

# Epidemiologic Assessment of Mortality among Inpatients in a Psychiatric Hospital

## Bir Psikiyatri Hastanesinde Yatan Hastalardaki Ölümlerin Epidemiyolojik Değerlendirilmesi

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### ABSTRACT

Individuals with psychiatric disorders have higher early mortality rates than the general population, and all types of mental disorders are associated with a short life expectancy. In this context, assessment of the mortalities of both natural and unnatural causes in psychiatric inpatients is of critical importance in terms of mortality epidemiology, which provides data that can help improve the quality and planning of psychiatric care. The population of this study retrospective, cross-sectional study consisted of inpatients that died in Manisa Mental Health and Diseases Hospital between May 2002 and December 2022. Of the 120 inpatients that died, 119 patients, 63.9% male, and 36.1% female, were included in the study sample. The mortality rate decreased from 3.2% to 0.22% during the period covered by the study. The difference between mortality rates before 2013, when quality and accreditation processes started, and after 2013 has decreased from 74.8% to 25.2%. Of the natural deaths, 45.4% were caused by cardiac arrest, whereas 100% of the unnatural deaths occurred due to suicides. Short hospital stays and close follow-up in the first week of hospitalization are essential in reducing mortality rates in psychiatric inpatients. In addition, increasing the quality of health care in accordance with the national and international quality and accreditation criteria will further reduce the mortality rates in psychiatric inpatients.

**Keywords:** Mortality, epidemiology, psychiatry, psychiatric hospital

### ÖZ

Ruhsal bozukluğu olan bireylerin genel nüfusa göre daha yüksek erken ölüm oranlarına sahip olduğu ve tüm ruhsal bozukluk türlerinin kısa yaşam beklentisi ile ilişkili olduğu bilinmektedir. Bu bağlamda, psikiyatrik yatan hastalarda hem doğal hem de doğal olmayan nedenlerden kaynaklanan ölümlerin değerlendirilmesi, psikiyatrik bakımın kalitesini ve planlamasını iyileştirmeye yardımcı olabilecek veriler sağlayan mortalite epidemiyolojisi açısından kritik öneme sahiptir. Bu retrospektif, kesitsel çalışmanın evrenini Mayıs 2002-Aralık 2022 tarihleri arasında Manisa Ruh Sağlığı ve Hastalıkları Hastanesi'nde yatarak tedavi gören ve ölen hastalar oluşturmaktadır. Yatarak tedavi gören 120 hastadan %63,9'u erkek, %36,1'i kadın olmak üzere 119 hasta çalışma örneğine dahil edilmiştir. Çalışmanın kapsadığı dönem boyunca ölüm oranı %3,2'den %0,22'ye düşmüştür. Kalite ve akreditasyon süreçlerinin başladığı yıl olan 2013 öncesi ölüm oranları ile 2013 sonrası fark ise %74,8'den %25,2'ye gerilemiştir. Doğal ölümlerin %45,4'ü kardiyak arrest nedeniyle gerçekleşirken, doğal olmayan ölümlerin %100'ü intihar nedeniyle meydana gelmiştir. Kısa hastanede kalış süreleri ve hastaneye yatışın ilk haftasında yakın takip, psikiyatrik yatan hastalarda ölüm oranlarını azaltmada esastır. Ayrıca, ulusal ve uluslararası kalite ve akreditasyon kriterlerine uygun olarak sağlık bakım kalitesinin artırılması, psikiyatrik yatan hastalarda ölüm oranlarını daha da azaltacaktır.

**Anahtar sözcükler:** Mortalite, epidemiyoloji, psikiyatri, psikiyatri hastanesi

## Introduction

Mortality, a key determinant of health, is a focal point in epidemiological studies. Epidemiological studies on mortality provide continuous evaluation of the effectiveness of interventions in reducing mortality (Hernandez and Kim 2022). In this context, epidemiological studies on mortality in psychiatric patients provide important data that can be used to improve the quality and planning of psychiatric care (Shinde et al. 2014, Plana-Ripoll et al. 2022). In this way, the focus of psychiatric care can be shifted to preventive health issues (Firth et al. 2019, Hernandez and Kim 2022). It is well-established that individuals with mental disorders have higher early death rates than the general population, and all types of mental disorders are associated with a reduced life expectancy (Plana-Ripoll et al. 2019). In fact, one life expectancy study found that mental disorders resulted in a 15.9-year reduction in life expectancy for Australian male psychiatric patients and a 12-year reduction for female patients

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(Lawrence et al. 2000). Similarly, in a study conducted with patients with schizophrenia, it was determined that schizophrenia led to an 18.7-year reduction in life expectancy for Danish male patients and a 16.3-year reduction for female patients (Laursen 2011). Individuals with severe psychiatric disorders such as schizophrenia, schizoaffective disorder and bipolar disorder have a life expectancy reduction of 10 years on average compared to the general population. (Delibaş et al. 2021).

