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Cause-specific mortality and risk factors of death among inpatients of a psychiatric hospital

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Summary

Aim. The aim of the study was to determine general and specific in-hospital mortality rates, and to identify mortality risk factors.

Method. The study included 15,997 medical records of subjects who have been hospitalized at the Hospital for Patients with Neurotic and Psychiatric Diseases in Starogard Gdanski in 2005–2012. The study was designed as a retrospective cohort study with Cox proportional model for survival analysis. Standardized mortality ratio (SMR) and its 95% confidence intervals were calculated (95% CI).

Results. Independent risk factors for death were: male sex, older age, hypertension, atherosclerosis, history of myocardial infarction, heart failure, cirrhosis, tuberculosis, history of cancer, anemia, and inflammation. Delirium not induced by alcohol or other psychoactive substances was associated with the highest mortality risk of all psychiatric diagnoses. Unemployment was associated with doubled risk of in-hospital death. SMR for the whole population of hospitalized patients amounted to 17.88 (95% CI: 15.99–20.00).

Conclusions. Medical comorbidities have a significant and clinically important impact on in-hospital mortality in psychiatric patients in Poland. Clinicians' awareness and active management of medical conditions amongst such patients is needed to reduce the risk of inhospital mortality in psychiatric facilities.

Key words: mortality, comorbidity, psychiatric hospitals

Introduction

During recent decades, a number of studies conducted worldwide analyzed mortality rates for mentally ill patients against mortality in general population, and tried to identify mortality risk factors for this group. Mortality rates were analyzed according to a psychiatric diagnosis and cause of death [1, 2]. The list of studied mortality risk factors included age, marital status, education level, diagnosis, pharmacotherapy, and

duration of hospital stay [3–5]. Longer and permanent hospitalization turned out to be principal mortality risk factors in mentally ill patients. Importantly, irrespective of diagnosis and sex, mortality risk in patients with mental illnesses was shown to be higher than in general population [6]. However, mortality of psychiatric patients is also influenced by presence of concomitant somatic diseases and severity thereof, and this issue was frequently underestimated in previous studies dealing with the problem in question. Psychiatric care has undergone substantial changes over the last few decades. The most prominent changes included release of novel psychotropic agents, development of environmental treatment models and progressive integration of psychiatric and general medical care. Theoretically, these changes should contribute to lower mortality risk. However, during the same period, mortality of psychiatric patients has increased substantially as compared to general population; the increase was particularly evident in the case of cardiovascular mortality and deaths due to non-natural causes [7].

This study emphasizes the better understanding of underlying somatic disorders in mentally ill hospitalized patients and the role of interdisciplinary medical care. Identifying the factors associated with the death of inpatients is of utmost importance in assessing the care in a psychiatric hospital and in formulating better treatment plan and policy in mental health.

Material

We analyzed data from medical documentation of patients who have been hospitalized at the Hospital for Patients with Neurotic and Psychiatric Diseases in Starogard Gdanski from 01.01.2005 to 31.12.2012. The analysis covered such a period due to the availability of documentation and archiving of data in electronic form at that time. The records for a total of 15,997 hospitalizations were analyzed, among them the data for 7,711 (48.2%) first-time hospital stays. Psychiatric diagnoses were identified according to ICD-10. Research have been approved by local Ethics Committee (decision no. NKBBN/419/2016).

Method

The study was designed as a retrospective longitudinal cohort study. Each observation started at admission to the hospital and was continued till the time of discharge or death. In the case of repeated hospitalization, observation was continued using the same unique patient identifier, new hospitalization number and other information relevant for a given stay. Each stay was analyzed separately.

The results are presented as means ± standard deviations, or numbers and percentages of patients from a given category. Statistical characteristics of normally-distributed variables were compared with Student's *t*-test, and Mann–Whitney *U* test for independent variables was used for intergroup comparisons whenever the distribution of analyzed parameters was other than normal. Distributions of categorical variables were

compared with chi-squared test. Survival analysis was conducted with Kaplan–Meier method. Univariate and multivariate analysis of survival was based on Cox proportional hazards models. Explanatory variables with $p \leq 0.2$ on univariate analysis were included in multivariate models. The results were considered statistically significant at $p < 0.05$. Standardized mortality ratios (SMRs) were calculated using indirect standardization method. SMRs determined with this method inform about a relative difference in mortality of the study population and a reference population. In this study, we used population of Pomeranian Province as the reference, and calculated SMRs based on 2005–2012 mortality data for 5-year age brackets.

