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Mortality and suicide rates in patients discharged from forensic psychiatric wards in Japan

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ABSTRACT

Background: Japanese forensic mental health services for patients with psychiatric disorders under the Medical Treatment and Supervision Act was initiated in 2005; however, the prognosis of those patients is not well-known, particularly regarding mortality and suicide. This study aimed to evaluate the all-cause mortality and suicide rate in forensic psychiatric outpatients who had been discharged from forensic psychiatric wards in Japan.

Methods: Participants included 966 patients who had been discharged from forensic psychiatric wards. Data were collected from July 15, 2005 to July 15, 2018 at 29 of the 33 forensic psychiatric wards in Japan. Only the patients who provided written informed consent were included. We and collaborators at each forensic psychiatric ward identified demographic data of participants from the medical records for the inpatient treatment period. The reintegration coordinators, who belonged to the Ministry of Justice, investigated the prognosis of the participants during the outpatient treatment order period. We then connected demographic data and participants' prognosis for analysis. The crude rates (CRs) and standardized mortality ratios (SMRs) were calculated to analyze all-cause mortality and suicide rates. Univariate analysis was performed to examine the factors associated with all-cause mortality and suicide rates using the Cox proportional hazards ratio model.

Results: The participants included 3.3 times as many men ($n = 739$) compared to women ($n = 227$), and their combined mean age was 47.3 ($SD = 12.9$). The most common primary psychiatric diagnosis was psychotic disorders (81.3%). The mean follow-up period was 790.2 days ($SD = 369.6$). The total observation period was 2091.2 person-years. The CR for all-cause death was 812.9 per 100,000 person-years (95% CI [426.5, 1199.4]), while the SMR for all-cause death was 2.2 (95% CI [1.3, 3.5]). The CR for completed suicide was 478.2 per 100,000 person-years (95% CI [181.8, 774.6]). The suicide SMR was 17.9 (95% CI [8.6, 32.9]) overall, 7.7 (95% CI [2.5, 18.0]) for men, and 79.4 (95% CI [25.8, 185.2]) for women. Univariate analysis showed that women had higher completed suicide risk than men (hazard ratio = 3.599, 95% CI [1.041, 12.445]).

Conclusion: The all-cause mortality and completed suicide rates were higher in participants than observed in the general population consistent with the results of previous international studies.

1. Introduction

In 2005, the Medical Treatment and Supervision Act (MTSA) took effect in Japan. The MTSA is the first law in Japan that mandated forensic mental health services for patients with psychiatric disorders who are adjudged to be insane or as having diminished responsibility at the time they commit a crime. Criminal behaviors that are identified as being subject to the MTSA include homi-

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cide, bodily injury, arson, robbery, and sexual assaults. The MTSA is responsible for implementing forensic outpatient treatment orders. The period of forensic outpatient treatment order is typically three years and can last up to five years. During the period of mandated outpatient treatment, patients regularly receive psychiatric outpatient treatment at designated outpatient medical institutions. The MTSA is also responsible for implementing inpatient treatment orders in forensic psychiatric wards. As of July 15, 2018, 33 forensic psychiatric wards with 833 beds had been established nationwide. When patients' mental conditions have improved, and they have been assessed as having a low reconviction risk by their inpatient medical providers under the MTSA, the court may judge that the patients can be discharged from the forensic psychiatric wards. Over 80% of all patients leave the forensic psychiatric wards with a forensic outpatient treatment order. More detailed information about the MTSA has been reported previously in domestic research conducted by Ando et al. [1].

The MTSA aims to not only prevent reconvictions but also foster the reintegration of forensic psychiatric patients into society [2]. The rate of serious re-offenses among patients discharged from forensic psychiatric wards under the MTSA has been lower than those previously found in domestic and overseas research [3–5]. Both the all-cause mortality and suicide rates are important indices when examining reintegration into society; the all-cause mortality and suicide rate of patients who are discharged from forensic wards in Japan are not well known.

