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SOMA: SCREENING AND SOMATIC HEALTH INTERVENTION PROGRAM FOR PEOPLE WITH SEVERE MENTAL ILLNESS

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Summary

Background: *Progress in psychiatric treatment has led to important improvements in the quality of life of patients with severe mental illness (SMI). Nevertheless, the life expectancy of patients with SMI remains two decades shorter than that of the general population, and the most prevalent cause of death is cardiovascular disease. Given that the delivery of somatic care to a population of individuals with mental illness is specific, we developed a screening and intervention programme aimed at this vulnerable population.*

Subjects and methods: *The "SOMA" programme is a complex somatic health intervention system consisting of screening and a set of interventions. Risk screening is evaluated automatically; the interventions include dietary intervention, healthy lifestyle education (HSE), physiotherapy, kinesiotherapy, and occupational therapy (KOP).*

Results: *The programme was introduced into the practice of the hospital, and its outcomes were monitored with a pilot population divided into 2 subprogrammes. CV risk factor prevalence study (n= 5481) as the most common CV risk factors identified hypertension (56.6 %) and smoking (55.7 %), high-risk patients proportion was 1364 (27 %). HSE (n=40) enrolled patients improved their body weight. KOP results show that patients with schizophrenia preferred physical activity less than others; 53 % of patients have no physical activity during hospitalization, and spontaneous physical activity depends on BMI in our sample. We observed improvement in cognitive functioning, perception of physical functions, or perceived limitations was comparable to the general population.*

Conclusion: *Results show the usability of the program design; initial screening with two intervention branches can increase motivation for physical activity and adoption of health-promoting behaviors and support a recovery process in SMI patients. SOMA project is unique in the Czech environment, however, larger sample with longer observation period is needed.*

Keywords: *Severe mental illness; Cardiovascular disease; Healthy lifestyle education; Nutritional care; Physiotherapy*

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INTRODUCTION

Patients with severe mental illness (SMI), such as schizophrenia or bipolar disorder, have a life expectancy much shorter than that of the general population, and cardiovascular disease (CVD) is a leading cause of death for this population (Bradford & Cunningham 2016, Druss et al. 2011, Lawrence et al. 2003). Complex causal factors lead to excessive mortality from CVD in psychiatric patients, with drug-induced weight gain, a high prevalence of smoking, poor diet and physical inactivity being critical risk factors (Bak et al. 2014, Manu et al. 2015, Osborn et al. 2015, Afzal et al. 2021).

A multilevel model of risk for excess mortality in people with severe mental disorders is due to social and individual determinant risk factors as well as health care system factors: medication use, fragmentation of services or limited health information system possibilities (Druss et al. 2011, Liu et al. 2017). Additionally, there is considerable evidence that screening and intervention for CVD in patients with severe SMI is effective and brings cost benefits to the health system (Stubbs et al. 2018). The

most widespread indicators are the CV score according to the Framingham study (Kannel et al. 1976) and the Systematic Coronary Risk Assessment (SCORE) (Conroy et al. 2003). The Prediction and Management of Cardiovascular Risk in People with Severe Mental Illnesses (PRIMROSE) study (Osborn et al. 2015) model incorporates new variables that are specific to the SMI population: psychiatric diagnosis, harmful alcohol use, antidepressant and antipsychotic use, and social deprivation rate.

Programmes targeted at reducing the prevalence of CVD risk factors tend to fail in a specific population of SMI patients, as they need interventions tailored to their needs (Ashdown-Franks et al. 2018, Pearsall et al. 2014, Ward et al. 2015). The intensity and duration of the programme components may need enhancement in interventions targeting patients with SMI (Ward et al. 2015). We should not separate mental illness treatment from comorbid somatic disease treatment; physical activity should be an integral part of complex treatment intervention (Stubbs et al. 2018). Somatic health screening in SMI patients is recommended by international guidelines (Kuipers et al. 2014, Stubbs et al. 2018). Additionally, there is evidence that SMI patients have restricted access to primary and somatic care and, therefore, limited screening and preventive intervention possibilities for CVD risk compared with the general population (Mackin et al. 2007). Even in Nordic, egalitarian countries with public funded healthcare systems CV mortality is a leading cause of death among patients with severe mental illness, accounting for approximately 25% of all death in patients with schizophrenia and 33% in patients with bipolar disorder, twice as high as in the general population (Højstrup et al.2023). In addition, psychiatrists are not sufficiently aware of their patients' comorbid somatic illnesses (Saillant et al. 2016). The arguments above underlie the need for coordinated, multimodal interventions targeting somatic health and CVD risk in each SMI patient (Druss et al. 2011).

We aim to create a preventive intervention programme targeting metabolic and somatic health in mentally ill individuals (SOMA, from the Czech Systém Ovlivnění Metabolismu a Aktivity; System Modify Metabolism and Activity). To our knowledge, such a complex programme represents a unique approach in the Czech Republic and Eastern Europe overall.

