

Monitoring and management of cardiometabolic risk factors in schizophrenia- A global perspective: rationale, aims and methods

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Abstract

Background: The excess morbidity and mortality associated with schizophrenia is partly due to cardiovascular diseases resulting from the complex inter-relationships between unhealthy life style including, metabolic problems, and the metabolic risks associated with the use of psychotropic medications. The current project involves patients with schizophrenia, their informal care providers and the health professionals, who treat them. **Aims;** Our primary aim in the Monitoring and Management of Cardiovascular Risk factors In Schizophrenia (MOMACRIS) Project is to determine whether an integrated mental and physical health care approach that involves patients with schizophrenia, their informal care providers and the health professionals who treat them, would improve identification, management and outcome of cardio-metabolic risk factors in these patients. **Methods;** We assess the knowledge and attitude of patients, their informal care providers and health care professionals about general cardiometabolic risk factors and life style modification. We also assess the current cardiometabolic monitoring and management practices by the health care professionals who treat patients with schizophrenia and we identify any barriers that may be limiting what these care professionals do. At baseline we assess the needs for improved cardiometabolic monitoring. Thereafter we carry on culturally-tailored psycho-educational based interventions directed at the patients with schizophrenia, their informal care providers and health care professionals following the baseline assessments of the identified needs for improved cardiometabolic monitoring. This will be achieved in an integrated collaborative effort between psychiatrists, psychologists, general/family physicians (or internists/endocrinologists), dieticians and physiotherapists. **Conclusion;** Morbidity and mortality from cardiometabolic risk in schizophrenia is higher than chance occurrence. Identification and management of these risk factors seem to be hampered by a number of barriers despite years of developing one guide line after another. There is need to re-evaluate the current knowledge, beliefs and practice of everyone concerned with schizophrenia.

Keywords

Schizophrenia, Cardiometabolic, Risk Factors, Monitoring, Management

1. Running Text

MOMACRIS study

1.1. Background and Rationale

Morbidity and mortality in patients with schizophrenia is very high. All forms of physical diseases contribute to this disproportionate burden but of particular importance are cardiovascular and metabolic (cardio metabolic) diseases. Obesity, glucose metabolism dysregulation, atherogenic dyslipidaemia and cigarette smoking are interconnected cardio-metabolic risk factors that are about twice as prevalent in patients with schizophrenia than individuals from the general population (Correll, 2007). High risk for CVD and its associated premature mortality among people with schizophrenia is commonly attributed to low socio-economic status, behavioural factors and treatment factors. There may also be possible genetic vulnerability of this patient population to develop metabolic problems (Gough et al 2005 Peet 2004, Hasnain et al 2009, Roick et al 2007, Koola et al 2012, Vancampfort et al 2010, Beary&Mildgust 2012, Wildgust &Beary 2010.). In a recent publication, Larsen et al (2013) reported that cardiovascular diseases, diabetes mellitus and obesity were increased in patients with schizophrenia in the three cultural settings of Africa (Nigeria), Japan, and Western Europe (Denmark, Germany and Switzerland). Life style diseases were described in all the cultures. In a literature review on co- morbid physical diseases in schizophrenia, Leucht et al (2007) reported that people with schizophrenia have higher prevalence of HIV infection, hepatitis, osteoporosis, altered pain sensitivity, sexual dysfunction, obstetric complications, cardiovascular diseases, overweight, diabetes, dental problems, and polydipsia than the general population. They concluded that the increased frequency of physical diseases in schizophrenia might be accounted for by factors related to schizophrenia and its treatment, the unsatisfactory organization of health services, the attitudes of medical doctors, and the social stigma ascribed to the schizophrenic patients.

Patients with schizophrenia are thus predisposed to cardiovascular disease and die of it 20 years sooner than individuals from the general population (Allison et 2009, De Hert et al 2009, Hennekens et al 2005, Tiihonen et al 2009). The cardiovascular disease related mortality gap between patients with schizophrenia and the general population has not changed over the last couple of decades (Hennekens et al 2005, Tiihonen et al 2009). In a literature search to explore the distribution of standardized mortality ratios (SMRs) for people with schizophrenia, Saha et al (2007) reported that the SMRs for all-cause mortality have increased during recent decades (P=.03) indicating a substantial gap between the health of people with schizophrenia and the general community. This differential mortality gap has worsened in recent decades.

This is reflective of failure of current strategies to

improve the cardio-metabolic care and outcome of patients with schizophrenia.

