenomas are noted at low doses, EPS is common at higher doses, and weight gain in adults and especially children is significant at any dose of risperidone (Jibson & Hermann, 2014). In a recent randomized, double-blind, placebo-controlled Stanford University trial for mixed or manic episodes, a 14% mean weight gain of 2kg was seen over three weeks in the children taking 0.5-2.5mg risperidone per day (Singh *et al.*, 2010).

Paliperidone (Invega)

With a longer half-life, slower absorption, and lower peak, 9-hydroxy-risperidone (paliperidone) is a controlled-release active metabolite of risperidone but better tolerated by many patients. Like other atypicals, paliperidone is a SDA but is not hepatically metabolized (9-hydroxy-risperidone is the product of risperidone after metabolism by CYP450 2D6), has very few pharmacokinetic drug interactions, is delivered via osmotic capsule for gradual absorption, and has a significantly lower side effect profile for EPS, sedation, orthostasis, and metabolic complications (Stahl, 2013). Little is known about the pharmacologic difference between risperidone and paliperidone because binding profiles are so similar (slightly less affinity in general for many of the targeted receptors);

therefore, it is believed that the delivery described above may be responsible for increased tolerability through decreased potency (Stahl, 2013). Although an active metabolite of risperidone, paliperidone is not dosed the same and does not need to be titrated up. It is appropriate to start and stay on 6mg daily, paliperidone can be increased by 3mg daily up to 12mg (every five days to accommodate a serum steady state) for severe psychosis (Stahl, 2013). Invega Sustenna is a monthly, long acting injectable formulation of paliperidone that has been shown effective for early intervention, increased adherence, and more favorable outcomes (Stahl, 2013).

Ziprasidone (Geodon)

Approved for the treatment of schizophrenia by the FDA in 2001, ziprasidone is known for its obsolete weight gain side effect profile (Finkel, 2009). Contrary to its competitors and related to the current beliefs about the moderate 5HT_{2C} and H₁ antagonistic pharmacologic binding properties, ziprasidone has little association with sedation, dyslipidemia, elevation of fasting triglycerides, or insulin resistance (Stahl, 2013). In fact, when patients are switched from other SGAs to ziprasidone, they often experience weight loss and lowering of triglycerides. Indications for once to twice daily oral dosing (starting at 20-40mg and up to 200mg) of ziprasidone include psychosis, mania, affective symptoms, and acute agitation for which there is an IM formulation (Stahl, 2011). Ziprasidone historically has a well-known QT prolongation; however, recent studies have shown that it is not a clinically significant problem in patients without a cardiac history. Regular ECG monitoring is unnecessary and instead practitioners

should use caution with concurrent use of other QT prolonging medications (Jibson & Hermann, 2014).

Lurasidone (Latuda)

As one of the newest atypical antipsychotics, lurasidone has a high affinity for dopamine D₂ and serotonin 5HT_{2A} receptors and is approved by the FDA in the US for schizophrenia (Stahl, 2011). Lurasidone has minimal affinity for H₁-histamine and M₁-cholinergic receptors providing little to no sedation or weight gain. The clinical profile can be explained by simple binding properties, most potent on D₄ (very little known), 5HT₇, 5HT_{1A}, and α₂ receptors suggesting potential for excellent antidepressant efficacy. SSRI/SNRI augmentation for depression/anxiety, pro-cognitive effects, and increased circadian rhythm regulation is appropriate (Stahl, 2013). As with ziprasidone, metabolic effects can reverse when switched to lurasidone from another atypical with a higher incidence. Moderate EPS could be present but less likely if dosed at night. Lurasidone is metabolized by CYP 3A4 causing coadministration of strong 3A4 inhibitors such as Suboxone or ketoconazole to increase plasma levels of lurasidone increasing the probability of motor side effects, increased prolactin production, sedation, and seizures occasionally seen in higher doses (Stahl, 2011).

Aripiprazole (Abilify)

Aripiprazole is the only atypical antipsychotic that is a dopamine partial agonist (also with less affinity for 5HT_{2A} antagonism than the other atypicals), a pharmacologic feature that directly results in reduced EPS and hyperprolactinemia (Stahl, 2013). Initially approved in 2002 by the FDA for schizophrenia (now age 13+), aripiprazole is currently

indicated for mania/mixed mania ages 10+, an adjunct for depression, and autism-related irritability in children from 6-17 years old (Stahl, 2011). Also without M₁-muscarinic cholinergic and H₁-histaminic antagonistic properties, this medication is void of sedation, usually has little to no weight gain, and like lurasidone and ziprasidone can aid in weight loss when switching from another antipsychotic that has induced metabolic effects (Stahl, 2013). Aripiprazole has a very long half-life, 75 hours, prolonging the time it will take to reach steady state as well as linger in the body longer, important when considering down titration, side effects, or drug interactions that also interact with the CYP 3A4 pathway (Stahl, 2011). Aripiprazole is available in oral tablets, ODT, liquid, short and long acting injections. Aripiprazole is also unique in dosing because it can be activating and increase agitation; therefore, unless actively psychotic, a small doses such as 2mg (up to 30mg daily has been approved) may be effective from children to elderly (Stahl, 2011). Some patients experience cognitive side effects (lowering the dose can help), headache, insomnia, tremor, and constipation (Jibson & Hermann, 2014).

Metabolic Syndrome

While this innovation in pharmacologic therapy is a vast improvement over the typical antipsychotics, the atypicals are not without their cost; both financially and physically. The newer, more targeted medications often cause metabolic syndrome, which include a group of side effects causing weight gain, dyslipidemia, insulin resistance, and eventually diabetes and cardiovascular disease (Stuart, 2009). Central obesity generally precipitates metabolic syndrome and can be accompanied by

hypertension, increased serum triglycerides, decreased high density lipoproteins (HDL), increased fasting blood glucose, and insulin resistance as it's defining characteristic (McCullough, 2011). For a diagnosis of metabolic syndrome, patients must usually meet criteria for three of the five aforementioned measurable markers. Once underway in the pathological process, it can predict the development of diabetes and cardiovascular disease (McCullough, 2011).

Normally, glucose in the blood signals to β -cells in the pancreas to make and secrete insulin into the bloodstream to decrease glucose; higher glucose in the blood increases signaling for more insulin secretion from the pancreas. The presence of insulin in the blood facilitates glucose uptake into many different cells in the body by binding to insulin receptors that signal for metabolism of glucose into energy (Edmunds & Mayhew, 2013). Insulin allows muscles and the liver to store glucose as glycogen, aids in intracellular transport of potassium (and possibly calcium), converts amino acids to protein, and facilitates fat storage as triglycerides in adipose tissue (Edmunds & Mayhew, 2013).

During the development of metabolic syndrome, the body starts to struggle with glucose metabolism causing insulin receptor molecules to become insulin resistant (Perese, 2012). In the absence of available glucose for cellular metabolism glycogenolysis (conversion of glycogen to glucose) and gluconeogenesis (production of glucose from lactate and amino acids) in the liver are triggered in response to cellular hypoglycemia. The result is hyperglycemia in the bloodstream (Edmunds & Mayhew, 2013). Furthermore, the insulin resistance creates a signal to the β -cells to produce more

insulin, a compensatory mechanism that can be effective initially but over time damages the β -cells (glucotoxicity) causing a disruption in the signaling of insulin. This results in hyperinsulinemia as well; a measurable characteristic of type 2 diabetes (National Diabetes Information Clearinghouse, 2014).

More recently researchers have also linked contributions to the development of insulin resistance from the lipolysis of adipocytes (excessive in obesity) attenuated by malfunctioning β -cells, which activates an inflammatory response, releases hormones that have an important effect on the sensitivity of insulin receptors, and causes the overproduction of free fatty acids further stimulating gluconeogenesis (McCance & Huether, 2010). Usually precipitated by the silent hallmarks of metabolic syndrome symptoms, it is estimated that 50% of β -cell function is already lost at diagnosis of type 2 diabetes. Further, the patient's struggle with insulin resistance, hyperglycemia, hypertension, hyperlipidemia, and obesity is likely to be intensely confounded by an inability to combat the illness without aggressive pharmacologic intervention to avoid further neurologic and vascular complications (Edmunds & Mayhew, 2013).

Prevalence

The National Cholesterol Education Program (NCEP) Adult Treatment Panel III (ATP III) reported an overall prevalence of metabolic syndrome more than a decade ago in the US at 22%, with notable differences between ethnic groups; Mexican-Americans had the highest prevalence for both men and women, followed by African-American women, white men, white women, and African-American men last (Meigs, 2014). Also, reported in this study, metabolic syndrome in the US correlated closely according to age

with a steady increase from youngest to oldest; the highest group aged 60-69 years old had a 45% prevalence, next ≥ 70 years at $\sim 40\%$, 35% for ages 50-59 years, 22% in ages 40-49, 13% ages 30-30, and less than 10% in the 20-29 year old group, respectively (Meigs, 2014). More recently, the American Heart Association suggested that 34% of US adults have metabolic syndrome with Asian Americans as the highest climbing cohort compared to other ethnic groups currently (Mallory, Angosta, & Kawi, 2014). The US has the highest prevalence of metabolic syndrome followed by South Asia (26%), China (17%), Australia (19%), France (9%), and Italy (18%) (McCullough, 2011).

Whereas prevalence estimates of metabolic syndrome in the general public varies between 22-35%, patients being treated with antipsychotic medications have experienced a higher prevalence of up to 66% (mean = 37% mean) (Centorrino, Masters, Talamo, Bladessarini, & Öngür, 2012). Authors of the Harvard University study at McLean Hospital in Massachusetts defined psychiatric patients ($n = 589$) identified as having metabolic syndrome was based on three of the following criteria: waist circumference, BMI, serum triglycerides, high density cholesterol, blood pressure, and fasting serum glucose. The research showed metabolic syndrome was four times higher from admit to discharge for all patients with a greater prevalence in three sub-groups; younger patients, patients having received a decade or more of treatment, and patients on polytherapy (≥ 2 antipsychotics, or one plus adjunctive mood-stabilizers, antidepressants, or sedatives) (Centorrino *et al.*, 2012).

Treatment and Adherence

With decreasing and/or preventing weight gain as the primary goal of treatment for metabolic syndrome, research has shown that lifestyle modifications are the one prominently successful intervention for weight gain reduction (Usher *et al.*, 2012). Followed by a somewhat less effective addition of pharmacologic agents such as metformin, weight loss and decreased blood glucose levels have been seen with type 2 diabetes as well as non-diabetic obese adults (Lee & Jeong, 2011). Even with successes seen in the above described interventions, many barriers exist in mental health populations that decrease treatment adherence and disease prevention (Roberts & Bailey 2013). Coordination of care is a critical component to management of patients with comorbid medical and psychiatric conditions (Tusaie & Fitzpatrick, 2013). In order to increase adherence and improve health outcomes, researchers have learned that a multidisciplinary team has an important role in assessing risk factors, creating a plan for health promotion, and assisting with and being involved in implementation of that plan (Park *et al.*, 2001). “Weight gain may cause patients on atypical antipsychotic agents to discontinue their medications because of concern about their appearance” (Lee & Jeong, 2011, p.537). Patients are more inclined to participate in programs that provide symptom reduction, peer support, staff involvement, and applicable education for improving outcomes and quality of life (Roberts & Bailey, 2010).

Lifestyle Modifications. It is well known that alterations in diet and exercise are the required components of health promotion and weight control but very little work has been done on how to successfully implement such programs (Roberts & Bailey, 2010).

Primary interventions for preventing weight gain in clients initiating SGA medications include healthy lifestyle education, increased exercise promotion, and nutrition training to reduced caloric intake. These interventions are keys to preventing metabolic complications, decreasing rates of mortality and morbidity, and increasing quality of life for patients (Usher *et al.*, 2012).

