The Incidence of Metabolic Risk Factors in an Inpatient Psychiatric Setting

ABSTRACT
Our study examines risk factors for metabolic syndrome on admission to an acute psychiatric facility and the incidence of medical referrals at discharge. Data on demographics, risk factors for metabolic syndrome, other health risk factors, medications, related diagnoses, and primary care providers and referrals were collected from 125 psychiatric patient charts. Comparison analysis was done for two groups: those with two or more risk factors for metabolic syndrome and those with less than two risk factors. Differences between groups were statistically significant for age, waist circumference, body mass index, high-density lipoprotein, triglycerides, and fasting glucose levels. Few patients were referred to their primary care provider for follow-up care. This study has clinical implications for improving assessment of psychiatric patients at risk for developing metabolic syndrome, for designing interventions to help patients adopt lifestyle changes to mitigate these risks, and for working toward fuller integration of psychiatric and primary care.

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During the past 2 decades, cardiovascular disease and obesity have become major public health problems. Metabolic syndrome further increases the risk for developing serious medical outcomes. The increased risk for these conditions has coincided with the introduction of second-generation antipsychotic medications (SGAs) for people diagnosed with a serious mental illness. Advances in medical science have led to a steady decrease in mortality rates for many segments of the population; yet, mortality rates for people with serious mental illness have shown a steady increase, particularly since the onset of use of SGAs (National Association of State Mental Health Program Directors, Medical Directors Council, 2006). It is known that, on average, people with serious mental illness live 25 years less than the general population, and complications from cardiovascular disease are among the leading causes of death for patients diagnosed with chronic schizophrenia (De Hert, Schreurs, Vancampfort, & Van Winkel, 2009; Hasnain et al., 2009). Individuals with mental illness may have an increased risk for metabolic syndrome due to a variety of other factors, including genetic predisposition to weight gain, sedentary lifestyles, and poor nutrition, as well as the side effects of their medications.

The purpose of this study was to describe risk factors associated with metabolic syndrome in a sample of patients admitted for treatment at an acute psychiatric facility. Describing the demographic features and other health risk behaviors in psychiatric patients at risk for or who have metabolic syndrome will assist in (a) addressing assessment and identification of at-risk patients; (b) guiding the development of interventions to help patients adopt lifestyle changes; and (c) working toward fuller integration of psychiatric and primary care.

BACKGROUND

With the development of SGAs (often called atypical antipsychotic agents), patients noted an improvement in both positive and negative symptoms of schizophrenia with few of the extrapyramidal side effects known to be prevalent with first-generation antipsychotic medications (FGAs). However, recent data suggest that while SGAs effectively manage serious symptoms of schizophrenia and other mental illnesses, they are also associated with weight gain, glucose dysregulation, and diabetes (Carpenter & Buchanan, 2008).

Metabolic syndrome is the name given to a group of multiple and interrelated conditions resulting from obesity, specifically abdominal obesity, and insulin resistance. Characteristics of metabolic syndrome include increased abdominal girth, elevation of triglyceride levels, low levels of high-density lipoprotein (HDL), increased blood glucose levels, and elevated blood pressure. People with three or more of these risk factors meet criteria for metabolic syndrome, according to the Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III) (2001) (Table 1). The weight gain associated with SGAs has been thought to further increase the risks for metabolic syndrome in individuals with serious mental illness (National Association of State Mental Health Program Directors, Medical Directors Council, 2006).
Most studies related to people with serious mental illness and metabolic syndrome or risk factors for metabolic syndrome have focused primarily on schizophrenia and were conducted almost exclusively in outpatient settings (Sernyak, Leslie, Alarcon, Losonczy, & Rosenheck, 2002). Few studies have been conducted on inpatient units (Mangu- rian, Goss, & Newcomer, 2010; Straker et al., 2005). Although individuals with serious mental illness may be at increased risk for serious health consequences related to more sedentary lifestyles, poorer nutrition, and smoking, they also have less access to preventive health care (Carney, Allen, & Doebbeling, 2002; Jones & Carney, 2006). These factors may also contribute to increased risk of metabolic syndrome, cardiovascular disease, and a resultant increase in morbidity and mortality in people with serious mental illness (Hasnain et al., 2009; Weber, Cowan, Millikan, & Niebuhr, 2009).

### METHOD

This was a descriptive research study using a chart review of a sample of patients admitted in May and June 2010 to two inpatient psychotic disorder units at a psychiatric hospital in the northeastern United States. The convenience sample consisted of the first 125 patients requiring psychiatric hospitalizations for psychotic disorders during the time period of the study.