Guidelines on metabolic screening and monitoring of patients with schizophrenia receiving antipsychotic medications have been available for several years (American Diabetes Association 2004, De N et al 2007, Expert Group 2004) but their implementation in clinical practice so far has been limited (Barnes et al 2007, Mackin et al 2007,Nasrallah et al 2006, De Hert et al 2011, Mitchell et al 2012)due to a complex set of reasons pertaining to physician, patient and system related factors(Lambert & Newcomer 2009, Ohaeri & Akanji 2010). It has been shown that even when patients with schizophrenia have been diagnosed with metabolic problems their medical care is less adequate than the care of those without schizophrenia (Hippisley-Cox et al 2007, Roberts et al 2007). Clearly, various guidelines and consensus statements have not been effective in adequately addressing the cardiometabolic health of people with schizophrenia. There is therefore a pressing need to re-evaluate our understanding of this problem of non-functioning preventive medical exercise and our approach to tackling it.

1.2. Aim of the Study

The primary aim of this study is to determine if educating health professionals working with patients with schizophrenia about the cardio-metabolic health care of these patients, and offering them a focused structure of work in collaboration with one other in routine clinical practice would improve screening for and monitoring, management and outcome of the cardio-metabolic risk factors. The specific major components of the study are:

- 1 To compare the attitude of health professionals, patients, and patients' informal care providers to adiposity, and unhealthy lifestyle.
- 2 To assess the current practice of cardio-metabolic health management of patients with schizophrenia by health professionals as to screening and monitoring for metabolic risk factors, metabolic problems and unhealthy lifestyle.
- 3 To identify the patient, physician, and system-related barriers that prevent or limit patients with schizophrenia from receiving effective care for their cardio- metabolic health.
- 4 To evaluate the effects of cardiometabolic care of patients with schizophrenia by collaboration between psychiatrists, general practitioners/family physicians or internists, dieticians, and physiotherapists or psychologists.

1.3. Global and Transcultural Perspective

Virtually all available consensus statements and guidance on cardiometabolic risk factors in patients with schizophrenia have emanated from works in Western and developed countries. Our study includes one centre in a

developed country and four centres in middle and low income countries (LAMIC), with different gross domestic products (GDPs) and systems of health care. It will provide information about how the cardiometabolic problem of patients with schizophrenia is viewed and tackled across different cultures and economies.

Cultural influences lead to difference in the habitual consumption of certain foods and in traditions and methods of preparation. Some diets that contain essentially the same core ingredients may assume different names in different cultures.

Different cultures adopt different diets and eating patterns. In some cultures, for example, fried foods, biscuits and ham hocks might be popular whereas in others such as those of many Asian cultures, menus may stress lower-fat foods and lots of vegetables. Cultural views about the health benefits and risks of various foods also differ. Furthermore, there are cultural differences in the perception and involvement in physical exercises. Whereas purposely planned physical exercises may not be fashionable in some cultures, the types and forms of work may involve very vigorous physical activities.

General and mental health manpower availability and distribution also differs across cultures and communities. These differences pose enormous challenges in studies of the like of MOMACRIS, *necessitating inevitable flexibility in the analyses of the results and eventual emanating recommendations.*

1.4. Hypothesis

We hypothesised that the cardiometabolic care and outcome of patients with schizophrenia could be improved by 1) improving awareness among the health professionals, patients and their care-providers about the increased cardiometabolic risk of these patients, 2) identifying and addressing the barriers to their effective cardio-metabolic care, and 3) integrating the cardiometabolic care with the psychiatric care by collaboration between professionals with expertise in this area.

2. Materials and Methods

2.1. Study Design

The current study is being carried out in a naturalistic setting. Retrospective, prospective and cross sectional data are collected in three continents located in Belgium, India, Nigeria, and Pakistan, Each of the participating centres has access to:

- Primary care physicians or internists with interest and expertise in metabolic problems
- laboratory facilities
- resources to maintain, handle and organize data, and
- health professionals skilled in offering counselling concerning physical activity/exercise, diet, cognitive therapy, smoking cessation, and substance

use disorders

We employ a modified stepped wedge design. The planned intervention is rolled-out sequentially to the trial participants (i.e. clusters of patients with schizophrenia, their family care providers and health care professionals) over different time periods across the participating centres. The different clusters receive the interventions once each centre completes the phase two of the study

2.2. Sample Size

We employed a most conservative estimate and assumed equality in all the clusters across the participating centres (Hayes & Benneth S 1999). We used two previous studies (Moratto et al 2009, Bobes et al 20110) that reported on the rates of metabolic monitoring before and after consensus statements on cardiometabolic risk factors in patients with severe mental illness. We estimated that at 80% power, each participating would need about fifty patient participants. We used a total population survey for all the mental health care professionals in each centre.

