

FEATURE ARTICLE

# Systematic screening for metabolic syndrome in consumers with severe mental illness

Scott Brunero and Scott Lamont

Liaison Mental Health Nursing, Prince of Wales Hospital, Sydney, New South Wales, Australia

**ABSTRACT:** *The high prevalence of metabolic syndrome (MetS) in people with a mental illness has been reported recently in the literature. Gaps have emerged in the widespread use of systematic screening methods that identify this collection of critical risk factors for cardiac and metabolic disorders in people with severe mental illness. A sample (n = 103) of consumers with severe mental illness was screened for MetS using the Metabolic Syndrome Screening Tool and compared to a sample (n = 72) of consumers who were not receiving a systematic approach to screening for MetS. The results demonstrated ad hoc screening of consumers for MetS in the comparison group, potentially leaving patients at risk of cardiac and metabolic disorders being untreated. Mental health nurses are well placed to show leadership in the screening, treatment, and ongoing management of MetS in people with severe mental illness. A potential new speciality role entitled the ‘cardiometabolic mental health nurse’ is proposed as a means leading to improved outcomes for consumers who have both the complication of physical health problems and a severe mental illness.*

**KEY WORDS:** *metabolic syndrome, physical health, severe mental illness, screening.*

## INTRODUCTION

International and national literature has identified the significant added complications of comorbid physical ill health in people with severe mental illness (Connolly & Kelly 2005; Lambert & Chapman 2005; Poulin *et al.* 2005). It is argued that screening for cardiovascular and metabolic risk factors takes on greater importance when atypical antipsychotic medications are prescribed (Llorente & Urrutia 2006). Several expert groups now recommend regular monitoring of physical health in consumers with severe mental illness (American Diabetes Association & American Psychiatric Association 2004; International Diabetes Federation 2007; Lambert & Chapman 2005; Schizophrenia and Diabetes Expert Consensus Meeting 2003).

Metabolic syndrome (MetS) is a cluster of critical cardiac risk factors (diabetes and prediabetes, abdominal obesity, high cholesterol, and high blood pressure) (International Diabetes Federation 2007). The International Diabetes Federation 2007 estimates that one-quarter of the world’s adult population have metabolic syndrome, and that people with MetS are twice as likely to die from and three times as likely to have a heart attack or stroke, and have a five-fold greater risk of developing type 2 diabetes. They further report that MetS and diabetes are ahead of HIV/AIDS in morbidity and mortality terms, yet the problem is not as well recognized (see Figure 1 for the diagnostic criteria of MetS).

## PREVALENCE OF METABOLIC SYNDROME IN MENTAL ILLNESS

Several authors have highlighted the increased risk of MetS in consumers diagnosed with severe mental illness. In studies specifically related to patients prescribed clozapine treatment, Ahmed *et al.* (2008) found that 39 (46.4%) of 84 patients in a study in Ireland met the

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**Correspondence:** Scott Brunero, Prince of Wales Hospital, Edmund Blackett Building, Nurse Education and Research Unit, Room 7, High Street, Randwick, NSW 2031, Australia. Email: scott.brunero@sesiahs.health.nsw.gov.au

Scott Brunero, RN, Dip AppSc BHS, MNsg (Nurs Prac).

Scott Lamont, RN, RMN.

Accepted December 2008.

According to the new International Diabetes Federation definition, for a person to be defined as having the metabolic syndrome, they must have:

**Central obesity** (defined as waist circumference  $\geq 94$  cm for Europid men and  $\geq 80$  cm for Europid women, with ethnicity-specific values for other groups)

**plus any two of the following four factors:**

- **raised triglyceride level:**  $\geq 150$  mg/dL (1.7 mmol/L) or **specific treatment for this lipid abnormality**
- **reduced high-density lipoprotein cholesterol:**  $< 40$  mg/dL (1.03 mmol/L\*) in males and  $< 50$  mg/dL (1.29 mmol/L\*) in females or **specific treatment for this lipid abnormality**
- **raised blood pressure:** systolic blood pressure  $\geq 130$  or diastolic blood pressure  $\geq 85$  mmHg or **treatment of previously diagnosed hypertension**
- **raised fasting plasma glucose**  $\geq 100$  mg/dL (5.6 mmol/L) or **previously diagnosed type 2 diabetes**  
If above 5.6 mmol/L or 100 mg/dL, OGTT is strongly recommended, but is not necessary to define the presence of the syndrome.