#### Data Collection

A researcher-designed Metabolic Study Data Tool was used to organize the collection of data pertaining to demographics, weight, height, blood pressure, waist circumference, lipid panel, fasting blood glucose, educational level, smoking history, primary care provider, employment, number of hospitalizations, and length of stay for each patient. Approval for the study was acquired from the Institutional Review Board at the hospital and participating university.

The team of researchers serially reviewed charts on two units, and interrater reliability was verified. Information was gathered at admission and discharge from the unit. For the purposes of this study, we used the definitions for metabolic syndrome risk factors reported in the Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III) (2001) (Table 1).

#### RESULTS

The sample for analysis consisted of 73 men and 52 women, ranging in age from 18 to 64 (mean age = 37.2, SD = 12.7 years). The majority were Caucasian (73.6%), with 10.4% African American, 7.2% Hispanic, 4.8% Asian, and 1.6% Other (2.4% were missing data). Single marital status was the most common (73.6%), and 72.6% reported having no children. Although the sample was relatively well educated (more than 64% reported having at least some college education), most (74.4%) were unemployed. The sample consisted of patients with a significant psychiatric history: 34.4% reported five or more lifetime hospitalizations for psychiatric disorders.

Risk factors for metabolic syndrome were evaluated using the definition specified above (Table 2). Since waist circumference measurements were unavailable for 49 patients, body mass index (BMI) was calculated, and BMI >25 was used as a proxy for waist circumference. Twenty-one patients (16.8%) met the criteria for metabolic syndrome.
additional 26 patients (20.8%) had at least two risk factors. Because we were trying to determine factors to assist in preventing progression to metabolic syndrome, we further analyzed the total sample divided into two groups: those with two or more risk factors for metabolic syndrome (Group A, n = 47) and those with less than two risk factors (Group B, n = 78). No significant demographic differences were found between the two groups, with the exception of age. The mean age for Group A was 40.9, whereas the mean age for Group B was 35 (p = 0.011).

The two groups differed significantly with regard to waist circumference, BMI, HDL, triglycerides, and fasting plasma glucose. Only blood pressure measurement was found not to be significantly different between the two groups. Group A had a mean waist circumference of 42.8 inches for men and 40.7 inches for women, compared with the average waist circumference of 37.4 inches for men and 34.6 inches for women in Group B. The mean BMI at discharge for Group A was 30.5, whereas the mean BMI at discharge for Group B was 26. HDL levels in Group A ranged from 14 to 54 (mean = 34.43) for men and 26 to 69 (mean = 40.17) for women. In contrast, HDL levels in Group B ranged from 26 to 72 (mean = 46.29) for men and 29 to 73 (mean = 56.33) for women. Triglyceride levels at admission also differed considerably: Group A had an average triglyceride level of 185.35 and Group B had an average triglyceride level of 75. Finally, fasting plasma glucose differed between groups in that Group A had a mean reading of 112.8, whereas Group B had a mean reading of 85.4.

Of note, both groups were similar in regard to primary care providers in that 63 of 122 (51.6%) patients reported not having a primary care provider. Similarly, 25 of 46 (54.3%) individuals in Group A and 38 of 76 (50%) in Group B lacked a primary care provider. Only nine total referrals for primary care follow up were made after discharge: five for patients in Group A and four for patients in Group B.

Regarding SGAs, which may increase the risk of metabolic syndrome, 79.2% of the total sample were prescribed at least one SGA at the time of discharge. Lifestyle risk factors were also gathered; 50.8% of the sample reported being smokers, and 68.8% did not report leisure activity, including exercise and stress-reducing activities.

An exploratory logistic regression analysis was performed for the outcome of two or more risk factors for metabolic syndrome and the predictors of age, sex,

### TABLE 2

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Group A ≥2 Risk Factors</th>
<th>Group B &lt;2 Risk Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. with Information Available</td>
<td>No. with Factor (%)</td>
<td>No. with Information Available</td>
</tr>
<tr>
<td>Waist circumference &gt;40 inches (men) or &gt;35 inches (women)</td>
<td>29</td>
<td>21 (72.4)</td>
</tr>
<tr>
<td>Systolic blood pressure &gt;130 mmHg</td>
<td>47</td>
<td>9 (19.1)</td>
</tr>
<tr>
<td>Diastolic blood pressure &gt;85 mmHg</td>
<td>47</td>
<td>9 (19.1)</td>
</tr>
<tr>
<td>Body mass index &gt;25</td>
<td>47</td>
<td>36 (76.6)</td>
</tr>
<tr>
<td>High-density lipoprotein &lt;40 mg/dL (men) or &lt;50 mg/dL (women)</td>
<td>48</td>
<td>34 (82.9)</td>
</tr>
<tr>
<td>Triglycerides ≥150</td>
<td>48</td>
<td>25 (61)</td>
</tr>
<tr>
<td>Fasting plasma glucose ≥100</td>
<td>48</td>
<td>31 (67.4)</td>
</tr>
<tr>
<td>Has a primary care provider</td>
<td>46</td>
<td>21 (45.7)</td>
</tr>
<tr>
<td>Referred to primary care provider</td>
<td>47</td>
<td>5 (10.6)</td>
</tr>
<tr>
<td>Current smoker</td>
<td>47</td>
<td>27 (57.4)</td>
</tr>
<tr>
<td>Physically active</td>
<td>44</td>
<td>15 (34.1)</td>
</tr>
</tbody>
</table>