A comprehensive study on the causes of mortality in psychiatric patients revealed that premature deaths are caused primarily by suicide, adverse health conditions, infectious diseases, tumors, diabetes, and diseases of the circulatory and respiratory systems (Plana-Ripoll et al. 2019). Deaths are usually categorized into two groups as natural and unnatural deaths (Wilson et al. 2019). Unnatural deaths are deaths in which the death occurs due to an external cause such as suicide or accident (Woudenberg-van den Broek et al. 2022). Unnatural deaths are significantly more common in individuals with mental disorders compared to the general population (Laursen 2019). The leading cause of unnatural deaths in individuals with mental disorders is suicide (Swaraj et al. 2019). On the other hand, the primary cause of natural deaths in patients with severe psychiatric illnesses is cardiovascular diseases (Swaraj et al. 2019). Side effects of the antipsychotic drugs, smoking, sedentary life, metabolic syndrome, and lack of regular health follow-ups cause deterioration in cardiovascular health in these patients (Swaraj et al. 2019).

Compared to the general population, psychiatric patients have less access to quality health services including close monitoring of their physical health, medication and side effect management, stress management, psychosocial support and interventions to reduce suicide risk (Schneider et al. 2019). However, in order to reduce mortality in psychiatric patients, it is essential to follow them in terms of modifiable risk factors, as well as screening them for comorbid medical diseases, to ensure that they are diagnosed early, and provide them access to treatment (Bahorik et al. 2017). Since psychiatric patients constitute a high-risk group among all patients, it is even more critical that they are evaluated and followed up regularly, particularly in terms of cardiovascular diseases (Schneider et al. 2019, Delibaş et al. 2021). Given the drug interactions and side effects associated with psychopharmaceuticals, it is vital to follow up with psychiatric patients, particularly during the treatment process (Delibaş et al. 2021). Relevant studies emphasize the need for coordinated care in order to improve the general medical conditions of individuals with mental disorders (Suetani et al. 2015, Plana-Ripoll et al. 2019, Schneider et al. 2019). The literature emphasizes the need for further research to determine the underlying causes of mortality in psychiatric patients and address the related (Shinde et al. 2014, Osman et al. 2020).

Understanding how different psychiatric illnesses and other factors affect mortality can help identify specific causes of death (Plana-Ripoll et al. 2019). Therefore, determining mortality criteria and related factors in institutions providing mental health services is of great importance for evaluating psychiatric care, as these criteria and factors will help develop better treatment plans and policies in related to mental health disorders (Shinde et al. 2014).

However, there are only a handful of studies conducted on this subject in Turkey. In this context, this study, which presents the mortality data of the last 20 years at Manisa Mental Health and Diseases Hospital, was conducted to address this gap in the literature. In light of the aforementioned context, the primary aim of this study is to conduct an in-depth epidemiological investigation into the mortality patterns among inpatients within a specialized psychiatric hospital. The study seeks to meticulously analyze the multifaceted causes of mortality, encompassing both natural and unnatural factors, prevalent among psychiatric inpatients. It is hypothesized that individuals grappling with mental disorders, subsequently admitted as inpatients in a dedicated psychiatric facility, are susceptible to encountering elevated mortality rates when contrasted with the broader general population. This supposition is based on the intricate interplay between mental health challenges and physiological well-being, which may manifest as a heightened vulnerability to life-threatening circumstances. Furthermore, the hypothesis asserts that within this demographic, cardiovascular ailments and instances of suicide are projected to emerge as prominent determinants of mortality.

## Method

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### Sample

The population of this retrospective, cross-sectional study consisted of inpatients that died in Manisa Mental Health and Diseases Hospital between May 2002 and December 2022. Patients that died in the hospital as outpatients before they started to receive treatment as inpatients were excluded from the study. When an inpatient dies, the hospital's Mortality Council, composed of all specialists and chaired by the Chief of Medicine, convenes. After the final decision of the relevant council, the cause of death and the diagnosis of death are

clarified and recorded in the mortality records in this way. A forensic autopsy is requested for patients with suspicious deaths, or all convicted patients, and they are sent to the Forensic Medicine Branch Directorate for autopsy. The cause of death is accurately determined by the evaluation of the genetic/biological samples taken by the forensic medicine specialist, the results of the histopathological evaluation and the systemic forensic toxicology report and examination of the deceased. Suspicious deaths of prisoners and convicts are evaluated in the hospital and the body is sent to the forensic medicine department. In the case of suspicious deaths, an administrative investigation is initiated by the chief physician of the hospital at the same time as an investigation is initiated by the judicial authorities. If there is a development that is considered malpractice in the forensic autopsy reports, a lawsuit is filed by the appropriate prosecutor in the criminal court.