Multimodal interventions that involve a combination of approaches and support systems, such as the Australian *Passport 4 Life* report significant successful weight reductions in their program for people with SMI (Usher *et al.*, 2012). *Passport 4 Life* is a structured 12 week program that meets for one hour each week to discuss a healthy lifestyle topics, such as the food groups, exercise guidelines, food feelings, healthy snacks, or motivation followed by a 30 minute low or no-cost group exercise such as walking, swimming, or group sports such as cricket. Nurse or researcher-led, the premise was based on Prochaska and DiClemente's 1983 theoretical model of change (Park *et al.*, 2011). "The development of personal skills and an increase in knowledge on healthy lifestyles are fundamental to health promotion and are necessary for changing risky behaviors, including poor nutrition, inactivity, and sedentary lifestyles" (Park *et al.*, 2011, p. 431). During each class, the participants were given healthy snacks and visual reminders of healthy eating tips, fruit and vegetable suggestions, menu planning advice such as buying seasonal produce, and adding herbs to bring out natural flavors in healthy foods. Participants were provided with a pedometer, water bottle, a food guide, and a journal to record activity, hydration, emotions, food intake, and goals (Park *et al.*, 2011). *Passport 4 Life* and several other studies with similar physical health prevention

interventions have shown 1-3 kg per month of weight loss, which can lead to decreased blood pressure and cholesterol rates (Park *et al.*, 2011).

Education, group participation, and nurse facilitation are common strategies for prevention programs to increase interest, motivation, social interaction, independence, self-esteem, and self-efficacy for improved participation, program adherence, and better outcomes (Roberts & Bailey, 2011). Increased weight loss, therefore, has a direct correlation with increased quality of life, as seen in a two year 2008-2009 University of Pennsylvania clinical trial that looked at 390 obese men and women with a BMI of 30-50 kg m⁻² with at least two components of metabolic syndrome (Sarwer *et al.*, 2013). The participants were randomly placed in one of three different interventions with varying intensity; 1) quarterly PCP check-ins with weight management education, 2) quarterly PCP check-ins plus monthly behavioral weight control counseling sessions with lifestyle coaches, or 3) quarterly PCP check-ins, monthly lifestyle coaches, and meal replacements or weight loss medications. Each of the groups completed three different quality of life measure questionnaires at baseline, 6, 12, and 24 months. Within the first 6 months a positive correlation was seen between greater weight loss and all domains of the weight-related quality of life among participants in each of the groups, which was maintained over the two years (Sarwer *et al.*, 2013). True for both men and women, greater weight loss was associated with greater self-improvements and quality of life, particularly at 12 months when many experienced the greatest loss (Sarwer *et al.*, 2013).

It is important to recognize barriers to lifestyle interventions that cause significant challenges to prevention of metabolic syndrome. The health promotion model (HPM)

was developed in the 1980's to integrate nursing and behavioral sciences for promotion of personal health and well-being, as "...perceived barriers were reported to be the single most powerful predictor of health promoting behavior..." (McGuire & Anderson, 2012, p.51). Real or imagined, facilitators have a very important role in providing the education component for supporting, modeling, and motivating participants (Roberts & Bailey, 2013). In contrast, barriers such as social anxiety, stigma, cost, fear of safety, lack of time, or conflicting responsibilities must be overcome to achieve the acquisition of knowledge, confidence, and self-esteem that leads to participation and improved health outcomes (Roberts & Bailey, 2013).

Clinical Pharmacology. Pharmacoprevention as primary treatment of metabolic syndrome or pre-diabetes is not recommended due to the lack of evidence of consistent efficacy (Meigs, 2014). However, individuals who have already developed impaired fasting glucose and glucose intolerance may benefit from 1000-2000mg daily of the antihyperglycemic drug Metformin, in addition to losing 5-10% of body weight (Marder & Stroup, 2013). Controlling hemoglobin A1c has been shown to improve mortality and morbidity rates, reduce microvascular and neuropathic complications, and prevent the development of type 2 diabetes (Edmunds & Mayhew, 2013). Criteria for diagnosis of type 2 diabetes is A1c > 6.5% or fasting glucose > 126mg/dl or two hour plasma glucose > 200mg/dl during an oral glucose tolerance test. For those at very high risk for diabetes or for a new diabetes diagnosis, (assuming adequate kidney function) Metformin should be started immediately to achieve A1c < 7%, decrease the amount of glucose produced

by the liver, and enhance sensitivity in both hepatic and peripheral tissues (Edmunds & Mayhew, 2013; Lee & Jeong, 2011, Mallory *et al.*, 2014).

Multidisciplinary Team Approach. More than two thirds of adults (68%) with a mental disorder have a medical condition and 29% of adults with a medical condition have a mental disorder (Goodell, Druss, & Walker, 2011). Many medical conditions in the psychiatric community go undiagnosed for a multitude of reasons. The PCP may assume that the secondary psychiatric care provider is assessing and screening for medical conditions and vice versa. Mental health patients may not follow up with their PCP. Other explanations include high cost, electronic medical record (EMR) differences, and the absence of community policies to direct continuity of care (Raaijmakers, Hamers, Martens, Bagchus, de Vries, & Kremers. 2013). Therefore, a combination approach of education, exercise, diet, and behavioral interventions in groups carried out by a multidisciplinary team of therapists, mental health nurses, case managers, and PCP is more effective in the long term reduction of weight for patients on SGA treatment (Usher, et al., 2012).

Gallatin Mental Health Center

GMHC is a non-profit community mental health center located in Bozeman, MT. Gallatin County's mental health center is one of the 14 branches of Western Montana Mental Health Center (WMMHC) providing mental health care for 16 other counties across the state of Montana. GMHC offers outpatient, inpatient, and day treatment services on site. The staff consists of licensed social workers, counselors, licensed nurses,

psychiatric nurse practitioners, case managers, crisis stabilization workers, and peer support specialists (Gallatin Mental Health Center, 2014).

According to an interview with Mr. Scott Malloy, Director of GMHC, the outpatient clinic provided services to 1,315 clients in 2014, 985 of them received “med services” (personal communication, January 7, 2015). Scott also commented on the Hope House, a 72 hour inpatient crisis stabilization facility on campus with eight voluntary and two emergency detention beds. Mr. Malloy said, “We served 471 clients at the Hope House this year and are looking to expand based on increasing need for psychiatric stabilization in our community, we are improving and growing every year” (S.Malloy, personal communication, January 7, 2015).

The GMHC nursing department provides a variety of services such as new intake mental status assessments, education, regularly scheduled patient contacts, and patient assistance programs (PAPs) that encourage medication compliance. However, there is currently not a program or policy in place that delineates an assessment protocol for physical health assessment or coordination of care with a client’s PCP regarding that health status. Physical health provisions have not been a big focus at GMHC under the policy manual for nursing through WMMHC, “Nursing staff may assist with administering medication, filling medication organizer boxes, delivering labeled medications to clients, providing education about mental illness, and observing the client's self-administration of medications” (WMMHC Psychiatric Services, 2015).

During an interview for a new psychiatrist to the GMHC community, Dr. Bruce Swarney, rural internal medicine doctor and psychiatrist in Montana said, “I think it is

our responsibility to deal with metabolic syndrome, waist circumference, blood work, either writing for or monitoring of, we need to be the oversight” (B.Swarney, personal communication, January 9, 2015). Possibly a more simple process in rural settings of less than 5,000 people where Dr. Swarney has practiced is effective. However, complications arise in a larger town like Bozeman, where coordination of care is complicated by differing EMRs and less personal collaboration time between providers. In this larger setting a protocol that clearly delineates the standard of care for GMHC is indicated.

CHAPTER 3

PROJECT DEVELOPMENT

Health Improvement Profile (HIP)

Sheila Hardy and Richard Gray of the Northampton Physical Health and Wellbeing Project in England, UK initiated extensive research in the early 21st century to address a best practice guide of physical health checks for people with SMI. In addition to lifestyle choices, Hardy & Gray discovered that exacerbation of weight gain can be caused by antipsychotic medications (2011). The *Health Improvement Profile for Primary Care (HIP-PC)* used evidence based research to suggest that physical health should be monitored by mental health nurses in the absence of primary care to decrease high mortality rates from obesity, diabetes, and circulatory disease among patients with SMI; a staggering 50% higher than the general population (Hardy & Gray, 2011).

Several variations of what resulted as the HIP-PC had been looked at over the past decade of research, with the intention of providing "...a specific tool designed to help mental health nurses outline the physical health of the SMI patients they work with..." (Hardy & Gray, 2011, p.2). The current male and female version of Hardy & Gray's modified HIP, received via email on January 5th, 2015 from Sheila Hardy, has 28 assessment items with recommended parameters, interventions, and rationales for abnormal values (see Appendix H).

Metabolic Management Assessment (MMA)

Understanding the severe long-term results of untreated metabolic syndrome, especially in the mental health population, it was determined that a tool for adequate assessment and monitoring of the identified parameters mentioned throughout the literature review should be designed for use at GMHC. Approval for the project was obtained by the Institutional Review Board for Protection of Human Subjects (Appendix A) and a consent form for client participation was drafted (Appendix B).

In order to understand the current prevalence of SGA-induced metabolic syndrome and intervention needs of the clients at GMHC, a patient satisfaction survey (Appendix C) was created and delivered to clients from January 2014 through January 2015. An eligible GMHC client was defined as one with a SMI diagnosis taking atypical antipsychotics for one year or more. The purpose of the survey was to gather data on age, diagnoses, BMI, SGA side effects, adherence to current treatment (and reasons for non-adherence), education provided during treatment, level of activity, psychiatric symptom reduction satisfaction, and specific interests for preventative health care interventions and strategies if available at GMHC. The survey was offered in both paper and electronic formats for convenience to the clients.

CHAPTER 4

RESULTS

Summary of Findings

The Metabolic Management Assessment (MMA) was completed by 23 clients ages 18-87 years old (40% female, 60% male), who met criteria by taking at least one atypical antipsychotic for the past year. The majority (n = 18) of participants completed a paper copy of the MMA that was manually entered into a data collection survey service called Survey Monkey, the other seven preferred to use the website based survey.

Clients were asked 28 questions based on four assessment areas determined by looking at the theory of health behavior derived from the Health Belief Model:

- Demographics such as age, weight, gender, education, and insurance type
- Health care information such as diagnosis, medications, treatment plans, primary care and psychiatric provider contacts
- Adherence to treatment related to appointments, medications, and treatment recommendations from their providers
- Satisfaction with current psychiatric management and suggestions for additional services

Body Mass Index (BMI) was calculated from height and weight provided by the 23 clients and placed into three categories based on the World Health Organization's Global Database on Body Mass Index (see Table 1). 'Normal' weight is described by a BMI of 18.5-24.9 kg m⁻², 'overweight' is 25.0-29.9 kg m⁻², and 'obese' individuals have

a BMI greater than 30.0 kg m⁻² (2015). The average BMI of the 23 clients surveyed at GMHC is 30.9 with a range from 18.0-43.0, median and mode both 31.0.