It is well known that patients with psychiatric disorders have higher all-cause mortality risk compared with the general population [6–8]. In particular, suicide is strongly associated with increased mortality among the psychiatric population [9]. Individuals with a history of criminal behavior and incarceration have also been shown to be at increased risk of all-cause mortality [10,11]. Several previous reports have examined all-cause mortality among forensic psychiatric outpatients [12–18]. In a meta-analysis, it was reported that the pooled estimate for all-cause death CR was 1538 (95% CI [1175, 1901]) [5]. We were able to find previous research reporting on the SMR for the all-cause death among forensic psychiatric outpatients [13,15,17]. The SMR for all-cause death among patients discharged from a forensic medium secure hospital with 88 patients in Sweden was 10.4 (95% CI [6.4,16.1]) overall, 9.2 (95% CI [5.3, 14.8]) for men, and 40.5 (95% CI [8.3, 118.3]) for women [13]. The SMR for all-cause death after discharge from medium secure care units in the United Kingdom was 6.00 (95% CI [4.54, 7.74]), 4.75 (95% CI [3.45, 6.38]), and 9.75 (95% CI [5.19, 16.68]) for the entire sample, for men, and for women, respectively [15]. The SMR for patients discharged from special hospitals with mandated restriction was 2.1 (95% CI [1.5, 3.0]) for men and 1.7 (95% CI [0.6,4.5]) for women [17].

Suicide rates among patients with mental illness are higher than those in the general population [6,7,19–21], but few studies have examined suicide rates among populations of forensic psychiatric patients [13,15,22]. The pooled estimate for the CR for completed suicide was 325 (95% CI [235, 415]) per 100,000 person-years in a meta-analysis [5]. The SMR for suicide in patients discharged from high-security hospitals in the United Kingdom was 23.25 (95% CI [19.01–27.51]) for men and 44.86 (27.27–62.45) for women [23]. Another study in the United Kingdom reported the suicide SMR for patients who were discharged from the medium-security unit was 32.31 (95% CI [19.15, 51.07]) [15]. In Finland, suicide SMR for patients who were committed to a forensic psychiatric hospital for treatment was 7.1 (95% CI [5.5, 9.2]) overall, 6.6 (95% CI [5.1,8.7]) in men, and 19.5 (95% CI [8.8, 38.0]) in women [22] during both the inpatient and outpatient period. To date, no research has described suicide attempts among forensic psychiatric outpatients in detail.

In this study, we aimed to conduct an exploratory analysis of the all-cause mortality, completed suicide rates, and rates of suicidal behavior in forensic psychiatric outpatients discharged from forensic psychiatric wards in Japan.

2. Material and methods

2.1. Procedures

We collaborated with the Ministry of Justice and 29 of 33 forensic psychiatric wards throughout Japan. With assistance from the collaborators at each forensic psychiatric ward, we recruited patients who were discharged from forensic psychiatric wards. All participants provided written consent for this study. After receiving patients' consent, we along with the collaborators identified demographic data from the medical records for the inpatient treatment period. During the outpatient treatment order period, the reintegration coordinators, who belong to the Ministry of Justice and are responsible for adjusting the social environment of forensic outpatients under the MTSA, completed questionnaires on the patients' outpatient prognosis on July 15 every year. These questionnaires were then submitted to the forensic psychiatric wards that had discharged each participant. After combining the demographic data and prognosis data, the research collaborators at each forensic psychiatric ward submitted the data set to the National Center of Neurology and Psychiatry Hospital in Japan. We then connected the data set from each forensic psychiatric ward for analysis.

2.2. Participants

Participants included patients who had been discharged from 29 forensic psychiatry wards and were mandated to receive outpatient treatment under the MTSA between July 15, 2005 and July 15, 2018. Only the patients who provided written informed consent to research collaborators were included. The follow-up period was calculated from the day of discharge to the end of the study period (July 15, 2018) or the last day of the outpatient treatment order.

According to Japanese justice statistics, 3007 patients had received a mandated inpatient treatment order as of December 31, 2017, and 1921 had received a mandated outpatient treatment order after being discharged from a forensic psychiatric ward under the MTSA across the country [24]. Three hundred and ninety-nine patients with inpatient treatment order received an order of having completed forensic treatment under the MTSA at the time of discharge from forensic psychiatric wards because the court determined that the patients did not need further outpatient treatment. The approximately 700 remaining patients were assumed to be admitted to forensic psychiatric wards on December 31, 2017. Thus, the present study included 966 participants who represented approximately half of all patients who were mandated to receive outpatient treatment after being discharged from a forensic psychiatric ward under the MTSA.