**FIG. 1:** International Diabetes Federation criteria for metabolic syndrome. OGTT, oral glucose tolerance test.

criterion for MetS. In a North American study of 93 patients and a matched group of comparison patients ( $n = 2701$ ), Lamberti *et al.* (2006) found that 50 patients (53.8%) taking clozapine met the criterion for MetS compared to 369 (20.7%) in the comparison group. In an Australian study, Brunero *et al.* (2009) screened 73 patients for MetS and found that 45 (61.6%) met the criterion for MetS.

De Hert *et al.* (2006) found prevalence rates in a European study of patients prescribed second generation antipsychotics to be 28.4%, 32.3%, and 36% using different diagnostic criteria. In North America, Straker *et al.* (2005) studied 89 acutely admitted patients and found that 26 (29.2%) met the criterion for MetS, while Sacks (2004) reported the prevalence rates of MetS in North America at 37%. The detection of MetS in people with severe mental illness requires screening methodologies as a means of referral for treatment.

## SCREENING AS A METHOD OF DETECTION

Screening means applying a test to a defined group of persons in order to identify an early stage, a preliminary stage, a risk factor, or a combination of risk factors of a disease (Wilson & Jungner 1968). A risk factor is described as a manifestation or measurement, which evidence suggests is likely to lead to the development of a disease state if not modified or treated (Connolly & Kelly 2005). The object of a screening service is to identify a certain disease or risk factor for a disease before the affected person spontaneously seeks treatment. This enables the person to cure the disease or prevent or delay

its progression or onset by early intervention (Braveman & Tarimo 1996).

The effectiveness of screening concerns itself with whether the health outcomes for the individuals are improved. Oortwijn *et al.* (2001) suggested if the answer to this is no, then screening should not go ahead; if the answer is dubious, then more research should be done; if the answer is yes, then further study should elucidate whether screening is cost effective in improving the health outcome. Oortwijn *et al.* (2001) argued that it is not enough to know that screening identifies disease at a single time point, but that the interventions or treatments for that disease be effective and evidence based. The Council of Europe (1994) identified four key criteria that a disease state should have to argue a rationale for screening, which are applicable to metabolic syndrome in people with severe mental illness: (i) the disease should be an obvious burden for the individual and/or the community in terms of death, suffering, or economic or social costs; (ii) the natural course of the disease should be well known, and the disease should go through an initial latent stage or be determined by risk factors, which can be detected by appropriate tests; (iii) adequate treatment or other intervention possibilities are indispensable; and (iv) screening followed by diagnosis and intervention in an early stage of the disease should provide a better prognosis than intervention after spontaneously sought treatment.

## PHYSICAL HEALTH SCREENING IN MENTAL HEALTH SERVICES

There are substantive examples of screening tools used to detect psychiatric illness and deleterious side-effects of

neuroleptic medication; however, there is a significant gap in the literature in providing a screening tool which provides for an assessment of specific physical health needs in mental health patients (Phelan *et al.* 2004). Despite the compelling literature regarding MetS in people with severe mental illness, there would appear a lack of systematic screening and attention to this health problem. The physical health needs and medical comorbidities of people with severe mental illness are poorly recognized, underdiagnosed, and largely untreated (Marder *et al.* 2004; Osborn 2001; Poulin *et al.* 2005; Usher *et al.* 2006; Wand & Murray 2008). De Hert *et al.* (2006) argued that the true prevalence of diabetes mellitus in people with schizophrenia is substantially underestimated, despite the diagnosis of schizophrenia alone being a risk factor, while the increased risk of MetS signs and symptoms in people with schizophrenia currently receives little or no medical attention (Lamberti *et al.* 2006; Usher *et al.* 2006).

