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Improving Metabolic Syndrome Screening on Patients on Second Generation Antipsychotic Medication

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A B S T R A C T

Aim: This quality improvement project aims at stressing the importance of screening for metabolic syndrome (MS) on patients with serious mental illness (SMI) managed with second generation antipsychotic (SGA) medication.
Method: One hundred charts of patients who were on SGA (n = 100) were randomly selected from more than 1000 charts for the purpose of this project with (n = 50) charts for pre-intervention and (n = 50) charts for post intervention. A chi-square test of independence was calculated comparing the frequency of labs and vital done in pre-intervention and post-intervention period.
Results: A significant interaction was found [$\chi^2(2) = 32.67$, $p < .001$] indicating that providers were more likely to order labs in postintervention (62%) than in pre-intervention (22%). No significant relationship was found for vital signs [$\chi^2(1) = .542$, $p > .05$]. The use of the screening and monitoring tool showed that gaps exist in the screening for MS among patients on SGA.
Implication to practice: Advanced health nurse practitioners are well placed to take the lead in screening, monitoring, and implementing the necessary measures to address MS among patients with serious mental illness.

The development of second generation antipsychotic (SGA) medication has led to an increase in their use due to the ability to control both negative and positive symptoms of psychosis. The use of SGA among patients with serious mental illness (SMI) has seen an increase in the occurrence of metabolic syndrome (MS) as one of the side effects. Vancampfort et al. (2013), found the prevalence of MS among patients using SGA to be greater than in the general population. This high preference of MS among this population has led to increased mortality and morbidity, and increase in use of healthcare resources. To reduce the occurrence of MS, there is a need for screening and monitoring for its occurrence. However, many health care providers do not screen and monitor for MS among patients with SMI. Holt et al. (2010) posit that despite the high prevalence of MS among individuals using SGA, screening for its occurrence remains suboptimal. This laxity in monitoring for MS is a common health problem and a local community mental health facility in a southwestern state is not an exception. The purpose of this quality improvement (QI) project was to improve screening rates for MS for early identification, timely intervention, and treatment among the SMI patients.

AIM

The use of second generation antipsychotic medication has been on the increase due to the ability to treat both negative and positive symptoms of psychosis. The aim of this QI is to promote and increase screening for MS among SMI patients on SGA. The purpose of the screening is to enable mental health clinicians to ensure early management and referral of the affected patients for specialized treatment is done. The project aims to answer the following question of whether implementation of the MS screening and monitoring tool will increase the screening rates of patients at risk of MS for management and referral.

LITERATURE REVIEW

Metabolic syndrome is a combination of symptoms of high blood pressure, high cholesterol, high fasting glucose, and truncal obesity which can lead to cardiovascular disease and/or type two diabetes (Alberti et al., 2009). Any elevated values of high blood pressure, cholesterol, blood sugar, and increased waist circumference should be a warning sign of development of MS. It is estimated that 20–25% of the world's adult population has MS with higher rates among the SMI population (De Hert et al., 2011; Mitchell et al., 2013a; Mitchell et al., 2013b). A

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Table 1
Chi-Square Tests.

	Value	df	Asymp. Sig. (2-sided)
Pearson chi-square	32.679[a]	2	.000
Likelihood ratio	35.239	2	.000
Linear-by-linear association	24.135	1	.000
N of valid cases	100		

NOTE. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 9.00.