2.3. Participants

The study has three groups of subjects: (i) Patients with a clinical (DSM-IV) diagnosis of schizophrenia made by the local mental health experts. (ii) Care-providers (spouse, a family member or a friend) of these patients, as nominated by the patient and available to participate in the study. The care-providers are henceforth referred to as “patient care-providers” to differentiate them from the health-care providers (iii) Health care professionals (psychiatrists, psychiatric nurses, psychiatric social workers, occupational therapists, clinical psychologists, physiotherapists, dieticians, internists, primary care physicians or any other health professionals involved in the care of the participating patients.

In each participating centres where patients are involved, an attempt is made to select a sample reasonably representative of the typical schizophrenia population seen in the centre. A simple random probabilistic sampling is employed to select the participants from the pool of patients with schizophrenia in each centre. The factors for consideration include the profile of the patients with respect to age, gender, duration of illness, location of origin within the study centre and any other unique factors in any centre. Given the different reported ranges of non-measurement of cardio metabolic parameters, and the presence of gluco-lipid dysregulation in patients with schizophrenia and the referral rates by psychiatric care providers of patients who have schizophrenia with cardiometabolic diseases to other health care providers, we estimated the sample size of patients with schizophrenia that would be needed. We took note of the fact that our study centres would likely have very poor rates of cardiometabolic monitoring and documentation. We assumed that on the average, complete cardiometabolic monitoring and documentation in patients with schizophrenia may be about 7% (Mackin, Bishop &

Watkinson 2007). With an error of estimate (precision) of 5%, we expected that we would need a minimum of 100 patient participants. On the other hand, we speculated that in most of our participating centres, there would be only few mental health care professionals (involved in the direct care of patients with schizophrenia). Consequently, we aim to recruit all the mental health care professionals in each centre.

Each centre, would select by systematic probabilistic random sampling, 50 or more adult (≥ 18 years) patients with schizophrenia, who had received psychiatric care for a minimum of six months prior to the study. All patients already participating in any ongoing clinical trial are excluded. Patients with acute and/or unstable medical conditions (e.g., unstable coronary heart disease, recent myocardial infarction, acute/severe hyperglycaemia, acute hepatic or renal problems, poorly controlled seizure disorder, recent cerebrovascular accident or an acute infection) are not eligible to participate.

The study conforms to the requirements for investigations involving human subjects (Helsinki Declaration). All the participating centres have approval from their appropriate clinical research ethics committee (institutional review board).

The purpose of the study was verbally explained to all participants and only participants who give signed informed consent are included. Patients who have acute psychotic disturbance during the study and who are deemed not to have the capacity to sign an informed consent, are not eligible to participate.

2.4. Instruments and Measures

Using structured questionnaires developed and adapted from previous studies (Lambert & Newcomer 2009, (20) Bocquier et al 2005, Deurenberg-Yap et al 2001, Merz et al 2002, Osler et al 2001, Pirkis et al 2005, Puig et al 2005, Spearing et al 1997, Zibaenezhad 2007), we collected data retrospectively, cross-sectionally and prospectively. There are a total of nine sets of questionnaires, subdivided as different sections, designated as FORMS A, B, C, D, E, F, G, H and M. Each questionnaire subgroup contains the demographic profile of the participants and a rating of the reliability of the interview (worthless interview=0, serious doubts=1, some doubts=2, no or few doubts=3, or perfectly reliable=4).

Most of the FORMS are completed at baseline, and after an educational intervention.

FORM A is specifically designed to collect information that would evaluate the health professionals' knowledge, views and practices about screening and monitoring of patients with schizophrenia for metabolic and cardiovascular risk factors and for their unhealthy lifestyle. It is meant only for health care providers. It is a 33-item questionnaire, where each stem question has five possible responses ranging from strongly agree to strongly disagree. Scores range from 33-165; lower scores reflect more positive attitude.

FORM B is designed to assess the barriers to the metabolic care of patients with schizophrenia as identified by the health professionals working with these patients in their particular context. It contains 28 question items, worded to elicit opinions like in FORM A. The questions address both personal and institutional factors that could interfere, delay, disrupt or discourage metabolic monitoring in patients with schizophrenia.

FORMS C and D are designed to enable comparison of the health professionals, patients, and patients' informal care-providers on their views about cardio-metabolic risk factors including adiposity, exercise, smoking, caffeine consumption and alcohol consumption.

FORM C is meant specifically for health professionals whereas FORM D is for patients and patients' informal care providers. The questionnaires (C and D) have a set of items that assess knowledge about the cardio-metabolic risk factors and another set of questions that assess practices for healthy lifestyle. Taken together, these two sets of questions reflect the degree of congruity between individuals' knowledge and practices about cardio-metabolic risk factors. Weight and BMI of all participants are measured at baseline and after interventions. For all groups, the extent of exercise, efforts to eat healthily, and changes in smoking and consumption of alcohol were also measured. It also consist of the International physical activity questionnaire (IPAC)

2.5. The International Physical Activity Questionnaire (IPAQ)

The development of an international measure for physical activity commenced in Geneva in 1998 and was followed by extensive reliability and validity testing undertaken across 12 countries (14 sites) during 2000 (Ralph- Maddison et al 2007.).