Results

Approximately 90% of hospitalizations lasted less than three months, with mean duration of hospital stay equal to 90 days (Table 1). The most common psychiatric diagnosis among hospitalized patients included in our study were mental and behavioral disorders due to use of alcohol, present in 19.1% of women and 54.7% of men. The second most common diagnosis was schizophrenia, present in 17.8% and 10.6% of hospitalized women and men, respectively. The third cause of hospitalization was other causes – neurotic stress-related and somatoform disorders in women (16.4%) and forensic psychiatric observation in men (4.8%).

Women who have been hospitalized for the first time, significantly more often presented with arterial hypertension (12.7% vs. 6.6%), diabetes mellitus (5.8% vs. 3%), atherosclerosis (5.5% vs. 2.6%), and thyroid diseases than first-time hospitalized men. In turn, men were characterized by significantly higher prevalence of epilepsy (4.9% vs. 3.4%), liver cirrhosis (0.4% vs. 0.1%) and tuberculosis (1.7% vs. 0.6%).

Both women and men included in our study were treated with first – and second-generation neuroleptics. Second-generation neuroleptics (17% vs. 11.6%) and antihypertensive agents (15.8% vs. 9.15%) were significantly more often prescribed in women than in men.

Table 1. **Characteristics of patients hospitalized for the first time**

		Women	Men	p
Number (%)		2,652 (34.4%)	5,059 (65.6%)	
Age (mean ± SD)		48.1± 17.1	44.0 ± 14.3	<0.001
Source of income	Arrest	6 (0.2%)	132 (2.6%)	NA*
	Unemployment	605 (22.8%)	1,770 (35%)	
	Age pension	352 (13.3%)	357 (7%)	
	Work	380 (14.3%)	978 (19.3%)	
	Health pension	1,172 (44.1%)	1,684 (33.3%)	
	Student	137 (5.2%)	138 (2.7%)	

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Place of residence	Town/city	1,603 (60.5%)	3,094 (61.2%)	0.066
	Countryside	1,043 (39.3%)	1,948 (38.6%)	
	DPS	5 (0.2%)	3 (0.06%)	
	Homeless	0 (0%)	7 (0.14%)	
Duration of first-time hospitalization	3–6 months	155 (5.8%)	279 (5.5%)	0.007
	<3months	2,405 (90.7%)	4,527 (89.5%)	
	>6 months	92 (3.5%)	253 (5%)	
Duration of hospitalization (mean ± SD)		88.76 ± 645.6	99.45 ± 1,141.3	0.655
BMI (mean ± SD)		25.42 ± 47.4	24.04 ± 4.43	0.04
Cigarette smoking		1,215 (45.8%)	3,397 (67.1%)	<0.001

*not available due to large number of subgroups

The largest groups among women who have been hospitalized at least once during the study period were patients diagnosed with schizophrenia (n = 1,654; 30.4%), mental and behavioral disorders due to use of alcohol (n = 926; 17%), mental disorders due to brain damage and dysfunction and to physical disease (n = 592; 10.9%), and anxiety disorders (n = 543; 10%). The largest median number of hospital stays was documented among female patients diagnosed with mental and behavioral disorders due to use of cannabinoids (29 stays), moderate mental retardation (7 stays), schizophrenia, schizotypal and schizoaffective disorders (5 stays). However, it should be emphasized that all these diagnoses had been established during the first hospitalization, and were sometimes modified during subsequent hospital stays. The largest median number of hospitalization days was recorded in women diagnosed with behavioral and mental disorders due to use of opioids (91 days), dementia in Alzheimer's disease (61.5 days) and amnestic syndrome due to use of alcohol and other psychoactive substances (58 days).