study by Kagal, Torgal, Patil, and Malleshappa (2012) found the prevalence of MS to be 35% among patients diagnosed with schizophrenia. Studies by Khalil (2012), Ervin (2009), Sweileh et al. (2012), Lee, Chow, and Leung (2011), found the prevalence of MS to be worldwide the SMI population. These statistics not only highlight the magnitude of this condition, but also enlightens how it remains undiagnosed. Undiagnosed and untreated MS remains high due to suboptimal screening which leads to missed opportunities for use of primary preventive measures (De Hert et al., 2011; Hasnain, Fredrickson, Vieweg, & Pandurangi, 2010; Mitchell, Delaffon, Vancampfort, Correll, & De Hert, 2012). Failure to diagnose MS among the SMI population in a timely manner has dire consequences which includes development of other comorbidities and decreased life span. The missed opportunities are linked with high indisposition and death rates (Holt et al., 2010; Vancampfort et al., 2013). To reduce the occurrence of MS, there is need to have better screening methods and tools in place. Regular monitoring and adequate preventive efforts for MS risk factors are imperative (Vancampfort et al., 2013). Ronsley, Raghuram, Davidson, and Panagiotopoulos (2011) posits that lack of knowledge of the required monitoring parameters and poor communication is one of the biggest obstacle for collaborative care success. This lack of knowledge thus creates the need to have an effective tool that can be used to monitor for MS. Riordan, Murphy, and Antonini (2011) emphasized the need for supporting programs that are geared towards increasing monitoring of laboratory and clinical measures. These measures will reduce risk factors associated with MS, improve patient's quality of life and reduce health related costs. The American Diabetes Association, American Psychiatric Association, and American Association of Clinical Endocrinologists and North American Association for the study of obesity (2004) recommend implementation of the MS screening protocol to facilitate preventative strategies, early diagnosis, and monitoring of metabolic disturbance to address this problem. Lack of transforming guidelines into action to prevent, diagnose early and treat MS risk factors among SMI was found to be the highest setback (Saloojee, Burns, & Motala, 2014). Low serum high density lipoprotein and fasting blood glucose have been found to have the highest sensitivity for screening for MS at 89.28% and 90.38% respectively (Kagal et al., 2012). This mandates the adoption of the recommended MS screening and monitoring guidelines to monitor fasting glucose or glycated hemoglobin, lipid panel, weight, waist circumference, and height to identify MS early.

METHOD

The method used in this QI was pre and post-intervention design. The QI was to evaluate the effectiveness of using the recommended MS monitoring and screening tool in improving identification of patients at risk for MS. The project was approved by the university institutional review board prior to implementation, and was conducted in an outpatient mental health facility in a south western state. The project was carried over a two month period of time. The QI consisted of contacting baseline audition and screening for MS in selected charts (n = 50), of patients seen at the facility from January 1 to January 31, 2015. The charts were selected randomly from over 1000 charts of patients who were on one or more SGA. The charts were reviewed for whether the patient was on SGA, and whether MS screening had been done per the recommended guidelines. The data comprised of monitoring of blood pressure, weight, height, lipid panel, fasting glucose and/or glycated hemoglobin parameters. Before implementation of the screening and monitoring tool, a meeting was held with the mental health providers and medical assistants to discuss the project and the use of the screening tool. Education on the use of the tool and the importance of adhering to the recommended guidelines was discussed during the meeting. The emphasis was on the importance of monitoring for MS using the recommended guidelines (Appendix A). All mental health providers were given the screening and monitoring tool in paper format to collect the required information. Audition of patients' charts (n = 50) of patients seen from February 1 to February 21, 2015 after the implementation of the monitoring and screening tool was done. The charts used for the post intervention were different from charts used for pre-intervention as this writer wanted to find if after the implementation of the screening tool there was improvement in patients screened for MS.

The recommended MS screening and monitoring tool (Appendix B) was developed during a consensus conference between the American Diabetes Association, American Psychiatric Association, American Association of Clinical Endocrinologists, and North American Association for the Study of Obesity, which met to address the growing problem of MS among patients on SGA (American Diabetes Association et al., 2004). The tool in use contains the required monitoring parameters that are necessary to guide mental health providers in screening for MS. This tool was adopted from Missouri Department of Mental Health as it was succinct and easy to use. Post intervention data were collected from February 1, 2015 to February 21, 2015.

PARTICIPANTS

The QI consisted of a total of 100 patients' charts with 50 charts for pre-intervention and 50 charts for post-intervention. The patients' charts were selected randomly among the patients seen during that time. The inclusion criteria included charts for patients on SGA, ages 19 years and above seen at the clinic during that time. Exclusion criteria included charts of patients 18 years and below, and those not on SGA. Of the total 100 charts reviewed, 65 of the patients were on one SGA medication while, 35 of them were on two or more antipsychotic medications. Since this was a QI project and screening for MS is part of the routine requirement for all patients seen at the clinic, approval from the facility independent review board (IRB) was not required; however, a project proposal was submitted to the university IRB for approval. In addition, informed consent was not required because patients routinely sign conditions of treatment to receive regular care which includes monitoring for MS.

Table 2
Chi-Square Tests.

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson chi-square	.542[a]	1	.461		
Continuity correction[b]	.241	1	.623		
Likelihood ratio	.544	1	.461		
Fisher's Exact Test				.624	.312
Linear-by-linear association	.537	1	.464		
N of valid cases	100				

[a] 0 cells (0.0%) have expected count less than 5. The minimum expected count is 10.50.
[b] Computed only for a 2 × 2 table.