2.3. Measures

We collected demographic data including age, gender, primary psychiatric diagnosis (ICD-10), the criminal behaviors that were the cause of being subject to the MTSA, and substance use problems before admission to a forensic psychiatric ward. Outpatients' social and economic variables such as residence type (e.g., living alone, living with family, welfare facilities, general psychiatric hospitals), use of psychoactive substances, job status, and major sources of income (e.g., salary, disability pension, old-age pension, social security, savings) were also collected. We examined several outcomes, including reconviction, death, completed suicide, suicidal behaviors (including attempts and completed cases), readmission to forensic psychiatric wards, and readmission to general

Table 1
Demographic data, comparison between men and women (n = 966).

	men and women	men	women	test statictics	P-value
Mean age at discharging from forensic psychiatric wards, years (SD)	47.3 (12.9)	47.0 (13.0)	48.1 (12.9)	t-test	0.289
Primary psychiatric diagnosis (ICD10)					
F0, n (%)	12 (1.2)	11 (1.5)	1(0.4)	Fisher's exact test	0.313
F1, n (%)	73 (7.6)	60 (8.1)	13 (5.7)	Fisher's exact test	0.254
F2, n (%)	785 (81.3)	622 (84.2)	163 (71.8)	Fisher's exact test	<0.001*
F3, n (%)	80 (8.3)	37 (5.0)	43 (18.9)	Fisher's exact test	<0.001*
F4, n (%)	2 (0.2)	1 (0.1)	1 (0.4)	Fisher's exact test	0.415
F5, n (%)	1 (0.1)	0 (0.0)	1 (0.4)	Fisher's exact test	0.235
F6, n (%)	3 (0.3)	0 (0.0)	3 (1.3)	Fisher's exact test	0.013*
F7, n (%)	6 (0.6)	4 (0.5)	2 (0.9)	Fisher's exact test	0.630
F8, n (%)	3 (0.3)	3 (0.4)	0 (0.0)	Fisher's exact test	1.000
F99, n (%)	1 (0.1)	1 (0.1)	0 (0.0)	Fisher's exact test	1.000
total	966 (100.0)	739 (100.0)	227 (100.0)		
Substance use problems before admission to a forensic psychiatric ward, n (%)	305 (31.6)	269 (36.4)	36 (15.9)	Fisher's exact test	<0.001*
Criminal behaviors as cause of being subject to the MTSA**					
homicide, n (%)	330 (34.0)	221 (29.8)	109 (47.8)	Fisher's exact test	<0.001*
bodily injury, n (%)	332 (34.2)	293 (39.5)	39 (17.1)	Fisher's exact test	<0.001*
arson, n (%)	224 (23.1)	151 (20.4)	73 (32.0)	Fisher's exact test	<0.001*
robbery, n (%)	43 (4.4)	36 (4.9)	7 (3.1)	Fisher's exact test	0.357
sexual assaults, n (%)	41 (4.2)	41(5.5)	0 (0.0)	Fisher's exact test	<0.001*
total	970 (100.0)	742 (100.0)	228 (100.0)		
Type of residence at discharging from forensic psychiatric wards					
with family, n (%)	229 (23.7)	155 (21.0)	74 (32.6)	Fisher's exact test	<0.001*
alone, n (%)	207 (21.4)	162 (21.9)	45 (19.8)	Fisher's exact test	0.519
welfare facilities, n (%)	394 (40.8)	308 (41.7)	86 (37.9)	Fisher's exact test	0.317
admitting to general psychiatric hospitals, n (%)	134 (13.9)	112 (15.2)	22 (9.7)	Fisher's exact test	0.037*
unknown, n (%)	2 (0.2)	2 (0.3)	0 (0.0)	Fisher's exact test	1.000
total, n (%)	966 (100.0)	739 (100.0)	227 (100.0)		
Mean obeservation period, days (SD)	790.2 (369.6)	804.6 (364.8)	743.4 (381.7)	t-test	0.033*
Total obesrvation period, person-years	2091.2	1628.9	462.3		

SD: standard deviation; MTSA: Medical Treatment and Supervision Act; *p < 0.05, **four patients offended two type of criminal behaviours.

psychiatric hospitals. In this study, we focused on three specific outcomes, death, completed suicide, and suicidal behaviors.