The International Physical Activity Questionnaires (IPAQ) comprises a set of 4 questionnaires. Long (5 activity domains asked independently) and short (4 generic items) versions for use by either telephone or self-administered methods are available. We use the seven item version of IPAQ in a face to face interview and adopt the last seven days as the period of reference. The IPAQ shows good psychometric properties in patients with schizophrenia (Faulkner et al 2006).

FORM D is the equivalent of FORM C designed for patients with schizophrenia or their informal care providers. It eliminates all clinical questions that would be inappropriate for non health professionals. It contains the IPAQ as in FORM C.

FORM E is an audit questionnaire. It is designed for the evaluation of the existing screening, monitoring and management practices of cardio-metabolic problems in patients with schizophrenia. In each study centre, a review of some randomly selected patients' charts/medical records is done at base line. Among other things, the review notes if there is any documentation of the diagnosis of hyperglycaemia and/or dyslipidaemia, and whether the

patient is being treated for these conditions where present. The patients whose charts are reviewed have fasting blood glucose, and lipid profile measured to determine 1) any patients who have cardiometabolic problems but are undiagnosed by the treating health professionals, and 2) how well the cardiometabolic problem of those who have the documented diagnosis is controlled. After the intervention phase of the Project, the same data is collected again in the same manner.

FORM F is a Follow-up audit questionnaire. When a patient with schizophrenia is found by the treating mental health professionals to have a metabolic or cardiometabolic problem, it is expected that such a patient will be referred to appropriate professionals such as internists of family physicians. The physical health professionals are conventionally expected to make some recommendations to the mental health professionals and the patients on what needs be done. The study questionnaire F is designed to capture the follow up and treatment adherence with the family physician/ general physician/internist recommendations.

Respectively, FORMS G and H are the Clinical Global Impression Scale (CGI) (Spearing et al 1997) and the Health of the Nations Outcome Scale (HoNOS) (Pirkis et al 2005) used for the evaluation of patients' well being/improvement. In all the phases of the study, the patients' symptoms are monitored with the HoNOS and the Clinical Global Impression Scale (CGI) along side the metabolic monitoring.

2.6. The CGI

Clinical Global Impression Scale (CGI) is a brief clinician-rated instrument that consists of three different global measures (Spearing et al 1997,). The measures include: *Severity of illness* (CGI-S); *Global improvement* (CGI-I); *Efficacy index*(CGI-E).The CGI has been widely utilized as an efficacy measure in clinical drug trials in different mental disorders including schizophrenia. It is concise and easy to administer (Spearing et al 1997).

2.7. The HONOS

The HoNOS was developed partly in response to The Health of the Nation policy document and the National Health and Community Care Act (Jacobs 2009). The aim was to provide a means of recording progress towards the Health of the Nation target to improve the health and social functioning of people with mental disorders (Jacobs 2009, Glover et al. 1997). This resulted in is a 12 item an instrument which combines the measurement of psychiatric symptoms, hospital service use and „patient based aspects such as social functioning.

HoNOS has been translated into many languages and is being widely used in Australia and New Zealand, Canada, Denmark, France, Italy, Germany and Norway (Glover et al. (1997).

The 12 HoNOS items are each scored from 0 (no

problem) to 4 (severe problem) yielding a total score in the range of 0 (best) to 48 (worst). Ratings are carried out either by an individual psychiatrist, nurse, psychologist, or social worker, or by using input from the clinical team. Outcome is measured by comparing a patient's scores at two points in time using individual items scores, the subscale scores and the total score.

The subscale items relate to social disability and community functioning and the rating period should cover the previous two weeks. The HoNOS takes an average of between 5 and 15 minutes to complete, depending on the experience of the rater and the complexity of the patient's problems (Pirkis et al 2005, Jacobs 2009, Glover et al. 1997).

For all participants who undergo any interventions in the phase 3 of the study (see below for the description of the phases), FORM M is used to monitor personal, physical and laboratory variables at base line and at follow up. Use of alcohol, cigarette, cannabis and involvement in physical activity, is assessed. Anthropometric parameters, blood pressure and lipid profiles are measured.

The therapeutic drugs including the first and second generation antipsychotics used by the treating physicians will not in any way be interrupted; however, the managing doctors will be given the feed back of cardiometabolic indices of clinical importance.