There is an ongoing malpractice case file in which physicians and other health care professionals are being held responsible for deaths that occurred in our hospital during the study period. One death was not included in the study because the case file was not closed and the final decision was not made.

## Procedure

Dates and causes of death, psychiatric diagnoses, and demographic data of the mortal cases between 2002 and 2004 were obtained from the Central Population Administration System archives of XXX Mental Health and Diseases Hospital, whereas the dates and causes of death, psychiatric diagnoses and demographic data of mortal cases between 2004 and 2022 were obtained from the Hospital Information Management System of XXX Mental Health and Diseases Hospital.

These data were checked against the reports created by the council evaluating deaths. The mortal cases' demographic characteristics and medical diagnoses were recorded and analyzed. Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR), published in 2000, was used for psychiatric diagnoses in hospital files, which complied with DSM-5 diagnostic criteria published in 2013 and the DSM-5-TR diagnostic criteria published in March 2022.

Hospital mortality data were evaluated according to the International Classification of Diseases, 8th revision (ICD-8) until July 1st, 2005, and according to the International Classification of Diseases, 10th revision (ICD-10) since then. Hospital death data since 2006 have been published based on ICD-10 (Table 1). This study's protocol was approved by the Manisa Celal Bayar University Faculty of Medicine Health Sciences Ethics Committee (Approval Date: 03.08.2022, Approval No.:20.478.486/1453).

ICD-8	ICD-10
Senile Dementia	Dementia in Alzheimer Disease
Delirium Tremens	Withdrawal State with Delirium
Alcohol Addiction	Dependence Syndrome
Drug Dependence	Dependence Syndrome
Anxiety Neurosis	Anxiety Disorder

ICD-8: International classification of diseases-8; ICD-10: International classification of diseases 100

## Statistical Analysis

The statistical analyses of the collected data were carried out using the SPSS 25.0 (Statistical Product and Service Solutions for Windows, Version 25.0, IBM Corp., Armonk, NY, U.S., 2017) software package. Descriptive statistics were initially employed to provide a comprehensive overview of the dataset. Measures of central tendency and variability, such as mean, median, and standard deviation, were calculated to summarize the central tendencies and variations of the key variables. This step facilitated a clear understanding of the characteristics of the studied patient population. The normality of the data distribution, a fundamental assumption for many statistical analyses, was rigorously assessed. The normality of data was confirmed using the Shapiro-Wilk test, and the results significantly showed that the data adhered to a normal distribution ( $p > 0.05$ ). Consequently, it was established that the requisite assumption of normality was met, enhancing the validity of subsequent statistical procedures. Correlation analysis was conducted to explore potential relationships between different variables. This technique contributed to a more detailed understanding of factors influencing patient outcomes by identifying significant correlations between demographic and clinical characteristics of decedents. Chi-square tests were employed to uncover differences and trends between various groups and time periods. By comparing variables across groups, the analysis highlighted significant variations, thereby providing insights into underlying patterns. Temporal trends in mortality were investigated through

the analysis of death occurrences over time. Distribution of deaths within distinct time intervals was examined, aiding in the comprehension of potential fluctuations and changes in mortality rates.

## Results

The number of hospitalizations, the number of mortal cases, and mortality rates in XXX Mental Health and Diseases Hospital during the period between 2002 and 2022 are shown in Table 2. The mean and median age of the mortal cases included in the study was 49.5±11.9 years and 51(min. 19, max. 81) years, respectively. The mean and median length of hospital stay (LoS) was 14.7±32.4 days and 6(min. 1, max. 318) days, respectively. Of these 119 mortal cases, of whom 76 (63.9%) were male, and 43 (36.1%) were female, 30 (25.2%) were under the age of 40, 69 (58.0%) were between the ages of 41-60, and 19 (16.0%) were over the age of 60. The analysis of the marital statuses of these cases revealed that 25 (21.0%) were married, 47 (39.5%) were single, and the marital status of 47 (9.5%) was unknown. Additionally, the analysis of their psychiatric diagnoses revealed that 80 (69.5%) had spectrum of schizophrenia and other psychotic disorders, 9 (7.8%) organic psychiatric disorder, 12 (4.3%) bipolar and related disorders, 4 (9.8%) depressive disorder, 9 (7.8%) substance-related and addictive disorders and 1 (0.9%) anxiety disorder (Table 3).