The overall aim of this report is to present the programme development and design and the pilot study results. The objectives are to assess the prevalence of cardiovascular risk factors in our inpatient cohort, analyse the current state of the cardiometabolic services available for our SMI patients, identify areas in need of improvement and design new services to complement contemporary practice, test the feasibility of implementing new services into routine hospital practice, and monitor the benefits of healthy life educational and nutritional care interventions.

This study was approved by the Ethical Committee of the Third Faculty of Medicine, Charles University, Prague, and the Institutional ethical committee of Bohnice Psychiatry Hospital.

SUBJECTS AND METHODS

Study setting

Bohnice Psychiatric Hospital provides wide-ranging care from child and adolescent psychiatry, general psychiatry, addiction treatment, old-age psychiatry, and internal medicine to forensic care. The number of inpatients is nearly eight thousand per year; the number of patients treated in outpatient programmes is several times higher. The hospital runs outpatient clinics specialising in crisis intervention, psychology, physiotherapy, nutritional care, psychomotor therapy, speech therapy, internal medicine, anaesthesiology, psychiatry, sexology, gynaecology, dentistry, radiology, and dermatology. A 24/7 internal medicine specialist is accessible to provide physical healthcare to all indicated patients on psychiatric wards. The hospital also operates three Community Flexible Assertive Teams serving the SMI patient target group. In this study, the team of professionals caring for SMI patients consisted of an attending physician, a psychiatric nurse, a psychologist, a physiotherapist, an occupational therapist and a nutritional therapist.

SOMA programme compilation

We completed the development of the methods between 2015 and 2018. The team comprised experts from psychiatry, psychiatric nursing, physiotherapy, dietary nursing, smoking cessation, general medicine, nutrition, preventive cardiology, information technology, occupational therapy and clinical pharmacy. We held an initial meeting to map the core areas of the project solution. Based on the project objectives, we divided the team into groups according to their expertise and anticipated work scope in a given area. We set up expert groups in the following areas: cardiovascular disease risk screening, healthy lifestyle education and nutritional care, and interventions in kinesiotherapy, occupational therapy and physiotherapy.

Experts worked in groups according to the following procedure: literature review; good clinical practice review; identification of areas of implementation, methodological

development/adjustment; pilot study; and improvement of the methods based on the evaluation of the pilot studies. The main methodological requirements of the expert groups were usability in routine clinical practice, human and financial inputs, sustainability, suitability for validation of effectiveness and further improvement.

After the working group reviewed the needs for the establishment of new services, the SOMA team chose to implement the following services to complement the existing healthcare services:

a. Cardiovascular risk factor screening – SOMA score
b. Subprogramme 1 – Healthy lifestyle education and nutritional care (HSE)
c. Subprogramme 2 – Kinesiotherapy, occupational therapy, and physiotherapy (KOP)

Cardiovascular disease risk screening – SOMA score

We based the retrospective CV risk analysis on data collected from the Electronic Health Records of Bohnice Psychiatry Hospital. We included all patients aged over 18 years hospitalised from Jan 1st to Dec 31st 2014 (N=6170). We did not restrict the analysis to diagnosis; after excluding readmissions, there were 5122 patients. For each patient included in the analysis, we obtained the following variables: sex, age, Body mass index (BMI) (m/kg2), family history of CVD (defined as the presence of ischaemic heart disease, stroke, or ischaemic disease of the lower limbs in a first-line family member), family history of hypertension (defined as the presence of hypertension in a first-line family member), family history of diabetes (defined as the presence of diabetes in a first-line family member), medical history of atherosclerosis (defined as the presence of ischaemic heart disease, stroke, or ischaemic disease of the lower limbs), hypertension (defined as systolic/diastolic BP ≥ 140/90 mmHg and/or use of an antihypertensive medication), dyslipidaemia (any lipid-lowering medication), and diabetes (fasting glycaemia > 5.6 mmol/l and/or use of any antidiabetic medication). We used data reports produced by physicians and other care providers in the electronic notes system. We calculated the Framingham score based on nonlaboratory parameters as previously published (D'Agostino et al. 2008).

For the statistical analysis, the Excel statistical package 2013 (Microsoft Inc., USA) and GraphPad PRISM version 7.03 (USA) were used to analyse prevalence data and correlations. All calculations were carried out with a significance level of $\alpha = 0.05$. A detailed analysis is provided in the supplementary file: SOMA statistical analyses.

Subprogramme 1 – Healthy lifestyle education and nutritional care (HSE)

We screened all patients; a nutrition specialist checked those classified as medium- and high-risk (according to the initial SOMA score). We assessed nutrition status using the Nottingham scale (Lehmann et al. 1991) and the Mini Nutritional Assessment (MNA) tool (Cereda et al. 2008). We provided targeted nutrition interventions ranging from individual diet prescriptions and nutrition supplementation to systematic nutrition counselling.

