Physical illness in patients with severe mental disorders. II. Barriers to care, monitoring and treatment guidelines, plus recommendations at the system and individual level

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Physical disorders are, compared to the general population, more prevalent in people with severe mental illness (SMI). Although this excess morbidity and mortality is largely due to modifiable lifestyle risk factors, the screening and assessment of physical health aspects remains poor, even in developed countries. Moreover, specific patient, provider, treatment and system factors act as barriers to the recognition and to the management of physical diseases in people with SMI. Psychiatrists can play a pivotal role in the improvement of the physical health of these patients by expanding their task from clinical psychiatric care to the monitoring and treatment of crucial physical parameters. At a system level, actions are not easy to realize, especially for developing countries. However, at an individual level, even simple and very basic monitoring and treatment actions, undertaken by the treating clinician, can already improve the problem of suboptimal medical care in this population. Adhering to monitoring and treatment guidelines will result in a substantial enhancement of physical health outcomes. Furthermore, psychiatrists can help educate and motivate people with SMI to address their suboptimal lifestyle, including smoking, unhealthy diet and lack of exercise. The adoption of the recommendations presented in this paper across health care systems throughout the world will contribute to a significant improvement in the medical and related psychiatric health outcomes of patients with SMI.

Key words: Physical illness, severe mental illness, physical health, health care, barriers, health disparities, monitoring and treatment guidelines

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As outlined in the first part of this bi-partite publication (1), individuals with severe mental illness (SMI) are at an increased risk for a large number of physical disorders that require clinical attention. People with SMI are entitled to the same standards of care as the rest of the population. However, rates of undiagnosed and untreated medical illnesses are higher in SMI individuals, compared to the general population. Despite the fact that the higher morbidity and mortality of physical illnesses in SMI patients are largely due to modifiable lifestyle risk factors (1), there is sufficient evidence that disparities not only in health care access and utilization, but also in health care provision, contribute to these poor physical health outcomes (2,3). According to one recent study, people with psychotic disorders, bipolar disorder, or major depressive disorder have greatly increased odds of reporting difficulties in accessing care (odds ratios, OR=2.5-7.0) (4).

Although parity in access to and provision of health care should be conceived as a basic human right, a confluence of patient, provider, treatment and system factors has created a situation in which access to and quality of health care is problematic for individuals with SMI (5). Table 1 summarizes the barriers to the recognition and management of somatic illnesses in SMI patients.

In many cases, the SMI patients' only contact with the health service is through the mental health care team. Moreover, because of their SMI, these patients are less capable than other patients of interpreting physical signs, as well as solving their problems and caring for themselves, which places an increased responsibility on the part of mental care workers to be in the fore front for the physical health care of these patients (6). Two consensus conferences have called on mental health care providers to take responsibility for the physical health of their patients (7,8). However, despite data suggesting that the sensitization of psychiatrists to expand their tasks to include assessments of both mental and physical health in SMI patients can be improved by consensus guidelines (9), many psychiatrists still consider their primary or, even, sole function to provide clinical care in terms of psychiatric symptom control and are reluctant to monitor physical health (6).

Although many barriers can be related to the patient and his/her illness, and/or to the clinician and his/her medical treatment, the reintegration of psychiatric care and general somatic services, with an ultimate goal of providing optimal services to this vulnerable patient population, seems to represent one of the most important challenges for psychiatric care today (7,10). However, this is only one part of the broader picture: 37% of 195 countries in the world do not even have a specified budget for mental health, and 25% of the countries (of the 101 countries that reported their mental

Table 1 Barriers to the recognition and management of physical diseases in patients with severe mental illness (SMI)

Patient and illness-related factors	Treatment-related factors	Psychiatrist-related factors	Other physician-related factors	Service-related factors
Not seeking adequate physical care due to symptoms of the SMI (e.g., cognitive impairment, social isolation and suspicion) (13)	Deleterious impact (e.g., obesity, type 2 DM, CVD, hyperprolactineamia, xerostomia) of psychotropic medication on physical health (14)	Tendency to focus on mental rather than physical health (15) with infrequent baseline and subsequent physical examination of patients (13)	Stigmatization of people with mental disorders (7,13,17,21)	Financial barriers, especially in developing countries (16), paucity of funding in some countries of general somatic care for patients with SMI (7)
Difficulty comprehending health care advice and/or carrying out required changes in lifestyle due to psychiatric symptoms and adverse consequences related to mental illness (e.g., low educational attainment, reduced social networks, lack of employment and family support, poverty, poor housing) (12,14,17,18)		Poor communication with patient or primary care health workers (15)	Physical complaints regarded as psychosomatic symptoms (2)	High cost of (integrated) care (19)
Severity of mental illness (SMI patients have fewer medical visits, with the most severely ill patients making the fewest visits) (20)		Physical complaints regarded as psychosomatic symptoms (2)	Suboptimal and worse quality of care offered by clinicians to patients with SMI (7,17,33-38).	Lack of access to health care (17,19,22,23)
Health risk factors and lifestyle factors (e.g., substance abuse, poor diet, smoking, lack of exercise and unsafe sexual practices) (2,20,24,25)		Suboptimal and worse quality of care offered by clinicians to patients with SMI (7,17,32-38). Lack of assessment, monitoring and continuity of care of the physical health status of people with SMI (2,14,39-41)	Lack of assessment, monitoring and continuity of care of the physical health status of people with SMI (2,14,39-41)	Lack of clarity and consensus about who should be responsible for detecting and managing physical problems in patients with SMI (2,7,14)
Less compliant with treatment (26,27,28)		Guidelines perceived as a threat to autonomy, not well known or not clinically accepted (43)	Unequipped or underfunded teams to handle behavioural and emotional problems of patients with SMI (46)	Fragmentation or separation of the medical and mental health systems of care, lack of integrated services (2,7,17,29)
Unawareness of physical problems due to cognitive deficits (30,31) or to a reduced pain sensitivity associated with AP medication (30,31)		Lack of knowledge regarding medical issues (47)	Complexity and time intensity of coordinating both medical and psychiatric medications (17)	Under-resourcing of mental health care that provides little opportunity for specialists to focus on issues outside their core specialty (2)
Migrant status and/or cultural and ethnic diversity (42)		Erroneous beliefs (SMI patients are not able to adopt healthy lifestyles, weight gain is mainly adverse effect of medications, lower cardiac risk medications are less effective)(45)		Lack of health insurance coverage (7,17)
Lack of social skills (13) and difficulties communicating physical needs (44)		Unequipped or underfunded teams to handle behavioural and emotional problems of patients with SMI (46)		