Year	The Total Number of Inpatients	The Total Number Deaths	Observed Death Rate*
2002	5302	17	3.2
2003	5512	10	1.81
2004	6873	12	1.74
2005	5032	1	0.19
2006	5125	4	0.78
2007	5189	7	1.34
2008	5807	10	1.72
2009	6173	5	0.8
2010	6556	5	0.76
2011	6689	7	1.04
2012	7022	11	1.56
2013	6653	5	0.75
2014	6256	7	1.11
2015	5896	5	0.84
2016	6109	4	0.65
2017	5707	3	0.52
2018	5481	2	0.36
2019	5181	4	0.77
2020	2195	0	0
2021	2920	0	0
2022	4524	1	0.22

\* Mortality rate per 1000 hospitalized patients

Analysis of the causes of death revealed that 54 (45.4%) died due to cardiac arrest, 4 (3.4%) suicide (hanging one's self by the neck), 6 (5%) respiratory failure, 2 (1.7%) foreign body aspiration and 1 (0.8%) acute respiratory distress syndrome (ARDS). The cause of death in 52 (43.7%) deaths could not be obtained (Table 4). The analysis of the mortal cases by the period the mortality occurred revealed that 44 (37%) died between 2002-2006, 34 (28.6%) between 2007-2011, 32 (26.9%) between 2012-2016, and 9 (7.6%) between 2017-2022. The distribution of deaths by year is shown in Figure 1 and Table 4. The analysis of the correlations between demographic and clinical characteristics of decedents revealed that there was no significant relationship between psychiatric diagnosis and age ( $p=0.53$ ), but there was a significant relationship between psychiatric diagnosis and LoS ( $p=0.008$ ). It has been shown that the loss of psychiatric patients diagnosed with psychiatric diagnoses and LoS, Spectrum of Schizophrenia and Other Psychotic Disorders is longer than that of psychiatric patients diagnosed with other disorders (Table 5). On the other hand, there was a significant correlation between gender and psychiatric diagnoses ( $p=0.009$ ) and there was no significant correlation between gender and cause of death ( $p=0.06$ ) (Table 5).

<b>Table 3: Demographic characteristics of mortal psychiatric cases</b>			
	<b>n</b>	<b>Mean±SD</b>	<b>Median(Min-Max)</b>
LoS (days)	119	14.7±32.4	6.00(1-318)
Age (years)	118	49.5±11.9	51(19-81)
Gender	n	%	
Female	43	36.1	
Male	76	63.9	
Marital Status			
Married	25	21.0	
Single	47	39.5	
Age Groups			
<40	30	25.2	
41-60	69	58.0	
>60	19	16.0	
Psychiatric Diagnosis			
Spectrum of Schizophrenia and Other Psychotic Disorders	80	69.5	
Organic Psychiatric Disorder	9	7.8	
Bipolar and Related Disorders	12	4.3	
Depressive disorder	4	9.8	
Substance-Related and Addictive Disorders	9	7.8	
Anxiety Disorder	1	0.9	

LoS: length of hospital stay; n: number; min: minimum; max: maximum; SD: standard deviation; %: percent

<b>Table 4. Clinical characteristics of mortal psychiatric cases</b>		
<b>Cause of Death</b>	<b>n</b>	<b>%</b>
Cardiac Arrest	54	45.4
Respiratory Failure	6	5
ARDS	1	0.8
Suicide by hanging	4	3.4
Foreign Body Aspiration	2	1.7
Unknown	52	43.7
<b>The Period Mortality Occurred</b>		
between 2002 and 2006	44	37.0
between 2007 and 2011	34	28.6
between 2012 and 2016	32	26.9
between 2017 and 2022	9	7.6

ARDS: acute respiratory distress syndrome; n: number; %: percent

On the other hand, no significant relationship was found between mortal psychiatric cases with organic psychiatric disorder and the periods in which deaths occurred in psychiatric cases ( $p=0.12$ ). Accordingly, mortal psychiatric cases with organic psychiatric disorder were more common in the period between 2002 and 2006, psychiatric cases with dependence syndrome were also more frequent in the period between 2002 and 2006, the proportion of psychiatric cases with Affective (Mood) Disorder increased most in the period between 2012 and 2016, and the mortal psychiatric cases with Schizophrenia Spectrum and other Psychotic Disorders observed were more frequent in the period 2002-2006. At the same time, it was determined that the patient diagnosed with anxiety also died between 2002 and 2006. (Table 5).

The distribution of psychiatric diagnoses in psychiatric deaths according to the period in which the death occurred is shown in Figure 1. The analysis of the correlations between causes of death and the periods of