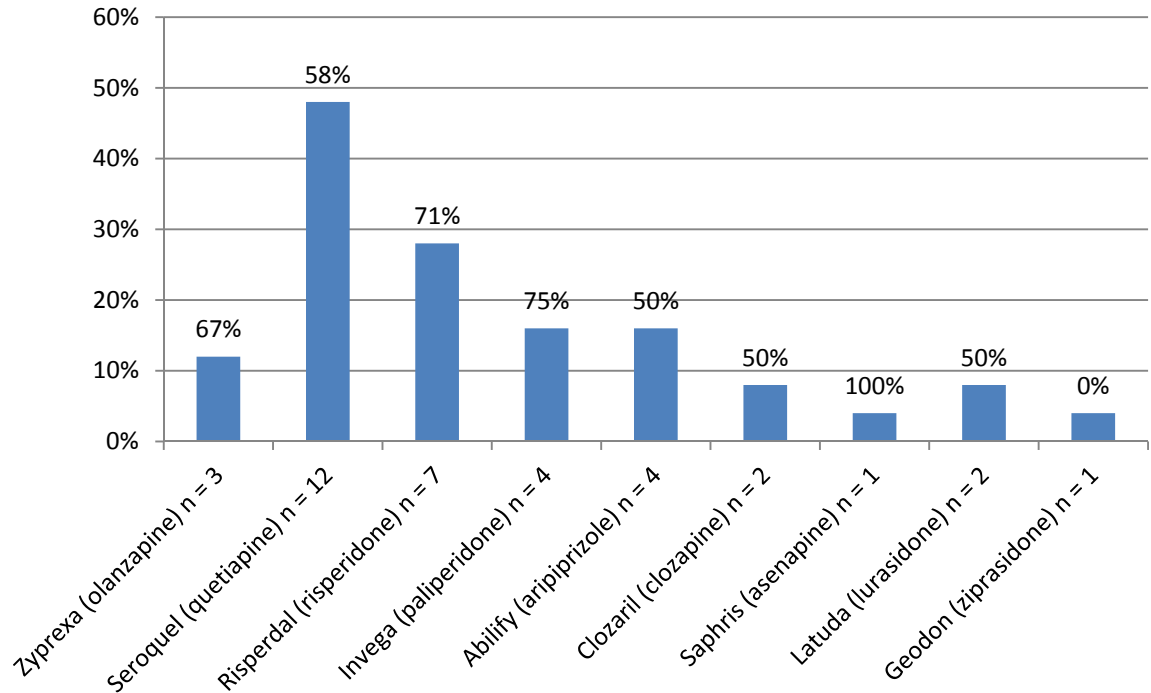
Table 1: MMA Body Mass Index calculations

	18-20	21-29	30-39	40-49	50-59	60-69	70-79	80+	%	MT %
Normal	0	0	1	2	1	0	0	1	21.7%	17%
Overweight	1	1	0	0	1	1	0	0	17.4%	60%
Obese	1	3	4	3	3	0	0	0	60.8%	23%
<i>n</i> =	2	4	5	5	5	1	0	1	23	

Note. Total clients (*n* = 23) surveyed that have taken atypical antipsychotics for at least one year arranged by age and BMI at GMHC (% column) compared to the CDC's statistics (MT % column) for Montana in 2010 (Baehr, 2012).

The most common SGA in the sample was quetiapine (*n* = 12, 52%). Of the 12 clients taking quetiapine, 75% are overweight or obese (*n* = 9), should have their physical health monitored closely, and would benefit from diet and exercise interventions to prevent metabolic syndrome. The next most common SGA in the sample is risperidone with 7 clients taking it, 71% are obese (*n* = 5), and 86% (*n* = 6) of the clients taking risperidone have an overweight BMI >27.0. Clients taking paliperidone have a 75% obesity rate in this sample; and all three clients taking olanzapine are overweight with BMIs of 25.0, 34.0, and 39.0, respectively. Taking into consideration the possibility of a few outliers, it is apparent that there is a correlation between weight and SGAs for clients at GMHC (Figure 1) that agrees with the literature discussed previously in this paper.

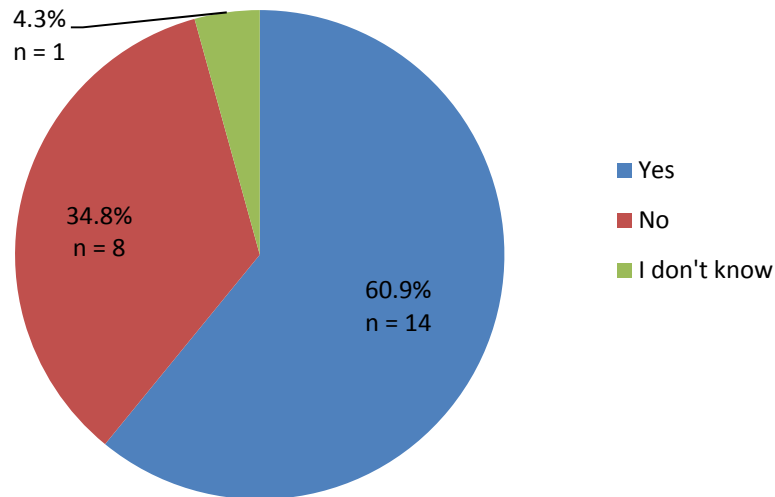
Figure 1: Obesity rates by SGA prevalence



Note. Survey results ($n = 23$) of client-reported SGAs taken at GMHC by percentage of sample prevalence with average obesity rates for each SGA listed at the top of the bar.

Difficult to determine is the knowledge of which came first, weight or medications and without baseline assessments as recommended in the HIP, it would be impossible to determine causation in this sample. However, 61% of these clients stated they have experienced physical side effects such as increased blood pressure, increased blood sugar, and weight gain since starting on their SGAs (Figure 2). These figures clearly convey the need for a specific tool to assist in the plan of care to address physical health management for clients with SMI at GMHC.

Figure 2: Prevalence of physical side effects on SGAs

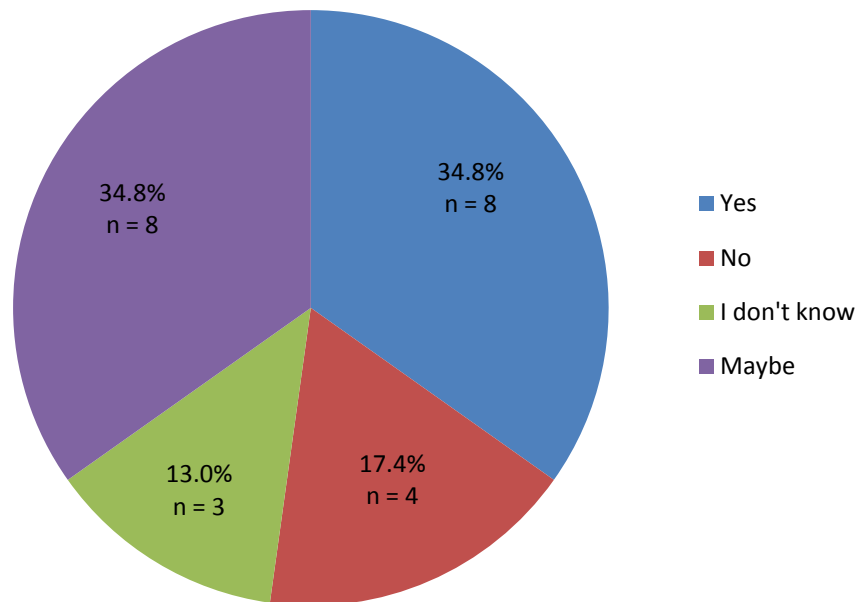


Note. Client responses ($n = 23$) at GMHC to the question, “Have you experienced any physical changes since starting the medications above? (such as weight gain, increased blood pressure, or increased blood sugar)”

In addition to the need for a tool to help nurses determine risk factors and intervention intensity for clients at GMHC on SGAs, it appears from the survey results that clients are in need of a tool to help them remember when they have appointments and what they need to do to improve their overall health and quality of life. When asked if clients had a primary care provider outside of their psychiatric provider at GMHC, 78% ($n = 18$) said yes. When missing blood draws or appointments with their providers, 50% of the time was because they did not know when the appointment was or they did not know when to go to the lab to get their blood drawn. Additionally, 40% ($n = 9$) of clients said they do not remember or they had not been provided with a detailed plan of care about side effects or blood draws as part of their health care management on the new SGA from either primary or secondary care providers.

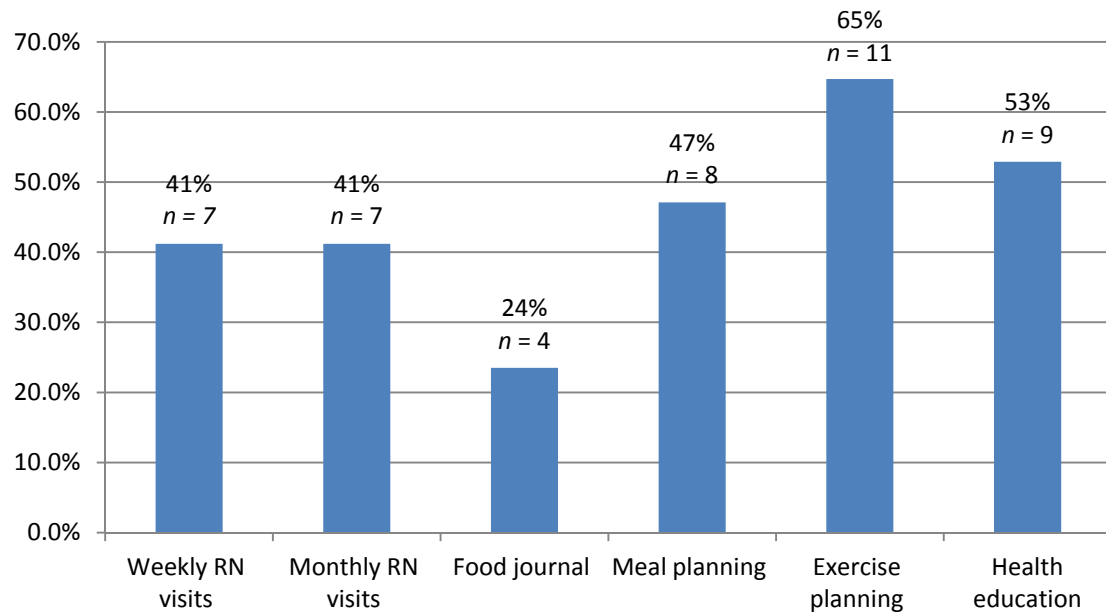
Considering the challenges that some clients have described with weight management, 70% of them reported being “very satisfied” with the management of their psychiatric symptoms on SGAs. The clinical significance of the MMA was discovered when 83% ($n = 19$) of clients reported that they felt a detailed plan of care could positively benefit their health (Figure 3). When the surveyed clients were given some of the evidence based lifestyle modifications recommended in the aforementioned research as interventions options for optimal metabolic management, only one client did not agree with any of the additional services offered in the MMA (Figure 4).

Figure 3: Perceived health benefit from a specific plan of care



Note. When clients at GMHC were asked, “Do you feel that your health would benefit from receiving a more specific plan for you to follow on how to take care of yourself?” only 17% ($n = 4$) replied “no”.

Figure 4: Additional services requested at GMHC



Note. Clients ($n = 23$) were asked, “Would any of the following additional services be beneficial for you?” They were allowed to choose more than one service resulting in a total of $n = 54$ choices with 93% of the respondents requesting at least one of the six additional services offered. Only four responses were recorded in the “other” option with the following verbatim statements: 1) More holistic health care, insured!, 2) I’ll to have a nurse stop by my APT 2 in Livingston, 3) Already doing so, 4) No.

Metabolic Assessment Checklist (MAC)

A plan of care is more successful for patients when goals are individualized and agreed upon to best achieve desired outcomes (Edmunds & Mayhew, 2013). After researching health outcomes in the SMI population in Montana and comparing them to international trends, collecting the survey results summarized above, and using best practice recommendations for addressing high rates of metabolic syndrome, a program to accommodate the management and recommendations was created for use at GMHC.

Considering the results of the MMA survey and the literature review, Hardy & Gray's 2011 research and recommendations were determined to be very appropriate for use at GMHC in Bozeman. Permission was granted by co-author Sheila Hardy for the Health Improvement Profile to be modified and used to create the Metabolic Assessment Checklist for GMHC. Of the 28 evidence based assessment categories from the Health Improvement Profile, 26 are applicable in the United States and were used in the assessment checklist (Appendix D). The interventions are tailored to fit resources available at GMHC and several of the rationales were altered based on American guidelines.