DM – diabetes mellitus; CVD – cardiovascular disease; AP – antipsychotic

health budget) spend less than 1% of their total health care budget on mental health (11). In some parts of the world, mental health resources are even poorer. In Africa and in the Western Pacific Regions, a mental health policy was found to be present in only half of the countries (12). Moreover, in developing as well as in developed countries, stigmatization, discrimination, erroneous beliefs and negative attitudes associated with SMI will have to be eliminated to achieve parity in health care access and provision. Due to differences between regions and countries (e.g., level of economic development, budgeting of health care, availability of mental health care personnel, etc.), the majority of actions should be adapted to the local needs and circumstances (7).

MONITORING AND TREATMENT GUIDELINES

The excess mortality rates in persons with SMI are largely due to modifiable health risk factors (1). Therefore, the monitoring and treatment of these factors should be a part of clinical routine care of the psychiatrist. Furthermore, to address the problem of suboptimal medical treatment for patients with SMI, changes need to be made in the health care system and delivery (48), wherein the psychiatrist, once again, can and should play a pivotal role.

Monitoring

Physical health checks should focus on monitoring (49-51):

- weight gain and obesity (body mass index, BMI; waist circumference, WC);
- blood pressure;
- dietary intake;
- activity level and exercise;
- use of tobacco and alcohol or other substances;
- fasting blood levels of glucose;
- fasting blood levels of lipids, especially triglycerides and high-density lipoprotein (HDL)-cholesterol;
- prolactin levels (if indicated by reproductive system and/or sexual symptoms);

– cardiovascular disease (CVD) risk and electrocardiographic (ECG) parameters;
– dental health;
– liver function tests, blood count, thyroid hormone, electrolytes (periodically, as indicated).

Many of these physical health monitoring tests are simple, easy to perform and inexpensive (6,52-54), and therefore can/should be implemented in the health care systems of developed as well as developing countries. Moreover, even in developing countries, several of these simple and inexpensive measurements (e.g., body weight and blood pressure) can be routinely done by health workers other than doctors.

Screening and assessment of physical health should begin with the patient's personal and family history, covering (40): diabetes mellitus (DM), hypertension, CVD (myocardial infarction or cerebrovascular accident, including age at onset), smoking, diet, physical activity. Secondly, as the individual components of the metabolic syndrome (MetS) (see 1) are critical in predicting the morbidity and mortality of CVD, DM, cancer and other related diseases, these, as well as some other non-metabolic parameters, should be checked at baseline and measured regularly thereafter (46,51). Concerning metabolic parameters, one should remember that drug-naïve, first-episode patients, as well as children and adolescents with psychotic disorders, are at higher risk for metabolic side effects of medications (55,56). Higher baseline values of weight and visceral fat distribution, as well as laboratory evidence of impaired glucose and lipid metabolism, have been, although not consistently, reported for these patients (57). Likewise, young drug-naïve patients of non-Caucasian ethnicity with a personal or family history of metabolic risk factors are more likely to develop metabolic side effects (57).

Abdominal obesity

Psychiatrists should, regardless of the medication prescribed, monitor and chart BMI and WC of every patient with SMI at every visit, and should encourage patients to monitor and chart their own weight (58). WC seems to be a more useful measurement than BMI. Prospective data in patients with impaired glucose tolerance revealed that central adiposity, having a strong correlation with insulin resistance (59), better predicted future type 2 DM than BMI (60). WC is also a stronger indicator than BMI for systolic blood pressure, HDL-cholesterol, or triglycerides (61), and has been proposed as the best single measure to identify individuals at high risk for CVD and the MetS (52). It is also a simple tool to assess the likelihood of insulin resistance: in one study, a WC <100 cm excluded insulin resistance in 98% of males and 94% of females (61). This assessment can easily be done with a simple and inexpensive waist tape measure. The International Diabetes Federation (IDF) definition (see 1) provides sex- and race-specific criteria for defining elevated WC to identify people with central obesity, thus adapting this criterion to make it also applicable to non-Caucasian populations. However, multiple studies found that WC is rarely measured (62-64).

The other MetS criteria of blood pressure, fasting plasma glucose and fasting lipid profile should also be assessed, even if WC is normal. As the MetS components seem to cluster, the presence of one component often suggests the presence of the others.

