RESEARCH

Long-term observations on the mortality of mentally ill patients admitted to a short-stay psychiatric hospital: 23 years retrospective Egyptian study

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Abstract

Background: Information about mortality patterns in different psychiatric populations is scanty, yet it is vital for designing successful preventive mental health strategies. In this study, we aimed to assess mortality rates and patterns for the patients admitted to Ain Shams University Institute of Psychiatry (ASUIP) with different psychiatric diagnoses from1990 to 2013. All medical records and related registration files were reviewed and investigated for death cases and their possible causes in a retrospective record linkage study. Data were recorded, tabulated, and coded to be used in the Statistical Package for Social Sciences (SPSS) Version 17.

Results: The study identified 57 death cases in 23-years duration with a mortality rate of 3/1000. Mortality rates were more in younger patients and females. Medical comorbidity was reported in 34.8% of them. The most common known causes for death in the current sample were cardiac causes 15.2%, followed by cerebrovascular causes that were 10.9%. However, sudden or unknown causes were the most frequent diagnosis in the sample.

Conclusions: The institute mortality rates were lower than those of the general population during this period. The most common known death causes were cardiovascular problems, which mandates close monitoring of high-risk psychiatric patients with co-morbid cardiac problems. Unknown morality causes represented an unresolved challenge for the current registration system and the quality of care given to patients with serious mental illness.

Keywords: Mortality rates, Death causes, Serious mental illness

Background

Patients suffering from common mental disorders, especially persons with psychotic disorders, major depressive disorders, and substance use disorders, are at high risk of premature death [1, 2]. This risk is not similar for all mental health problems, and the underlying causes of death may also vary [1, 2]. Mortality can be as high as two

or three times that in the general population in patients of some serious mental disorders (SMD) [3, 4].

Mental and behavioral disorders account for 8.6 million (0.5%) of all years of life lost to premature mortality [5]. Some high-quality studies from Ethiopia and Bali reported that the average potential years of life lost for persons with SMD was 28.4 years [6, 7].

Sixty percent of patients with serious mental illness (SMI) mortalities are due to physical illnesses that are also prevalent in the general population. Yet, the fact that the access to high-quality health care services is difficult

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for those population negatively impacted their medical outcome [8, 9].

In Egypt, there is a lack of published data on the state of health, morbidity, and mortality of people with serious mental illness, both on the community and the mental health hospital level. This retrospective record linkage study aimed to assess mortality rate, medical comorbidities, and death causes when possible for the patients admitted to the Institute of Psychiatry, Ain Shams University, from its opening 1990, till the end of 2013.

Methods

Study cohort

All data were collected retrospectively from Ain Shams University Institute of Psychiatry (ASUIP) files. The institute is a WHO collaborative center for research and training that provides 3 years of a residency program in neuropsychiatry and training program for a master and doctorate degree in psychiatry. It is a short-stay psychiatric hospital, where admitted patients stay between 1 and 2 months. It contains 105 beds for inpatient admission services in addition to outpatient clinics that cover all psychiatric domains 4 days a week (about 80 patients/day).

The institute is located in eastern Cairo and serves both urban and rural areas, middle, and low social class population. It is in the catchment area for more than 20 million inhabitants.

Research Ethics Committee of the faculty of medicine at Ain Shams University approved the study proposal. A well-trained team on data collection and data categorization reviewed ASUIP inpatient registration system database and medical records in October 2013 and for 3 months. From 17,562 files (4395 females and 13167males) of adult inpatient admissions for serious mental health conditions, between 1990 and 2013, mortality reports saved in Ain Shams University Hospital's health care system and ASUIP registration system identified 57 death events for the same period. Needed data analysis was completed for 46 death event files. Eleven files were discarded and excluded from the study due to missing data.

Procedure

Collected data were subjected to the following

All information in the patients' files, including mortality reports, were reviewed and examined manually and categorized by a trained team member. The data included patients' socio-demographic characteristics and admission psychiatric diagnoses, according to ICD-10, categorized in the main groups. Schizophrenia, schizoaffective, delusional, and other non-organic psychotic disorders, and acute psychotic episodes were grouped under psychotic disorders. We collected data about patients; last

admission in days, co-morbid medical conditions and lab investigations results, psychotropic medications given in the incident-related episode and its doses, ECT (electroconvulsive therapy) regimen if was given and any reported complications, investigation and interventions before death together with features of the incident, and the number of consultations to other specialties before the death incident, consultations done, plan of management followed at that time (as transfer to a general medical hospital, emergency, or conservative management).