The program, called the Metabolic Assessment Checklist (MAC) is a tool specifically intended to provide nurses at GMHC with a means of fulfilling the five steps of nursing care planning and documenting. The MAC is easily added to current clinical nursing practice and should be beneficial for many of the case management tasks involved in the RNs day when asked by providers to search for specific documents such as recent lab work, current PCP, or last report of sleep habits. The MAC will provide more direct client care and alleviate concerns expressed in the literature by other mental health nurses when asked to perform physical health assessments. Additionally, the assessment meets several best practice recommendations for care plan documentation and coordination of care between primary and secondary care providers (Scott, 2006; Greenberg & Seidman, 2012).

Four simple components of the MAC will help GMHC nurses efficiently assess, diagnose, plan, implement, and evaluate metabolic management recommendations for clients with SMI on atypicals to achieve the following objectives:

1. An assessment ‘checklist’ (Appendix D):
 - a. Determine metabolic risk
 - b. Identify referral needs to members of a multidisciplinary team
 - c. Communicate with PCPs for improved continuity of care
2. An assessment ‘key’ (Appendix E):
 - a. Recognize diagnostic criteria for each health related category
 - b. Provide recommendations for follow-up care
 - c. Utilize evidence based rationale to educate clients appropriately
3. An assessment ‘order set’ (Appendix F):
 - a. Define appropriate interventions for the corresponding assessment
 - b. Guide pertinent services provided by GMHC
 - c. Create a care plan with evidence based rationale
4. An assessment ‘care plan’ (Appendix G):
 - a. List individualized interventions
 - b. Specify goals and dates to measure outcomes appropriately
 - c. Display a clear and easy to understand plan of care

Application

The MAC checklist will be completed with clients at GMHC upon initiation of atypical antipsychotic treatment and yearly thereafter. Additional monitoring may be

indicated more frequently for some patients depending on individual baseline results. For clients who have already been on SGAs, the initial assessment will be completed by nursing as soon as they are identified with follow-ups scheduled annually thereafter. Upon completion of the MAC, it will be faxed to the client's PCP for coordination of care and scanned into their electronic medical record at GMHC.

The MAC key is designed to easily provide the nurse with assessment cues, tips, educational opportunities, and answers to many clinical questions that clients might have about their physical screening. The key will provide relief from concerns that the psychiatric nurse's may feel while assessing physical issues outside of their psychiatric specialty skill-set and is an efficient learning tool with updated, evidence based rationales to reintroduce foundational nursing assessment skills.

The MAC order set has pre-fabricated interventions to help create the care plan based on resources already available at GMHC. The MAC care plan will be created by the nurse with a simple copy and paste process from the order set, resulting in an individualized plan of care that can be displayed on the client's refrigerator or wall. Most of the interventions are intended for nursing; to increase patient contact and more clearly define health assessment goals and outcomes together with the client. However, some non-nursing activities on the care plan can be delegated by nursing to case management or other members of the multidisciplinary team, such as physical or occupational therapy, as those positions become available at GMHC. The care plan is intended to provide the client with a simple reference tool highlighting appointment times and contact numbers to serve as an easy reminder of the steps recommended for optimal health management.

Training and Implementation

Minimal training will be required to implement the MAC for the two registered nurses (RNs) at GMHC. Both RNs at GMHC are trained and licensed in nursing assessments in the state of Montana and both have been working in mental health nursing for more than two years. A four hour training session will be set up and provided to the nurses to discuss the assessment process, expectations for implementation into practice, and evaluation goals of the four aspects of the MAC: 1) measurements, 2) labs, 3) screening, and 4) lifestyle. With the creation of the MAC key to supplement the checklist, assessment review talking points for the training course will be used from normal and abnormal parameters in each assessment category, recommended interventions, and rationales provided on the key. Walking through each of the four components of the MAC followed by an interactive discussion around the goals and outcomes for clients with SMI on atypical antipsychotics will be incorporated followed by a practice care plan creation to better conceptualize the final product provided to the client.

The clients will have to be initially identified for metabolic monitoring inclusion with the MAC. The electronic medical record used at GMHC does not have a feature that will provide a computerized list of clients in Bozeman taking atypical antipsychotics. Alternatively, the list of clients will need to be collected manually based on attendance for scheduled appointments with their provider and recommendations from the providers. One of the nurses will be assigned as point person to create and maintain a spreadsheet of clients that meet the MAC criteria as SGA therapy is initiated and for those who are currently taking SGAs. Additionally, four measureable outcomes needed to evaluate the

tool yearly will be added to the spreadsheet. Outside of the client's name and birthdate, tracking will include: 1) MAC completion dates, 2) annual notations of improvement or decline within the metabolic criteria, 3) PCP follow-up attendance, and 4) adherence to appointments at GMHC as recommended by their care plan. Both nurses will be instructed to update the list at the end of each day as needed.

Goals and Outcomes. Goals will be divided into two areas; GMHC and the client. Short term goals for GMHC include increased productivity expressed through the submission of 99211 nursing notes and increased PCP coordination among clients with a SMI diagnosis taking atypical antipsychotics over an annual period. Long term goals include improved client care and increased funding. The annual measurable outcomes that will be used for GMHC to determine MAC success is a 90% completion rate and 90% PCP follow-up attendance for clients prescribed atypical antipsychotics.

Short term goals for clients include metabolic risk identification and improved treatment adherence recognized by less crisis house admissions. Long term goals include BMI categorized as normal and improved quality of life. The annual measurable outcomes that will be used for clients to determine MAC success will be a 90% appointment attendance rate and decreases in markers of metabolic syndrome such as blood pressure, blood sugar, BMI or weight, and lipids.

Measurement and Evaluation. The medical team, which consists of nursing, psychiatric providers, and case managers will meet every 3 months to discuss challenges and successes for clients and staff regarding the MAC and care plans. Feedback regarding

collaboration internally and externally will be welcomed in order to determine progress towards the identified goals and a brief training review will be offered to the nurses after the multidisciplinary meetings. Modifications to interventions can be made and will be adjusted on the order set as needed. Evaluation of the MAC will be completed annually to compile the measurable outcomes mentioned above.

CHAPTER 5

DISCUSSION AND SUMMARY

Implications

Obesity can be identified by comparing weight divided by the square of the height for the BMI calculation and is an international indicator of underweight, overweight, or obesity (WHO, 2015). Many people with SMI struggle with life threatening comorbidities related to increased visceral adiposity. Battling obesity will never be easy but decreasing central adiposity and preventing further development is known to be a successful way to avoid a shortened life span. Obesity is the most significant predictor of metabolic syndrome around the world and especially among the SMI population. As the primary precursor to the development of diabetes and cardiovascular disease internationally, we have learned that early intervention upon recognition of increased central obesity, triglycerides, blood pressure, and fasting glucose is critical. Aggressive metabolic management is the only way to increase overall quality of life and mitigate or decrease early mortality rates.

Without assessment and treatment of atypical antipsychotic induced metabolic syndrome, a large portion of the SMI population will encounter life threatening complications. Many years of life lost, millions of dollars in secondary and tertiary prevention for the health care system, decreases in treatment adherence and overall quality of life for patients are among the results of unaddressed metabolic risk factors.

Challenges and Limitations

The number of participants is a limitation in the project at GMHC. Outliers can appear to be more significant with a smaller sample size, making correlations difficult. Many clients who were asked to participate did not return their survey and were evasive when asked to follow up. Some results could be less than accurate depending on the mental stability of the participant at the time. With the author being the only data collector and being employed at the facility there could be a potential bias by the clients based on their feelings about the author.

Several additions or clarifications with survey questions would have been helpful and were noted after analyzing the results. Ethnicity was not included in the demographic section. Allowing clients to choose more than one diagnosis in the survey could have skewed the representative sample of diagnoses and made it difficult to correlate diagnosis with medication or BMI. Most of the participants are taking more than one SGA or may have struggled with weight prior to therapy so it is difficult to know if one over another is responsible for causing the reported physical risk factors.

Conclusion

A number of hypotheses exist as to why people on SGA medications have an alarmingly higher predisposition to metabolic syndrome. In addition to genetic and environmental factors, some research has linked the blocking of serotonin receptors as the culprit (Park, Usher, & Foster, 2011). Being the trademark property of SGAs, the decreased serotonergic transmission has been successful in treating symptoms of SMI,

resulting in a decrease in psychotic symptoms and increased quality of life.

Unfortunately, the secondary metabolic complications of SGAs adversely affect quality of life and treatment adherence and have been shown to be difficult to manage. However, recent research on cognitive and behavioral strategies for managing metabolic syndrome in this population shows promising results (Greenberg & Seidman, 2012; Hardy & Gray, 2011; Mallory *et al.*, 2014; McGuire & Anderson, 2012; Sarwer *et al.*, 2013; Scott & Happell, 2011). Individualized interventions that include education, more frequent interactions with nursing and peers, and specific lifestyle modifications that clearly communicate a plan are not only beneficial but preferred and requested by clients (Gilstrap *et al.*, 2013; Usher *et al.*, 2013; Wiklund & Willen, 2011).

Group and multidisciplinary interventions have significantly better results in decreasing relapse and SGA induced metabolic side effects by increasing adherence, participation, and overall health outcomes. Similar services are available at GMHC and the addition of the MAC will provide a clear designation of those services for specific clients in addition to improved communication and continuity of care between primary and secondary care providers in the community. Nurses at GMHC will tailor an order set to easily provide each client with a care plan including individualized health promotion and education interventions based on the available services and programs at GMHC.

According to the President and CEO of the Medicaid Health Plans of America (MHPA), the challenges specific to health care delivery such as underuse of preventative health services, lack of integrated care, inconsistent patient adherence, and over-reliance on emergency care must be addressed in order to improve quality of care for people with

SMI (Greenberg & Seidman, 2012). By using technology, developing better care management programs, increasing screening, and expanding collaboration, as recommended by the MHPA, we can move our nation towards integrated, coordinated mental and physical health services for people with SMI to promote recovery. The implementation of the MAC at GMHC can achieve those goals to improve treatment adherence and quality of life by decreasing the prevalence of metabolic syndrome in patients taking atypical antipsychotics in Bozeman, MT.

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APPENDICES

APPENDIX A

INSTITUTIONAL REVIEW BOARD FOR THE
PROTECTION OF HUMAN SUBJECTS

INSTITUTIONAL REVIEW BOARD

For the Protection of Human Subjects
FWA 00000165



960 Technology Blvd. Room 127
c/o Immunology & Infectious Diseases
Montana State University
Bozeman, MT 59718
Telephone: 406-994-6783
FAX: 406-994-4303
E-mail: cherylj@montana.edu

Chair: Mark Quinn
406-994-5721
mquinn@montana.edu
Administrator:
Cheryl Johnson
406-994-6783
cherylj@montana.edu

MEMORANDUM

.....

TO: Shelby Frye and Laura Larsson

FROM: Mark Quinn *Mark Quinn CH*
Chair, Institutional Review Board for the Protection of Human Subjects

DATE: April 24, 2014

SUBJECT: "Preventative Care for Atypical Antipsychotic Induced Metabolic Syndrome through the Implementation of Individualized Order Sets" [SF042414]

The above proposal was reviewed by expedited review by the Institutional Review Board. This proposal is now approved for a period of one-year.

Please keep track of the number of subjects who participate in the study and of any unexpected or adverse consequences of the research. If there are any adverse consequences, please report them to the committee as soon as possible. If there are serious adverse consequences, please suspend the research until the situation has been reviewed by the Institutional Review Board.

Any changes in the human subjects' aspects of the research should be approved by the committee before they are implemented.

It is the investigator's responsibility to inform subjects about the risks and benefits of the research. Although the subject's signing of the consent form, documents this process, you, as the investigator should be sure that the subject understands it. Please remember that subjects should receive a copy of the consent form and that you should keep a signed copy for your records.

In one year, you will be sent a questionnaire asking for information about the progress of the research. The information that you provide will be used to determine whether the committee will give continuing approval for another year. If the research is still in progress in 3 years, a complete new application will be required.