The largest groups among men who have been hospitalized at least once during the study period were patients diagnosed with mental and behavioral disorders due to use of alcohol (n = 5,730; 54.6%), schizophrenia (n = 1,342; 12.8%) and mental disorders due to brain damage and dysfunction and to physical disease (n = 504; 4.8%). The most common causes of repeated hospitalization in male patients were mental and behavioral disorders due to use of stimulants other than cocaine (median 12 stays), unspecified nonorganic psychosis (10 stays), and mental and behavioral disorders due to use of cannabinoids (8 stays). The longest hospital stays among male patients were associated with mixed personality disorders (median 151 days), enduring personality changes not attributable to brain damage and disease (143 days), and amnestic syndrome due to use of alcohol and other psychoactive substances (105 days).

Women diagnosed with dementia, delirium not induced by alcohol and other psychoactive substances, other mental disorders, personality and behavioral disorders due to brain damage and dysfunction and to physical disease, dependence for multiple psychoactive substances, schizophrenia, manic episodes, reaction to severe stress and

adjustment disorders, specific personality disorders, and mild mental retardation, as well as women subjected to psychiatric observation turned out to be significantly older than other female patients included in this study.

Survival analysis

The list of concomitant somatic diseases and other risk factors associated with mortality risk, including heart failure, atherosclerosis and neoplasms, is presented in Table 2.

Delirium not induced by alcohol and other psychoactive substances turned out to be associated with the highest mortality risk compared to other psychiatric diagnoses in univariate analysis (HR = 18.99; 95% CI: 14.49–24.9; p <0.001). Other mental disorders associated with increased mortality risk were dementias, specifically vascular dementia (F01), dementia in other diseases classified elsewhere (F02) and unspecified dementia (F03). When multivariate model is applied diagnosis of dementia in other diseases classified elsewhere (F02) appeared to be associated with particularly high mortality (in model III HR = 29.48; 95% CI: 6.38–136.1). The use of the first-generation antipsychotics was associated with increased risk of mortality but not the second-generation antipsychotics (HR = 1.46; 95% CI: 1.15–1.85 and HR = 0.77; 95% CI: 0.57–1.02 respectively).

In multivariate model I, including age, sex, source of income, place of residence, concomitant somatic diseases, cigarette smoking, BMI and laboratory parameters, a statistically significant increase in mortality risk was associated with the presence of following somatic diseases: liver cirrhosis, history of myocardial infarction, heart failure, neoplastic disease, and atherosclerosis. All mentioned diseases were associated with approximately doubled risk of death except cirrhosis which increased mortality more than six times (Table 2).

In model II, additionally adjusted for psychiatric diagnosis, the mortality risk related to physical illness slightly decreased but remained still statistically significant. The following psychiatric diagnoses were significantly associated with higher mortality: vascular dementia (F01), dementia in other diseases classified elsewhere (F02), dementia in other diseases (F02), delirium not induced by alcohol and other psychoactive substances (F05), and personality change due to known physical condition (F07). Additionally severe and profound intellectual disabilities (both F72 and F73) were associated with a significant and pronounced increase in mortality risk in this model (HR = 12.87; 95% CI: 3.91–42.46 and HR = 7.59; 95% CI: 1.51–38.19 respectively).

In multivariate model III, after including also information about neuroleptic, antihypertensive and hypolipemic treatments, results were only slightly different from those obtained in model II. A significant increase in mortality risk was documented among patients who have been prescribed antihypertensive agents (HR = 1.78; 95% CI: 1.33–2.37; p <0.001) or hypolipemic drugs (HR = 3.82; 95% CI: 1.69–8.59; p = 0.001) – probably due to presence of a concomitant somatic disorder. Prescription of these

agents seems to be more reliable marker of a somatic disease than its diagnosis recorded in patient records, owing that some medical histories lacked adequate information about comorbidities. Contrary to this finding, the diagnosis of hypertension was associated with statistically significantly reduced risk of death in all three models. An erythrocyte sedimentation rate as an indicator of the presence of inflammation was statistically significant predictor of increased mortality in all three models.