2.8. Measures

The measures include : Socio demographic data, psychiatric history, present treatment, anthropometric measures (weight, height, BMI, waist circumference, hip circumference, waist-Hip ratio), blood pressure, laboratory tests (cholesterol, triglycerides, HDL/LDL, blood glucose, and other relevant lab tests), level of activity, tobacco, drug, and alcohol use. The Clinical Global Impression Scale (CGI) and Health of the Nations Outcome Study (HoNOS) are used to monitor symptoms and well being. All laboratory investigations are conducted locally at each centre by only one medical/scientific laboratory to ensure standard and reliability.

2.9. Primary Outcome Measures

The primary outcome measures are a change in metabolic monitoring and care by health professionals and a change in life style of patients with schizophrenia (diet, physical activity/exercise, cigarette smoking and alcohol use).

2.10. Secondary Outcome Measures

The secondary outcome measures are changes in weight, laboratory values and clinical assessments (CGI and HoNOS) in the patients with schizophrenia.

2.11. Study Procedure and Phases

The study is an open transcultural naturalistic multicentre intervention study with “waiting list” and

background population comparison groups. The study has 4 phases.

Phase 1 is the *protocol establishment phase*. This phase focused on refining and finalizing the study protocol. During this phase, we identified and adapted questionnaires and instruments from previous studies. We identified potential study centres and communicated with the resource persons at these centres to determine which centres were interested in participating and had relevant resources to do so. Initially about twenty centres expressed readiness to participate but eventually only five centres actually took part in the project. Subsequent to the release of the final protocol to the designated local principal investigators or centre heads, video, e-mail conferences were conducted to achieve agreement about the procedures of the study (and to make the participating centres function as a whole by gaining familiarity). The Protocol was finalized within 6-12 months from the date of acceptance of the proposal by the World Psychiatric Association, the Sponsor of the Project. . An additional period of 3-6 months was granted to individual centres to seek approval from their Research Ethics Boards or Institutional Review Boards.

Phase 2 is the *baseline data collection phase* and takes place across all participating centres. In the five centres that have completed this phase it lasted about 6 months. The specific components of this phase involve:

- 1 Comparison between the health professionals, patients, and patients' care-providers for their weight, BMI and lifestyle (smoking, exercise, caffeine consumption and alcohol consumption), and getting a perspective of these individuals about adiposity and the health behaviours known to be metabolic and cardiovascular risk factors.
- 2 Evaluation of the health professionals' views about screening and monitoring of patients with schizophrenia for metabolic and cardiovascular risk factors and for their unhealthy lifestyle
- 3 Evaluation of existing screening, monitoring and management practices
- 4 Identification of barriers to the metabolic care of patients with schizophrenia as reported by the health professionals working with these patients.

Phase 3 is the *intervention phase*. Psychiatrists, general physicians/internists, nutritionists/dieticians and cognitive/behavioural therapists or physiotherapists, will offer culturally appropriate standard needs-based treatments following from phase 2. The exact intervention strategies are developed and refined during Phase 1 and their specific applications to the relevant study participants is determined by the findings of phase 2. We aim to minimize costs by employing group approaches whenever practical and feasible. The interventions in this phase will be -

1. Offering education to the members of the mental health care professionals in the participating centres about: (i) the need for cardio-metabolic screening and monitoring of patients with schizophrenia, (ii) about the relative metabolic liability of various

antipsychotic medications and when and how to switch them, and (iii) the significance of healthy lifestyle interventions to address cardio-metabolic risk factors.

2. When possible, providing guidance and encouragement to the centre heads in addressing barriers to the cardio-metabolic care of patients.
3. Availing services of a dietician who will offer guidance and education in a group setting following established dietary guidelines.
4. Availing services of a behavioural/cognitive or other trained therapist in a group setting, who will follow a standard therapy programme across the centres to improve physical exercise activity, eating healthily, quitting smoking and quitting or decreasing caffeine and alcohol consumption.
5. Switching patients from an antipsychotic medication with high metabolic liability to one with low metabolic liability.
6. Availing services of the general physician or internist as deemed necessary, for example for the control of lipid and or glucose metabolic dysregulation.

Phase 4 would be the *follow-up phase*. In this phase the impact of interventions offered in phase 3 would be evaluated. This phase would aim principally at determining:

1. The impact of educational interventions on the knowledge, attitude and practice of the involved health professionals about screening and monitoring of patients with schizophrenia for cardio-metabolic risk factors.
2. Whether barriers to the metabolic care of patients with schizophrenia as identified by the health professionals working with these patients changed over time, and how effectively the barriers identified by them earlier were removed.
3. Evaluation of the current screening, monitoring and management practices will be done to determine whether the actual practice of the health professionals with respect to cardio-metabolic monitoring changed over the study period
4. Whether the study interventions indirectly influenced the personal views about and approach of the health professionals, patients and their care-providers about the significance of healthy lifestyle, and impact upon their weight and BMI.
5. This phase will also identify the barriers to the interventions (group dietary counselling, group behavioural/cognitive therapy, switching antipsychotic medications and management of metabolic problems by the physician) of phase two.