APPENDIX B

SUBJECT CONSENT FORM FOR
PARTICIPATION IN HUMAN RESEARCH AT
MONTANA STATE UNIVERSITY

**SUBJECT CONSENT FOR
FOR
PARTICIPATION IN HUMAN RESEARCH AT
MONTANA STATE UNIVERSITY**

**Preventative Care for Atypical Antipsychotic Induced Metabolic Syndrome Through the
Implementation of Individualized Order Sets**

You are being asked to participate in a study to determine the effects of metabolic syndrome. The study will specifically provide insight into primary prevention strategies for patients taking second generation antipsychotic (SGA) medications.

Participation in voluntary and you can opt out of the survey at any time; incomplete surveys will be discarded along with the related consent. You were identified as a potential subject based on the location of the clinic where you obtain your mental health care. If you agree to participate in this study, you will be asked to complete a ten minute computer based survey. A chart review of your medications and diagnosis will occur but your information will not be shared, your survey will be coded and without identifying information to protect your privacy. All survey results will be anonymous and confidential. The closing date for chart review on this project is May 2015.

There is no cost for your participation, no foreseeable risks involved and there may be no benefit to you. In the case of injury occurring during your participation in the study you will be referred to the team at the Gallatin Mental Health Center who will assist with providing you with appropriate care but no compensation will be available. Your confidentiality will be maintained during all aspects of this project. You are encouraged to ask any questions you may have regarding the study. All additional questions about the rights of human subjects can be answered by the Chair of the Institutional Review Board at Montana State University, Mark Quinn, (406) 994-4707.

AUTHORIZATION: I have read the above and understand the discomforts, inconvenience and risk of this study. I, _____ (*name of subject*), agree to participate in this research. I understand that I may later refuse to participate, and that I may withdraw from the study at any time. I have received a copy of this consent form for my own records.

Signed: _____

Witness: _____

Investigator: _____

Date: _____

**APPROVED
MSU IRB
04/24/2014
Date approved**

APPENDIX C

METABOLIC MANAGEMENT ASSESSMENT (MMA)
SURVEY

Metabolic Management Assessment

1. Date of birth (mm/dd/year)

2. Which category below includes your age?

- | | |
|-----------------------------|-----------------------------------|
| <input type="radio"/> 18-20 | <input type="radio"/> 50-59 |
| <input type="radio"/> 21-29 | <input type="radio"/> 60-69 |
| <input type="radio"/> 30-39 | <input type="radio"/> 70-79 |
| <input type="radio"/> 40-49 | <input type="radio"/> 80 or older |

3. What is your height?

	0	1	2	3	4	5	6	7	8	9	10	11
Feet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inches	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4. How much do you weigh?

- | | | |
|--|--------------------------------------|--|
| <input type="radio"/> Less than 120 pounds | <input type="radio"/> 181-200 pounds | <input type="radio"/> 261-280 pounds |
| <input type="radio"/> 121-140 pounds | <input type="radio"/> 201-220 pounds | <input type="radio"/> 281-300 pounds |
| <input type="radio"/> 141-160 pounds | <input type="radio"/> 221-240 pounds | <input type="radio"/> 301-320 pounds |
| <input type="radio"/> 161-180 pounds | <input type="radio"/> 241-260 pounds | <input type="radio"/> More than 321 pounds |

5. What is your gender?

- Female
- Male

6. What is the highest level of education you have completed?

- | | |
|--|--|
| <input type="radio"/> Did not attend school | <input type="radio"/> Some college |
| <input type="radio"/> Elementary school | <input type="radio"/> Completed Bachelors degree |
| <input type="radio"/> Middle school | <input type="radio"/> Some graduate classes |
| <input type="radio"/> Graduated from high school | <input type="radio"/> Completed graduate school |
| <input type="radio"/> GED | <input type="radio"/> Some PhD classes |
| <input type="radio"/> Completed Tech or trade school | <input type="radio"/> Completed PhD |

7. Do you currently smoke cigarettes, or not?

- Yes, I do
- No, I do not

Metabolic Management Assessment

8. How much do you smoke?

- Less than every day

 21-30 cigarettes daily
 1-10 cigarettes daily

 31-40 cigarettes daily
 11-20 cigarettes daily

 More than two packs daily

9. Do you have any of the following psychiatric diagnosis? (Please check all that apply)

- PTSD

 Anxiety
 Schizoaffective

 Bipolar II
 Bipolar I

 Schizophrenia
 Depression

 None

10. Have you been taking any of the following medications consistently for the past year? (Please check all that apply)

- Saphris (asenapine)

 Clozaril (clozapine)
 Geodon (ziprasidone)

 Risperdal (risperidone)
 Zyprexa (olanzapine)

 Latuda (lurasidone)
 Invega (palliperidone)

 Abilify (aripiprizole)
 Seroquel (quetiapine)

 None

11. What type of insurance do you have? (Please check all that apply)

- Medicare

 MHSP
 VA

 Private insurance such as Blue Cross
 Medicaid

 None

12. Do you have a primary care physician (PCP) to take care of your medical needs?

- Yes
 No

13. How often do you follow up with your psychiatric provider as recommended?

- Always

 Usually

 Sometimes

 Never

Metabolic Management Assessment

14. If you did not answer "always" follow up with your psychiatric provider as recommended, why do you not go to follow up appointments?

- I don't know when they are
 I don't get along with my provider
 I don't remember
 I don't want to go

Other (please specify)

15. How often do you get your blood drawn as recommended by your provider?

- Always
 Sometimes
 Rarely
 Never

16. Why don't you "always" get your blood drawn as recommended?

- I did not want to go
 I do not like to get my blood drawn
 I did not know when to go
 I do not think it is important
 I did not have transportation

Other (please specify)

17. Has an exercise plan or recommendation been provided to you since you started taking any of the medications you checked above?

- Yes, and I follow it
 Yes, but I don't like it
 No, but that would be nice
 No, and I don't want one
 I don't think so

Other (please specify)

18. Has a detailed plan of care been offered to you since you started taking any of the medications above? (Such as when you will need labs and what kind of side effects you may experience)

- Yes
 No
 I don't know

19. How often do you take your medications as prescribed?

- Usually
 Always
 Never
 Sometimes

Metabolic Management Assessment

22. If you have experienced physical side effects such as high blood pressure or weight gain, have you notified your psychiatric or medical provider?

- No
 Yes
 I don't have one
 I didn't know that I should tell someone

Other (please specify)

23. How satisfied are you with the management of your symptoms on your medication(s)?

- Very satisfied
 Not very satisfied
 Not satisfied at all
 A little satisfied

24. What don't you like about your medications?

Other (please specify)

25. Do you want a detailed plan on how to monitor your health?

- No
 Maybe
 Yes
 I don't know

26. Do you feel that your health would benefit from receiving a more specific plan for you to follow on how to take care of yourself?

- Maybe
 I don't know
 No
 Yes

27. Would any of the following additional services be beneficial for you?

- Weekly visits with a nurse to ask questions
 Monthly visits with a nurse to ask questions
 Education about your health that may include stop smoking, diet, exercise, or preventative health care
 Food journal assistance
 Exercise planning and/or assistance
 Nutritional information and/or meal planning assistance

Other (please specify)

Metabolic Management Assessment

26. Do you want a detailed plan on how to monitor your health?

- Yes No I don't know Maybe

27. Do you feel that your health would benefit from receiving a more specific plan for you to follow on how to take care of yourself?

- I don't know Maybe No Yes

28. Would any of the following additional services be beneficial for you?

- Exercise planning and/or assistance
- Education about your health that may include stop smoking, diet, exercise, or preventative health care
- Food journal assistance
- Monthly visits with a nurse to ask questions
- Nutritional information and/or meal planning assistance
- Weekly visits with a nurse to ask questions

Other (please specify)

THANK YOU FOR YOUR TIME!!

we must be
willing to let go
of the life we
have planned,
so as to have
the life that is
waiting for us
- joseph campbell

APPENDIX D

METABOLIC ASSESSMENT CHECKLIST (MAC)



Metabolic Assessment Checklist (MAC)
To be completed prior to SGA initiation and then yearly thereafter

Faxed to PCP
 Date _____
 Initials _____

Name _____ DOB: _____ Dx: _____

Primary care provider _____ Date of last lab draw: _____

New medication or follow up? (Please circle) **NEW** (med name) _____ **FOLLOW UP**

Assessment	Ok	Follow up	Assessment	Ok	Follow up
Ht _____ (in) Wt _____ (lbs) BMI _____		(1)	Breast v (F & M) Normal / Abnormal		(14)
Waist circumference _____ cm		(2)	Menstrual cycle (female) LMP _____ regular? Y/N		(15)
Pulse _____ bpm		(3)	Urine _____ per day Color _____		(16)
Blood Pressure _____ / _____		(4)	Bowels _____ per day Painful / loose / concerning		(17)
Temperature _____		(5)	Sleep _____ hrs/night		(18)
Liver function Normal / Abnormal		(6)	Smoker Y / N		(19)
Total cholesterol _____ HDL _____ LDL _____		(7)	Exercise Y / N _____ hours _____ days/wk		(20)
Fasting glucose _____ OR A1c _____		(8)	Alcohol intake Y / N _____ per day		(21)
Cervical smear (women) Normal / Abnormal		(9)	Diet 5-a-day? Y/N < fat, salt, carbohydrates		(22)
Testicle self v (men) Normal / Abnormal		(10)	Fluid intake _____ per day		(23)
Teeth _____		(11)	Caffeine intake _____ per day		(24)
Eyes _____		(12)	Safe sex Y/N		(25)
Feet _____		(13)	Sex satisfaction Y / N		(26)

RN Signature _____ Date: _____

APPENDIX E

METABOLIC ASSESSMENT CHECKLIST (MAC)
KEY



Metabolic Assessment Checklist (MAC)-KEY with Normal Limits, Recommendations, & Rationale
 Checklist Instructions for Mental Health Nurses (MHNs)