Blood pressure

High blood pressure in SMI patients is often missed (65). As the cost for measuring blood pressure is low, and hypertension is a relevant CVD risk factor, blood pressure can/ought to be assessed routinely, even at every visit. Hypertension can be defined as a systolic blood pressure ≥130 mm Hg or a diastolic blood pressure ≥85 mm Hg (66). This diagnosis requires at least two separate, independent measurements that fall both within the range of hypertension (65). Individuals with a systolic blood pressure of 120 to 130 mm Hg or a diastolic blood pressure of 80 to 85 mm Hg should be considered as pre-hypertensive and require lifestyle modifications to prevent heart disease (67).

Fasting blood glucose and lipid levels

A baseline measure of plasma glucose level should be collected for all patients before starting treatment (58). In patients starting antipsychotic (AP) treatment, finger prick tests should be carried out at baseline, 6 and 12 weeks to capture early cases of hyperglycemia and then, at minimum, yearly. Formal laboratory screening tests can then be carried out when necessary (68). Ideally, blood glucose measurement should be conducted in the fasting state, because this is the most sensitive measurement for the detection of developing glucose abnormalities. However, this can prove problematic to achieve. In cases where patients present non-fasting, it is preferable to conduct a random blood glucose test (and/or hemoglobin A_{1C} test), rather than to miss the opportunity to screen (6). An abnormal test value (fasting plasma glucose ≥126 mg/dl or hemoglobin A_{1C} value ≥6.5%) (69) suggests the possibility of DM. Fasting plasma glucose levels between 100 and 125 mg/dl (or hemoglobin A_{1C} values of 5.7-6.4%) are indicative of pre-diabetes and should also prompt closer assessment and follow-up. However, the possibility of false positive results need to be excluded by at least one repeated measurement of fasting plasma glucose. If the abnormality is confirmed, the frequency of fasting plasma glucose measurements needs to be increased to 4 times a year to assess the speed of the rise. Likewise, if fasting plasma glucose levels are ≥126 mg/dl or hemoglobin A_{1C} values are >6.4%, the possibility of false positive results needs to be excluded by at least one repeated measurement of fasting plasma glucose. If the second measurement confirms the abnormality, this should

lead to a consultation with an internist or other primary health care provider for further assessment and, possibly, treatment. Importantly, hemoglobin A_{1C} reflects the mean glucose levels during the past 3 months. This is excellent as a goal for treatment outcome, but probably not sensitive enough to detect hyperglycaemia in its early stages (70).

Patients who have significant risk factors for DM (family history, BMI ≥25, WC above critical values, gestational diabetes, minority ethnicity) should have their fasting plasma glucose level or hemoglobin A_{1C} value monitored at the same time points as other patients starting medication (baseline, week 6 and 12), but thereafter they need to be checked more frequently (approximately every 3-6 months). Patients who are gaining 7% or more of their baseline weight should also have their fasting plasma glucose level or hemoglobin A_{1C} value monitored more frequently, for example, every 4 months (58).

Because of its high mortality, special attention should be given to diabetic ketoacidosis (DKA). DKA signs and symptoms often develop quickly, sometimes within 24 hours. One may notice: polyuria and polydipsia, nausea and vomiting, abdominal pain, poor appetite, unintended weight loss, fatigue, Kussmaul respirations (a pattern of deep breathing and hyperventilation in response to metabolic acidosis), fruity-scented breath, somnolence and confusion. The presentation of a patient with DKA varies substantially depending on the severity of the episode (e.g., mild or moderately ill patients may only describe vague symptoms of fatigue, lethargy, poor appetite, or headache). In type 2 DM, polyuria and polydipsia may have been building for weeks to months. More specific signs of DKA, which can be detected through laboratory tests, include: blood glucose level >250 mg/dL, pH <7.3 and a moderate degree of ketonemia or ketonuria (71-74).

Lipid parameters (especially triglycerides and HDL-cholesterol) should also be assessed at baseline and at 3 months, with 12-monthly assessments thereafter. More frequent screening is unnecessary, unless in case of abnormal values. Abnormal values for total cholesterol are >190 mg/dl for patients without DM and >175 mg/dl for patients with DM. Abnormal low-density lipoprotein (LDL)-cholesterol values for patients without and with DM are >115 mg/dl and >100 mg/dl, respectively (65). However, the cost and lack of availability of this assessment may not make it feasible as a routine measure in all settings and patients.

CVD risk and ECG parameters

The patient's individual CVD risk should be calculated from his/her age, sex, presence or absence of DM, smoking habit, systolic blood pressure and total cholesterol, or the ratio of total cholesterol to HDL-cholesterol with reference to published guidelines, local protocols or online risk calculators. These measurements are relatively simple and easily accessible (54).

In the psychiatric setting, it is often difficult to obtain an ECG as rapidly as in other acute medical settings. In less well economically developed countries, obtaining an ECG may be even more problematic. In these cases, whatever psychotropic a psychiatrist is intending to prescribe, patients should be asked about heart risks, such as family history of early cardiac death (i.e, <50 years in males and <55 years in females), personal history of a heart murmur, previous prescription of cardiac medications or anti-hypertensives, or if he/she has ever had an episode of simple syncope (51). Nevertheless, the measurement of ECG parameters as a baseline requirement deserves serious consideration. We propose that the ECG monitoring of patients with SMI has to be seen as a desired baseline parameter in order to assess the overall cardiac health status. As a general rule, we recommend that every patient should have an ECG measurement prior to the initiation of medication. Thereafter, depending on the advice given by a cardiologist, ECG monitoring can be repeated. A baseline ECG assessment is especially important in patients with clinical risk factors for arrhythmias, i.e., those with a family history of early cardiac death, personal history of a heart murmur, hypertension or diabetes, tachycardia at rest, irregular heart beats and fainting spells, particularly upon exertion.