The use of first-generation antipsychotics was not associated with significant change in mortality risk compared to second-generation antipsychotics in multivariate model. Quite interestingly, we also found that unemployment double the risk of death in three multivariate models, however, these results were of borderline significance.

Table 2. **Survival analysis based on Cox proportional hazards models**

		Univariate analysis		Model I		Model II		Model III	
		HR (95% CI)	p	HR (95% CI)	p	HR (95% CI)	p	HR (95% CI)	p
Sex		0.807 (0.64–1.02)	0.069	1.40 (1.05–1.86)	0.022	1.43 (1.07–1.92)	0.015	1.47 (1.099–1.964)	0.009
Age		1.09 (1.09–1.10)	<0.001	1.07 (1.06–1.09)	<0.001	1.07 (1.06–1.086)	<0.001	1.07 (1.055–1.083)	<0.001
Source of income	Unemployed	2.84 (1.18–6.81)	0.019	2.41 (0.93–6.23)	0.069	2.58 (0.99–6.68)	0.051	2.2 (0.97–6.47)	0.059
	Health pension	7.13 (3.14–16.18)	<0.001	1.83 (0.73–4.64)	0.199	1.73 (0.68–4.45)	0.252	1.68 (0.65–4.31)	0.281
	Age pension	30.95 (13.64–70.24)	<0.001	2.14 (0.82–5.54)	0.117	1.92 (0.73–50.04)	0.186	1.81 (0.69–4.78)	0.228
	Arrest	1.17 (0.14–9.73)	0.884	0.95 (0.11–0.83)	0.96	0.76 (0.086–6.74)	0.81	0.74 (0.84–6.61)	0.791
Countryside		0.83 (0.88–1.45)	0.116	1.13 (0.88–1.45)	0.327	1.11 (0.90–1.5)	0.24	1.15 (0.89–1.48)	0.276
Arterial hypertension		0.47 (0.28–0.77)	0.003	0.33 (0.19–0.59)	<0.001	0.34 (0.19–0.59)	<0.001	0.26 (0.15–0.466)	<0.001
Diabetes mellitus		2.20 (1.51–3.2)	<0.001	0.98 (0.62–1.56)	0.945	1.03 (0.65–1.63)	0.9	0.784 (0.48–1.27)	0.326
Atherosclerosis		15.44 (12.26–19.44)	<0.001	2.04 (1.49–2.77)	<0.001	1.79 (1.29–2.47)	0.001	1.64 (1.18–2.26)	0.003
Myocardial infarction		5.86 (3.28–10.45)	<0.001	2.94 (1.52–5.70)	<0.001	2.35 (1.22–4.54)	0.01	2.05 (1.05–4.00)	0.036
Stroke		4.85 (3.1–7.59)	<0.001	0.88 (0.54–1.44)	0.607	0.77 (0.465–1.28)	0.314	0.82 (0.49–1.36)	0.447
Heart failure		21.33 (15.92–28.57)	<0.001	2.70 (1.90–3.85)	<0.001	2.3 (1.6–3.32)	<0.001	2.17 (1.51–3.11)	<0.001