## AIM

The aim of the present study was to determine the effectiveness of systematic screening in the detection of metabolic syndrome and its individual components in consumers with severe mental illness.

## DEVELOPMENT OF THE METABOLIC SYNDROME SCREENING TOOL

The Metabolic Syndrome Screening Tool (MSST) was adapted from another study, which sought to determine the prevalence of MetS in clozapine patients (Brunero *et al.* 2009). A literature review of relevant publications, expert panels, and consensus statements related to MetS, using Medline, Psychinfo, CINNAHL, and Google Scholar was undertaken. Key words used were schizophrenia, metabolic syndrome, physical health screening, diabetes, and cardiovascular disease. Following the development of the tool, the key elements were presented to a working party consisting of two endocrinologists, two psychiatrists, and a general practitioner for an expert clinical review. The completed tool subsequently included: (i) a history of gestational diabetes, as this is reported to increase the risk of MetS developing 3 years' post-birth (Hoffman *et al.* 1998); (ii) culturally-specific demographic information (Salsberry *et al.* 2007); (iii) a family history of cardiovascular disease and diabetes, due to their relationship of increased incidence with these disease states (Hanson *et al.* 1995; Wright *et al.* 2007); (iv) a personal history of polycystic ovarian syndrome, due to its relation-

ship with the increasing prevalence for metabolic disorders and cardiovascular disease (Kousta *et al.* 2005); and (v) current medications (Llorente & Urrutia 2006) and relevant MetS risk indicators, including age, weight, height, body mass index (BMI), waist circumference, blood pressure (BP), fasting plasma glucose (FPG), total cholesterol, high-density lipoproteins, low-density lipoproteins, and triglycerides (International Diabetes Federation 2007) (See Fig. 2 for MSST).

## METHODS

Some of the data in this study are from a previous study determining the prevalence and key predicting items of metabolic syndrome in a sample of patients diagnosed with schizophrenia (Brunero *et al.* 2009). The intervention group was made up of consumers attending an outpatient clozapine clinic. The consumers were screened for MetS risk factors using the MSST. The International Diabetes Federation (2007) criterion for MetS was used for its ease of use in practice. A mental health nurse conducted the screening; blood pathology was collected by the contracted hospital pathology services and followed up by the mental health nurse (Brunero *et al.* 2009).

For the comparison, a baseline clinical audit of screening for MetS risk factors in an opportunistic sample of patients within the inpatient mental health program (not including consumers in the intervention group;  $n = 72$ ) was conducted. A clinical audit approach was chosen, as suggested by Bowling (2002) and Shaw and Costain (1989). A clinical audit differs to that of a medical, financial, or managerial audit as it concerns itself with aspects of clinical care rather than focusing on the managerial, financial, or care delivered just by medical staff. The comparative clinical audit commenced after the analysis and dissemination of the intervention group screening results to the entire mental health service. All medical files in the five different inpatient mental health units of the mental health service were audited. The audit was undertaken over 1-week period, with 1 day being spent in each of the five clinical areas. Two mental health nurses conducted the clinical audit and ensured that data from each file were de-identified. Evidence for BP, BMI, FPG, fasting lipid profiles, and waist circumference recordings were entered onto a paper form and then entered into SPSS version 11.0 (SPSS, Chicago, IL, USA) for analysis. The five inpatient areas of the mental health service audited included the acute unit ( $n = 20$ ), general admission unit ( $n = 27$ ), rehabilitation unit ( $n = 13$ ), an aged care unit ( $n = 8$ ), and a psychiatric emergency care unit ( $n = 4$ ). The

Affix MRN sticker

### Metabolic Syndrome Screening Tool (MSST)

Hx Gestational Diabetes Mellitus	Y/N/U	Hx Polycystic Ovarian Syndrome	Y/N/U	FHx Diabetes	Y/N/U
FHx Cardiovascular Disease	Y/N/U	Aboriginal / TSI	Y/N	Country of birth	