Prolactin measurement

If possible, to have a reference value, prolactin levels should be measured in all patients at baseline. If too expensive, prolactin levels should only be measured in case sexual or reproductive system abnormalities are reported. Yet, these need to be asked about directly and monitored. Reproductive system abnormalities triggering prolactin level measurement include amenorrhea or oligomenorrhea (i.e, <9 periods per year), galactorrhea, gynecomastia in males, and/or breast tenderness and pain in females. Sexual dysfunction that should prompt prolactin measurement include new symptoms and/or those that coincided with antipsychotic treatment or dose change, including decreased libido, erectile or ejaculatory dysfunction, problems with arousal or orgasm. In these cases, prolactin should be measured every 3 months, especially when increasing the dose of known prolactin-elevating compounds. Although the clinician needs to be aware that laboratory ranges may differ between sites (75,76), in most laboratories normal prolactin values are set at 20 ng/ml (424 mIU/mL) for men and 25 ng/ml (530 mIU/L) for women (77). A complicating factor during measurement of prolactin levels is the presence of macroprolactin, which is essentially biologically inactive, but may lead to falsely high prolactin levels as measured by many assays (78). Conservative estimates suggest that the presence of macroprolactin leads to misdiagnosis in as many as 10% of all reported instances of biochemical hyperprolactinemia (79). In cases where measured prolactin is significantly raised, reporting of estimated monomeric prolactin instead of just "macroprolactin positive" can avoid unnecessary investigations.

With antipsychotic treatment, prolactin levels below 200 ng/ml and, mostly, below 100 ng/ml are most commonly observed. To date, the physiological relevance of these levels is unknown, unless hypogonadism (i.e., a state of markedly reduced sex hormone production) is the result, which has been associated with osteoporosis and fracture risk. The risk for breast cancer is much less clear. What seems to be certain is that any prolactin level that leads to hypogonadism should prompt a treatment change to a less prolactin elevating antipsychotic (e.g., quetiapine, aripiprazole or, in refractory patients, clozapine). Magnetic resonance imaging (MRI) of the sella turcica to rule out a prolactinoma should only be ordered after other reasons for prolactin elevation are excluded (e.g., chronic renal failure by assessing creatinine, hypothyroidism by assessing thyroid stimulating hormone, and pregnancy or oral contraception), if prolactin levels are above 200 ng/ml and do not decrease after a change to a lower risk agent, or if lateral visual deficits are observed, raising the suspicion of a prolactinoma (80).

Oral health

Although currently considered by many clinicians as not important, oral health needs to be scrutinized in the same way as other physical health problems (81,82). Risk factors for a poor oral health (e.g., smoking, medication side effects) and individual oral care needs should be assessed (83).

How and when to screen

Physical screening and monitoring programs are well accepted by patients and can be implemented in a variety of settings. Contrary to general belief, it is not difficult to motivate most patients to take part in the fasting blood assessments, and most are keen to getting and discussing the results of the evaluations (53,54).

Screening patients using an algorithm (84), monitoring form (85) or risk chart (65,86) is a simpler option than using the more complex and detailed guidelines previously published. Although, over recent years, both national and international groups have developed screening and monitoring guidelines (58,84,87-95), these seem not to be routinely implemented in the clinical care of patients (62,64,96,97).

Follow-up monitoring should be done at appropriate intervals (98) (Table 2). Physical health assessments should be recorded on charts showing the times and results of the assessments compared with reference ranges (54). During initial phases of treatment, it is important to measure weight weekly to identify patients who gain weight rapidly. Watereus and Laugharne (84) advocate screening of all patients on any medication at baseline (to identify high-risk individuals and to ensure early detection of changes in metabolic parameters), and, at the minimum, every 3 months. Other guidelines propose screening and monitoring at baseline, 3 months, 12 months and annually, unless patients gain at least 7% of baseline body weight or are at increased risk for adverse health outcomes (e.g., family history of DM or early cardiac death, personal history of overweight or obesity, gestational DM, minority ethnicity, etc.).

Table 2 Routine measurements for use in monitoring and evaluation of physical health in SMI patients with normal baseline values (according to 64,65 and 88)

	Baseline	6 weeks	3 months	At least at 12 months and annually thereafter
Personal and family history	X			
Smoking, exercise, dietary habits	X	X	X	X
Weight (body mass index)	X	X	X	X
Waist circumference	X	X	X	X
Blood pressure	X	X	X	X
Fasting plasma glucose	X	X[a]	X	X
Fasting lipid profile	X		X	X
ECG parameters	X			
Prolactin	X[b]		X[c]	X[c]
Dental health	X			X

[a]This early blood sugar assessment to rule out precipitous diabetes onset has been recommended in Europe, but not in the US; [b]if possible to have some reference values, or, if this is too expensive, only in case sexual or reproductive system abnormalities are reported; [c]only in case of sexual dysfunction that coincided with antipsychotic treatment or dose change

If the patient has central obesity, hypertensive blood pressure (≥130/85 mm Hg), pre-diabetes (fasting plasma glucose =100-125 mg/dL or hemoglobin A_{1C} =5.7-6.4%) or DM (fasting plasma glucose ≥126 mg/dL or hemoglobin A_{1C} >6.4%), or marked dyslipidemia (total cholesterol >350 mg/dL; LDL-cholesterol >160 mg/dL; triglycerides >300 mg/dL), he/she should be referred to primary care provider to treat these conditions, unless simple healthy lifestyle guidance or behavioural adjustment and/or switching to a lower cardiometabolic risk medication can address these medical conditions adequately (17,99).