2.4. Analysis

Analyses were performed using IBM SPSS version 24.0. We performed student's *t*-tests for comparing continuous variables (i.e., age, length of time after discharge to the endpoint). We performed Fisher's test to compare categorical variables (i.e., gender, primary psychiatric diagnosis, type of criminal behavior, substance use problems, residence). Cumulative probabilities were calculated for three years. The Crude Rates (CRs) of all-cause death, completed suicides, and suicidal behaviors were calculated by the following formula. CR = 100,000 × all-cause deaths OR completed suicides OR suicidal behaviors / all observation period (year). We also calculated the all-cause mortality and the completed suicide mortality as standardized mortality ratios (SMRs) through a comparison with the general population of Japan. The all-cause mortality and completed suicide rate for the general population were derived from the Vital Statistics Survey in Japan, which is conducted by the Ministry of Health, Labour and Welfare [25]. The objective of the Vital Statistics Survey is to collect vital events in Japan and obtain a basic data source for the population, including the all-cause death mortality and suicide death mortality [25]. We used an indirect method to calculate the SMRs. We divided the observed mortality by the expected mortality. Expected mortality was calculated from the Vital Statistics in Japan after controlling for age (in groups of five years), gender, and period. To control the period, we averaged the mortality rates from the Vital Statistics of 2005, 2010, 2015. We used a Poisson test to calculate 95% confidence intervals for the SMRs. Univariate analysis was performed to examine the factors associated with all-cause mortality and suicide rates using the Cox proportional hazards ratio model. The variables included in the univariate analysis were age, gender, primary psychiatric diagnosis (ICD-10), criminal behaviors that were the cause of the patient being subject to the MTSA, and substance use problems. We defined statistical significance at $p < 0.05$ in this study.

2.5. Ethical considerations

This study was approved by the Ethics Committee of the National Center of Neurology and Psychiatry and conducted in accordance with the Declaration of Helsinki. Further, this study conformed with the recommendations of the Ethical Guidelines for Medical and Health Research Involving Human Subjects (partially revised on February 28, 2017), which was established by the Ministry of Education, Culture, Sports, Science and Technology and the Ministry of Health, Labour, and Welfare in Japan.

3. Results

3.1. Demographic data

The demographic data are described in Table 1. The sample included 966 forensic psychiatric outpatients who were discharged from Japanese forensic psychiatric wards. There were 3.3 times as many men ($n = 739$) participating than women ($n = 227$). The mean age was 47.3 ($SD = 12.9$), and there were no significant age differences by gender. The most common primary psychiatric diagnoses were psychotic disorders (81.3%), followed by mood disorders (8.3%). Men were more likely to be diagnosed with psychotic disorders, while women were more likely to have mood disorders. The most common criminal behaviors were inflicting bodily injury and homicide. Compared to women, men were more likely to have

Table 2
Causes of death and methods of suicidal behavior.

	men and women	men	women	test statictics	P-value
Mean age at death (SD)	48.7 (12.7)	47.7 (14.0)	50.1 (10.5)	t-test	0.705
Mean follow up period till death, days (SD)	480.1 (328.6)	429.4 (334.8)	552.6 (330.8)	t-test	0.465
Mean follow up period till first suicide behavior, days (SD)	494.1 (324.4)	535.3 (339.4)	419.9 (297.5)	t-test	0.377
Mean follow up period till completed suicide, days (SD)	556.9 (348.2)	556.2 (400.0)	557.6 (335.9)	t-test	0.995
Causes of death, n					
suicide	10	5	5		
disease	3	1	2		
accident	3	3	0		
suffocation	1	1	0		
total	17	10	7		
Methods of suicidal behavior, n (completed)					
overdose	9 (1)	6	3 (1)		
jumping off	7 (3)	4 (2)	3 (1)		
hanging	5 (4)	4 (3)	1 (1)		
cutting	4 (1)	2	2 (1)		
bruise by oneself	2	2	0		
swalloing foreign materials	2	2	0		
self-immolation	1 (1)	0	1 (1)		
unknown	2	2	0		
total	32 (10)	22 (5)	10 (5)		

SD: standard deviation.

committed the crimes of bodily injury and sexual assaults. Women were more likely to have committed the crimes of homicide and arson compared to men.