  

Date	Weight (kg)	Height (m)	BMI (kg/m <sup>2</sup> )	Waist (cm)	BP (Syst)	BP (Diast)	FPG	Fasting Lipid Profile				Medications & Daily Dose	Length of Time (Years)
								Tot Chol	HDL	LDL	TG		

**FIG. 2:** Metabolic Syndrome Screening Tool. BMI, body mass index; BP, blood pressure; Diast, diastolic; FPG, fasting plasma glucose; HDL, high-density lipoproteins; LDL, low-density lipoproteins; Syst, systolic; TG, triglycerides. Tot Chol, total cholesterol; TSI, Torres Strait Islander.

purpose of the clinical audit was to ascertain the existence of the items mentioned earlier. To demonstrate this, simple descriptive statistics (percentages) were used to report the results of the comparison group. Ethics approval was received from the local human research and ethics committee.

**RESULTS**

A total of 103 patients were screened in the intervention group with the MSST by the mental health nurse. Of these patients, 103 had their BP, BMI, and waist circumference recorded, and 73 (70%) patients returned FPG and fasting lipid profiles. Therefore, 30 patients who returned non-fasting blood profiles were excluded from the diagnostic analysis of MetS. Metabolic syndrome (International Diabetes Federation 2007) was identified in 45 (61.6%) patients of the intervention group using the MSST (specific details are reported in Brunero *et al.* 2009).

Of the 72 patients in the comparison sample, 39 (54.2%) had a record of their BP, 30 (41.7%) had a record

of their FPG, and fasting lipid profiles were documented in 18 (25%) cases. There were no records of BMI or waist circumference. There were no records within the medical files of patients diagnosed as having MetS using the International Diabetes Federation (2007) or any other criteria.

**DISCUSSION**

This small study highlights the substantial gap in attention to MetS risk factors between a screening group and non-screening comparison group, and how the use of a screening tool can improve attention to and the detection of MetS. In the intervention group, where the MSST was used, screening compliance was predictably high, given the focus of the intervention involved. The screening results in the comparison group highlight the lack of attention to this serious syndrome. Screening in the comparison group appeared to be ad hoc in nature and lacked a systematic approach, with risk factors being screened for in isolation. In another study, screening with a physical health check tool using a screening group and a control

group found that the collection of information in the control group was inconsistent, reactive, and patchy (Phelan *et al.* 2004).

MetS is argued to be a stronger precursor to cardiovascular disease than any of its individual components; therefore, greater attention to the full syndrome is recommended (Straker *et al.* 2005). Although screening for the full syndrome is warranted, attention to the individual components remains important, as these risk factors are considered to be modifiable risk factors. Modifiable risk factors are highly prevalent in people with severe mental illness and are argued to be a consequence of illness and lifestyle (Connolly & Kelly 2005). It has been demonstrated that effective lifestyle changes can have a positive impact on these modifiable risk factors (Wu *et al.* 2008), and as such, must be systematically identified and addressed by mental health-care providers.

It is argued that physical health comorbidities within mental health populations, particularly schizophrenia, begin to receive a proportionate response to their prevalence (Connolly & Kelly 2005; Osborn 2001) and that care of such populations is integrated across speciality health-care providers (Ahmed *et al.* 2008). A significant barrier to increased screening is the assumption of responsibility for the screening process. People with schizophrenia are less likely to have a general practitioner than the general population, yet it is often assumed that general practitioners are providing physical health care. Marder *et al.* (2004) and Osborn (2001) argued that psychiatrists need to provide physical health monitoring, which would normally be the responsibility of primary care providers. It would appear prudent that psychiatrists assume the lead role in initiating screening and follow up of MetS abnormalities in people with severe mental illness (Connolly & Kelly 2005; De Hert *et al.* 2006; Lamberti *et al.* 2006; Marder *et al.* 2004). Howard *et al.* (2007); Wand and Murray (2008); Usher *et al.* (2006) argued that mental health nurses are ideally situated to fulfil this requirement. The benefits of such a focus are argued to be improved health outcomes for people with severe mental illness and a reduction in MetS in this population (Marder *et al.* 2004; Osborn 2001; Usher *et al.* 2006).