3. Minimum Data Collection

The study is naturalistic, and represents quality control and best practices in the cardio-metabolic health of patients with schizophrenia. Centres differ in the amount of data

that are collected. The minimum data to be collected include anthropometric measures (weight and height), blood pressure, laboratory tests (HDL, LDL, plasma glucose, cholesterol and triglycerides) and symptoms (CGI and HoNOS).

Recommendations by various professional organizations concerning monitoring of anthropometric and laboratory variables in routine clinical practice is found in Table 1

3.1. Measurement of Cardiometabolic Risk Factors

We examine blood glucose, high-density lipoprotein (HDL), triglycerides, low density lipoprotein (LDL) and body mass index (BMI) as cardiometabolic risk markers. We used the definition of the components of the metabolic syndrome categorically as 1. High-blood glucose, defined as blood glucose ≥ 5.5 mmol/L; 2. Low-HDL cholesterol as HDL cholesterol < 1.0 in men and < 1.3 mmol/L in women; 3. High-triglycerides as triglycerides ≥ 1.7 mmol/L; 5. High LDL cholesterol ≥ 2.6 mmol/L; and 6. High-BMI as BMI ≥ 25.0 kg/m².

We adopted these cut-off points based on the clinical cut points for adverse outcomes defined by the World Health Organization (Albert & Zimmer 1998) and ATP-III (Adult Treatment Panel III, 2001).

3.2. Statistical Analysis

Data analysis to determine the overall effectiveness of the intervention involves comparison of the data points in the control section of the wedge (pre-intervention/pre-education) with those in the intervention section.

4. General Conclusion

Morbidity and mortality from cardiometabolic risk in schizophrenia is higher than chance occurrence. Identification and management of these risk factors seem to be hampered by a number of barriers despite years of developing one guide line after another.

There is need to re-evaluate the current knowledge, beliefs and practice of every one concerned with schizophrenia (be they formal or informal care providers) and develop a comprehensive yet simple, cheap, friendly integrated method of simultaneously including patients themselves, patients relations and all health professionals involved with service delivery for schizophrenia in the cardiometabolic risk reduction technique. The MOMACRIS Project is designed to address this goal.

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References

- [1] Allison DB, Newcomer JW, Dunn AL, Blumenthal JA, Fabricatore AN, Daumit GL, et al. Obesity among those with mental disorders: a National Institute of Mental Health meeting report. *Am J Prev Med* 2009 Apr;36(4):341-50.
- [2] American Diabetes Association. Consensus development conference on antipsychotic drugs and obesity and diabetes. *Diabetes Care* 2004 Feb;27(2):596-601.
- [3] Barnes TR, Paton C, Cavanagh MR, Hancock E, Taylor DM. A UK audit of screening for the metabolic side effects of antipsychotics in community patients. *Schizophr Bull* 2007 Nov;33(6):1397-403.
- [4] Beary M, Wildgust HJ. A critical review of major mortality risk factors for all-cause mortality in first-episode schizophrenia: clinical and research implications. *Journal of Psychopharmacol.* 2012; 26(5 Suppl):52-61
- [5] Bocquier A, Verger P, Basdevant A, Andreotti G, Baretge J, Villani P, et al. Overweight and obesity: knowledge, attitudes, and practices of general practitioners in France. *Obes Res* 2005 Apr;13(4):787-95.
- [6] Correll CU. Balancing efficacy and safety in treatment with antipsychotics. *CNS Spectr* 2007 ;12(10 Suppl 17):12-20, 35.
- [7] De Hert M, Vancampfort D, Correll CU, Mercken V, Peuskens J, Sweers K, Mitchell AJ. Guidelines for screening and monitoring of cardiometabolic risk in schizophrenia: systematic evaluation. *Br J Psychiatry* 2011; 199(2): 99-105
- [8] De HM, Dekker JM, Wood D, Kahl KG, Holt RI, Moller HJ. Cardiovascular disease and diabetes in people with severe mental illness position statement from the European Psychiatric Association (EPA), supported by the European Association for the Study of Diabetes (EASD) and the European Society of Cardiology (ESC). *Eur Psychiatry* 2009 Sep;24(6):412-2
- [9] De NA, De HM, Scheen A, Van GL, Peuskens J. [Conference report: Belgian consensus on metabolic problems associated with atypical antipsychotics]. *Encephale* 2007 Mar;33(2):197-202.