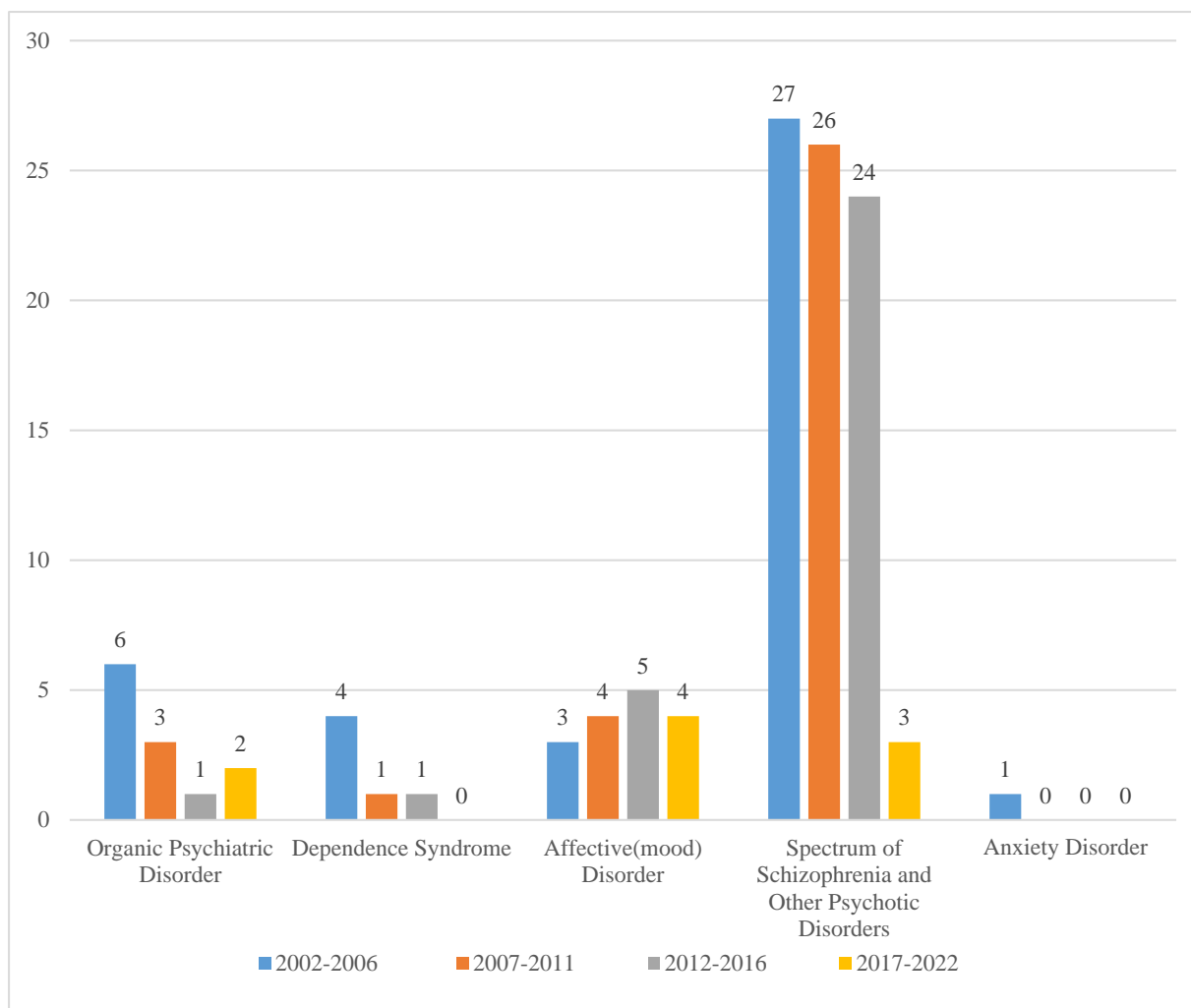
mortality revealed a significant correlation between the incidence of death in mortal psychiatric deaths and the periods of mortality ( $p=0.000$ ). Accordingly, the incidence of cardiac arrest in mortal psychiatric deaths was the highest during the period between 2002 and 2006. Accordingly, the rate of mortal psychiatric deaths with an unknown cause of death was the highest in the period between 2007 and 2011 (Table 5). A total of 119 deaths were recorded during the study period. The mortality cases are historically divided into two periods: pre-2013 and post-2013. According to the findings, 89 (74.8%) people died in the pre-2013 period, while 30 (25.2%) died in the post-2013 period. The results of the chi-square test showed that this difference was statistically significant ( $X^2 = 29.25, p < 0.001$ ) (Table 5).