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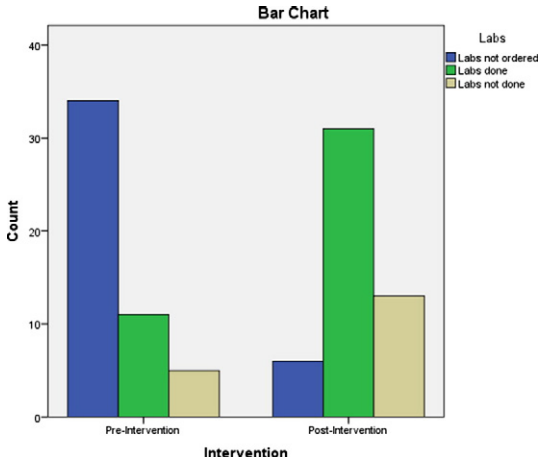
Table 3
Crosstab.

			Labs			Total
			Labs not ordered	Labs done	Labs not done	
Intervention	Pre-intervention	Count	34	11	5	50
		% within intervention	68.0%	22.0%	10.0%	100.0%
	Post-intervention	Count	6	31	13	50
		% within intervention	12.0%	62.0%	26.0%	100.0%
Total		Count	40	42	18	100
		% within intervention	40.0%	42.0%	18.0%	100.0%

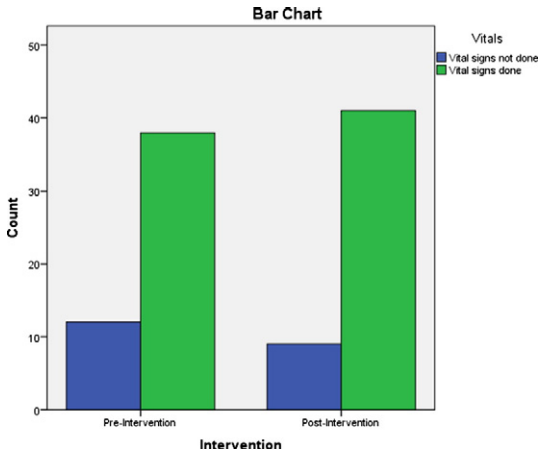


MEASURES

The required MS monitoring and screening parameters included patient's weight, height, blood pressure, and fasting blood glucose or glycated hemoglobin and lipid panel. The weight and height is used to calculate body mass index (BMI), to determine if patients are overweight or obese. BMI of above 25 is regarded as overweight, whereas BMI of above 30 is regarded as obesity thus predisposing patients to pre-diabetes (Appendix A). Blood pressure parameters are also recorded with measurement of 140/90 and above regarded as hypertension requiring attention. Fasting glucose (FBS) and/or glycated hemoglobin (HbA1c) values are recorded with FBS of 125 and/or HbA1c of 6.1 and above regarded

Table 4
Crosstab.

			Vitals		Total
			Vital signs not done	Vital signs done	
Intervention	Pre-intervention	Count	12	38	50
		% within intervention	24.0%	76.0%	100.0%
	Post-intervention	Count	9	41	50
		% within intervention	18.0%	82.0%	100.0%
Total		Count	21	79	100
		% within intervention	21.0%	79.0%	100.0%



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as a diabetic state requiring intervention. Lipid panel values are recorded with emphasis on low density lipids (LDL), high density lipids (HDL) and triglycerides levels. If LDL is above 130 mg/dl, HDL below 40 mg/dl and/or triglycerides higher than 150 mg/dl, these patients are regarded to be at risk for hyper-lipidemia (Appendix A). The QI aimed at finding if the required lab works were ordered per the recommended guidelines (Appendix B), whether they were done or not, and if the results were recorded in the patient electronic health system. In addition, the QI aimed to find out if the required vital signs were done and recorded per the recommended guidelines.

STATISTICAL ANALYSIS

The researchers analyzed the data using the SPSS 22 (Statistical Package for Special Sciences) packet program. An independent sample chi-square test was used to compare pre and post-intervention mean scores, and the significance was set at $\alpha = 0.05$. A chi-square test of independence was calculated comparing the frequency of labs done in pre-intervention and post-intervention period.

RESULTS

A chi-square test of independence was calculated comparing the frequency of labs ordered in pre-intervention and post-intervention. A significant interaction was found [$\chi^2(2) = 32.67$, $p < .001$] (Table 1).

This finding indicates that providers were more likely to do order labs in post-intervention (62%) than in pre-intervention (22%). A chi-square test of independence was calculated to compare the results of vital signs done in pre-intervention and post-intervention. No significant relationship was found [$\chi^2(1) = .542$, $p > .05$] (Table 2).