The welfare facilities accounted for 40.8% of resident type at the time of discharging from forensic psychiatric wards. The follow-up period ranged from 3 days to 1826 days, with a mean follow-up of 790.2 days (*SD* = 369.6). The follow-up period for men was significantly longer than women. The total observation period was 2091.2 person-years.

3.2. All-cause mortality

Seventeen participants died during the follow-up period (Table 2), with a mean age at death of 48.7 years (*SD* = 12.7). Suicide was the most common cause of death while a natural cause of death was observed in only three cases. The mean period between discharge to death was 480.1 days (*SD* = 328.6). The cumulative probability of all-cause deaths was estimated to be 2.5% per 3 years (Table 3). The CR for all-cause death was 812.9 per 100,000 person-years (95% CI [426.5, 1199.4]). The SMR for all-cause death was 2.2 (95% CI [1.3, 3.5]). For men, there was no significant difference between our sample and the general population regarding SMR.

3.3. Suicide

Suicidal behaviors were observed in 28 patients, representing 32 cases. Completed suicides were observed in 10 patients (Table 2). The mean follow-up period to completed suicide was 556.9 days (*SD* = 348.2). Four of ten patients completed suicide within one year of discharge, specifically within 12 days, 198 days, 265 days, and 325 days.

The most common forms of suicidal behaviors were overdose (28.1%), jumping off (21.9%), hanging (15.6%), and cutting (12.5%). The cumulative probability for suicidal behavior was 3.9% per 3 years, and the CR was 1355.2 per 100,000 person-years (95% CI [853.2, 1857.2]). The most common methods of completed suicide were hanging (40.0%) and jumping off (30.0%). The cumulative probability for completed suicide was 1.6% per 3 years, and the CR for completed suicide was 478.2 per 100,000 person-years (95% CI [181.8, 774.6]). The suicide SMR of women was approximately ten times higher than that of men, and the univariate analysis showed that women had higher completed suicide risk than men (Table 4).

Fourteen patients with psychotic disorders died during the follow-up period, with eight patients dying by suicide. The cumulative probability was 2.7% per 3 years in all-cause death and 1.7% in completed suicide. There were no major differences in all-cause mortality and suicide rates when compared to the overall sample (Table 3).

4. Discussion

This study used a cohort design that was conducted through a collaboration with the 29 of 33 forensic psychiatric wards in Japan. Thus, this represents one of the largest studies reporting the all-cause mortality and suicide rate among forensic psychiatric outpatients discharged from forensic psychiatric wards in Japan. Reintegration coordinators from the Ministry of Justice completed questionnaires on outpatient prognosis. Thus, the withdrawal rate was low, and reliable data were collected.

The results showed the all-cause mortality and suicide death rate were higher than the rate observed in the general population.

4.1. All-cause mortality

There are several reports regarding patient mortality following from forensic psychiatric wards that have shown a higher all-cause mortality rate compared to the general population [12–15]. Our study showed that all-cause death mortality was higher among the discharged patients in our sample than in the general population, which is consistent with the findings of previous studies. The CR for all-cause death was relatively low compared with the result of a prior meta-analysis [5]. All-cause SMR for the whole group was almost the same as in a study of patients with a restriction order in the United Kingdom [17] and was lower than that reported in the Swedish study [13] as well as the study relating to patients discharged from medium secure hospitals in the United Kingdom [15].

Patients with psychiatric disorders have a higher mortality risk compared to the general population because of unhealthy lifestyles, lifestyle diseases, higher smoking rates, the side effects of antipsychotic disorders, and poor access to medical care [26,27]. However, natural causes of death accounted for only 17.6% (3/17) of all-cause death in our study. Direct comparison of the rates of the natural course of death found in previous studies is difficult because the studies have been conducted in different settings and differ-

Table 3
Cumulative probability per 3 years, CRs (100,000 person-years) and SMRs.