MEASUREMENTS

BLOOD TESTS

<p>1. Body Mass Index (BMI) – Stated height is acceptable, weigh for accuracy.¹</p> <ul style="list-style-type: none"> • Underweight < 18.5; Ideal 18.5 - 24.9; Overweight 25 - 29.9; Obese >30 (See attached table).⁴ Monthly weights (BMI) are recommended for clients taking atypical antipsychotics. Diet advice should be offered to anyone with a BMI ≥ 28.³ • <i>Any degree of overweight as it coincides with diabetes and other serious illnesses.³</i> 	<p>2. Waist Circumference – Tape should be placed midway waist, at the level of the belly button.³ Measurements unnecessary if BMI >35⁵</p> <ul style="list-style-type: none"> • Females 80-88cm (31.5-35in), Males 94-102cm (35-40in)^{3,5} Educate on diet and exercise programs, weight loss programs, and/or medication review.³ • <i>Waist circumference correlates with visceral adipose tissue, lipids, and insulin levels³ and are associated with an increased risk for type 2 diabetes, dyslipidemia, hypertension, and CVD in patients with a BMI in a range between 25 and 34.9 kg/m².</i>⁵ 	<p>3. Pulse rate (PR) – Take a manual reading if possible, at least 15 seconds x4, 30 seconds x2 is preferred.⁶</p> <ul style="list-style-type: none"> • Ideal PR is 60-100 bpm, if raised or starting new SGAs, consider ECG.^{3,7} Patients taking clozapine, ziprasidone and/or high doses of FGA, those with CVD risk or personal history, or being admitted to an inpatient unit should have an ECG done.^{7,3} • <i>Most antipsychotics have the potential for lengthening the QT interval (>450ms in males, >470ms in females), ventricular arrhythmias, and cardiac arrest.³</i> 	<p>4. Blood Pressure (BP) – Manual readings are preferred and more accurate, wait >10min after arrival, patient should be sitting with legs uncrossed.²</p> <ul style="list-style-type: none"> • Pre-hypertension >130/80, Hypertension >140/90 and should be counseled on weight loss (if overweight), improved diet, increased exercise, smoking cessation, decreased salt and alcohol intake.³ BP >160/100 (or 140/90 with diabetes or established CVD) should begin drug therapy.³ • <i>High BP increases the risk of cardiovascular complications such as coronary heart disease, stroke, and death.³</i> 	<p>5. Temperature – no preferred measurement method</p> <ul style="list-style-type: none"> • Normal temp is 37.0-37.7°C (98.6-99.9°F) >37.7°C (99.9°F) is considered a fever; >39°C (102°F) starts to become life threatening.⁸ 41°C (106°F) is a medical emergency.⁸ Look for signs of infection, ask about ETOH withdrawal and drug use. Fluctuating BP or dystonia, suspect NMS, refer to EMS immediately.³ OTC acetaminophen or ibuprofen are appropriate for elevated temp, refer to directions on the bottle & refer to PCP PRN. • <i>Raised temperature can be caused by infection, heat stroke, ETOH withdrawal, anticholinergic drugs, allergic rxns, and agonist drugs. Neuroleptic malignant syndrome is usually associated with Haldol & Prolixin, the dopamine depletion is rare but life threatening with elevated temp set point, muscle rigidity, AMS, & autonomic dysfunction³</i> 	<p>6. Liver Function Test (LFT) – to be checked baseline and every 12 months³</p> <ul style="list-style-type: none"> • Total Protein: 6.0-8.4 mg/dL, Serum Albumin: 3.5-5.5 g/dL, Total Bilirubin: 0.3-1mg/dL, Direct Bilirubin: 0.1-0.3 mg/dL, ALT (Alanine Transaminase): 10-35 IU/L, AST (Aspartate Transaminase): <35 IU/L, ALP (Alkaline Phosphatase): 44-147 IU/L, Serum Amylase: 60-160 IU/L, Serum Lipase: <160 IU/L.¹⁰ Physical symptoms are jaundice, ascites, encephalopathy, and sepsis. If abnormal, repeat in 6 months, reduce ETOH intake, encourage diabetes control or weight loss if appropriate, refer to PCP. If abnormal LFTs persist, refer to a specialist.³ • <i>Antipsychotic medicine can cause a nonalcoholic fatty liver disease (NAFLD) progression to carcinoma & liver failure, and/or abnormal LFTs.^{3,9}</i> 	<p>7. Lipids – to be checked baseline, fasting at 12 weeks, and annually¹¹</p> <ul style="list-style-type: none"> • Total Cholesterol: <200 mg/dL, HDL (High Density Lipoprotein): 45-100 mg/dL female; 50-110 mg/dL male, LDL (Low Density Lipoprotein): <100 mg/dL, TAG (Triglycerides): ages 10-39 = 54-110 mg/dL; ages 40-59 = 70-150 mg/dL; ages 60+ = 80-150 mg/dL.¹⁰ If abnormal, educate and discuss meal planning, diet discussion and exercise, refer to PCP to consider a statin.³ • <i>Dyslipidemia is a key component to metabolic syndrome and a precursor for cardiovascular disease.³</i> 	<p>8. Glucose – Fasting is most accurate and should be done baseline, at 12 weeks, and annually¹¹</p> <ul style="list-style-type: none"> • Fasting plasma glucose < 126 mg/dL, A1c < 6.5%. Assess for risk factors such as family hx, physical inactivity, diet, smoking, and medications.³ If abnormal tests start education program on diabetes, diet, meal planning, and exercise; monitor more frequently, refer to PCP.³ • <i>Diabetes occurs in 15% of people with schizophrenia compared to 5% of the general population.³ Early intervention, glucose monitoring and regulation can be lifesaving to prevent CAD, PVD, CVD, neuropathy, amputations, and death.¹⁴</i>
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SCREENING

	<p>Other recommended lab tests to be considered with all antipsychotic drugs – baseline and annually unless noted otherwise</p> <ul style="list-style-type: none"> • Prolactin –Hyperprolactinemia is a common SE with any antipsychotic, sx include gynecomastia, galactorrhea, amenorrhea, and sexual dysfunction. Recommendations are to be proactive. Elevated prolactin for more than 3 months may compromise bone health. Stop, refer to endocrinologist PRN. ³ • Urea, electrolytes and calcium – Electrolyte imbalance risk with antipsychotics. Pts taking Lithium should test Q6m d/t hypercalcemia and abn renal fxn. ³ • Thyroid function test – Neuroleptics may affect thyroid hormone metabolism and elevate T₄ (90% of what thyroid gland secretes, rx for hypothyroidism b/c body can produce T₃ from T₄) ^{3,12} Pts taking Lithium should test Q6m. ³ Hypothyroidism is r/t depression/social anxiety and may benefit from supplements. ¹³ • Full Blood Count – Leukocytes, hemoglobin, erythrocytes, and platelets have been found to be abnormal in patients with schizophrenia. ³ Leukopenia and neutropenia can be side effects of antipsychotic medicine (especially Clozaril) and should be monitored. ³ • B12 & Folate – Supplements shown successful for mental health symptoms of depression, cognitive deficits in dementia/Alzheimer’s dementia, & delirium. ¹⁴ • Vitamin D – R/t Depression, cognitive decline, and ↑ heart disease ¹² ~70% of US has ↓ serum levels & a sample should be monitored, ↑ common North ¹⁵
9.	<p>Cervical cytology – Women ; assess screening hx ³</p> <ul style="list-style-type: none"> • Screening guidelines: <21y – no screening; 21-65y – cytology Q3y; ages 30-65y should also have HPV screen Q5y. ¹⁶ Refer and encourage to PCP, PAP and HPV screenings should not take the place of yearly well-women visits. PAP results can take up to 3 weeks, abnormal results do not imply cancer. ¹⁶ • <i>Every year in US, ~ 12k women + cervical cancer and ~4k die from it but is most preventable female cancer with regular screening tests and early treatment.</i> ¹⁷
10.	<p>Prostate & Testicular examination – Men; assess screening hx ³</p> <ul style="list-style-type: none"> • No established screening guidelines without symptoms such as urinary retention, refer testicular lumps & urinary retention to PCP. ¹⁸ • <i>Prostate CA screening is not shown to be effective. Testicular cancer, the most common CA in men aged 15 to 34 years can usually be cured.</i> ¹⁸
11.	<p>Teeth – Assess dental visits and dental hygiene habits ³</p> <ul style="list-style-type: none"> • Discuss brushing & flossing 2x/day. Check-ups should be Q3 months to 2 yrs PRN, encourage clients to make regular visits to CHP. ³ • <i>Antipsychotics, antidepressants, and mood stabilizers can reduce saliva flow leading to gingivitis, caries, and periodontal disease. Also a contributor to poor oral hygiene is smoking and poor diet and some research shows good oral hygiene can result in a healthier heart.</i> ³
12.	<p>Eyes – Assess relationship with an optometrist ³</p> <ul style="list-style-type: none"> • Check-up every two years, refer to local optometrist PRN. ³ • <i>Antipsychotic medications can cause lens and cornea damage, and has been associated with the development of cataracts.</i> ³
13.	<p>Feet – Inspect feet and assess washing, nail trimming, and sensation ³</p> <ul style="list-style-type: none"> • Educate about the importance of foot care, cleaning and asking for assistance with nail trimming PRN, refer problems & elderly to PCP. ³ • Personal care can be very challenging with SMI, foot neglect can lead to problems through the body, especially with metabolic complications. ³
14.	<p>Breasts (male & female) – Assess self-screening, lactation, physical changes, and family history</p> <ul style="list-style-type: none"> • Ed/provide self-exam ed. Risk factors: age, obesity, fam hx, ↑estrogen levels, & antipsychotics. Enc. v-ups, yr. exam all ages & mammo >50 (>40 w/fam hx). ³ • <i>Breast CA is the 2nd leading cause of CA in women, 12% will develop, can be aggressive and fatal, early screening is imperative to survival.</i> ¹⁹ <i>Causes of breast CA in men is UKN, correlated with increasing age.</i> ³ <i>Hyperprolactinemia is an adverse effect of antipsychotics that can lead to breast related problems.</i> ³
15.	<p>Menstrual cycle – Women; assess LMP and regularity of cycle</p> <ul style="list-style-type: none"> • Range: 24-35d. if positive for amenorrhea or significant irregularity, refer to PCP to consider oral contraceptives, or consider psychiatric medication changes. ³ • <i>Hyperprolactinemia can cause amenorrhea, associated with infertility and osteoporosis.</i> ³
16.	<p>Urine – Assess frequency, color of urine, incontinence, and kidney stone history</p> <ul style="list-style-type: none"> • Range: 1-2L (32-64oz)/day. Educate about importance of fluid balance, symptoms of urinary tract infections (pain, urgency, odor), refer to PCP for concerns. ³ • <i>Polyuria and polydipsia can be signs of diabetes, renal failure, alcohol and drug misuse, and metabolic abnormalities.</i> ³
17.	<p>Bowels – Assess for diarrhea, constipation, straining, bleeding, and frequency</p> <ul style="list-style-type: none"> • For mild concerns, educate about exercise, diet, ↓ ETOH intake, and ↑ water (~13C. men, 9C. for women). CA screening is recommended Q2y for age 60-69. ³ • For severe concerns, refer client to PCP, internal medicine, or gastroenterologist or endoscopy. ^{3,21} • <i>People with schizophrenia are nearly twice as likely to have bowel cancer compared to the general public and rarely complain.</i> ³ <i>Diet is a major contributor, excessive red or processed meats and deficiencies in fiber, fruits and vegetables can be attributors.</i> ³

LIFESTYLE

18.	<p>Sleep – Assess sleep habits, routine, bed time, restfulness, daytime sleepiness, sleep study</p> <ul style="list-style-type: none"> • Most adults need 7-8h sleep/night; educate good sleep hygiene/habits (blue screens, routines), sleep diary, refer to psych or PCP for med review PRN.³ • <i>Complaints of poor sleep quality are often related to quality of life and stress, sometimes related to medication side effects or untreated symptoms of SMI.</i>³
19.	<p>Smoking – Assess about smoking habits</p> <ul style="list-style-type: none"> • Provide smoking cessation, educate w/nicotine alternatives (patch, gum, bupropion, Chantix), comorbid health risks (respiratory disease, heart disease), review symptom control, if nicotine habit Δs look @ appt. with psych provider d/t medication efficacy. Refer to PCP for respiratory complications/bx.³ • <i>Pts with schizophrenia smoke 5x more than general public, thought to alleviate the cognitively blunting side effects of antipsychotic medications.</i>^{3, 15}
20.	<p>Exercise – Assess about level of activity</p> <ul style="list-style-type: none"> • Assist with an exercise plan of 30m x5d/wk and ↑ as tol.³ Refer to CBR for specific guided activities when available. • <i>People with SMI are more physically inactive and have ↑health complications than the general pop. Physical activity can have + impact on psych wellbeing.</i>³
21.	<p>Alcohol – Assess for excessive ETOH intake</p> <ul style="list-style-type: none"> • Provide resources and education beyond moderate ETOH use which is > 1 drink daily for women >2 drinks daily for men daily. Heavy or high risk drinking is 3 drinks daily or >7/wk for women & 4 drinks daily or > 14/wk, which can interfere with the efficacy, and increase side effects, should be avoided.^{3, 22} • <i>Excessive drinking ↑the risk of cirrhosis of the liver, hypertension, stroke, type 2 diabetes, cancer of the ↑gastrointestinal tract & colon, injury, & violence.</i>²²
22.	<p>Diet: 5-a-day – Assess eating habits</p> <ul style="list-style-type: none"> • Provide resources for maintaining <1,500mg sodium, limited sugars, and minimal saturated fats, new sources recommend ¼ of each meal is fruits & veggies • <i>Diets high in saturated fats, salt, and carbs are associated with poor outcomes in mental health & can exacerbate CVD, diabetes, obesity, and some cancers</i>³
23.	<p>Fluid intake – Assess for dehydration (turgor, excessive thirst, HA, constipation, low BP, sunken eyes, rapid heartbeats, nausea, dizziness, confusion).²⁰</p> <ul style="list-style-type: none"> • Water intake range: Men 13 cups (1C = 8oz), Women 9 cups (4C = 1liter)²³ More than 3L per day may indicate polydipsia and should be referred to PCP²² • <i>Water flushes toxins out of vital organs, carries nutrients to your cells, and provides a moist environment for ear, nose and throat tissues. Water loss occurs through breath, perspiration, urine and bowel movements, illness, elevation, exercise & pregnancy; dehydration can drain your energy and make you tired.</i>²³
24.	<p>Caffeine intake – Assess average daily caffeine intake</p> <ul style="list-style-type: none"> • Low-moderate 130 mg-300 mg/day, moderate 200 mg-300 mg/day, high >400 mg/day, heavy consumption >6,000 mg/day cause restlessness, nervousness, excitement, insomnia, flushing, diuresis & GI probs (see table in MAC order set) Withdrawal can occur 12-24h after abstinence, w/peak at 20-51h up to 2-9d²⁴ • <i>Withdrawal can induce psychosis, headache, tiredness/fatigue, decreased energy/activeness, decreased alertness/attentiveness, drowsiness/sleepiness, decreased contentedness/well-being, depressed mood, difficulty concentrating, irritability, and felling muzy/foggy/not clearheaded</i>^{3, 24}
25.	<p>Safe sex – Assess knowledge, practices, and behaviors</p> <ul style="list-style-type: none"> • Educate on healthy relationships, use of condoms, birth control, sexually transmitted disease and HIV prevention. Refer to PCP or local fam planning clinic³ • <i>People with SMI that are sexually active are more likely to engage in ↑ risk bx that can lead to HIV, STI, unwanted sexual coercion, and unstable relationships</i>³
26.	<p>Sex satisfaction – Assess concerns or complications with sexual relations</p> <ul style="list-style-type: none"> • Monitor serum prolactin M 3-14ng/mL, F 3-27ng/mL. Hyperprolactinaemia can negatively affect libido, arousal, and orgasmic dysfunction, assessed using a 5 point scale - The Arizona Sexual experience scale (ASEX) www.psy-world.com/asex_print.htm²⁵ Also discuss relationships and emotional capabilities³ • <i>Sexual dysfunction can occur in ~45% of patients on antipsychotics, for both men & women it is r/t hyperprolactinaemia.</i>³