- [10] Deurenberg-Yap M, Li T, Tan WL, van Staveren WA, Chew SK, Deurenberg P. Can dietary factors explain differences in serum cholesterol profiles among different ethnic groups (Chinese, Malays and Indians) in Singapore? *Asia Pac J Clin Nutr* 2001;10(1):39-45.
- [11] Expert Group. 'Schizophrenia and Diabetes 2003' Expert Consensus Meeting, Dublin, 3-4 October 2003: consensus summary. *Br J Psychiatry Suppl* 2004 Apr;47:S112-S114.
- [12] Faulkner, G, Cohn, T., Remington, G., 2006. Validation of a physical activity assessment tool for individuals with schizophrenia. *Schizophr. Res.* 82, 225–231.
- [13] Glover, G, et al. (1997). The development of a new minimum data set for specialist mental health care, *Health Trends*, 29: 48-51.
- [14] Gough SC, O'donovan MC. Clustering of metabolic comorbidity in schizophrenia: a genetic contribution? *J Psychopharmacol* 2005 Nov;19(6 Suppl):47-55.
- [15] Hasnain M, Vieweg WV, Fredrickson SK, Beatty-Brooks M, Fernandez A, Pandurangi AK. Clinical monitoring and management of the metabolic syndrome in patients receiving atypical antipsychotic medications. *Prim Care Diabetes* 2009 Feb;3(1):5-15.
- [16] Hennekens CH, Hennekens AR, Hollar D, Casey DE. Schizophrenia and increased risks of cardiovascular disease. *Am Heart J* 2005 Dec;150(6):1115-21.
- [17] Hippisley-Cox J, Parker C, Coupland C, Vinogradova Y. Inequalities in the primary care of patients with coronary heart disease and serious mental health problems: a cross-sectional study. *Heart* 2007 Oct;93(10):1256-62.
- [18] Jacobs R. Investigating Patient Outcome Measures in Mental Health. Centre for Health Economics, University of York, York, 2009.
- [19] Koola MM, McMahan RP, Wehring HJ, Liu F, Mackowick KM, Warren KR, Feldman S, Shim JC, Love RC, Kelly DL. Alcohol and cannabis use and mortality in people with schizophrenia and related psychotic disorders. *J Psychiatry Res.* 2012; 46(8):987-93
- [20] Lambert TJ, Newcomer JW. Are the cardiometabolic complications of schizophrenia still neglected? Barriers to care. *Med J Aust* 2009 Feb 16;190(4 Suppl):S39-S42.
- [21] Lambert TJ, Chapman LH. Diabetes, psychotic disorders and antipsychotic therapy: a consensus statement. *Med J Aust* 2004 Nov 15;181(10):544-8.
- [22] Larsen JI, Andersen UA, Becker T, Bickel GG, Bernhard Bork, Cordes J, Frasc K, Jacobsen BA, Jensen SOW, Reinhold Kilian, Lauber C., Mogensen B N, Nielsen JA, Rossler W, Tsuchiya KJ, Uwakwe R, Munk-Jorgensen P. Cultural diversity in physical diseases among patients with mental illnesses. *Australian and New Zealand Journal of Psychiatry* 2013, 47: 250-258.
- [23] Leucht S, Burkard T, Henderson J, et al (2007) Physical illness and
- [24] Schizophrenia: A review of the literature. *Acta Psychiatrica Scandinavica* 2007, 116: 317 – 333.
- [25] Mackin P, Bishop DR, Watkinson HM. A prospective study of monitoring practices for metabolic disease in antipsychotic-treated community psychiatric patients. *BMC Psychiatry* 2007;7:28.
- [26] Mackin P, Bishop DR, Watkinson HM. A prospective study of monitoring practices for metabolic disease in antipsychotic treated community psychiatric patients. *BMC Psychiatry* 2007, 7: 28.
- [27] Merz CN, Buse JB, Tuncer D, Twillman GB. Physician attitudes and practices and patient awareness of the cardiovascular complications of diabetes. *J Am Coll Cardiol* 2002 Nov 20;40(10):1877-81.
- [28] Mitchell AJ, Delaffon V, Vancampfort D, Correll CU, De Hert M. Guideline concordant monitoring of metabolic risk in people treated with antipsychotic medication: systematic review and meta-analysis of screening practices. *Psychol Med* 2012; 42(1): 125-147.
- [29] Nasrallah HA, Meyer JM, Goff DC, McEvoy JP, Davis SM, Stroup TS, et al. Low rates of treatment for hypertension, dyslipidemia and diabetes in schizophrenia: data from the CATIE schizophrenia trial sample at baseline. *Schizophr Res* 2006 Sep;86(1-3):15-22.
- [30] Ohaeri JU, Akanji AO. Metabolic Syndrome in Severe Mental Disorders. *Metab Syndr Relat Disord* 2010 Oct 21.
- [31] Osler M, Heitmann BL, Hoidrup S, Jorgensen LM, Schroll M. Food intake patterns, self rated health and mortality in Danish men and women. A prospective observational study. *J Epidemiol Community Health* 2001 Jun;55(6):399-403.
- [32] Peet M. Diet, diabetes and schizophrenia: review and hypothesis. *Br J Psychiatry Suppl* 2004 Apr;47:S102-S105.
- [33] Pirkis JE, Burgess PM, Kirk PK, Dodson S, Coombs TJ, Williamson MK. A review of the psychometric properties of the Health of the Nation Outcome Scales (HoNOS) family of measures. *Health Qual Life Outcomes* 2005;3:76.
- [34] Puig RA, McKenna J, Riddoch C. Attitudes and practices of physicians and nurses regarding physical activity promotion in the Catalan primary health-care system. *Eur J Public Health* 2005 Dec;15(6):569-75.
- [35] Ralph Maddison R, Mhurch CN, Jiang Y, Vander Hoon S, Rodgers A, Lawes CMM, Rush E. International Physical Activity Questionnaire (IPAQ) and New Zealand Physical Activity Questionnaire (NZPAQ): A doubly labelled water validation. *International Journal of Behavioural Nutrition and Physical activity*, 2007, 4: 52.
- [36] Roick C, Fritz-Wieacker A, Matschinger H, Heider D, Schindler J, Riedel-Heller S, et al. Health habits of patients with schizophrenia. *Soc Psychiatry Psychiatr Epidemiol* 2007 Apr;42(4):268-76.
- [37] Roberts L, Roalfe A, Wilson S, Lester H. Physical health care of patients with schizophrenia in primary care: a comparative study. *Fam Pract* 2007 Feb;24(1):34-40. Saha S, Chant D, McGrath J. A systematic Review of Mortality in
- [38] schizophrenia. Is the Differential Mortality Gap worsening over time? *Archives of General Psychiatry* 2007, 64 (10): 1123 – 1131
- [39] Spearing MK, Post RM, Leverich GS, Brandt D, Nolen W. Modification of the Clinical Global Impressions (CGI) Scale for use in bipolar illness (BP): the CGI-BP. *Psychiatry Res* 1997 Dec 5;73(3):159-71.