In the healthy lifestyle education interventions, we compiled material that served as a practical guide to help a nurse conduct educational group counselling on healthy lifestyle and dietary measures. The subprogramme consists of an educational interview, information leaflet provision, and HSE education subprogramme. As a foundation of HSE development, we used cognitive behavioural methodology, considering impaired cognition and specific learning needs of SMI patients (Wallace et al, 1992). HSE is divided into 12 lessons, covering healthy lifestyle skills, self-monitoring of food intake by diary recording, and weight monitoring. The manual also provided comprehensive information on nutrition and related civilisation diseases and risky habits (e.g., smoking, alcohol intake). We emphasised the need for regular GP visits and use of all prescribed medication.

The pilot intervention subprogramme enrolled 40 patients and was completed by 23 patients, of whom 14 were women and nine were men. HSE is a 12-week subprogramme for selected patients diagnosed with mental illnesses within the psychotic spectrum (F.2x) who were motivated to participate and were at a medium or high CVD risk based on the initial SOMA score. The subprogramme consists of an educational group and dietary and kinesiotherapy interventions. All patients had a scheduled activity at least four times per week. All patients underwent Nordic walking (NW) and were supervised by a trained therapist at least twice a week, up to 4 times a week, and some were involved in individual gym training.

Subprogramme 2 – Kinesiotherapy, Occupational therapy, and Physiotherapy (KOP)

Patients were assigned group therapeutic physical education (GTPE) and Nordic walking (NW) for eight weeks, with a frequency of 2x60 minutes of NW and 2–4x30 minutes of GTPE a week. To adjust the progression of the interventions for the needs of individual patients, we assessed physical activity before and during hospitalisation. We chose a polling method, using a nonstandardised

questionnaire with eight questions to evaluate physical activity (see Supplementary files for details).

Thirty inpatients completed the occupational therapy programme for six weeks, which consisted of group and individual therapy twice a week for 60 minutes. Before and after the intervention, we screened all patients by the Montreal Cognitive Assessment (MoCA) (Nasreddine et al. 2005).

In the kinesiotherapy pilot study, 52 patients were regularly treated with individual and group kinesiotherapy for eight weeks, with a frequency of 2-4 sessions per week for 60 minutes. After completing the subprogramme, they completed the SF-36 questionnaire (McHorney et al. 1993).

RESULTS

SOMA programme overview

The SOMA system divided service provision into two levels: low-threshold and selective (Figure 1). We provided low-threshold interventions to almost all patients; selective services, however, require individualisation and targeting depending on the identified risk. Decision making in intervention choices was dependent on clinical parameters and personal history data. Thorough diagnostic procedures and clinical counselling, e.g., medicine checks and dietetic care, were strongly recommended in each high-risk case.

Cardiovascular disease risk screening

To adjust screening to our population, we used 5122 complete individual patient records to retrieve CVD data and calculate a score based on those risks. The obtained SOMA score was correlated with their Framingham score (Spearman $R = 0.63$, $p < 0.0001$), indicating concurrent validity (D'Agostino et al, 2008). The mean Framingham score (based on nonlaboratory parameters) of the sample was 9.89 ± 7.3 CVD points, which corresponds to a $12.35 \pm 10.4\%$ 10-year risk of CV death. The proportion of high CV risk patients (10-year CV mortality > 20%) was 1364 (27%). In our sample, the most commonly represented ICD-10 diagnoses were F20 (schizophrenia),