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BMI	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Height (inches)	Body Weight (pounds)																
58	91	96	100	105	110	115	119	124	129	134	138	143	148	153	158	162	167
59	94	99	104	109	114	119	124	128	133	138	143	148	153	158	163	168	173
60	97	102	107	112	118	123	128	133	138	143	148	153	158	163	168	174	179
61	100	106	111	116	122	127	132	137	143	148	153	158	164	169	174	180	185
62	104	109	115	120	126	131	136	142	147	153	158	164	169	175	180	186	191
63	107	113	118	124	130	135	141	146	152	158	163	169	175	180	186	191	197
64	110	116	122	128	134	140	145	151	157	163	169	174	180	186	192	197	204
65	114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204	210
66	118	124	130	136	142	148	155	161	167	173	179	186	192	198	204	210	216
67	121	127	134	140	146	153	159	166	172	178	185	191	198	204	211	217	223
68	125	131	138	144	151	158	164	171	177	184	190	197	203	210	216	223	230
69	128	135	142	149	155	162	169	176	182	189	196	203	209	216	223	230	236
70	132	139	146	153	160	167	174	181	188	195	202	209	216	222	229	236	243
71	136	143	150	157	165	172	179	186	193	200	208	215	222	229	236	243	250
72	140	147	154	162	169	177	184	191	199	206	213	221	228	235	242	250	258
73	144	151	159	166	174	182	189	197	204	212	219	227	235	242	250	257	265
74	148	155	163	171	179	186	194	202	210	218	225	233	241	249	256	264	272
75	152	160	168	176	184	192	200	208	216	224	232	240	248	256	264	272	279
76	156	164	172	180	189	197	205	213	221	230	238	246	254	263	271	279	287

BMI	Height (inches)	Body Weight (pounds)																																
		36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54														
58	172	177	181	186	191	196	201	205	210	215	220	224	229	234	239	244	248	253	258															
59	178	183	188	193	198	203	208	212	217	222	227	232	237	242	247	252	257	262	267															
60	184	189	194	199	204	209	215	220	225	230	235	240	245	250	255	261	266	271	276															
61	190	195	201	206	211	217	222	227	232	238	243	248	254	259	264	269	275	280	285															
62	196	202	207	213	218	224	229	235	240	246	251	256	262	267	273	278	284	289	295															
63	203	208	214	220	225	231	237	242	248	254	259	265	270	278	282	287	293	299	304															
64	209	215	221	227	232	238	244	250	256	262	267	273	279	285	291	296	302	308	314															
65	216	222	228	234	240	246	252	258	264	270	276	282	288	294	300	306	312	318	324															
66	223	229	235	241	247	253	260	266	272	278	284	291	297	303	309	315	322	328	334															
67	230	236	242	249	255	261	268	274	280	287	293	299	306	312	319	325	331	338	344															
68	236	243	249	256	262	269	276	282	289	295	302	308	315	322	328	335	341	348	354															
69	243	250	257	263	270	277	284	291	297	304	311	318	324	331	338	345	351	358	365															
70	250	257	264	271	278	285	292	299	306	313	320	327	334	341	348	355	362	369	376															
71	257	265	272	279	286	293	301	308	315	322	329	338	343	351	358	365	372	379	386															
72	265	272	279	287	294	302	309	316	324	331	338	346	353	361	368	375	383	390	397															
73	272	280	288	295	302	310	318	325	333	340	348	355	363	371	378	386	393	401	408															
74	280	287	295	303	311	319	326	334	342	350	358	365	373	381	389	396	404	412	420															
75	287	295	303	311	319	327	335	343	351	359	367	375	383	391	399	407	415	423	431															
76	295	304	312	320	328	336	344	353	361	369	377	385	394	402	410	418	426	435	443															

APPENDIX F

METABOLIC ASSESSMENT CHECKLIST (MAC)
ORDER SET



Metabolic Assessment Checklist (MAC)-Order Set

Recommended Interventions (Copy & Paste into Care Plan)

1.	<p>BMI – Exercise & diet</p> <ul style="list-style-type: none"> <input type="checkbox"/> Meet with CBR on _____ for meal planning assistance <input type="checkbox"/> Start a wellness journal on _____ with daily diet, exercise, sleep, mood, _____ <input type="checkbox"/> Starting on _____ take a brisk walk for 30min on Monday, Wednesday & Friday <input type="checkbox"/> Starting on _____ take a brisk walk for 30min Monday-Thursday & Saturdays <input type="checkbox"/> Starting on _____ take a brisk walk for 60min on Monday, Wednesday & Friday <input type="checkbox"/> Starting on _____ take a brisk walk for 60min Monday-Thursday & Saturdays <input type="checkbox"/> Meet with a nurse weekly on _____ to discuss diet & exercise <input type="checkbox"/> Talk with your provider by _____ about looking at medications alternatives <input type="checkbox"/> Follow up with your Primary Care Provider by _____ for check-up <input type="checkbox"/> Establish care with Primary Care Provider by _____ for check-up
2.	<p>Waist Circumference – Stretch & sit ups</p> <ul style="list-style-type: none"> <input type="checkbox"/> Starting on _____ stretch legs for 5 minutes, arms for 5 minutes, and back for 5 minutes <input type="checkbox"/> Starting on _____ do 10 sit-ups every day <input type="checkbox"/> Starting on _____ do 20 sit-ups every day <input type="checkbox"/> Starting on _____ do 30 sit-ups every day <input type="checkbox"/> Meet with a nurse weekly to discuss exercise progress on _____
3.	<p>Pulse - Obtain an Electrocardiogram (ECG)</p> <ul style="list-style-type: none"> <input type="checkbox"/> Call 406-414-3959 by _____ to make an appointment, the order will be faxed from GMHC <input type="checkbox"/> Follow up with your Primary Care Provider by _____ for cardiac check-up <input type="checkbox"/> Establish care with Primary Care Provider by _____ for cardiac check-up
4.	<p>Blood Pressure - Diet & Exercise</p> <ul style="list-style-type: none"> <input type="checkbox"/> Meet with CBR on _____ for meal planning assistance, low sodium diet, increase vegetables <input type="checkbox"/> Starting on _____ take a brisk walk for 30min on Monday, Wednesday & Friday <input type="checkbox"/> Starting on _____ take a brisk walk for 30min Monday-Thursday & Saturdays <input type="checkbox"/> Starting on _____ take a brisk walk for 60min on Monday, Wednesday & Friday <input type="checkbox"/> Starting on _____ take a brisk walk for 60min Monday-Thursday & Saturdays <input type="checkbox"/> Meet with a nurse weekly to discuss diet & exercise on _____ <input type="checkbox"/> Follow up with your Primary Care Provider by _____ for HTN <input type="checkbox"/> Establish care with Primary Care provider by _____ for HTN
5.	<p>Temperature - Hydrate, Rest & Relax</p> <ul style="list-style-type: none"> <input type="checkbox"/> Follow up with your Primary Care Provider by _____ for acute care / elevated temp. <input type="checkbox"/> Establish care with a Primary Care Provider by _____ for acute care / elevated temp.
6. 7. 8.	<p>Labs</p> <ul style="list-style-type: none"> <input type="checkbox"/> Fasting / Nonfasting (circle) Please go to the walk-in BDH Lab at the hospital, 19th Ave, or the VA lab at Medical Arts on Willson before _____ <ul style="list-style-type: none"> <input type="radio"/> Due for Comprehensive Metabolic Panel <input type="radio"/> Due for Lipid panel <input type="radio"/> Due for Fasting glucose check <input type="radio"/> Due for prolactin check <input type="radio"/> Due for TSH check <input type="radio"/> Due for CBC with differential / without differential (circle) <input type="radio"/> Due for B12 & Folate check <input type="radio"/> Due for Vitamin D check <input type="radio"/> Others: _____ <input type="checkbox"/> Follow up with your Primary Care Provider by _____ for endocrinologist referral <input type="checkbox"/> Establish care with a Primary Care Provider by _____ for endocrinologist referral