* Statistically significant at p < 0.01.
race/ethnicity, and medications at admission. Of the four predictors, only age ($\beta = 0.046; p = 0.005$) was found to be a predictor of having two or more risk factors for metabolic syndrome. Older patients were more likely to have two or more risk factors compared with younger patients.

**DISCUSSION**

Results of this study support the findings of other researchers (Bermudes, Keck, & Welge, 2006). Psychiatric patients are at greater risk for metabolic syndrome for many reasons, including lifestyle habits and medication effects. More than 79% of patients in the total sample were taking one or more SGAs. In this study, 37.6% of patients had two or more risk factors for metabolic syndrome, and 16.8% met the criteria for metabolic syndrome. In addition, the older the patient, the higher the risk. Waist circumference and BMI were greater, triglycerides and glucose levels were higher, and the protective HDL levels were lower in those most at risk. This supports the need for further studies to evaluate interventions designed to decrease the risk for metabolic syndrome in people with serious mental illness.

Despite the increased risk for metabolic syndrome and its accompanying health problems, less than half of this sample reported having a primary care provider. In addition, only 5 of the 47 (10.6%) patients with two or more risk factors for metabolic syndrome were referred for primary care follow up after discharge. Medical specialization has led to “silos” of care for patients; therefore, psychiatric clinicians need to be aware of the competing medical needs of the patient when prescribing antipsychotic medications.

Unützer, Schoenbaum, Druss, and Katon (2006) reported on findings from the President’s New Freedom Commission on Mental Health in 2003, which established that delivery systems of mental health and medicine should be integrated to provide effective treatment and evidence-based models of care. Primary care physicians find it difficult to access mental health professionals, and up to half of patients fail to follow up with mental health referrals (Van Voorhees, Wang, & Ford, 2003). Based on results of our study, the reverse may also be true: that psychiatric clinicians may have difficulty accessing primary care for their patients who do not have established relationships with these providers.

We know that many patients with serious mental illness have medical problems that complicate their care. Weber et al. (2009) conducted a national survey of hospital discharges for medical illness for patients with and without a diagnosis of schizophrenia. They found that 50% of patients with schizophrenia had one or more comorbid medical conditions and that these comorbid conditions tend to be minimized, misdiagnosed, or inadequately treated. People with serious mental illness experience many barriers to accessing medical care, including both the patient’s psychiatric state and the organization or system of care. Carney et al. (2002) explored the allotment of medical services for psychiatric and substance abuse patients within a university medical center. Prevention-based services for nutrition, exercise, alcohol use, and sexual habits were provided less than 25% of the time for these patients, and the use of emergency treatment for medical problems occurred often. Provider issues can also hamper individuals with serious mental illness from receiving health care (Dixon et al., 2007). Issues such as variability of primary care providers, bias of providers toward patients with mental illness, and inaccurate interpretation of psychiatric patients’ description of medical signs and symptoms create barriers for appropriate medical care.

The challenge regarding who is responsible for the primary care of people with serious mental illness has been brought to the forefront. Dixon et al. (2007) described three areas of responsibility for psychiatrists, in particular: (a) medical conditions that emerge as a result of psychiatric treatment; (b) vigilance for conditions that could exacerbate a psychiatric illness; and (c) accountability for preventive screening, monitoring, and patient education. Specialized care with separate providers for mental and physical health creates coordination and communication obstacles for providers. Correll et al. (2010) reported on a national screening for metabolic risk factors of 10,084 psychiatric outpatients in which 62% were diagnosed with schizophrenia or bipolar disorder. Of those patients, 52% had metabolic syndrome, but most were not receiving treatment. Patients who reported receiving medical treatment had abnormal values for hypertension, hyperglycemia, and hypercholesterolemia. Despite guidelines, adequate monitoring of metabolic risk factors is not consistently implemented for psychiatric patients. Reasons mental health providers give for not monitoring risk factors include feelings of not being expert in the medical care arena, limited time, and limited resources to provide ongoing medical care (Correll et al., 2010).