Proactive and rigorous attention to such screening and follow-up practices may have some dissenters within mental health-care providers in relation to the costs associated with the extensive, frequent screening of all patients. However, such costs must be offset by ethical and professional responsibilities and long-term cost savings with potential improved health outcomes.

## IMPLICATIONS FOR MENTAL HEALTH NURSES

Mental health nursing has traditionally been restricted to the acute and long term management of mental health symptomatology. The consideration of physical health concerns has been a secondary issue (Gardner & Gardner 2005). Katon *et al.* (2001) and Norris *et al.* (2002) reported beneficial patient outcomes when nurses and case managers screen for physical health abnormalities in mental health patients. Elsom *et al.* (2005) reported on the extended role of mental health nurse practitioners in ordering appropriate pathology requests, such as lipid and plasma glucose profiles. It would appear to be unquestionable that mental health nurses now have a vital role in the assessment and management of MetS in consumers with mental health problems, and thus must acquire and maintain skills and knowledge of physical health care (Wand & Murray 2008). Emerson (2003) argued that the gap is in the skill level of mental health nurses and understanding of the seriousness of such issues, and that venipuncture and electrocardiogram assessments skills are required. Muir-Cochrane and Wand (2005) argued that mental health nurses are ideally placed throughout mental health assessment phases of care to screen for risk factors and identify metabolic and cardiovascular abnormalities.

Emerging from this study is the proposal of a new dual role concept of mental health nursing, as has been seen previously with alcohol and other drugs, perinatal, developmental disability, and mental health nurse consultancies (Gafoor 2001; Hussein-Rassool 2007). While the role of the mental health nurse in this study is primarily concerned with the screening and detection of MetS, the authors argue a much broader role in meeting the needs of consumers who are affected by MetS. The new role proposed here as the 'cardiometabolic mental health nurse consultant' would be primarily concerned with the prevention, detection, and treatment of cardiac and metabolic disorders in people with mental illness, based upon previously suggested approaches to disease management (Braveman & Tarimo 1996; Council of Europe 1994; Oortwijn *et al.* 2001; Wilson & Jungner 1968). For this to occur successfully and be maintained as part of the delivery of mental health services, pilot programmes of this particular nurse consultancy role are required. This speciality would most probably emerge from liaison mental health nursing who have a role linking mental and physical health services. Expert groups, such as the Consultation Liaison Special Interest Group (2005) and the Mental Health Consultation Liaison Nurses Association

(2008), are current leaders in the area and would serve as bodies that could develop standards, role descriptions, and lead the sourcing of funding for this dynamic new role.

## CONCLUSION

This study highlights the need for a systematic approach to screening for MetS and its individual components in people with severe mental illness. The study demonstrates that screening and attention to the risk factors for MetS is substantially improved by taking a systematic approach. The comparison group highlights the lack of systematic screening for these risk factors. Mental health nurses and future nurses, who may specialize in cardiometabolic mental health nursing, are well placed to deliver this care. Further longitudinal studies are warranted to assess the impact of systematic screening using such tools on physical health outcomes in people with severe mental illness.