	men and women cumulative probability (%)	CR (95%CI)	SMR (95%CI)	men cumulative probability (%)	CR (95%CI)	SMR (95%CI)	women cumulative probability (%)	CR (95%CI)	SMR (95%CI)
All participants									
all cause of death	2.5	812.9 (426.5–1199.4)	2.2 (1.3–3.5)	1.8	613.9 (233.4–994.4)	1.2 (0.6–2.2)	5.0	1514.2 (392.5–2635.9)	5.7 (2.3–11.7)
suicidal behavior	3.9	1355.2 (853.2–1857.2)		3.7	1117.3 (601.2–1633.5)		6.3	2197.3 (835.4–3559.2)	
completed suicide	1.6	478.2 (181.8–774.6)	17.9 (8.6–32.9)	1.0	306.9 (37.9–576.0)	7.7 (2.5–18.0)	3.7	1081.7 (133.5–2029.6)	79.4 (25.8–185.2)
Patients with psychotic disorders									
all cause of death	2.7	823.0 (391.9–1254.2)	2.6 (1.4–4.3)	1.8	580.2 (178.2–982.3)	1.3 (0.6–2.6)	6.6	1861.9 (372.1–3351.7)	8.5 (3.1–18.5)
suicidal behavior	3.7	1187.9 (667.3–1708.5)		3.2	1025.7 (488.4–1563.0)		6.1	1882.2 (376.1–3388.3)	
completed suicide	1.7	470.3 (144.4–796.2)	17.7 (7.6–34.8)	1.0	290.1 (5.8–574.4)	7.3 (2.0–18.7)	4.6	1241.3 (24.8–2457.7	91.6 (25.0–234.5)

CR: crude rate; SMR: standardized mortality ratio; CI: Confidence interval.

Table 4
Univariate analysis using the Cox proportional hazards model.

	Hazard ratio	95%CI	P-value
All-cause mortality			
Age	1.005	0.969–1.043	0.79
Sex			
male	1 (Reference)		
female	2.472	0.940–6.499	0.066
Primary psychiatric diagnosis			
F1	1.134	0.071–18.131	0.929
F2	1.443	0.190–10.971	0.723
F3	1 (Reference)		
Others	3.067	0.192–49.041	0.428
Substance use problems before admission to a forensic psychiatric ward	1.458	0.555–3.831	0.444
Criminal behaviors as cause of being subject to the MTSA			
homicide	1.002	0.290–3.461	0.997
bodily injury	1 (Reference)		
arson	1.462	0.423–5.050	0.548
robbery	0.000		0.981
sexual assaults	3.220	0.625–16.601	0.162
Suicidal behavior			
Age	0.989	0.960–1.019	0.455
Sex			
male	1 (Reference)		
female	2.007	0.926–4.350	0.078
Primary psychiatric diagnosis			
F1	1.483	0.332–6.627	0.606
F2	0.676	0.201–2.273	0.526
F3	1 (Reference)		
Others	1.010	0.105–9.708	0.993
Substance use problems before admission to a forensic psychiatric ward	0.692	0.294–1.629	0.400
Criminal behaviors as cause of being subject to the MTSA			
homicide	1.317	0.491–3.538	0.584
bodily injury	1 (Reference)		
arson	1.952	0.727–5.242	0.184
robbery	2.124	0.441–10.226	0.348
sexual assaults	1.158	0.142–9.414	0.891
Completed suicide			
Age	0.999	0.952–1.049	0.970
Sex			
male	1 (Reference)		
female	3.599	1.041–12.445	0.043*
Primary psychiatric diagnosis			
F1	1.137	0.071–18.184	0.928
F2	0.819	0.102–6.552	0.851
F3	1 (Reference)		
Others	0.000		0.988
Substance use problems before admission to a forensic psychiatric ward	0.520	0.111–2.451	0.409
Criminal behaviors as cause of being subject to the MTSA			
homicide	1.340	0.300–5.988	0.702
bodily injury	1 (Reference)		
arson	0.976	0.163–5.843	0.979
robbery	0.000		0.985
sexual offences	2.667	0.277–25.642	0.396

MTSA: Medical Treatment and Supervision Act; *$p < 0.05$.

ent countries. Thus, an appropriate comparison may be a study examining the natural course of death among a sample of general psychiatric patients with severe mental illness who were discharged from long-term hospitalization in Japan [28] with an average age was 50.0 years and estimated mean follow-up period was 7.8 years; the study reported that a natural cause of death accounted for 73.3% of all of deaths. Compared to that study, our observed proportion for a natural cause of death was low though it should be noted that our sample was younger, and the follow-up period was shorter.