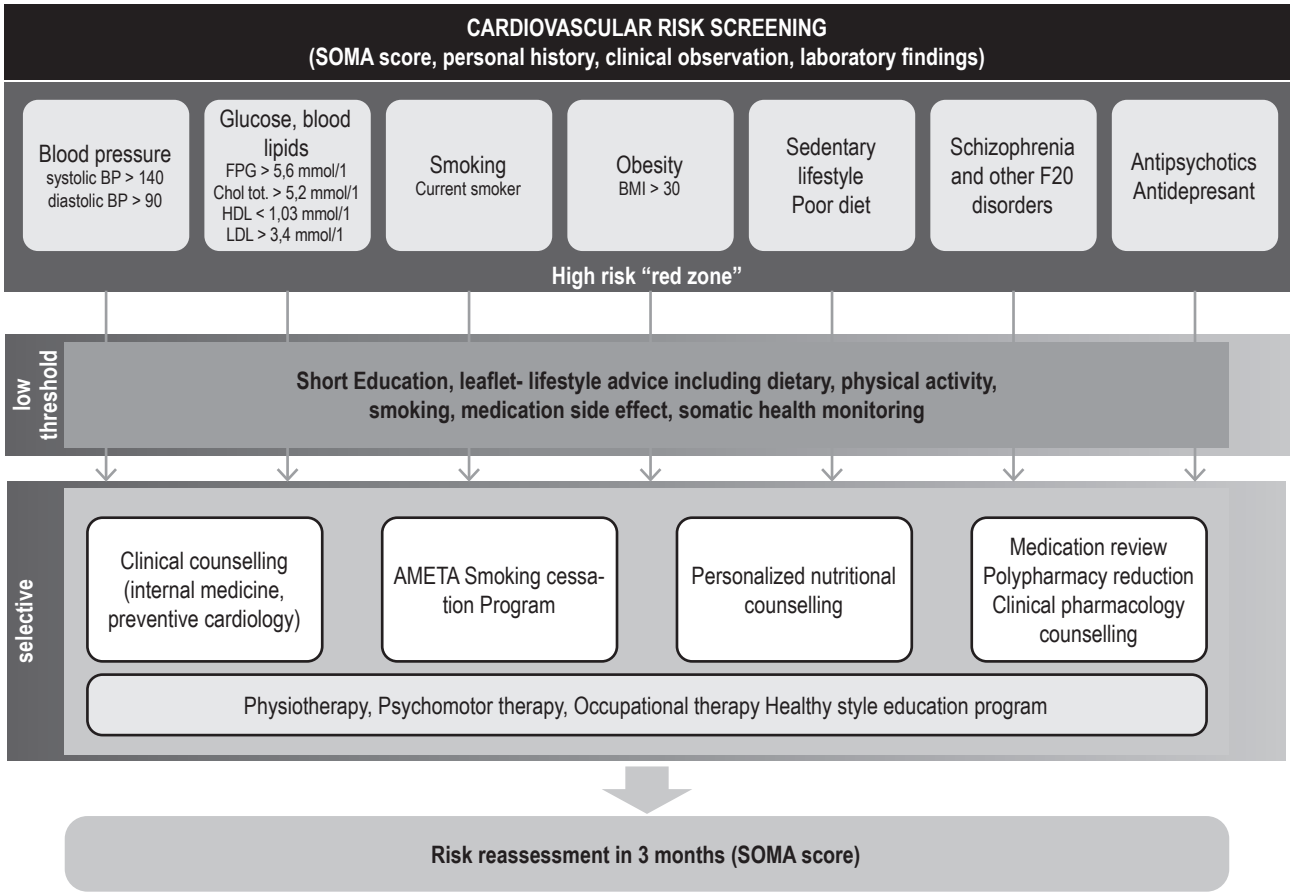

Figure 1. SOMA system overview. Design and implementation of the system for cardiovascular risk screening and therapy, including multifactor screening and complex support of high-risk patients with mental disorders.

F10 (psychoactive substance use), F06 (psychiatric disorders due to underlying physical health problems), and G30 (Alzheimer's disease). The average BMI had a normal distribution among different diagnoses. Our sample's major risk factors were hypertension and tobacco smoking, and 1/3 of the patients in our sample were overweight or obese (Table 1). A large proportion of patients had cooccurring risk factors (Figure 2). According to the multicriteria analysis results, the most undesirable metabolic profile was present among patients diagnosed with schizophrenia, followed by patients with the diagnosis of F10 (alcohol use disorders), who had the highest BMI and blood pressure. We developed an algorithm based on these findings, which we embedded in the hospital's electronic record system. We could thus screen all patients for CV risk using this SOMA score. We used a traffic light

Table 1. Distribution of the risk factors in the sample of hospitalised patients (N=5122)

Risk factor	Prevalence (%)
Hypertension	56.6
Smoking	55.7
Age and sex	39.1
Obesity	15.5
History of cardiovascular disease (CVD)	14.3
Family history of CVD	13.3
Dyslipidaemia	11.4
Diabetes	9.3