Treatment

Many, but not all, individuals with SMI either are unaware of the need to change or do not possess the knowledge and skills required to make lifestyle changes. Psychiatrists, physicians, nurses and other members of the multidisciplinary team can help educate and motivate people with SMI to address their lifestyle, including smoking, diet and exercise, through the use of effective behavioural interventions (57, 100). Patients with SMI, as well as their family and caregivers, should be taught about healthy lifestyles and should receive psychoeducational packages to facilitate them. Psychoeducation does not need to be administered by a specialist

Table 3 Impact of various interventions on overall health (see 103-108)

Intervention	Impact on overall health
Maintenance of ideal body weight	35-60% ↓ CHD
Weight loss	
4-5%	Eliminate the need for antihypertensive medication in adults and elderly
5-7%	58% reduced risk for type 2 DM in adults
6-7%	Improvement of the MetS by decreasing LDL-cholesterol and fasting insulin
10%	Reduction of lifetime risk for heart disease up to 4% and increase of life expectancy up to 7 months
10% ↓ blood cholesterol	30% ↓ CHD
4-6 mm Hg ↓ high BP (>14/9 mm Hg)	16% ↓ in CHD and 42% ↓ in CVA
Stop smoking	50-70% ↓ in CHD
Maintenance of active lifestyle (at least 30 min walk daily)	35-55% ↓ in CHD (women) 18% ↓ in CHD (men) 27% reduction in CVA 40-50% ↓ in risk of cancer 33-50% ↓ in risk of developing DM

CHD – coronary heart disease; DM – diabetes mellitus; MetS – metabolic syndrome; BP – blood pressure; CVA – cerebrovascular accident

(e.g., a nutritionist), nor does it require special training, but should be administered by staff at the mental health clinic. Lifestyle advice and interventions can be obtained using resources already available within the local mainstream service (6). Patients should be provided positive feedback and support (17) and treatment must be tailored to meet the individual needs of SMI patients (14). Non-pharmacological interventions, incorporating dietary and physical activity modifications, demonstrated promise in terms of preventing weight gain in schizophrenia (94-103). The impact on one's overall health, even with simple life style changes, is considerable (Table 3). A healthy diet, regular physical activity and quitting smoking are the key components of lowering the prevalence and impact of modifiable risk factors. However, if lifestyle interventions do not succeed, medication, including statins, anti-hypertensive therapy or antidiabetic agents, may be indicated. These drugs should be prescribed and managed as for the general population and are generally well tolerated (109,110). Moreover, pharmacologic treatments added to reduce antipsychotic-related weight can be tried. To date, most evidence exists for metformin (500 to 1000 mg bid with meals) or topiramate (50-200 mg in divided doses) (111).

Diet

Many patients with SMI do not know the components of a healthy diet (46). It is commonly known that patients with schizophrenia have a diet higher in fat (111), higher in refined sugar (112), lower in fiber (25), and poor in fruits and vegetables (113). Therefore, nutrition education may be beneficial (46). Patients should be advised to avoid juices and soft drinks containing sugar and, even, artificial sweeteners, as well as high calorie, high fat, and nutritionally poor food, such as fast food and unhealthy snacks. The importance of consuming healthy alternatives, such as fresh fruit and vegetables, fish, and lean meats in a balanced way, should be stressed by clinicians whenever possible. Although educating patients (as well as their family and caregivers) about healthy food is recommended, patients need to understand that lifestyle changes should be gradual. Most people who experience rapid weight loss without gradual behaviour modifications will return to their previous weight. Losing weight hastily increases the likelihood of developing cholesterol gallstones. Further, many toxins are stored in fat tissue and a rapid weight loss may release those toxins too quickly (46).

Changes in dietary composition can have substantial effects. Weight loss has many health-related benefits that are of particular importance to SMI patients, including a reduction in risk of DM and CVD, reduction of serum triglycerides and LDL-cholesterol concentrations, increase in HDL-cholesterol concentrations, and reduction in blood glucose concentrations and hemoglobin A_{1c} among patients with type 2 DM. However, interventions that address nutrition, weight management and physical activity have not become a routine part of psychiatric care (98). The psychiatrist can involve the individual with SMI in educational and psychosocial programs that address the issues of health and wellness, which can reduce medical comorbidities in this population. These programs, such as "The Healthy Living" program, the "Small Changes" strategy and the "Solutions for Wellness" program have been shown to be effective in people with SMI (114-119). Table 4 gives some examples of behavioural interventions to improve the health of patients with SMI.