This finding indicates that obtaining vital signs was independent of the intervention. Of the 50 charts of patients seen in the post-intervention period, 88% had blood work for fasting blood sugar and lipid panel ordered compared to 32% in the pre-intervention period (Table 3).

There was a great improvement in ordering of labs from the pre-intervention to post-intervention period accounting for 56% increase. However, it was noted that despite the increased screening rate, 29.54% of the post-intervention group did not get the labs done compared to 31.25% in the pre-intervention group (Table 1). In the post-intervention period, 82% of the patients had blood pressure, height, weight, and BMI taken compared to 76% in the pre-intervention period accounting for 6% increase in compliance of monitoring vital signs (Table 4).

There was also a decrease in the percentage of patients that did not have blood pressure, height, weight, and BMI taken during the pre-intervention period from 24% to 18% in the post-intervention group (Table 3). These results indicated an improvement in the screening rates for MS after implementation of the screening and monitoring tool.

DISCUSSION AND CONCLUSION

Before the implementation of the monitoring and screening tool, the screening rate was low as compared to after implementation. The rates for taking vital signs and ordering lab work increased to 62% and 82% respectively. Failure to screen patients before putting them on medication leads to omission of a critical component in screening and monitoring for MS among the SMI population. This omission leads to a lack of early identification of those at high risk for MS. This project highlights the substantial gap that exists in adherence to screening for MS. The gap displays the laxity that exists among health care providers in screening and monitoring for MS, despite its prevalence. The results show that the use of the recommended screening and monitoring tool can improve screening and monitoring of MS among the SMI population. After the implementation of the screening tool, the screening compliance improved given the emphasis of the intervention involved. Many SMI patients prescribed with SGA are not routinely screened for MS in accordance with the best practice recommendations. The rates of screening in the pre-intervention period highlight the laxity in screening and monitoring for MS among these patients. Therefore, it is safe to say that the use of the screening and monitoring tool can increase screening rates for MS. This project has shed light on the importance of proper screening and monitoring for MS among SMI patients for early management and referral.

IMPLICATION TO PRACTICE

Mental health providers should provide care that aims to prevent diseases. The screening and monitoring for MS among SMI patients on SGA will not only prevent complications associated with the condition, but will also promote patients' health. The incorporation of the screening tool to the patient electronic health record can increase the screening rates for MS in patients on SGA. However, educating mental health providers of the need and urgency of monitoring for MS on patients on SGA will prevent complications associated with their use and improve patient's outcome.

RECOMMENDATIONS

Due to the side effects associated with the use of SGA, monitoring for MS is critical in any healthcare setting. Adding the screening and monitoring tool to the patient electronic health record is recommended if the rates of screening and monitoring for MS will improve. In addition, the mental health facility should explore the option of including automatic reminders of monitoring for MS. The reminders will prompt the clinician when the annual labs are due and enable them to adhere to the recommended guidelines. Follow up calls to patients by case managers to remind them of the importance and need of getting the blood work done can also improve the screening rate. In addition, integration of laboratory services within the mental health care services can be convenient to the patients and thus improve compliance of getting the lab work done. Lastly, integration of primary care services in the same building with mental health services can foster compliance for monitoring for MS and also facilitate close follow up of patients identified to be at risk by primary care physician.

LIMITATIONS

Although the QI project implementation was a success, several limitations were encountered. The first limitation encountered was difficult in obtaining patients waist circumference as many patients were not comfortable with the staff performing the action; hence this important parameter was omitted. According to Panagiotopoulos, Ronsley, Kuzeljevic, & Davidson, (2012) waist circumference is a good indicator for monitoring central obesity. The second limitation was that some clinicians felt that the primary care physician (PCP) had the obligation of ordering labs for the patients and making follow up to address MS. Monitoring for MS should be a collaborative effort between the mental health provider and the PCP if success is to be achieved in managing this condition. The third limitation was time as the clinician had only 20 minutes to see the patients and make any decision; therefore, completing the screening and monitoring tool was a challenge and this could have affected the results. Failure of patients to get blood work done after they were ordered by the clinician was another limitation observed and despite the follow up calls, not many of the patients remembered to get the labs done. Lastly, the small sample size could have affected the validity of the results.

CONFLICT OF INTEREST STATEMENT AND FUNDING

This project did not have any conflict of interest and neither was there any funding required or any costs associated with this quality improvement project apart from the nominal student research costs.