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	Univariate analysis		Model I		Model II		Model III	
	HR (95% CI)	p	HR (95% CI)	p	HR (95% CI)	p	HR (95% CI)	p
Liver cirrhosis	3.89 (1.45–10.44)	0.007	6.44 (2.35–17.7)	<0.001	5.66 (2.014–15.9)	0.001	4.41 (1.55–12.61)	0.006
Anemia	2.16 (1.07–4.37)	0.032	0.82 (0.38–1.77)	0.62	1.01 (0.47–2.18)	0.98	0.94 (0.42–2.07)	0.872
COPD	2.46 (1.27–4.78)	0.008	1.28 (0.64–2.56)	0.49	1.49 (0.74–3.02)	0.263	1.24 (0.604–2.55)	0.554
Tuberculosis	2.06 (1.33–3.17)	0.001	1.62 (0.99–2.63)	0.051	1.69 (1.00–2.84)	0.047	1.84 (1.08–3.12)	0.023
History of neoplastic disease	9.39 (6.63–13.3)	<0.001	2.61 (1.76–3.86)	<0.001	2.72 (1.82–4.06)	<0.001	2.77 (1.86–4.12)	<0.001
Ischemic heart disease	1.77 (0.78–3.97)	0.17	0.65 (0.27–1.55)	0.337	0.533 (0.218–1.285)	0.16	0.49 (0.202–1.2)	0.118
Cigarette smoking	0.35 (0.27–0.44)	<0.001	0.80 (0.60–1.07)	0.13	0.906 (0.67–1.22)	0.52	0.82 (0.61–1.11)	0.21
BMI	0.94 (0.92–0.96)	<0.001	0.98 (0.96–1.01)	0.163	0.985 (0.96–1.00)	0.21	0.98 (0.96–1.004)	0.118
Hemoglobin	0.72 (0.68–0.75)	<0.001	0.87 (0.81–0.93)	<0.001	0.875 (0.82–0.93)	<0.001	0.87 (0.81–0.92)	<0.001
White blood cells	1.01 (1.006–1.015)	<0.001	1.01 (1.00–1.01)	0.04	1.01 (1.00–1.01)	0.02	1.01 (1.002–1.02)	0.011
Platelets	1.002 (1.001–1.002)	<0.001	1.00 (0.99–1.001)	0.27	1.00 (0.999–1.001)	0.741	1.00 (0.99–1.001)	0.734
Erythrocyte Sedimentation Rate	1.012 (1.011–1.014)	<0.001	1.01 (1.00–1.012)	<0.001	1.01 (1.00–1.012)	<0.001	1.01 (1.006–1.013)	<0.001
All types of dementia: F00–F03	10.02 (7.85–12.81)	<0.001	X	X	1.51 (1.12–2.02)	0.006	1.49 (1.01–1.94)	0.013
F05	18,99 (14.49–24.9)	<0.001	X	X	X	X	X	X
F06	0.68 (0.41–1.15)	0.151	X	X	0.45 (0.25–0.812)	0.01	0.47 (0.26–0.847)	0.012
F07	1.48 (0.915 –2.39)	0.110	X	X	0.94 (0.53–1.67)	0.84	0.98 (0.55–1.74)	0.945
F10	0.31 (0.23–0.43)	<0.001	X	X	0.54 (0.34–0.863)	0.01	0.561 (0.351–0.89)	0.016
F20	0.40 (0.28–0.56)	<0.001	X	X	0.543 (0.34–0.864)	0.01	0.591 (0.366–0.955)	0.032

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	Univariate analysis		Model I		Model II		Model III	
	HR (95% CI)	p	HR (95% CI)	p	HR (95% CI)	p	HR (95% CI)	p
F32	0.321 (0.08–1.29)	0.11	X	X	0.39 (0.09–1.62)	0.19	0.43 (0.104–1.77)	0.242
F72	3.17 (1.2–8.53)	0.022	X	X	4.415 (1.49–13.08)	0.01	3.83 (1.28–11.47)	0.016
F73	2.88 (0.715–11.59)	0.136	X	X	2.65 (0.567–12.38)	0.22	2.82 (0.60–13.26)	0.188
First–generation antipsychotics	1.46 (1.15–1.85)	0.001	X	X	X	X	0.98 (0.76–1.3)	0.902
Second–generation antipsychotics	0.77 (0.57–1.025)	0.074	X	X	X	X	0.97 (0.69–1.36)	0.862
Antihypertensive agents	4.56 (3.63–5.73)	<0.001	X	X	X	X	1.78 (1.33–2.37)	<0.001
Hypolipemic agents	5.97 (2.82–12.66)	<0.001	X	X	X	X	3.82 (1.69–8.59)	0.001

Model I – multivariate analysis that included age, sex, source of income, place of residence, concomitant somatic diseases, cigarette smoking, BMI and laboratory parameters.

Model II – Model I additionally adjusted for psychiatric diagnosis.

Model III – Model II additionally adjusted for neuroleptic, antihypertensive and hypolipemic treatments.