Physical activity

Physical inactivity is one of the risk factors that theoretically can most easily be addressed and modified in individu-

Table 4 Examples of behavioural interventions to improve the health of patients with severe mental illness (see 5,44,99)

Area of concern	Educational suggested tools
Diet	Healthy eating behaviour – Cutting down on fast food – Increase healthy food items (fruits, vegetables, fish), decrease high glycemic index food items and mono-unsaturated fats – Decrease processed fat free food – Making healthy snack choices – Controlling portion size – Consume 4-6, but small meals – Eating more slowly – Minimizing intake of soft drinks with sugar and with artificial sweetener Educational – Reading food labels – Learning to discern differences between physiological and psychological appetite and eating – Keeping food diaries/plans/exchange tables – Learning cooking skills – Healthy food shopping
Exercise	Physical activity – Keeping activity diaries, daily activity list – Increasing physical activity such as moderate intensity walking – Reduce sedentary behaviours (TV watching, video/computer games, etc.) – Treating/reducing sedation and extrapyramidal effects of medications

als with SMI (100). People with schizophrenia are significantly more sedentary than the general population (120). Only 25.7% of these patients meet the minimum public health recommendation of 150 min a week of at least moderate-intensity physical activity (121,122). According to the guidelines of the American College of Sports Medicine and the American Heart Association, moderate-intensity physical activity between 150 and 250 min a week will provide modest weight loss and is effective in preventing weight gain. Greater amounts of physical activity (>250 min a week) can be associated with clinically significant weight loss (108). Physical activity can improve metabolic health status even in the absence of weight loss. There is evidence that physical activity with or without diet counselling is feasible and effective in reducing weight and improving cardiometabolic risk profile in people with schizophrenia (123). However, in patients who are obese, physical exercise should be accompanied by proper diet to achieve significant weight loss. For example, if a patient walks for 1 hour per day, about 200 calories are burned. While this is beneficial in terms of cardiovascular health, this energy expenditure will not result in substantial weight loss. More strenuous physical activities, such as jogging, may be necessary (46). Considering all these facts, patients should be advised to engage in at least 30 minutes of moderately vigorous activity (at least a brisk walk) on most days of the week (65).

Smoking

A meta-analysis of worldwide studies demonstrated that schizophrenic patients, compared with the general population, have a higher prevalence of ever smoking, heavy smoking and high nicotine dependence, as well as of risk factors that make them more vulnerable to start smoking (124). Up to 85% of individuals with SMI will die and/or have a reduced quality of life because of a tobacco-related disease (48,125). Cessation of smoking is associated with approximately a 50% decrease in the risk of coronary heart disease (104), and a 75% decrease in the risk of high/very high 10-year cardiovascular events (126). Therefore, SMI patients should be strongly encouraged to stop smoking.

However, smoking cessation has important implications for the management of patients taking clozapine and olanzapine. Abrupt cessation of smoking is associated with a potentially serious risk of toxicity in patients taking clozapine, while olanzapine levels can also increase significantly. Cormac et al (127) found that the percentage of patients with a plasma clozapine level ≥1000 μg/l increased from 4.2% to 41.7% within the six month period following the smoking ban despite dose reductions. Therefore, plasma clozapine levels must be monitored closely and adjustments made in dosage, if necessary, for at least six months after cessation (127). Moreover, smoking cessation also increases the short-term risk for DM. In a prospective study, adults who quit smoking experienced an increased risk for incident DM that peaked within 3 years of quitting (hazard ratio, HR=1.91) but was still observable 6 years after quitting. The increased risk seems to be partially mediated by weight gain: withdrawal of nicotine may lead to increased appetite and excess caloric intake. Therefore, clinicians should consider countermeasures (e.g., use of nicotine replacement therapy), especially for heavy smokers (128).

Treating tobacco dependence is effective in patients with SMI. There is emerging evidence that people with SMI can stop smoking (129-132). Moreover, treatments that work in the general population appear to be approximately equally effective in SMI patients. The evidence also suggests that treating tobacco dependence in SMI patients with stable psychiatric conditions does not worsen mental state (133). Finally, although staff from psychiatric hospitals often express concerns that adopting a smoke-free policy would have a negative impact on the hospital's treatment milieu, this is not necessarily the case (134). Therefore, at a minimum, psychiatric professionals should assess tobacco use in all patients, advise all tobacco users to quit, assist patients in developing a quit plan, and arrange follow-up (100). If necessary and possible, patients can be referred to a smoking cessation service, which can offer behavioural counselling, nicotine replacement therapy or other pharmacological interventions (65).

Blood pressure

Target blood pressure levels of less than 130/85 mmHg are

recommended. Lifestyle changes, such as stopping smoking, reducing salt intake, weight reduction and increased exercise, may be sufficient to reduce mildly elevated blood pressure, although some patients are likely to require pharmacological therapy (65). Recently updated European guidelines stress the importance of choosing anti-hypertensive agents best suited to the individual patient's needs (86,135).

Oral health

Oral health advice, support and education should be provided to SMI patients, appropriate to their needs. Preventive and treatment programmes need to be tailored to meet the individual needs of patients with different diagnoses, severity and stages of mental illness. These should include dietary issues, smoking, and oral side effects of medication, namely dry mouth and carbohydrate craving. Advice on the dietary control of sugars and the importance of sugar free lubrication to relieve the symptoms of a dry mouth are essential to reduce the adverse oral side effects of some psychotropic drugs.