Information about mortality causes for cases was coded and divided into five main categories

- Unknown and sudden causes: for those who died without reporting any new medical complications in the last week before death or died before proper medical examination and investigation of the case.
- Cardiac causes: for cases of cardiovascular complications, i.e., heart failure or myocardial infarction prior to the death event.
- Neurological causes: in cases of cerebrovascular stroke, delirium, or encephalitis.
- Other medical causes: This group included cases with respiratory failure, renal failure, concurrent infection, and metabolic causes.

Mortality rates over the 23 years were calculated and recorded. The general mortality rate in Egypt at the same period was also recorded for analytical reasons.

Statistical analysis

All the data was recorded, tabulated, and transferred on Statistical Package for Social Sciences (SPSS) Version 17. For descriptive data, we used means and standard deviation (SD). Quantitative data were analyzed using a *t* test. Pearson's chi-square and cross-stab for analysis and relation of categorical variables (X^2). *P* value< 0.05 was used to indicate the level of significance.

Results

Characteristics of the study population

In 23 years, 17,562 patients were admitted, 13,167 male patients, and 4395 females. Fifty-seven patients died during this period, 46 of them had complete files, and 11patients had incomplete records.

The calculated total mortality rate in the study period was 3/1000. The mortality rate in females was significantly higher than males 6/1000 (26/4395) and 2/1000 (20/13167), respectively. This significant difference was not evident in other clinical variables as age, comorbidity, vital data, and medication, *P* value< 0.05 (Table 1 and 2).

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Table 1 Sample socio-demographic and clinical characteristics

The study sample		*N*=46
Age in years	M±SD	42.2±14.7
	Range	20–81
Age per gender	Male	41.4±14.5
	Female	42.8±15.1
Reported deaths in 23 years	Males	20 (43.5%)
	Females	26 (56.5%)
Number of admission in 23 years	Males	13,167
	Females	4395
Duration of hospitalization in days	M±SD	11.5±14.7
	Range	1–90 days
Die in the first week		28 (60.8%)

Table 2 Sample diagnostic categories and medical comorbidities

Diagnosis		Total=46
Dementia		2 (4.3%)
Substance use disorder		1 (2.2%)
Psychotic		14 (30.4%)
Bipolar affective disorder (Manic)		9 (19.6%)
Major depression		15 (32.6%)
Catatonia		3 (6.5%)
Aggression for investigations		2 (4.3%)
Medical co-morbidity	No co-morbidity	26 (56.5%)
	One co-morbidity	16 (34.8%)
	Multiple co-morbidities	4 (8.7%)

In the studied sample, the most common psychiatric diagnosis was depression which is 15 (32.6%) patients followed by the psychotic disorder group (schizophrenia and schizoaffective, delusional disorders) which is 14 (30.4%) patients. More than half of the sample has no history of medical comorbidity 26 (56.5%) (Table 2).

The total number of deaths in 23years (study duration) was 57. Data of 46 deaths are represented in Table 2. As observed, 20 (43.5%) patients received typical antipsychotic, while 4 (8.7%) received atypical antipsychotics (APD). Four (8.7%) patients received antidepressant medications. Moreover, 24 (52.2%) patients received polypharmacy versus 19 (41.3%) received monotherapy, and 3 (6.5%) patients stopped treatment for medical reasons (Table 3).

Medical complications and lab results recorded before the death event

Patients' medical records showed that patients were submitted to medical examination and routine investigations on admission, including CBC, liver, renal function, and RBS. 19.6% of the sample showed abnormal lab results in more than one domain.

Disturbed vital data (blood pressure and heart rate) and fever were the most frequently reported complications 34 (73.9%) and 21 (45.7%), respectively. No reported complications prior to death in 19.6% of the sample. 86.8% of the sample did not report drug complications.

Medical consultation and interventions 1 week before the death incident were reported in 19 (41.3%) patients. Conservative management procedures were evident in 9 (19.6%) of patients, while transfer to specialized medical department and ICU was reported in 10 (21.7%) patients. Twenty-one (45.7%) patients received ECT and 2 (4.4%) of them reported complications as shown in Table 4.

Correlation study data
Death cause in relation to patients' mean age
Younger mean ages were noted in the sudden unexplained death (SUD) group with a mean of 39.1±11. Older mean ages were noted in the cardiac cause group with a mean of 47.8±9.6, as shown in Table 5.

Polypharmacy and cause of death
Comparing different causes of death in relation to the type of drug revealed no significant difference as *P* was 0.502. Similarly comparing different causes of death in relation to pharmacotherapy (monotherapy versus polypharmacy) revealed no significant difference of 0.066 (Table 6).