Druss et al. (2008) examined screening for medical conditions in 181 community mental health centers. While two thirds had screening protocols for cardio-metabolic risk factors, only half could provide or refer the patient for medical treatment due to lack of accessible primary care providers in the community, reimbursement issues, and limited staff to initiate referral (Bradford et al., 2008). The existing need for primary care services for psychiatric patients has been established, and various intervention models have been proposed. Those that have integrated the mental health needs of the patient along with the provision of primary care have shown some success (Mangurian et al., 2010; Straker et al., 2005; van Orden, Hoffman, Haffmans, Spinhoven, & Hoencamp, 2009).
Psychiatric nurses can provide the link between the mental and physical health needs of patients with serious mental illness. By fostering a therapeutic alliance with the patient, nurses can detect and assess risk factors for metabolic syndrome and plan ongoing health care management. Nurses have an opportunity to promote healthy lifestyle education involving goal setting, motivational interactions, and follow-up plans (Usher, Foster, & Park, 2006). Psychiatric nurses can also be instrumental in recognizing the need for counseling patients at the onset of a course of SGAs. Behavioral strategies and healthy choices may help decrease the potential for weight gain when taking antipsychotic agents (Littrell, Hilligoss, Kirshner, Petry, & Johnson, 2003).

**LIMITATIONS**

There were several limitations to our study, including the small sample and missing data. Although waist circumference has been noted to be more predictive of risk for metabolic syndrome than BMI (Henderson et al., 2009), and despite measurement of waist circumference being a standard requirement for patients admitted to the studied units, waist circumference data were missing in 49 of the charts we reviewed. As a result, a less predictive measure (BMI) was substituted when waist circumference data were missing.

Further limitations involved the process of chart review versus actual patient interview. No attempt was made to clarify admission data, including medication history and lifestyle risk factors such as smoking, leisure/physical activity, and diet. In particular, the process of being admitted to an inpatient psychiatric facility, often during a psychiatric crisis, may not be the best time to gather lifestyle information necessary to plan preventive measures.

This same limitation applies to the notation of primary care provider information. Although more than 50% of the total sample reported having no primary care provider, this information may be skewed by the patient's inability to remember details of interactions with a primary care provider. Also, no attempt was made to determine when a patient had last seen his or her primary care provider. It may be that having a primary care provider does not mean a patient actually sees the provider on a regular basis.

**CONCLUSION AND IMPLICATIONS**

The study findings indicate the need to develop strategies to assure that all data required for making a diagnosis of metabolic syndrome are collected during a hospitalization, to design processes for mental health clinicians to routinely refer patients to their primary care provider, and to implement programs so all mental health patients have access to primary care clinicians.

Clinicians working on inpatient psychiatric units are positioned to help identify those patients with serious mental illness who have risk factors for metabolic syndrome and to begin to address those risk factors with the patients themselves, as well as to integrate the need for medical intervention into the ongoing plan of care. Assessment of risk factors for metabolic syndrome should occur throughout all levels of care, addressing modifiable lifestyle factors with patients at every step. Motivational techniques can be added to the repertoire of treatment teams to help patients make the changes necessary to decrease their risks. Discharge planning should include future plans for medical care, as well as interventions to modify lifestyle factors contributing to risk for medical complications.

New models of care, including nursing care, need to be developed to support the integration of physical and mental health. Weiss, Haber, Horowitz, Stuart, and Wolfe (2009) offered a comprehensive blueprint to advance integration. Key components of their recommendations include increasing the psychiatric nursing education preparation at the undergraduate level, ensuring that graduate-level curricula provide content that supports integrative care, and funding new delivery models of such care.

Psychiatric nurses in inpatient settings are uniquely positioned to assess for risk factors of metabolic syndrome and plan ongoing health care management. Nurses have an opportunity to promote healthy lifestyle education involving goal setting, motivational interactions, and follow-up plans (Usher, Foster, & Park, 2006). Psychiatric nurses can also be instrumental in recognizing the need for counseling patients at the onset of a course of SGAs. Behavioral strategies and healthy choices may help decrease the potential for weight gain when taking antipsychotic agents (Littrell, Hilligoss, Kirshner, Petry, & Johnson, 2003).
to begin to address those risks, offering patients lifestyle modification assistance and facilitating smooth transition to outpatient care. This study supports the need for further development of nursing models that foster this integration.

REFERENCES


REFERENCES

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