Psychiatrists should be made more aware of the importance of oral health habits. Therefore, training for clinicians in the identification of oral health risk factors such as smoking and of oral side effects of medication, and on proper oral hygiene techniques, is necessary (83). Above all, patients with SMI need encouragement and support to make regular use of dental services. Another option are regular visits by dental care personnel (136). The psychiatrist should search for dentists who do not stigmatize patients and who are willing to take care of this vulnerable population. On discharge from the hospital, procedures for ensuring continuity of dental care should be established. Formal training for the dental team regarding social and behavioural aspects of mental illness and oral medication side effects can be provided (79).

QTc prolongation and sudden cardiac death

AP or antidepressants (AD) known to be associated with QTc prolongation should not be prescribed for SMI patients with known heart disease, a personal history of syncope, a family history of sudden cardiac death at an early age (especially if both parents had sudden cardiac death), or congenital long QT syndrome (see 58). Withdrawal of any offending drugs and correction of electrolyte abnormalities are recommended in patients presenting with torsade de pointes (137).

Sexual health and pregnancy

Before beginning treatment, the SMI patient should be asked about symptoms possibly related to elevated prolactin, such as loss of libido, erectile and ejaculatory (dys)function or menstrual irregularities (54,58). If patients are receiving medications known to be associated with prolactin elevation, these baseline questions should be asked at every visit after starting the medication or until the dose is stable. When sexual dysfunction is identified, potential management strategies include decreasing the dose, switching to a prolactin-sparing medication, or specifically targeting sexual function by prescribing drugs such as dopamine agonists (138,139) or a partial agonist (140). Switching should be considered when prolactin elevation is persistently >50 ng/mL (>1000 mIU/L). When even a mildly elevated level persists for more than 3 months, dose reduction or switching to a prolactin-sparing medication should be considered. If a psychiatrist has any doubt regarding the cause of the raised prolactin, and levels are above 200 ng/ml, or the patient has symptoms suggestive of a cause other than medication-related hyperprolactinemia, then referral to an endocrinologist is recommended (141). Nevertheless, psychiatrists should also be aware that even minimal to moderate hyperprolactinemia can be the precursor of a serious underlying problem, such as a pituitary tumor (58).

Until there are more controlled prospective data on the impact of drugs on foetal and later development, the clinician will continue to work in a state of uncertainty, weighing partially estimated risks against managing individual clinical problems. On the basis of the available data, generalization is impossible and recommendations should be made on a drug-by-drug basis. The risks and benefits must always be carefully weighed for each patient on an individual basis. In general, the use of psychotropic medication during pregnancy is indicated when risk to the foetus from exposure to this medication is outweighed by the risks of untreated or exacerbated psychiatric illness in the mother (142). Women who require treatment should always discuss the risks and benefits of pharmacotherapy with their physician and, if it is felt that treatment should be continued during pregnancy, the available evidenced-based information will be of help in this important decision (143).

Importantly, advice on contraception and sexually transmitted infection prevention should also be given as part of routine mental health care (54).

Specific treatment advice on medication

Many psychiatrists are reluctant to switch medication, despite the presence of physical health issues (6). Nevertheless, consideration should be given to switching AP, AD and/or mood stabilizer medication when a SMI patient gains significant amount of weight (>5% of initial weight), or shows hyperglycemia, hyperlipidemia, or other significant adverse effects (e.g., clinically significant cardiometabolic side effects) during therapy. The switching protocol should, however, consider the entire psychiatric and physical condition of the patient and the pharmacological profiles of both agents (54). Another option is to add a pharmacological agent to reverse or prevent the medication-induced adverse event (e.g., metformin or topiramate to attenuate weight gain in patients taking AP) (111,144).

If DM or another severe physical illness has been diagnosed, the SMI patient should be referred to specialist services, including diabetology, endocrinology and cardiology, to receive the appropriate health care.

RECOMMENDATIONS

Our recommendations are organized at two levels of action: system level (state and health care institutions) and individual level (clinicians, patients, family) (Table 5).

System level

- *Designate the population with SMI as a health disparity population.* There is still a significant lack of awareness of the physical health and health care access problems for people with SMI. Therefore, state and health care institutions first have to identify and designate people with SMI as a health disparity population before the problem can be handled appropriately. Psychiatrists can play an important role in this process of raised awareness by addressing the current disparity with policy makers and budget decision makers.
- *Educate the health care community.* National and local education initiatives should be implemented to disseminate information widely about physical health risks in persons with SMI and to encourage awareness of the current disparity.
- *Train the health care community.* In addition to educational initiatives, mental health care personnel also need to be trained in adequately assessing and measuring CVD health and other (e.g., oral) health risks. Training in SMI issues should be offered to primary care clinicians.
- *Improve access to and care of physical health of the SMI population.* State and health care institutions should improve access to and care of physical health of the SMI population to ensure prevention, screening, and treatment of general health care issues. They have to build adequate capacity to serve the physical health care needs of the SMI population.
- *Reduce stigma and discrimination.* Stigma is a widespread and well-documented major access barrier for people with SMI. It lessens the responsiveness of the health services and may cause people with SMI to delay or to avoid seeking treatment altogether (145). Education interventions and personal contact with persons with SMI can be used to reduce public stigma and discrimination (22). If necessary, anti-discrimination legislation should be enforced and initiatives be implemented to ensure equal access to health care.
- *Bridge the collaboration gap between physical and mental health care and promote a policy of coordinated and integrated mental and physical health care for persons with SMI.* The reintegration of psychiatric care and general somatic services, with an ultimate goal of providing optimal services to this vulnerable patient population, seems to represent the most important challenge for psychiatric care today (146,147).
- *Address funding for these necessary service improvements.* Raise and provide adequate funding for the educa-