Discussion
Historical data have always been focusing on over-estimating the rate of unnatural deaths in inpatient populations with SMD (suicide, accidents, and homicides). It is known that the mortality gap cannot be attributed to this alone [10]. The linked data from mental and physical health services reported that the excess deaths were attributable to physical illnesses in over three-quarters of cases [10]. More attentive checks for psychiatric patient's physical illness, side effects of medications, and suicidal tendencies can take mortality rates to lower limits.

In this study, retrospective data analysis for 17,562 patient files, admitted to ASUIP during this period, revealed a mortality rate of 0.32%. 56.5% of the reported death cases were female patients. The general mortality rate in Egypt in the same period between 1990 and 2013 was 6.2 to 6.9 per 1000 population [11]. In other words, in this study mortality rate was nearly half the national reported average by the National Center for Health Statistics (NCHS) Public Health Surveillance, Population demographic reports 2015 [12].

Hewer and his colleagues reported higher inpatient mortality rates (1.38%) in German psychiatric hospitals

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Table 3 Types of drugs, number of deaths, and admissions/year

	Number of admission	Deaths	Type of drug				
			Typical	Atypical	ADD	Polypharmacy	No treatment
1990	193	2	2	0	0	1	0
1991	731	3	0	0	0	1	2
1993	605	1	1	0	0	0	0
1994	705	5	2	0	0	3	0
95	872	**7**	4	0	1	3	0
96	716	2	2	0	0	2	0
98	748	4	4	0	0	1	0
99	733	**9**	2	0	0	1	1
2000	670	2	2	0	0	2	0
2001	727	1	-	-	-	-	-
2002	688	7	1	2	0	5	0
2003	747	**2**	0	1	0	1	0
2004	861	**1**	-	-	-	-	-
2005	8985	3	-	-	-	-	-
2006	840	1	-	-	-	-	-
2007	974	1	0	0	1	1	0
2008	668	2	0	1	1	1	0
2009	691	1	-	-	-	-	-
2010	615	1	0	0	0	1	0
2012	861	1	0	0	1	0	0
2013	636	1	0	0	0	1	0
Total Number of admission	17562	57	20	4	4	24	3

NB missing data for 11 deaths, exclude years with zero mortality

[13]. Khamker and his colleagues reported near figure (1.47%) in a South African psychiatric hospital [14]. Although persons with SMD are dying younger than the general population globally, there is an emerging consensus that the majority of excess mortality is due to poor physical health, with cardiovascular disease as the primary cause of death [15].

Applying high standards and best practice guidelines in assessment and monitoring patients' physical and mental conditions as in the case of ASUIP, in addition to the restricting admission criteria excluding organic mental disorders unless well investigated and controlled, kept inpatients mortality rates to lower limits.

Rare studies were directed toward the analysis of mortality rates differences between long and short-stay mental health hospitals, but considering that ASUIP is a short-stay hospital, excluded other involved mortality causes related to long hospital admissions.

In agreement with other studies showed higher death rates in younger patients (42.2 ± 14.7) years [16–18]. Nevertheless, it came to the contrary to other studies that reported higher mortality in older age groups 50 and 70

years, respectively [14, 13]. This variation could be attributed to the younger age of admission in ASUIP versus older age ranges of patients, with organic mental diseases in other studied settings. This age range was much younger than the mean age of death in general population as general mortality rate in Egypt in 2013 was 70.8 years [19].

In this study, the number of admitted female patients in ASUIP was less than half the number of admitted males during the same period. Despite the data showed no statistically significant differences in both sexes in clinical variables, female patients had a higher mortality rate 6/1000 versus 2/1000 in males. Similarly, other studies reported slightly higher female mortality rates [13, 17, 20]. However, other studies failed to find differences among females and males [16] or even found a reversed male-female ratio with more reported male mortality [14].

The mean duration of hospitalization in ASUIP was 11.5± 14.7 days, with a range of 1–90 days. In contrast, previous studies reported that a more extended admission period was associated with inpatient death

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Table 4 Dead cases reported complications and lab results during the admission period

Type of complication		Frequency (%)
No complications		9 (19.6%)
Cardiac complications		13 (28.3%)
Neurological complications	CVS	6 (13%)
	Delirium	17 (37%)
Disturbed vital data (blood pressure and heart rate)		34 (73.9%)
Fever		21 (45.7%)
Infection		10 (21.7%)
Complications due to ECT		2 (4.4%)
More than one complication		10 (21.7%)
Complication of drugs	No	40 (86.8%)
	NMS	1 (2.2%)
	Delirium	1 (2.2%)
	Cardiac	2 (4.4%)
	Agranulocytosis	1 (2.2%)
	Constipation	1 (2.2%)
Lab results		Frequency (%)
No abnormalities in lab		21 (45.7%)
Impaired renal function		4 (8.7%)
Impaired liver function		1 (2.2%)
Impaired FBS		2 (4.3%)
High ESR		1 (2.2%)
Electrolyte disturbances		3 (6.5%)
More than one abnormalities		9 (19.6%)
Agranulocytosis		1 (2.2%)
Low hemoglobin level		4 (8.6%)