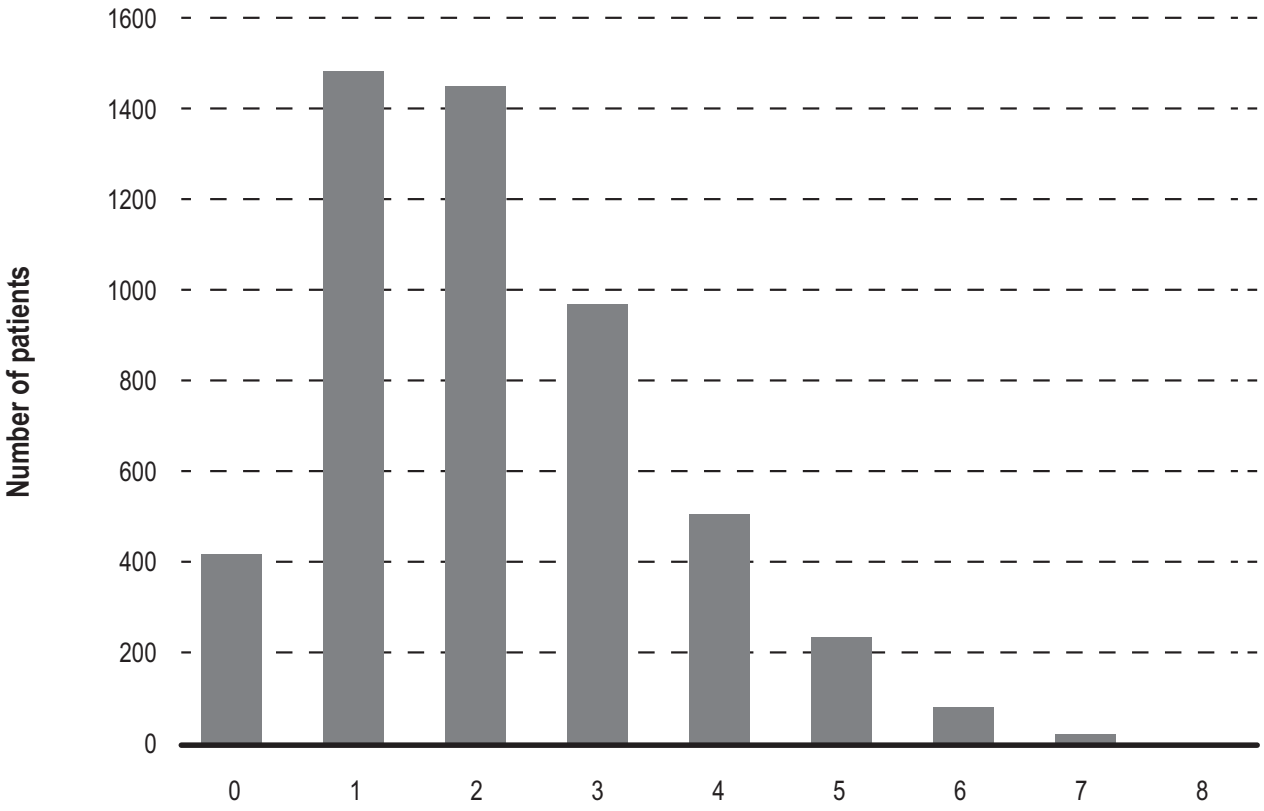

Figure 2. A cumulative number of risk factors (x-axis) in a sample of 5122 inpatients with mental illness.

system in the electronic hospital records, where red indicated high-risk (3 and more points), orange indicated medium-risk (1-2 points), and green indicated low-risk patient (0 points). The following criteria are each associated with one point on the SOMA index: systolic BP ≥ 140 mmHg; diastolic BP ≥ 90 mmHg; men aged ≥ 45 years or women aged ≥ 55 years; and BMI ≥ 25 (kg/m2). In addition, being diagnosed with schizophrenia or a similar psychotic disorder placed the patient at risk regardless of the other risk factors. This first-line screening was refined by mapping other risk factors (personal history, blood lipid profile, glycated haemoglobin, medication profile, waist circumference, lifestyle review) and targeting these risks to produce a "final" SOMA score (Table 2) (Páv et

Table 2. SOMA score and specific intervention

Parameter	Description
Age and sex	
Body Mass Index (BMI)	
Waist circumference	Measured in half distance between ribs and pelvis
Systolic blood pressure (BP)	Highest measured counts
Diastolic BP	Highest measured counts
Glycaemia	Fasting venous plasma sample
Glycated haemoglobin (HbA1c)	Fasting venous plasma sample
Total cholesterol	Fasting venous plasma sample
Low Density Lipoprotein (LDL) cholesterol	Fasting venous plasma sample
High Density Lipoprotein (HDL) cholesterol	Fasting venous plasma sample
Triglycerides	Fasting venous plasma sample
Smoking	Actual smoker (has smoked at least 100 cigarettes in their life and at present smokes cigars or pipe) History of smoking (has smoked at least 100 cigarettes in their life and at present does not smoke)
Alcohol abuse	Limiting daily activities
Social deprivation (Townsend scale)	5 is the highest deprivation rate
Physical activity	Less than 30 min 3 times a week of physical activity
Significant weight loss	Unintentional weight loss of 10%/6 months or 5%/1 month
Antidepressant	Any
Atypical antipsychotic	Any
Arterial hypertension in medical history or antihypertensive drug use	
Dyslipidaemia in medical history or hypolipidemic drug use	Any
Diabetes, prediabetes in medical history or antidiabetic drug use	Medical history
Severe mental illness (psychotic spectrum, bipolar disease)	
Medical history of manifest atherosclerosis (ischaemic heart disease, ischaemic disease of lower extremities, post-MI, poststroke)	Medical history
Cardiovascular risk in a family	Presence of any: arterial hypertension, ischaemic heart disease, ischaemic disease of lower extremities, post-MI, poststroke in first-line relatives before the age of 55 years in men and 65 years in women.

al. 2016). For the score calculation, however, the system requires active data input to the questionnaire.

Reassessment of the "final" SOMA score after three months of hospitalisation and six months for outpatients was then completed. We evaluated the benefits of interventions by observing the shift in the overall SOMA score or the scores of its individual parameters.