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APPENDIX A. RISK LEVELS AND RECOMMENDED MONITORING FREQUENCIES

Risk levels and recommended monitoring frequencies

Risk level	Definition
High risk	☐ On psychotropic medications AND presence of any risk factors or on treatment for any risk factors;
Moderate risk	☐ New start on all other psychotropic medications OR ☐ On psychotropic medications but no changes in past 3
Low risk	☐ No metabolic risk factors present; AND not on psychotropic medications

Risk factor	Frequency of monitoring by risk level High risk	Moderate risk	Low risk
Weight, waist circumference	☐ Baseline ☐ Monthly for 3 months and until	☐ Baseline ☐ Then 3	☐ Baseline ☐ Then annually
Blood pressure	☐ Baseline ☐ Monthly for 3 months and until	☐ Baseline ☐ Then 3	☐ Baseline ☐ Then annually
Lipids (triglycerides, HDL-C)	☐ Baseline ☐ 3 ☐ Then annually	☐ If ≥ 5% weight increase or if lipids	☐ Baseline ☐ Then annually
Fasting glucose (and Hb1Ac, if physician requests)	☐ Baseline ☐ 3 ☐ Then annually	☐ If ≥ 5% weight increase: 6 ☐ If fasting glucose abnormal: ☐ Otherwise, annually	☐ Baseline ☐ Then annually
Diabetes-DKA checklist	☐ Baseline ☐ Then	☐ Baseline ☐ Then 3	☐ Baseline ☐ Then annually

Adopted from Fraser Health (2011). Clinical guideline: Metabolic monitoring in adult mental health and substance use services. Retrieved from http://www.fraserhealth.ca/media/Metabolic%20Monitoring%20in%20Adult%20Mental%20Health%20and%20Substance%20Use%20Services.pdf

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APPENDIX B. METABOLIC SYNDROME SCREENING AND MONITORING TOOL

Metabolic syndrome screening and monitoring tool

NAME							DOB
AGENCY							DCN # (IF AVAILABLE)
VITAL HISTORY	Baseline	Subsequent Values					
Date	__/__/__	__/__/__	__/__/__	__/__/__	__/__/__	__/__/__	__/__/__
Height (in)							
BMI (kg/m2)							
	BMI Monitoring BMI ↑ 25 – overweight BMI ↑ 30 - obese Waist Circumference Monitoring Females ↓ 35" or Men ↓ 40" within normal limits Females ↑ 35" or Men ↑ 40" – pre-pre-diabetic risk factor						
	Baseline	Subsequent Values					
Date	__/__/__	__/__/__	__/__/__	__/__/__	__/__/__	__/__/__	__/__/__
Blood Pressure (mmHg)	M/A	M/A	M/A	M/A	M/A	M/A	M/A
	Blood Pressure monitoring Normal - BP 120/80 and below, Prehypertension - BP 120/80 - 139/89, Hypertension - 140/90 and above						
BLOOD GLUCOSE	Baseline	Subsequent Values					
Date	__/__/__	__/__/__	__/__/__	__/__/__	__/__/__	__/__/__	__/__/__
Plasma Glucose (mg/dl) Fasting -	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
	Fasting Plasma Glucose &/or Hgb A1c FPG ↓ 100 mg/dl or Hgb A1c ↓ 6.0 within normal limits FPG 100 - 125 mg/dl is indicative of pre-diabetes *Observe the patient for s/s of diabetes i.e.: wt gain (increase or decrease), polyuria or polydipsia.* FPG ↑ 126 mg/dl or Hgb A1c ↑ 6.1 indicates diabetic state						
LIPID PANEL	Baseline	Subsequent Values					
Date	__/__/__	__/__/__	__/__/__	__/__/__	__/__/__	__/__/__	__/__/__
LDL (mg/dl)							
HDL (mg/dl)							
	Lipid Panel Monitoring LDL ↓ 130 mg/dl, HDL ↑ 40 mg/dl &/or Triglycerides ↓ 150 mg/dl within normal limits LDL ↑ 130 mg/dl, HDL ↓ 40 mg/dl &/or Triglycerides ↑ 150 mg/dl at risk for hyperlipidemia						
Taking antipsychotic?	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N	Y/N
Pregnant	Y/N/U	Y/N/U	Y/N/U	Y/N/U	Y/N/U	Y/N/U	Y/N/U
Smoker	Y/N/U	Y/N/U	Y/N/U	Y/N/U	Y/N/U	Y/N/U	Y/N/U
Patient refused Date ___/___/___ Requested order from outside provider Date ____/_____/___							
Screeners Initials							

Adopted from The State of Missouri Department of Mental Health. Retrieved from http://dmh.mo.gov/docs/ada/metabolicsyndromescreeningandmonitoringtool_000.pdf

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