This low rate of death from natural causes may be due to the forensic outpatient treatment order under the MTSA. During an outpatient treatment order under the MTSA, patients are mandated to attend designated outpatient medical institutions to receive psychiatric outpatient treatment regularly. Further, various community resources such as psychiatric hospitals, general hospitals, mental health and welfare centers, visiting nursing, and daycare for psychiatric patients are utilized to maintain the continuous psychiatric and physical treatment for patients [29]. Those medical and psychosocial supports were coordinated by reintegration coordinators who received advice from the patients' psychiatrist belonging to the designated outpatient medical institutions.

Fazel et al. suggested that forensic outpatients in England and Wales had lower mortality rates compared to patients in other countries, as they had a more developed community forensic psychiatry program that included a liaison with primary care [5]. Additionally, in Australia, Segal et al. reported that one form of outpatient treatment—community treatment orders (CTOs) —was associated with lower mortality risk for patients who had a history of psychiatric hospitalization via facilitated access to medical care [30].

Careful medical and psychosocial supports for outpatient treatment under the MTSA may be associated with the low rate of death by natural causes. However, the actual mortality rate among MTSA individuals may, in fact, be higher than the study findings show given that some patients who were not included in the study could have died.

4.2. Suicide

The first months following discharge from a psychiatric hospital have been shown to be a high-risk period for suicide [31–33]. Similarly, studies of released prisoners have shown a high risk for suicide in the year after release from prison, particularly in the first few weeks following release [34,35]. In forensic psychiatric outpatients, an increased risk for suicide continued for several years following discharge from forensic psychiatric wards [22,23]. In our study, one case of completed suicide was observed within two weeks of discharge, but in the other cases, we observed a stable rate over three years.

It should be noted that rates of completed suicide vary greatly across developed countries. For example, the suicide rate in Japan is almost twice as much as that in the United Kingdom [36]. Thus, the CR for completed suicide may not be appropriate for comparison with the completed suicides rate in forensic psychiatric patients across countries. SMR for suicide may be a more appropriate method of comparison for existing international research.

As expected, our sample also had a significantly higher risk for completed suicide compared with the general population of Japan. The crude rate for suicide was relatively higher than that observed in previous studies from other countries [5], but the SMR for suicide was almost the same as that in previous research of multiple countries [15,22,23].

Suicide SMR for general psychiatric patients with severe mental illness who were discharged after long-term hospitalization in Japan was 7.38 (95% CI 2.40–17.22), and suicide death accounted for 11.1% of all deaths in this population [28]. Compared with that study, SMR for suicide in our sample was relatively high and suicide death proportion of all of deaths was high. We supposed that the outpatient treatment orders under the MTSA are insufficient as a means of preventing suicide deaths, suggesting that more effort is needed to develop effective suicide prevention for forensic psychiatric outpatients in Japan.

In general population, completed suicide rates for men is higher than for women in most countries, including Japan [36]. Further, among patients with mental illness, gender differences in completed suicide rates vary [6,37,38]. Studies of released prisoners showed higher suicide SMR in women [11,34,39]. In our study, suicide SMR for women was higher than that for men as with previous prisoners' studies. Univariate analysis also showed that women had significantly higher completed suicide risk than did men; however, this finding must be interpreted carefully because of the small number of suicide deaths. Further studies are needed to confirm that women had higher a suicide risk.

No known previous research has described suicide attempts of forensic psychiatric outpatients in detail. In the general population, previous studies report that women are more likely to make suicide attempts than men [40,41], that the most common completed suicide method was hanging [42], and the most prevalent methods of suicide attempt was overdose [40,42,43].

Unlike these previous general population studies, in the present study, there was no significant difference in suicidal behavior risk between men and women in univariate analysis. On the other hand, overdose was the most prevalent method for a suicide attempt, and hanging was the most prevalent method for completed suicide; these results agreed with previous general population studies.

4.3. Forensic psychiatric outpatients with psychotic disorders

In the Japanese legal system, offenders with personality disorders are conventionally assessed as having full criminal responsibility making them rarely mandated to treatment by an order under the MTSA [44] because the MTSA targets only patients with insane or diminished responsibility. After insanity or diminished responsibility is determined, patients are adjudged either to receive treatment under the MTSA or not. To receive treatment order under the MTSA, treatment possibility for psychiatric diagnosis is necessary, which is primarily determined by the availability of effective psychiatric drug therapy. Consequently, patients whose primary psychiatric diagnoses were dementia, intellectual disabilities, and pervasive developmental disorder were rarely included under the MTSA.