## REFERENCES

- Ahmed, M., Hussain, I., O'Brien, S. M., Dineen, B., Griffin, D. & McDonald, C. (2008). Prevalence and associations of the metabolic syndrome among patients prescribed clozapine. *Irish Journal of Medical Sciences*, *177*, 205–210.
- American Diabetes Association & American Psychiatric Association (2004). Consensus development conference on antipsychotics drugs and obesity and diabetes. *Diabetes Care*, *27*, 396–601.
- Bowling, A. (2002). *Research Methods in Health*, 2nd edn. Buckingham, Philadelphia, PA: Open University Press.
- Braveman, P. & Tarimo, E. (1996). Health screening development and equity. *Journal of Public Health Policy*, *17*, 14–27.
- Brunero, S., Lamont, S. & Fairbrother, G. (2009). Prevalence and predictors of metabolic syndrome among patients attending an outpatient clozapine clinic in Australia. *Archives of Psychiatric Nursing*. [Cited 27 Jan 2009]. Available from: URL: [http://www.psychiatricnursing.org/article/50883-9417\(08\)00137-4/abstract](http://www.psychiatricnursing.org/article/50883-9417(08)00137-4/abstract)
- Connolly, M. & Kelly, C. (2005). Lifestyle and physical health in schizophrenia. *Advances in Psychiatric Treatment*, *11*, 125–132.
- Consultation Liaison Special Interest Group (2005). *Consultation Liaison Special Interest Group*. [Cited 8 Dec 2008]. Available from: URL: <http://www.acmhn.org/>
- Council of Europe. (1994). Committee of Ministers, Recommendations on Screening as a Tool of Preventative Medicine. *Council of Europe*. No. R(94), 11, October 10.
- De Hert, M., Van Eyck, D. & De Nayer, A. (2006). Metabolic abnormalities associated with second generation antipsychotics: Fact or fiction? Development of guidelines for screening and monitoring. *International Clinical Psychopharmacology*, *21* (Suppl. 2), S11–S15.
- Elsom, S., Happell, B. & Manias, E. (2005). Mental health nurse practitioner: Expanded or advanced? *International Journal of Mental Health Nursing*, *14*, 181–186.
- Emerson, E. (2003). Prevalence of psychiatric disorders in children and adolescents with and without intellectual disability. *Journal of Intellectual Disability Research*, *47*, 51–58.
- Gafoor, M. (2001). The co-existence of psychiatric disorders and substance misuse: Working with dual diagnosis patients. *Journal of Advanced Nursing*, *27*, 497–502.
- Gardner, A. & Gardner, G. (2005). A trial of nurse practitioner scope of practice. *Journal of Advanced Nursing*, *49*, 135–145.
- Hanson, L., Pettitt, J., Bennett, H. *et al.* (1995). Familial relationships between obesity and NIDDM. *Diabetes*, *44*, 418–422.
- Hoffman, L., Nolan, C., Wilson, J. D., Oats, J. N. & Simmons, D. (1998). Gestational diabetes mellitus – management guidelines. *Medical Journal of Australia*, *169*, 93–97.
- Howard, P., El-Mallakh, P., Rayens, M. K. & Clark, J. J. (2007). Co-morbid medical illness and perceived general health among adult recipients of Medicaid mental health services. *Issues in Mental Health Nursing*, *28*, 255–274.
- Hussein-Rassool, G. (2007). *Dual Diagnosis Nursing: Nursing Management*. London: Blackwell Publishing.
- International Diabetes Federation (2007). *Worldwide Definition of the Metabolic Syndrome*. [Cited 14 Feb 2008]. Available from: URL: <http://www.idf.org/home/index.cfm?unode=1120071E-AAACE-41D2-9FA0-BAB6E25BA072>
- Katon, W., Von Korff, M., Lin, E. & Simon, G. (2001). Rethinking practitioner in chronic illness: The specialist, primary care physician, and the practice nurse. *General Hospital Psychiatry*, *23*, 138–144.
- Kousta, E., Tolis, G. & Franks, S. (2005). Polycystic ovary syndrome. Revised diagnostic criteria and long-term health consequences. *Hormones*, *4*, 133–147.
- Lambert, T. & Chapman, L. (2005). *Diabetes, Psychotic Disorders and Antipsychotic Therapy, a Consensus Statement. Members for the Australian Consensus Panel for Diabetes, Psychotic Disorders and Antipsychotic Therapy*. Sydney: Eli-Lilly Australia.
- Lamberti, J., Olson, D., Crilly, J. *et al.* (2006). Prevalence of the metabolic syndrome among patients receiving clozapine. *American Journal of Psychiatry*, *163*, 1273–1275.
- Llorente, M. D. & Urrutia, V. (2006). Diabetes, psychiatric disorders, and the metabolic effects of antipsychotic medications. *Clinical Diabetes*, *24*, 18–24.
- Marder, R., Essock, D., Miller, A. *et al.* (2004). Physical health monitoring of patients with schizophrenia. *American Journal of Psychiatry*, *161*, 1334–1349.