Subprogramme 1 – Healthy lifestyle education and nutritional care (HSE)

In this subprogramme, 23 patients were enrolled in the pilot study. Twelve patients improved their body weight; that is, overweight/obese patients lost weight (n=7), and underweight patients gained weight (n=5). When

Positivity	Weight for SOMA score	Specific intervention
Men ≥ 45 years	1,0	
Women ≥ 55 years	1,0	
≥ 25 (kg/m2)	1,0	Nutritional intervention Healthy lifestyle education subprogramme
≥ 30 (kg/m2)	2,0	
≤ 18,5 (kg/m2)	0	
≥ 102 in men	2,0	General medicine check-up
≥ 88 in women	2,0	
≥ 140 mmHg	2,0	
≥ 90 mmHg	2,0	
≥ 5.6 mmol/L	2,0	
≥ 39 mmol/mol	2,0	
≥ 5,2	2,0	
≥ 2,0	2,0	
≤ 1,2	2,0	
≥ 1,7	2,0	
	1,0	Anti-smoking intervention, Metabolic intervention program (AMETA)
	0,5	
	1,0	Addictology intervention
1	0	
2-3	0,5	
4-5	1,0	
Yes	1,0	Kinesiotherapy, occupation therapy, and physiotherapy (KOP)
Yes	0	Nutritional intervention
Yes	1,0	Pharmacotherapy review
Yes	1,0	Clinical pharmaceutical consultancy
Yes	2,0	General medicine check-up
Yes	2,0	
Yes	2,0	
At least one = yes	1,0	
Yes	4,0	
Yes	1,0	

assessing waist circumference, 12 patients also improved their values. In glycaemia and glycated haemoglobin, we did not notice significant differences. Other laboratory parameters, i.e., lipids, may indicate that most patients either improved their values or remained at the same levels; most patients did not have regular movement activity before joining the subprogramme. Nevertheless, most participated in the NW subprogramme (n=14).

Subprogramme 2 – Kinesiotherapy, Occupational therapy, and Physiotherapy (KOP)

We designed KOP interventions in line with contemporary evidence and recommendations as an aerobic exercise intervention of moderate-vigorous intensity at a frequency of 2–3 times a week, supervised by qualified professionals and achieving 150 min of movement activity per week to improve outcomes (Stubbs et al. 2018).

Our survey (N=52) showed that patients with schizophrenia preferred physical activity far less than others; more than 30% did not practice physical activity before hospitalisation (Figure 3). More than 53% of patients never practised any physical activity in their free time during hospitalisation. The results showed a dependence of spontaneous physical activity (not within the therapeutic subprogramme) during hospitalisation and before hospitalisation on BMI. The preferred movement activity was swimming.

The occupational therapy results from the assessment completed before the intervention showed that 73% of patients suffered from cognitive deficits, with memory, spatial orientation, and speech being the most affected. After completing the programme, the average improvement was 3 points out of a maximum of 30 obtainable in the MoCA test.

In the kinesiotherapy pilot study, the results of the SF36 questionnaire showed that the perception of physical functions or perceived limitations within a patient group was comparable to the general population. In contrast, in the perception of vitality, social functioning, and limitations due to emotional problems and mental health evaluation, our patients showed an average of 10 to 20% lower quality of life in comparison to general population (Supplementary files). Based on the abovementioned results, we arranged interventions in this area into three branches (Table 3). The length of the subprogramme was