Table 5 Recommended system and individual level actions to address identified gaps in the assessment and treatment of physical health in patients with severe mental illness (SMI)

System level actions	Individual level actions
Designate the population with SMI as a health disparity population	Take responsibility for the physical health of the SMI patient
Educate the health care community	Screen the patient's personal and family history at baseline to identify high-risk patients and to ensure early detection of changes in critical parameters
Train the health care community	Adopt ongoing surveillance methods
Improve access to and care of physical health of the SMI population	Use an algorithm, monitoring form, or risk chart during the patient's screening
Reduce stigma and discrimination	If weight gain (> 5% of initial weight), glucose abnormalities, hyperlipidaemia, or other adverse effects during therapy occur, consider switching to medications with lower risk profiles
Bridge the collaboration gap between physical and mental health care and promote a policy of coordinated and integrated mental and physical health care for persons with SMI	Communicate monitoring findings to the primary care teams and specialist services, including diabetology, endocrinology and cardiology
Address funding for these necessary service improvements	Forge stronger collaborations with these medical specialists and other health care professionals
	Include lifestyle modifications into education and treatment programs for SMI patients, incorporating nutrition, exercise and behavioural strategies
	Strive to encourage and improve the patient's adherence to both psychiatric/medical and behavioural interventions
	Support wellness, personal empowerment and individual responsibility to enable healthy choices for recovery, and promote individual efforts

tional campaigns, health assessment tools, and service integration. In developing countries this funding tends to be very low or nonexistent.

Individual level

- *Take responsibility for the physical health of the SMI patient.* Unless there is a clear provision of specific general somatic health care services for SMI patients, the psychiatrist should assume responsibility for the somatic health of his/her patients. He/she has to keep a check on the situation, as SMI patients may not seek help themselves until the problem is severe, or may not be aware of potentially harmful physical conditions until monitoring and education have been done.
- *Screen the patient's personal and family history at baseline to identify high-risk patients and to ensure early detection of changes in critical parameters.* For patients with a personal or family history of obesity, high blood pressure, DM, heart disease or cerebrovascular accident, or with high or borderline values on metabolic criteria, drugs with lower risk of adverse effects should be chosen.
- *Adopt ongoing surveillance methods.* Surveillance of the overall health status of SMI patients should include continued monitoring of weight, BMI, WC, blood pressure, fasting plasma glucose, fasting lipids, smoking, physical inactivity, diet, oral and sexual health, as well as adverse effects of the used psychotropic medications.
- *Use an algorithm, monitoring form, or risk chart during the patient's screening.* This is a simpler and better option than using the more complex and detailed published guidelines to monitor the physical health of the SMI patient.
- *If weight gain (>5% of initial weight), glucose abnormalities, hyperlipidemia, or other adverse effects during therapy occur, consider switching to medications with lower risk profiles.* Switching from higher to lower risk medications has been shown to reduce cardiovascular and endocrine risk factors (65), but needs to be done in a careful and informed way (148).
- *Communicate monitoring findings to the primary care teams and specialist services, including diabetology, endocrinology and cardiology.* Ensure that people with SMI who have been identified to be at risk of developing CVD and/or DM be appropriately managed. People with SMI who have established CVD and/or DM should be treated in primary care.
- *Forge stronger collaborations with these medical specialists and other health care professionals.* Coordinated and integrated physical care of patients with SMI has the greatest chance of improving their physical health care outcomes (53). These collaborations should seek to develop comprehensive educational efforts, aimed at improving the knowledge of primary care physicians about SMI patients, to reduce stigmatization and erroneous beliefs, as well as the knowledge of the psychiatrist, to better monitor and manage physical illness in SMI patients. Integrated care models should be developed. These include co-location of services (locating a primary health care team close to mental health services, with good links between primary care staff and mental health staff, is highly effective in improving the physical health of those with SMI), having staff from one service visit another on a regular basis, or appointing case managers to liaise between services and coordinate the overall care for the patient. Another option involves a multidisciplinary team of health workers including medical specialists, as well as psychiatrists (149).
- *Include lifestyle modifications into education and treatment programs for SMI patients.* Nutrition, exercise and behavioural strategies should be incorporated and tailored to the SMI population.
- *Strive to encourage and improve the patient's adherence* to psychiatric, medical and behavioural interventions.
- *Support wellness, personal empowerment and individual responsibility in patients with SMI, enabling them to make healthy choices for recovery, and promote their individual efforts.* Specific programs (e.g., the Health and Recovery Peer Program) exist to help people with SMI to become more effective managers of their chronic illnesses, improving a range of self-management and health outcome measures, including patient activation and greater likelihood of using primary care medical services (150).

The adoption of these recommendations, summarized in Table 5, across health care systems throughout the world (with adaptations based on specific local situations), will contribute to a significant improvement in the medical and related psychiatric health of patients with SMI. The improved physical health outcomes in SMI patients will benefit both patients and societies. This benefit will come from improving functioning, and reducing suffering and physical health care costs that arise from poorly screened and managed patients with advanced physical illnesses compounded on the presence and effects of psychiatric conditions. Even small changes in the monitoring and management of physical disorders that do not have to be costly can make a positive change in this generally underserved and disadvantaged patient group.

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