*F00–F72 – codes of Classification of Mental and Behavioural Disorders according to the International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10). Presented HRs were calculated in the model with dummy variable – reference group consists of all other diagnoses.

Standardized mortality rates

Age-standardized mortality ratios (SMRs) for the whole study population, stratified according to the place of residence and psychiatric diagnoses specified in ICD-10, are presented in Table 3. The analysis included all intrahospital deaths, also those recorded during repeated hospitalizations. Standardized mortality ratio for the whole study population was 17.88 (95% CI: 15.99–20.00). This means that the risk of intrahospital mortality among psychiatric patients was approximately 18-fold higher than in an age-adjusted general population. The highest SMRs were observed for dementia in other diseases classified elsewhere (SMR = 216.31; 95% CI: 54.1–864.88), profound mental retardation (SMR = 190; 95% CI: 47.52–759.71) and severe mental retardation (SMR = 56.79; 95% CI: 21.31–151.31). However, owing to low mortality among patients with the first two conditions, these results should be interpreted with caution. In turn, SMR for schizophrenia (SMR = 8.6; 95% CI: 6.31–11.73) should be considered an

interesting finding, since it was likely highly accurate taking into account high mortality among patients with this diagnosis.

Table 3. **Standardized mortality ratios (SMRs) for the whole study population and selected mental disorders**

	Number of deaths	SMR (95% CI)
Whole study population	315	17.88 (15.99–20.00)
Town/city	203	19.14 (16.65–21.01)
Countryside	109	15.59 (12.89–18.86)
Dementia in Alzheimer's disease (F00)	12	22.96 (13.04–40.43)
Vascular dementia (F01)	68	38.38 (30.26–48.68)
Dementia in other diseases (F02)	2	216.31 (54.1–864.88)
Unspecified dementia (F03)	15	17.46 (10.53–28.96)
Mental disorders due to brain damage and dysfunction and to physical disease (F06)	15	7.86 (4.74–13.04)
Personality and behavioral disorders due to brain disease, damage or dysfunction (F07)	18	12.24 (7.72–19.44)
Mental and behavioral disorders due to use of alcohol (F10)	45	15.03 (11.22–20.13)
Schizophrenia (F20)	40	8.6 (6.31–11.73)
Persistent delusional disorders (F22)	5	17.27 (7.18–41.48)
Depressive episode (F32)	2	8.78 (2.19–35.1)
Mild mental retardation (F70)	3	15.475 (4.99–47.98)
Moderate mental retardation (F71)	3	51.84 (16.72–160.72)
Severe mental retardation (F72)	4	56.79 (21.31–151.31)
Profound mental retardation (F73)	2	190 (47.52–759.71)

Discussion

The fact that mortality of psychiatric inpatients is higher than in general population has been well documented in many previous European studies. However, Polish estimates in this matter are limited and frequently incomplete. According to literature, standardized mortality rates for this group vary between slightly more than 1 and 6.55 [8, 10]. Although all types of mental disorders seem to be associated with increased mortality, the highest risk of preterm death has been documented in patients diagnosed with psychoactive substance dependence [11, 12] and organic mental disorders [8, 13]. In our study, SMR for the whole study group was substantially higher than previously reported values (17.88; 95% CI: 15.99–20.00). During a 7-year study period, the highest mortality rates were recorded among patients diagnosed with dementia. Diseases from this group were diagnosed in 97 out of 315 (30.7%)

patients who have died during the study period. This observation is consistent with published data from many other countries. Alcohol addicts were the group with the second highest mortality rates after dementia patients. Moreover, alcohol addiction turned out to be the most common cause of both first-time hospitalization (42.5%) and hospitalization overall (41.7%).

A total of 45 alcohol addicts (41 men and 4 women) have died during the study period; this number corresponded to 14.3% of all recorded deaths. Standardized mortality ratio for mental and behavioral disorders due to use of alcohol was 15.03 (95% CI: 11.22–20.13). Mortality rates for men with this diagnosis turned out to more than twice as high as in women (94.5 vs. 43.6).