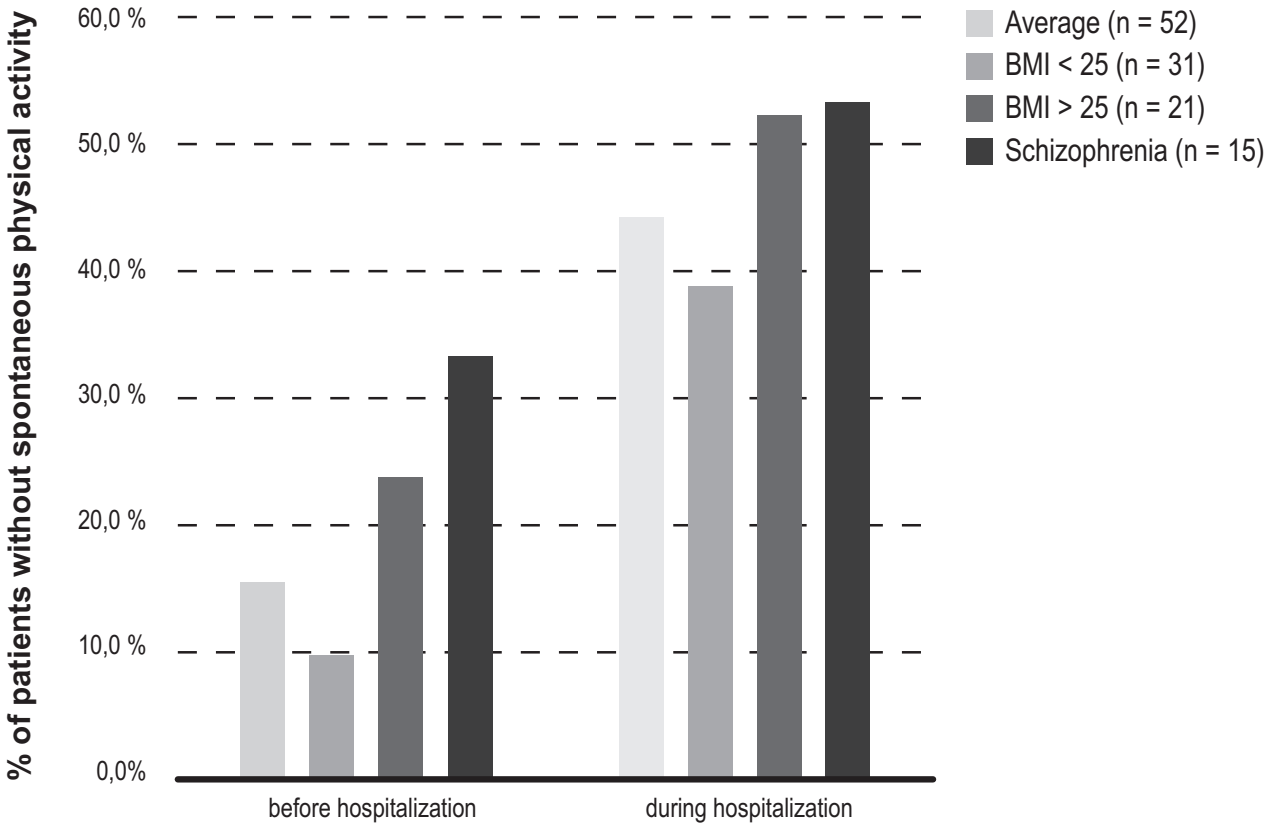

Figure 3. Spontaneous activity survey. The questionnaire was administered to hospitalised patients (N=52); for details, see Supplementary file.

Table 3. Subprogramme intervention in kinesiotherapy, occupation therapy, and physiotherapy (KOP)

Subprogramme 1 Inpatient, high surveillance	• Nordic walking 60 minutes, twice a week • Gym exercises 60 minutes, once a week
Subprogramme 2 Inpatient, outpatient, no surveillance Three months	**Monday** • Gym exercise 60 minutes circuit training, with instruments and aids (bicycle trainer, bench press, dumbbells, stepper, gymnasium, resistance training) **Tuesday** • Nordic walking 60 minutes **Wednesday** • Group kinesiotherapy (Chubb, Russian skittles, pétanque, basketball, volleyball, Ringo game, badminton, tennis, table tennis, exercises on gymnastics equipment, floorball, football, running). We divided patients into groups according to fitness; self-organisation is supported (tennis, football, volleyball, and basket), 60 minutes **Thursday** • Nordic walking 60 minutes **Friday** • Healthy lifestyle education (HSE), 45 minutes

independent of the hospitalisation duration; the whole system is intended for both hospitalised and outpatients, allowing a patient to participate in subprogrammes 1 to 3 in parallel with mental state improvement. We designed KOP modules to allow a patient to participate in immediate activity during the acute hospitalisation phase, e.g., involuntary hospitalisation in the first subprogramme. With the easing of monitoring, it is possible to extend these activities in subprogramme two, and then move from home or the community centre to attending preferred sporting or other activities within subprogramme three. Here, self-organisation is supported; KOP thus also comprises social rehabilitation and reintegration aspects.

DISCUSSION

We developed the SOMA score as both the screening and assessment tool for available interventions adjusted to our population. Depending on the degree and type of risk and patient preferences, we selected patients and assigned them specific intervention subprogrammes. As a clinical tool, the SOMA score is also designed to monitor the impact of these interventions on various clinical parameters. The set of variables and their cut-offs are a compromise between the score sensitivity on the one hand and the practical feasibility on the other. After screening, approximately 2000 patients were potential candidates for a specific CV risk intervention (sub) programmes. The same number was limited to minimal intervention, such as leaflet dispersion, lifestyle recommendations, and referral to other healthcare services. We observed that the incidence and distribution of CV risk factors is similar to other SMI samples (Osborn et al. 2015, Afzal et al. 2021, Goldfarb et al. 2022) with hypertension, obesity, dyslipidaemia and diabetes in the foreground. It is, therefore, necessary to increase patients' knowledge in this respect, and indeed, as a result of Healthy lifestyle education and nutritional care intervention, nearly half of the patients in our pilot sample improved their body weight. Our observation is in line with the findings of other authors demonstrating the efficiency of educational lifestyle intervention on physical and psychological health among SMI patients (Manu et al. 2025, Zhang et al. 2023). Intrinsic motivation plays a vital role in adopting and maintaining health-promoting behaviours and helps the patient in the individual recovery process (Vancampfort et al. 2015). As the effects of a healthy lifestyle, preventive activities, and regular health care checks depend primarily on the patient's motivation to participate in such interventions, it is crucial to strengthen motivational resources. Being rewarded by losing weight, for example, can increase adherence to pharmacologic treatment or utilization of other services.