Psychiatric Diagnoses	Organic Psychiatric Disorder	Dependence Syndrome	Affective (mood) Disorder	Spectrum of Schizophrenia and Other Psychotic Disorders	Anxiety Disorder		
n(%)	12(10.1)	6(5.0)	16(13.4)	80(67.2)	1(0.8)		
Age(mean rank)	47.79	76.08	60.72	56.90	58.50		
LoS (days)	46.54	51.92	35.25	65.14	24.50		
Gender n(%)							
Female	4(33.3)	0	11(68.8)	27(33.8)	1(100)		
Male	8(66.7)	6(100)	5(31.3)	53(66.3)	0		
Mortality Year Group n(%)							
2002-2006	6(50)	4(66.7)	3(18.8)	27(33.8)	1(100)		
2007-2011	3(25)	1(16.7)	4(25)	26(32.5)	0		
2012-2016	1(8.3)	1(16.7)	5(31.3)	24(30)	0		
2017-2022	2(16.7)	0	4(31.3)	3(3.8)	0		
Cause of Death	ARDS	Foreign Body Aspiration	Cardiac Arrest	Respiratory Failure	Suicide hanging	Unknown	Test-p value
Gender n(%)							
Female	1(100)	2(100)	20(37)	2(33.33)	3(75)	15(28.8)	$x^2:9.15$ $p:0.074$
Male	0	0	34(63)	4(67.7)	1(25)	37(71.2)	
Mortality Year Group n(%)							
2002-2006	0	0	35(79.5)	1(2.3)	3(6.8)	5(11.4)	
2007-2011	0	1(2.9)	1(2.9)	1(2.9)	0	31(91.2)	$x^2:76.30$
2012-2016	1(5.6)	1(3.1)	15(46.9)	1(3.1)	1(3.1)	13(40.6)	$p:0.000$
2017-2022	0	0	3(33.3)	3(33.3)	0	3(3.33)	
Deaths before 2013	89(74.8)						$x^2:29.25$
Deaths in 2013 and later	30(25.2)						$p:0.000$

The analysis of the causes of death in mortal psychiatric cases according to the psychiatric diagnoses revealed that 34 patients with Spectrum of Schizophrenia and Other Psychotic Disorders, 4 patients with Dependence Syndrome, 7 patients with Affective (mood) Disorder, 5 patients with Organic Psychiatric Disorder and 1 patient with anxiety died due to cardiac arrest. In addition, 3 patients with Spectrum of Schizophrenia and Other Psychotic Disorders and 1 patient with Affective (mood) Disorder died by suicide. 1 patient with Affective (mood) Disorder and 1 patient with Organic Psychiatric Disorder died due to respiratory failure. 1 patient with Spectrum of Schizophrenia and Other Psychotic Disorders and 1 patient with Dependence Syndrome died from pneumonia. 1 patient with Organic Psychiatric Disorder and 1 patient with Spectrum of Schizophrenia and Other Psychotic Disorders died due to foreign body aspiration. 1 patient with Spectrum of Schizophrenia and Other Psychotic Disorders died due to ARDS. 1 patient with Spectrum of Schizophrenia and other psychotic disorders died due to lung cancer (Table 6).

Causes of Death	ARDS	Foreign Body Aspiration	Cardiac Arrest	Respiratory Failure	Suicide by hanging	Unknown
Psychiatric Diagnoses						
Organic Psychiatric Disorder*	0	1	5	1	0	5
Dependence Syndrome**	0	0	4	1	0	1
Affective(mood) Disorder***	0	0	7	1	1	7
Anxiety Disorder	0	0	1	0	0	0
Spectrum of Schizophrenia and Other Psychotic Disorders****	1	1	34	2	3	39
Total	1	2	51	5	4	52

ARDS: acute respiratory distress; \*Dementia in Alzheimer Disease; Withdrawal State with Delirium, Mental Retardation; \*\*Dependence Syndrome; \*\*\*Bipolar Affective Disorder, Depression; \*\*\*\*Schizophrenia, Acute Transient Psychotic Disorder, Psychosis.



**Figure 1. Distribution of psychiatric diagnoses in mortal psychiatric cases by the periods the mortality occurred**

## Discussion

The comparative analysis of the results of this study, which evaluated 119 deaths that occurred during a period of 20 years, indicated that the number of mortalities in psychiatric patients significantly decreased over the years. Similarly, Shinde et al. reported a significant decrease in mortality rates in psychiatric patients over the years (Shinde et al. 2014). The restructuring process, initiated in the Turkish healthcare sector in 2013 in line with the accreditation and quality targets, has inevitably increased the quality of the services provided in psychiatric hospitals. The quality assessments and the accreditation studies carried out by the Turkish Health Care Quality and Accreditation Institute for the healthcare sector (Kavak 2016) might have been a factor in the

decreasing trend in mortality rates in psychiatric inpatients since 2013. The statistically significant decrease observed in mortality rates after 2013 may indicate that quality improvement and accreditation processes were effectively initiated in the hospital. It is reasonable to consider this result as a consequence of the implementation of standardized and monitored healthcare practices. The introduction of these measures could potentially explain the reduction in mortality rates. Hence, in parallel with the literature, it can be speculated that there have been significant changes in the physical and functional structuring of diagnosis, treatment, and healthcare services since then.

In addition to providing institution-based psychiatry services in hospitals, the spread of community-based psychiatry services, which started as a pilot project in Manisa in 2013, might have been another factor in the decreasing trend in mortality rates in psychiatric inpatients since 2013. Community-based psychiatry services helped reduce the number of hospitalizations and increase psychiatric patients' quality of life (Soygur 2016). Another factor in the said decreasing trend in psychiatric inpatients' mortality rates might be the decrease in the number of active beds in the Manisa Mental Health and Diseases Hospital from 780 in 2013 to 336 in 2022.