CVS cerebrovascular stroke, *FBS* fasting blood sugar, *ESR* erythrocyte sedimentation rate, *NMS* neuromalignant syndrome

Table 5 Study sample death causes and mean age

Cause of death		N=46
SUD or unknown	*N*	19 (41.3%)
	Mean age(M+/-SD)	39.1±11
Neurological (CVS)	*N*	5 (10.9%)
	Mean age (M±SD)	41.7±18.3
Cardiac	*N*	7 (15.2%)
	Mean age (M±SD)	47.8±9.6
Other medical	*N*	15 (32.6%)
	Mean age (M±SD)	40±9.6

SUD sudden unexplained death, *CVS* cerebro-vascular stroke, *other medical* renal failure, respiratory, bleeding, metabolic, and septicemia

Table 6 Causes of death and type of pharmacotherapy among the sample

Type of pharmacotherapy		Polypharmacy	Monotherapy	Total
SUD or unknown		7	12	19
Neurological (CVS)		5	0	5
Cardiac		4	2	6
Other		8	5	13
Total		24	19	43
Sig	Df	3		
	Sig	0.066		

Other (renal, respiratory, bleeding, metabolic, septicemia, overdose)

least frequent in the current study. Similar findings were detected in West Africa institute, in their cohort, schizophrenia (26%), and major depression (25%) constituted the main psychiatric diagnoses at the time of admission [17]. Hewer and his colleagues found that organic mental disorder had a high mortality risk [13].

Natural causes were the primary etiology of death among psychiatric patients, and their rates differ in different studies [14]. Consistently, in this study, natural death causes were responsible for all cases with a known and unknown causes. Cardiac complications were implicated in most of the death reports, followed by cerebrovascular accidents. Other death causes, which include renal failure, respiratory complications, bleeding, metabolic problems, septicemia, and drug intoxication, were involved in more than a quarter of the morality. Cases of patients who died without reporting any new medical complications in the last week before death or died before proper medical examination and investigation were counted as a separate group not under cardiac death causes group, despite that the registered cause of death in their death report was a sudden circulatory system failure. Sudden or unknown causes of death were reported in 41.3% of the sample. The high rate of disturbed vital data reported in the current study may raise the question about cardiac causes as a possible hidden cause of death in those cases [21, 22].

Cardiovascular causes were the most reported natural cause of death in psychiatric inpatients in previous different studies [16, 23]. Increased risk of cardiovascular diseases in psychiatric patients could be explained as a result of the use of antipsychotic drugs, psychosocial deprivation, and sedentary lifestyle as excessive smoking and physical inactivity [14, 21, 22]. Furthermore, cardiovascular causes could be the leading cause of sudden unknown deaths of psychiatric patients [24]. Interestingly, the main known causes of mortality in psychiatric inpatients differ in different populations.

incidence. However, it is worth mentioning that Khamker and colleague's study reported that 25% of the death incidence occurred in the first month of admission [14].

Major depression (32.6%) followed by schizophrenia (30.4%) were the most frequent diagnoses with reported mortality, while substance use disorder was

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Different death causes can explain part of that in a particular general population, as in the case of inconvenient socioeconomic factors and level of medical care in some communities and prevalence of infections or other endemic diseases in others. Infections were the most common natural cause of death in Singapore, South, and West Africa studies [14, 17, 20].

Remarkably, unnatural causes of mortality, such as suicide and injuries, were not reported in the current study. In contrast, suicide was the main unnatural cause reported by other studies [16]. Factors as the close follow-up of patients, short-stay hospitalization, proper medical care, and use of ECT could explain this finding.

The present study had some limitations, including incomplete files during registration, difficulty to access, and the improper documentation of some critical clinical data in patients' medical records, a high percentage of unknown death causes. The absence of essential comparative statistics data in this study was due to the lack of information about mortality patterns in patients with mental illness in the Egyptian community and in the Arab countries. This limitation should direct mental health planners and other stakeholders' efforts toward extensive epidemiological research projects, and the adoption of more functional registration systems. In addition to applying best practice guidelines in providing medical and mental health services to this population.

Conclusions
This study detected lower mortality rates compared to the general population. The most common known causes involved in patients mortality were cardiovascular diseases. Thus, close monitoring for psychiatric inpatients at high risk of cardiovascular complications is warranted. Interestingly also, this study highlighted patients with severe mental disorder needs for a more accessible and comprehensive, community-based, prevention, identification, and intervention medical care programs that address their physical and mental health [25].

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