We found out that movement activity in our sample is dependent on BMI. Although patients with schizophrenia move much less than other patients (Stubbs et al. 2016), they value activities such as NW, which are inexpensive and easy to implement. We therefore identified patients with schizophrenia as the most endangered group; this is in accord with the observation of (Lambert et al. 2022). However, there is a need to adjust movement programmes

to patients' fitness level; some (e.g. those with higher BMI) require a more rehabilitative approach, more consulting and dietary advice time; others consume the programme as a regular sports activity. Including physical activity in the patient's daily routine, we helped them regulate muscle and mental tensions and develop positive physical self-efficacy, self-confidence, and self-esteem (Vancampfort et al. 2015). Also, as in some areas (vitality, social functioning, and limitations due to emotional problems and mental health evaluated by SF-36 questionnaire), our patients report an average of 10 to 20% lower quality of life than general population movement activity can lead to increased quality of life increase. Recent findings in our hospital show that physical activity before and during hospitalization and changes during hospitalization affect the quality of life perception, and physically active patients showed significantly better quality of life than inactive patients. (Köhlerová et al. 2023).

SMI patients show impairments in memory, concentration, executive functions, and motor skills deficits (Aquila & Citrome, 2015). In our sample, we identified cognitive deficits, memory and spatial orientation problems using the MoCA test, replicating previous observations (Rosca et al. 2020). Also, enrolment into occupational therapy led to improvement in the MoCA in our sample; this is in line with findings that reveal evidence for the use of psychosocial interventions in targeting cognitive impairment (Aquila & Citrome 2015) and facilitating community reintegration in individuals with SMI (John et al. 2022).

Also, from our experience, adjusting local conditions is essential to implement these new services successfully. We found staff attitudes to be the most challenging part of introducing the programme to our hospital; providing more in-depth knowledge concerning cardiometabolic disease development increased the staff awareness of the importance of preventive efforts targeted to a patient's lifestyle and risky habits.

We see the strengths of our study in a comprehensive, clinical practice-oriented approach, which provides an example of care integration. Also, we bring one of the first reports of the prevalence of cardiovascular risk among patients with mental illness in the Czech Republic. Such a complex programme represents a unique approach in the Czech Republic and Eastern Europe.

However, limitations should be mentioned. We collected only part of CV risk factors, e.g. low physical activity (PA) and sedentary behaviour (SB) are significant contributors to mental health burden and increased somatic comorbidity and mortality. However, we were not able to evaluate our whole sample. Also, there is a need to collect CV risk reassessment data to confirm whether the development of SV screening scores over time reflects the intervention's effect. Also, relatively small numbers of enrolled patients limit the strength of study outputs. Larger groups and extended observation periods are needed to prove the system's efficacy.

CONCLUSION

We demonstrated a high prevalence of modifiable traditional CV risk factors in our sample. Compared to the general population, SMI patients do not have equal access to somatic care (Højstrup et al. 2023), including cardiovascular screening and interventions. There is a call for defined, coordinated interventions to reduce sedentary behaviour and promote a healthy lifestyle in the SMI population (Ashdown-Franks et al. 2018). Therefore, both psychiatric ward teams (Páv et al. 2017) and community assertive teams and outpatient clinics should monitor and deliver somatic health interventions to SMI patients. Such interventions should support a predominantly healthy lifestyle, allowing the patients to regain control of their somatic health and supporting their specific recovery process. They are essentially multidisciplinary, supporting compliance with psychiatric treatment and targeting urgent patient goals (e.g., weight gain), postponing thus the occurrence of cardiovascular morbidity. Each hospitalization episode can start this process, and the SOMA system can serve as an implementation example of an integrated physical healthcare programme tailored to SMI patients.

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Ethical Considerations: Does this study include human subjects? YES

Authors confirmed the compliance with all relevant ethical regulations.

Conflict of interest: The authors declare that they have no conflicts of interest.

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Authors Contribution: Ms. Michaela Zahradka Kohlerova: physiotherapy methods, study design, data collection, approval of the final version. Dr. Jan Gojda:

study design, SOMA score design, approval of the final version. Ms. Hana Kynstova: Kinesiotherapy methods, approval of the final version, dat collection, statistical analysis. Dr. Chantelle Wiseman: data collection, statistical analysis. Dr. Ivana Tašková: data collection and analysis. Dr. Eliska Selinger: QoL data collection. Dr. Martin Hollý: study design, approval of the final version. Dr. Jan Mužík: design and data collection, statistical analysis. Dr. Marek Páv: study design, first draft, approval of the final version, statistical analysis, corresponding author

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