9.	PAP & Prostate/Testicular exam - Reproductive screening
10.	<input type="checkbox"/> Follow up with your Primary Care Provider by _____ for screening / concerns (circle) <input type="checkbox"/> Establish care with a Primary Care Provider by _____ for screening / concerns (circle)
11.	Teeth – Dental visit (yearly check-up) <input type="checkbox"/> Brush teeth for 2 minutes twice a day – morning and night <input type="checkbox"/> Floss teeth before brushing twice a day – morning and night <input type="checkbox"/> Follow up with a dentist by _____, last appt was _____
12.	Eyes – Optometrist (2 year check-up) <input type="checkbox"/> Follow up with your optometrist by _____ for vision changes <input type="checkbox"/> Meet with ACM/CBR on _____ for \$10 appt/referral letter to Lens Crafters <input type="checkbox"/> Call Lens Crafters at 406-585-4214 in the Gallatin Valley Mall to make an appointment
13.	Feet – Care & Monitoring <input type="checkbox"/> Follow up with your Primary Care Provider by _____ for foot care <input type="checkbox"/> Establish care with a Primary Care Provider by _____ for foot care
14.	Breast (male & female) & menstrual cycle – Education/exam
15.	<input type="checkbox"/> Follow up with your Primary Care Provider by _____ for screening / concerns (circle) <input type="checkbox"/> Establish care with a Primary Care Provider by _____ for screening / concerns (circle)
16.	Urine – Hydration & follow up <input type="checkbox"/> Drink at least 8oz of noncarbonated (no added sweeteners) water every 2 hours while awake <input type="checkbox"/> Meet with nurse weekly on _____ to discuss diet & hydration <input type="checkbox"/> Follow up with your Primary Care Provider by _____ for polyuria, anuria, pain (circle) <input type="checkbox"/> Establish care with a Primary Care Provider by _____ for polyuria, anuria, pain (circle)
17.	Bowels – Diet & Exercise <input type="checkbox"/> Drink at least 8 oz of noncarbonated (no added sweeteners) water every 2 hours while awake <input type="checkbox"/> Meet with CBR on _____ to identify and add 2 fiber foods into daily meal planning <input type="checkbox"/> Take a brisk walk for 30 minutes on 5 days each week <input type="checkbox"/> Start a wellness journal with diet, exercise, sleep, mood, and bowel habits <input type="checkbox"/> Take 100 mg of over-the-counter Colace or Metamucil daily x2 weeks <input type="checkbox"/> Meet with nurse on _____ to discuss diet, exercise, and constipation <input type="checkbox"/> Follow up with your Primary Care Provider by _____ for bowel care <input type="checkbox"/> Establish care with a Primary Care Provider by _____ for bowel care
18.	Sleep – Routine <input type="checkbox"/> Avoid daytime napping <input type="checkbox"/> Work on a bedtime routine – 1 hour prior to attempting to sleep every night do the following: <ul style="list-style-type: none"> <input type="checkbox"/> Change into bedtime clothes <input type="checkbox"/> Turn lights down and turn all screens off <input type="checkbox"/> Shower, bath, warm blanket, warm tea or milk <input type="checkbox"/> Brush teeth/wash face <input type="checkbox"/> Avoid alcohol and snacks after 7pm <input type="checkbox"/> Read or journal <input type="checkbox"/> Ear plugs <input type="checkbox"/> Other _____ <input type="checkbox"/> Follow up with your Primary Care Provider by _____ to discuss apnea/sleep study <input type="checkbox"/> Establish care with a Primary Care Provider by _____ to discuss apnea/sleep study
19.	Smoking – Quit/cut down/follow up <input type="checkbox"/> Call 1-800-QUIT-NOW (1-800-784-8669) 6am-11pm to discuss ways to help you quit using tobacco <input type="checkbox"/> Decrease your tobacco intake from _____ to _____ by _____ <input type="checkbox"/> Chew on a toothpick or hard candy instead of using tobacco 1x every day starting _____ <input type="checkbox"/> Chew on a toothpick or hard candy instead of using tobacco 4x every day starting _____ <input type="checkbox"/> Congratulations! You have decreased your tobacco intake! Follow up with your Psychiatric Provider by _____ to discuss your medications

20.	<p>Exercise – Activity plan</p> <ul style="list-style-type: none"> <input type="checkbox"/> Starting on _____ take a brisk walk for 30 min on Monday, Wednesday & Friday <input type="checkbox"/> Starting on _____ take a brisk walk for 30 min Monday-Thursday & Saturdays <input type="checkbox"/> Starting on _____ take a brisk walk for 60 min on Monday, Wednesday & Friday <input type="checkbox"/> Starting on _____ take brisk walk for 60 min Monday-Thursday & Saturdays <input type="checkbox"/> Starting on _____ stretch legs for 5 minutes, arms for 5 minutes, and back for 5 minutes <input type="checkbox"/> Starting on _____ do 10 sit-ups every day <input type="checkbox"/> Starting on _____ do 20 sit-ups every day <input type="checkbox"/> Starting on _____ do 30 sit-ups every day <input type="checkbox"/> Meet with a nurse weekly on _____ to discuss diet & exercise <input type="checkbox"/> Meet with CBR on _____ to create a local activity plan <input type="checkbox"/> Participate in group exercise programs offered at DIC starting on _____ <input type="checkbox"/> Journal daily activity goals starting on _____ <input type="checkbox"/> Drivers: Park in the farthest parking spot in the lot starting on _____
21.	<p>Alcohol – Quit/cut down/follow up</p> <ul style="list-style-type: none"> <input type="checkbox"/> Follow up with CBR on _____ to make an intake appointment at ADSGC <input type="checkbox"/> Follow up at ADSGC on _____ for an intake assessment <input type="checkbox"/> Decrease drinking by 1 day per week every week starting on _____ days per week _____ <input type="checkbox"/> Decrease drinking by 1 day per week every week starting on _____ days per week _____ <input type="checkbox"/> Decrease drinking by 1 day per week every week starting on _____ days per week _____ <input type="checkbox"/> Decrease drinking by 1 day per week every week starting on _____ days per week _____ <input type="checkbox"/> Decrease drinking to 3 drinks per day starting on _____ <input type="checkbox"/> Decrease drinking to 1 drinks per day starting on _____ <input type="checkbox"/> Find a local AA meeting by _____ call 1-888-607-2000 or go to www.aa-montana.org <input type="checkbox"/> Attend AA meeting on _____ at _____ <input type="checkbox"/> Attend AA meetings at _____ every _____ <input type="checkbox"/> Find a sponsor by _____ <input type="checkbox"/> Follow up with your Primary Care Provider by _____ for alcohol related health concerns <input type="checkbox"/> Establish care with a Primary Care Provider by _____ for alcohol related health concerns
22.	<p>Diet: 5 a day – Meal plan</p> <ul style="list-style-type: none"> <input type="checkbox"/> Eat something green every day this week starting on _____ <input type="checkbox"/> Eat something green with every meal this week starting on _____ <input type="checkbox"/> Choose fruits or vegetables as in-between meal snacks this week starting on _____ <input type="checkbox"/> Eat a fruit every day this week starting on _____ <input type="checkbox"/> Eat a fruit with every meal this week starting on _____ <input type="checkbox"/> Eat 5 fruits and/or vegetables every day this week starting on _____ <input type="checkbox"/> Don't eat after 7 pm this week starting on _____ <input type="checkbox"/> Eat 5 small meals this week instead of 2-3 large meals that make you feel full starting on _____ <input type="checkbox"/> Meet with CBR on _____ to plan meals for every day this week that have low fat, low salt, low carbohydrates, and high fruit/veggies http://www.fruitsandveggiesmorematters.org/ <input type="checkbox"/> On Sunday, prepare & package 1-2 fruit and/or veggie snacks for each day starting on _____ <input type="checkbox"/> Start a wellness journal with diet, exercise, sleep and mood starting on _____ <input type="checkbox"/> Meet with a nurse weekly on _____ to discuss food journal and diet
23.	<p>Fluid intake – Hydration & follow up</p> <ul style="list-style-type: none"> <input type="checkbox"/> Drink a 8 ounces (1 cup) of water in the morning when you wake up starting on _____ <input type="checkbox"/> Drink 4 cups (32 ounce or approximately 1 liter) of water each day starting on _____ <input type="checkbox"/> Drink 8 cups (64 ounces or approximately 2 liters) of water each day starting on _____ <input type="checkbox"/> Use a water bottle that has unit measure on it to keep track of water intake starting on _____ <input type="checkbox"/> Meet with nurse weekly on _____ to discuss water intake and dehydration <input type="checkbox"/> Follow up with your Primary Care Provider by _____ for possible electrolyte imbalance <input type="checkbox"/> Establish care with a Primary Care Provider by _____ for possible electrolyte imbalance

24.	<p>Caffeine intake – Quit/cut down/ follow up</p> <ul style="list-style-type: none"> <input type="checkbox"/> Use the Sources of Caffeine & Caffeine content table to identify drinks you have regularly, write down your average daily consumption estimate in a wellness journal and include exercise, sleep, and mood <input type="checkbox"/> Use your journal to track what size/kind of caffeinated drinks you consumed every day this week starting on _____ add up your milligrams for the week _____ <input type="checkbox"/> Meet with the nurse weekly on _____ to discuss caffeine journal and plan <input type="checkbox"/> Drink only 2 caffeinated drinks each day starting on _____ <input type="checkbox"/> Drink only 5 caffeinated drinks per week starting on _____ <input type="checkbox"/> Meet with a nurse weekly on _____ to discuss caffeine intake and mood/sleep
25. 26.	<p>Safe Sex & Satisfaction – Resources & Education</p> <ul style="list-style-type: none"> <input type="checkbox"/> Follow up with Primary Care Provider by _____ for STI screening <input type="checkbox"/> Follow up with Bridger Care by _____ for STI screening <input type="checkbox"/> Establish care with Primary Care Provider by _____ for STI screening

APPENDIX G

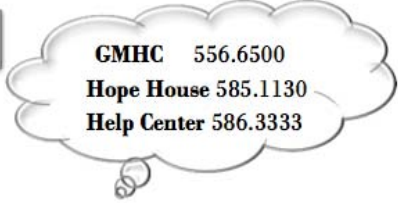
METABOLIC ASSESSMENT CHECKLIST (MAC)
CARE PLAN TEMPLATE

Name _____ DOB: _____ Today's Date _____



MAC-Care Plan

This plan has been designed for you based on the outcome of your metabolic assessment with your nurse. It is intended to be a guide for optimizing your health!



Name _____ DOB: _____ Today's Date _____

Sources of caffeine and caffeine content

Plain, brewed coffee 8 oz	135 mg (range 102-200)	Monster Energy 16 oz	160 mg
Instant coffee 8oz	95 mg (range 27-173)	Red Bull 8.5 oz	80 mg
Espresso 1 oz	40 mg (range 30-90)	Rip It energy drink 8 oz	100 mg
Plain, decaffeinated coffee 8 oz	5 mg (range 3-12)	Sobe No Fear energy drink 8 oz	130 mg
Green tea 8 oz	53 mg (range 40-120)	Spike Shooter energy drink 8.4 oz	300 mg
Black tea 8 oz	40-70 mg	Milk chocolate bar 1.5 oz	9 mg
Barq's root beer	22 mg	Sweet chocolate bar 1.45 oz	37 mg
Coca-Cola Classic 12 oz	35 mg	Cocoa powder mix 3 tsp	5 mg
Diet Coke 12 oz	47 mg	Hershey's Special chocolate bar 1.45 oz	31 mg
Dr. Pepper 12 oz	42 mg	Hot cocoa 8 oz	9 mg (range 3-15)
Diet Dr. Pepper 12 oz	Data 44 mg	Ready-to-eat chocolate pudding 4 oz	9 mg
Mountain Dew regular or diet 12 oz	54 mg	Ben & Jerry's Coffee Heath Bar Crunch 8 oz	84 mg
Pepsi-Cola 12 oz	38 mg	Ben & Jerry's Coffee Flavored Ice Cream	68 mg
Diet Pepsi 12 oz	36 mg	Excedrin Extra Strength, 1 tablet	65 mg
Sunkist Orange 12 oz	42 mg	Bayer Select Maximum Strength	64.5 mg
Full Throttle energy drink 16 oz	144 mg	Midol Menstrual Maximum Strength	60 mg

Primary Care Providers around Gallatin County

- Bozeman Community Health Partners
214 E Mendenhall
406-585-1360
- Bozeman Community Health Partners
214 E Mendenhall
406-585-1360
- Livingston CHP
126 S Main
406-222-1111
- Belgrade CHP
19 E Main Suite A
406-922-0820
- West Yellowstone CHP
11 Electric St
406-646-9441
- Bozeman Deaconess Hospital
915 Highland Blvd
406-585-5000

Reproductive Health and Family Planning

- Bridger Care
300 N Willson Suite 2001
406-587-0681

Dental care around Gallatin County

- Bozeman
120 N 19th Suite H
406-585-8701
- Livingston
112 W Lewis Suite 3 (upstairs)
406-922-0881

Labs

- Bozeman Deaconess Hospital Outpatient Services
915 Highland Blvd
406-414-1010
- 19th Ave Lab
120 N 19th Suite D
406-414-4605
- Medical Arts Lab
300 N Willson Suite 1001
406-585-2040

Alcoholics Anonymous

- 1-888-607-2000 or
- <https://www.aa-montana.org/>

Tobacco Quit Line

- 1-800-QUIT-NOW (1-800-784-8669)
- <https://montana.quitlogix.org/>