There are only two studies on mortality rates in psychiatric hospitals in Turkey. The first one is an unpublished doctoral dissertation conducted in 2001 that examined the mortality rates during a period of 4 years in a total of 26.194 patients hospitalized in a closed psychiatric ward (Alataş 2001). The second one is Böke et al.'s study that examined the mortality rates during a period of 7 years in a total of 19.100 patients hospitalized in a 400-bed regional closed psychiatric ward (Böke et al. 2007). On the other hand, studies on the mortality rates of psychiatric patients abroad mostly include both closed and open psychiatric wards and high-security forensic psychiatry hospitals.

The literature data on the relationship between mortality in psychiatric inpatients and gender, in general, revealed higher mortality rates in male patients than in female patients (Barbosa et al. 2016, Osman et al. 2020). Similarly, in this study, the mortality rate in psychiatric inpatients was higher in male patients than in female patients. The discrepancies between the studies on the relationship between mortality in psychiatric inpatients and gender might be attributed to the fact that a higher number of forensic psychiatry patients were included in some studies and that the male gender is more prominent in criminal cases as well as in psychiatric hospitalizations.

The mean age of the mortal psychiatric cases investigated in this study was  $49.5 \pm 11.9$  years. Similarly, the mean age of the mortal psychiatric cases was  $50.40 \pm 14.57$ ,  $50.40 \pm 14.57$  and  $50.81 \pm 19.18$  years in the study conducted in Turkey by Böke et al., in the study conducted in the psychiatry service in Portugal (Barbosa et al. 2016), and in the study conducted in 2020 in Sudan (Osman et al. 2020), respectively. The findings of this study also support the finding reported in the literature that patients with severe psychiatric illness have a reduced life expectancy than the general population.

In a meta-analysis study that included 148 studies conducted with psychiatric patients, the mortality rate in overall psychiatric patients and psychosis patients was found to be 2.2 and 2.5 times higher than in the general population, respectively (Walker et al. 2015).

The most common psychiatric diagnoses among the mortal cases included in this study over the study period were psychotic disorder, schizophrenia, and bipolar disorder in order. In parallel, Böke et al. (Böke et al. 2007) reported that patients with psychotic disorders and schizophrenia had the highest mortality rate. Similarly, in a 16-year retrospective study conducted in Finland (Heilä et al. 2005) and a 15-year retrospective study including 133.105 patients in Australia (Lawrence et al. 2000), patients with schizophrenia had the highest mortality rate.

Of the 119 deaths investigated in this study, 115 (97.64%) were natural deaths, whereas 4 (3.36%) were unnatural deaths. In parallel, a meta-analysis study determined that natural deaths significantly exceeded unnatural deaths (Swaraj et al. 2019).

Studies have reported that patients with severe psychiatric illness had increased anxiety levels about natural death (Swaraj et al. 2019). Most deaths with known causes investigated in this study (79.68%,  $n=51$ ) were due to cardiac arrest (Table 2). Similarly, in the literature, the most common cause of death in individuals with the severe psychiatric disease has been reported as cardiovascular disease (Swaraj et al. 2019). In contrast, in a study conducted in Nigeria (Malomo et al. 2003), the most common cause of death in individuals with the severe psychiatric disease has been reported as infections and infestations. This finding, which contradicts other relevant findings reported in the literature, might be attributed to the lack of sanitation and health management in the respective country.



There are case series in the literature on sudden and unexplained deaths triggered by the use of antipsychotics. Given that the final psychiatric diagnosis was established in most cases, it is estimated that most of the mortal cases included in this study have been using antipsychotics (Table 1). Ventricular arrhythmia or torsade de pointes caused by antipsychotics may reportedly cause sudden death in individuals with some genetic predisposition (Kuo et al. 2022). Although there are many studies on this subject, the related etiopathogenesis has yet to be elucidated. In parallel, the results of this study revealed the necessity of conducting further research on deaths related to the use of antipsychotics in psychiatric inpatients.

In two of the mortal cases included in this study, the cause of death was foreign body aspiration. One of these patients was diagnosed with schizophrenia, and the other was diagnosed with dementia. Similarly, Böke et al. reported foreign body aspiration as the cause of death in a patient with schizophrenia (Böke et al. 2007). It is known that antipsychotics used in treating schizophrenia cause dry mouth, dysphagia, or pseudo-parkinsonism (Kuo et al. 2022). The fact that the patient with schizophrenia who died due to foreign body aspiration has been taking 2nd generation antipsychotics, as indicated in the respective medical file, might have led to the development of secondary dysphagia or pseudo-parkinsonism. It is also known that xerostomia and dysphagia caused by antipsychotics can lead to obstructive asphyxia and death in psychiatric patients (Kuo et al. 2022). In this context, the effect of antipsychotics should be considered, especially in deaths that occur due to asphyxia or foreign body aspiration during periods when typical antipsychotic use is common. The other patient who died due to foreign body aspiration had been diagnosed with dementia. The oral behavior generally observed in patients with dementia might have led to foreign body aspiration in this specific case.