Disorders due to use of alcohol among hospitalized patients may vary from an asymptomatic withdrawal syndrome to a life-threatening delirium tremens. Most previous studies analyzing mortality of alcohol addicts have been conducted at internal medicine departments of general hospitals. These studies were primarily focused on alcohol withdrawal syndrome, a condition associated with high intrahospital mortality risk, according to various European studies, estimated at 2–7% [14–16]. However, mortality rate documented in our study was lower than those figures (0.67%, which corresponded to 45 deaths per 6,670 hospitalizations). Similarly low mortality rate (1%) was previously reported by Wojnar et al. [17] in a group of 1,179 patients hospitalized at the Nowowiejski Hospital in Warsaw in 1973–1987. Lower mortality rates documented by these authors [17] and found in our study may be at least in part explained by transfer of some critically ill patients to intensive care units at other centers.

An important finding is that unemployment appears to be a complex condition that burdens the individuals affected with mental disorder, increasing their risk of death also in a hospital.

Schizophrenia turned out to be the second leading cause of hospitalization in our study. Admissions due to schizophrenia represented 13.1% of first-time hospitalizations and 18.7% of hospitalizations overall. Furthermore, individuals with schizophrenia were the group with the third highest mortality. A total of 40 schizophrenics (17 men and 23 women) have died during the study period, which corresponded to an 8.6 standardized mortality ratio (95% CI: 6.31–11.73). In an international study conducted by Harrison et al. [18] in 15 developing and developed countries, SMRs for schizophrenia ranged from 0.0 for a clinic in the United States to 8.88 for a Dutch center. In another study, Hewer and Rössler [19] determined SMR for schizophrenics hospitalized in seven German hospitals at 6.6. In a meta-analysis of 37 studies conducted in 25 countries, mean standardized mortality ratio for schizophrenia patients was 2.58 [20]. Similar results (SMR = 1.96 for men and 2.25 for women) were obtained by Kiejna [21] in a population of 762 patients from Wroclaw region. Only 20% of patients included in the latter study died in a psychiatric hospital; other deaths occurred in general hospitals, in a home setting or at other centers. Usually, SMRs for hospitalized patients are higher than those documented in a community

setting. This phenomenon, observed in previous studies mentioned above, constitutes the most likely explanation for a relatively high SMR for schizophrenics included in our study. Main cause of death in this group were cardiovascular diseases (65%), followed by neoplasms (22.5%) and infections (12.5%). Noticeably, none of the schizophrenics included in this study died due to suicide, although non-natural causes, including suicides, have been previously frequently reported as an important contributor of increased mortality in this group [18, 20]. Possible explanations for this fact are careful care and developed procedures in psychiatric wards to prevent this type of event. Also in the previously mentioned study conducted by Kiejna [21], nearly 95% of suicidal deaths of patients with schizophrenia occurred outside a psychiatric hospital.

One of the causes of poorer medical care in psychiatric patients is the disturbed communication between the patient and the physician as the presence of a psychiatric illness may influence how information about patients' current symptoms and prior medical conditions is conveyed to physicians. Additionally, the physician may attribute symptoms of medical conditions to the psychiatric illness and perhaps be less diligent. This imply that physicians may overlook important medical conditions and implement less aggressive care than may be required.

Conclusions

Pre-existing comorbid somatic conditions are common among psychiatric patients admitted to psychiatric hospital. Our findings call for regular examination of patients with mental illness for medical conditions during their stay in psychiatric hospital. It also demands better liaison services with internal medicine consultants since psychiatric patients can have high medical co-morbidities. Comparative analysis of mortality causes in psychiatric patients and in general population implies that prognosis in the former group might be improved due to better general medical care. Therefore, studies designed to enhance screening and rapid identification of existing clinically significant somatic disorder among patients at admission may facilitate risk reduction of hospitalization-associated complications, thereby lowering mortality. Moreover, increased vigilance of clinical staff caring for psychiatric patients may be justified given the prevalence of pre-existing cardiovascular diseases and other chronic disorders with inhospital mortality.

These findings demonstrate that the physical health of people with mental health problems requires greater attention by healthcare policymakers, services and professionals in Poland.

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