- Mental Health Consultation Liaison Nurses Association (2008). *Mental Health Consultation Liaison Nurses Association*. [Cited 8 Dec 2008]. Available from: URL: <http://www.mhclna.org.au/>
- Muir-Cochrane, E. & Wand, T. (2005). *Contemporary Issues in Risk Assessment and Management in Mental Health*. Greenacres, SA: Australian and New Zealand College of Mental health Nurses Inc.
- Norris, P., Nichols, C., Caspersen, R. *et al.* (2002). The effectiveness of disease and case management for people with diabetes. A systematic review. *American Journal of Preventive Medicine*, 22, 15–38.
- Oortwijn, W., Banta, D. H. & Cranovsky, R. (2001). Introduction: Mass screening, health technology assessment and health policy in some European countries. *International Journal of Technology Assessment in Health Care*, 17, 269–274.
- Osborn, D. P. (2001). The poor physical health of people with mental illness. *Western Journal of Medicine*, 175, 329–332.
- Phelan, M., Stradins, L., Amin, D. *et al.* (2004). The Physical Health Check: A tool for mental health workers. *Journal of Mental Health*, 13, 277–284.
- Poulin, M., Cortese, L., Williams, R., Wine, N. & McIntyre, R. (2005). Atypical antipsychotics in psychiatric practice: Practical implications for clinical monitoring. *Canadian Journal of Psychiatry*, 50, 555–562.
- Sacks, F. M. (2004). Metabolic syndrome: Epidemiology and consequences. *Journal of Clinical Psychiatry*, 65 (Suppl. 18), 3–12.
- Salsberry, P., Corwin, E. & Reagan, P. (2007). A complex web of risks for metabolic syndrome: Race/ethnicity, economics, and gender. *American Journal of Preventive Medicine*, 33, 114–120.
- Schizophrenia and Diabetes Expert Consensus Meeting (2003). Consensus summary, 3–4 October. *British Journal of Psychiatry*, 184 (S47), 112–114.
- Shaw, C. & Costain, D. (1989). Guidelines for medical audit: Seven principles. *British Medical Journal*, 19, 498–499.
- Straker, D., Correll, C., Kramer-Ginsberg, E. *et al.* (2005). Cost effective screening for the metabolic syndrome in patients treated with second generation antipsychotic medications. *American Journal of Psychiatry*, 162, 1217–1221.
- Usher, K., Foster, K. & Park, T. (2006). The metabolic syndrome and schizophrenia: the latest evidence and nursing guidelines for management. *Journal of Psychiatric and Mental Health Nursing*, 13, 730–734.
- Wand, T. & Murray, L. (2008). Lets get physical. *International Journal of Mental Health Nursing*, 17, 363–379.
- Wilson, J. M. G. & Jungner, G. (1968). *Principles and Practice of Screening for Disease*, Public Health Paper No. 34. Geneva: World Health Organization.
- Wright, C. E., O'Donnell, K., Brydon, L., Wardle, J. & Steptoe, A. (2007). Family history of cardiovascular disease is associated with cardiovascular responses to stress in healthy young men and women. *International Journal of Psychophysiology*, 63, 275–282.
- Wu, R., Zhao, J., Jin, H. *et al.* (2008). Lifestyle intervention and metformin for treatment of antipsychotic-induced weight gain a randomized controlled trial. *JAMA*, 299, 185–193.

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