- [40] Tiihonen J, Lonnqvist J, Wahlbeck K, Klaukka T, Niskanen L, Tanskanen A, et al. 11-year follow-up of mortality in patients with schizophrenia: a population-based cohort study (FIN11 study). *Lancet* 2009 Aug 22;374(9690):620-7.
- [41] Vancampfort D, Knapen J, Probst M et al. Considering a frame of reference for physical activity research related to the cardiometabolic risk profile in schizophrenia. *Psychiatry Res* 2010; 177: 271-279.
- [42] Wildgust HJ, Beary M. Are there modifiable risk factors which will reduce the excess mortality in schizophrenia? *J Psychopharmacol.* 2010;24(4 Suppl):37-50
- [43] Zibaenezhad MJ BHVS. Knowledge, attitude and practice of general physicians in treatment and complications of hypertension in Fars province, southern Iran. *Iraninan Red Crescent Medical Journal* 2007;9:4-8.
- [44] Hayes RJ, Benneth S. Simple sample size calculation for cluster randomized trials. *International Journal of Epidemiology* 1999, 28: 319-326.
- [45] Morrato EH, Newcomer JW, Kamat S, Baser O, Harnet J, Cuffel B. Metabolic screening after the American Diabetic Association's consensus statement on antipsychotic drugs and diabetes. *Diabetes Care* 2009, 32: 1037-1042.
- [46] Albert KG, Zimmer PZ. Definition, diagnosis and classification of diabetes mellitus and its complications. Part I. Diagnosis and classification of diabetes mellitus – provisional report of a WHO consultation. *Diabetes Medicine* 1998, 15: 539-553.
- [47] Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults: Executive Summary of the Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation, And Treatment of High Blood Cholesterol In Adults (Adult Treatment Panel III). *JAMA* 2001, 285: 2486–2497.
- [48] Bobes J, Alegria AA, Saiz-Gonzalez MD, Barber I, Perez JL, Saiz-Ruiz J. Change in psychiatrist 'attitudes towards the physical health care of patients with schizophrenia coinciding with the dissemination of the consensus on physical health in patients with schizophrenia. *European Psychiatry* 2010, doi:10.1016/j.eurpsy.2010.04.004