It is estimated that some patients with mood disorders were deemed to not require admission to forensic psychiatric wards, as mood disorders had often remitted by the time of court judgement; these individuals may have fewer social problems than patients with other forms of mental illness, such as psychotic disorders. For these reasons, patients with psychotic disorders accounted for about 80% of our sample and among all forensic psychiatric inpatients in Japan (Appendix A) [45].

A systematic review reported that the all-cause SMR of patients with schizophrenia was 2.58 (90% CI [1.18, 5.76]) [7]. The one-year all-cause SMR for the patients with schizophrenia discharged from general psychiatric hospitals showed that the SMR for suicide was approximately 20 [19]. In our study, the SMR for all-cause death was nearly identical to a systematic review of patients with schizophrenia. The SMR for suicide was relatively high compared to a long-time follow-up study of general psychotic patients [46] but was similar to a study of patients with schizophrenia which examined a short observational period after patient discharge from general psychiatric hospitals [19].

4.4. Limitations

There are several limitations to this study that are worth noting. First, the follow-up period was shorter than that in previous studies as the period of forensic outpatient treatment under the MTSA is typically three years and at most five years. Thus, we were unable to evaluate long-term outcome after discharge from forensic psychiatric wards.

Second, for ethical reasons, our research only included patients who consented to participate; thus, we are unable to know how

many of the 50% of individuals not included in the study committed suicide or died from other causes. However, we were able to compare our sample with the patients who were mandated to receive inpatient treatment under the MTSA in Japan [45], and there were no major differences regarding age, gender, primary psychiatric diagnosis, and the type of criminal behavior (Appendix A). For this reason, we supposed that our sample is generally representative of this population.

Third, we could collect data on only the primary psychiatric diagnosis; therefore, we could not collect details on psychiatric comorbidity. Further investigation is necessary to identify the influence of comorbid psychiatric disorders.

Fourth, we only performed univariate analysis to identify associated factors with all-cause death and suicides. From a statistical perspective, we decided that it is inadequate to introduce multivariate analysis because of the small number of observations.

5. Conclusion

This study is the first empirical research examining the prognosis of forensic psychiatric outpatients who have been discharged from forensic psychiatric wards in Japan. In summary, we reported the all-cause mortality, completed suicide rate, and suicidal behaviors rate. All-cause and suicide SMRs in them were higher than in the general population as has been shown in previous studies.

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Declaration of Competing Interest

All authors declared that there are no conflicts of interest associated with this article.

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Appendix A

Appendix Demographic data, comparison between our sample (n = 966) and all inpatient (n = 2175)

	this study	Kono [45] (all inpatients between 2005 and 2014)
Men (%)	739 (76.5)	1688 (77.6)
Mean age, years (SD)	47.3 (12.9)**	44.3 (13.7)***
Primary psychiatric diagnosis (ICD10)		
F0, n (%)	12 (1.2)	54 (2.5)
F1, n (%)	73 (7.6)	152 (7.0)
F2, n (%)	785 (81.3)	1742 (80.1)
F3, n (%)	80 (8.3)	120 (5.5)
F4, n (%)	2 (0.2)	15 (0.7)
F5, n (%)	1 (0.1)	2 (0.1)
F6, n (%)	3 (0.3)	20 (0.9)
F7, n (%)	6 (0.6)	31 (1.4)
F8, n (%)	3 (0.3)	28 (1.3)
F99, n (%)	1 (0.1)	
others, unknown		11 (0.5)
total	966 (100.0)	2175 (100.0)
Criminal behaviors as cause of being subject to the MTSA*		
homicide, n (%)	330 (34.0)	728 (33.5)
bodily injury, n (%)	332 (34.2)	742 (34.1)
arson, n (%)	224 (23.1)	519 (23.9)
robbery, n (%)	43 (4.4)	92 (4.2)
sexual assaults, n (%)	41 (4.2)	94 (4.3)
total	970 (100.0)	2175 (100.0)

SD: standard deviation; MTSA: Medical Treatment and Supervision Act; *four patients offended two type of criminal behaviours in our sample.

**mean age at discharging from forensic psychiatric wards, ***mean age at admitting to forensic psychiatric wards.

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