In addition, it is known that respiratory diseases are prevalent in ward-type structures such as barracks, prisons, and warehouse hospitals (Kuo et al. 2022). The deaths due to respiratory failure investigated in this study may also be considered in the said category. A study conducted in Taiwan (Kuo et al. 2022), covering 15 years and involving 18 thousand of asthma patients, reported that typical antipsychotics, in particular, caused severe exacerbation in individuals diagnosed with asthma. The cause of death in a patient with schizophrenia included in this study was lung cancer (Table 5). A cancer diagnosis is known to be relatively low in individuals with schizophrenia (Lambert et al. 2022). Similarly, in the study conducted in Nigeria (Malomo et al. 2003), only 1 patient with schizophrenia died due to neoplasm. In parallel, in a long-term study conducted in India (Shinde et al. 2014), only 2 patients were diagnosed with cancer.

All four unnatural deaths among the mortal psychiatric cases included in this study were due to suicide (Table 2). Of these cases, one was a female patient with unipolar depression, and the other three were male patients with schizophrenia. In parallel, the highest suicide rates among unnatural deaths in hospitalized psychiatric patients were reported in patients with schizophrenia, bipolar and unipolar depression in the literature. Accordingly, 79 suicides were reported in a 605-bed psychiatric hospital in Slovenia over a 10-year period (Steblij et al. 2007), 34 suicides were reported in a 216-bed high-security forensic psychiatric hospital in Spain over a 13-year period (Pérez-Cárceles et al. 2001), 22 suicides were reported in patients hospitalized in psychiatry clinics of 7 different hospitals in Germany over a 4-year period (Hewer et al. 1996), one suicide was reported in the psychiatric hospitals in Nigeria over a 10-year period (Malomo et al. 2003), and also once suicide was reported in an acute psychiatry service in Portugal over a 16-year period (Barbosa et al. 2016).

The epidemiological studies revealed the suicide rate in patients hospitalized in psychiatry services as 13.7 per 10000. In addition, the male-to-female ratio among psychiatric inpatients that committed suicide was reported as 2:1 (Thomas et al. 2018). In a study conducted in India (Shinde et al. 2014), the male-to-female ratio among psychiatric inpatients that committed suicide was 1.3 to 1. In parallel, the male-to-female ratio among psychiatric inpatients that committed suicide in this study was 3 to 1. These results are compatible with the male-to-female ratios reported in the literature for psychiatric inpatients that committed suicide. Yet, the fact that this ratio was found to be even higher in this study can be attributed to the fact that the number of beds reserved for male psychiatric patients has been higher in Manisa Mental Health and Diseases Hospital.

It is known that hanging by the neck is the most common method for committing suicide in psychiatric hospitals and prisons (D. Hernández-Calle et al. 2020). In line with the literature data, all unnatural deaths that occurred among the psychiatric inpatients included in this study were due to suicide by hanging (Table 2).

The average LoS of psychiatric patients hospitalized in Manisa Mental Health and Diseases Hospital was 14.7 days. Both natural and unnatural deaths of hospitalized psychiatric patients reportedly occur in the first 7 days of hospitalization. In the study conducted by Böke et al., the average LoS was 48 days, and deaths were concentrated in the first 3 days (Böke et al. 2007). The average LoS of psychiatric patients hospitalized in

comparable hospitals is around 10 days (Böke et al. 2007). Similarly, in this study, it was observed that the majority of the deaths occurred within the first 6 days of hospitalization.

The primary limitation of this study was that it was conducted retrospectively based on the records available in patient files. However, the fact that death records in the hospital had been well kept might have eliminated some of the disadvantages associated with retrospective research. The death notification system ensures that death certificates are issued electronically, and the related data are collected in a shared pool, entered into force in 2013. The lack of data on the dietary habits, obesity, smoking, and use of antipsychotics of deceased patients was another limitation of the study.

## Conclusion

It is of critical importance that the psychiatry services in our country meet and maintain national and international criteria for quality and accreditation of healthcare in order to reduce the mortality rates. In this context, close observation and follow-up during the first week of hospitalization, the period with the highest mortality risk, is essential. Equally important is that psychiatric hospitals have the capacity to intervene in acute psychiatric patients in order for these patients to be quickly discharged and followed up, and treated as outpatients. In addition to reducing the mortality rate in psychiatric inpatients, providing treatment and health care during the first week of hospitalization, the period with the highest mortality risk, will also prevent long-term hospitalizations.

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