Received: 16 September 2024 | Revised: 27 November 2024 | Accepted: 4 December 2024

DOI: 10.1002/pcn5.70047

ORIGINAL ARTICLE

PCN Reports Psychiatry and Clinical Neurosciences Open Access

The COVID-19 pandemic-induced behavioral restrictions and their impact on child and adolescent psychiatric units—Infection control or freedom

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Funding information
National Center for Global Health and Mecine, Grant/Award Number: 24A1014; National Center for Glonal Health and Medicine, Grant/Award Number: 24rin005

Abstract

Aim: This study examines the impact of COVID-19 pandemic-induced behavioral restrictions on child psychiatric inpatients in Japan, particularly focusing on limitations placed on outings and overnight stays as infection-control measures.

Methods: Data were collected from inpatients from the children's mental health registry between January 2016 and December 2022. The clinical data, such as age, gender, diagnosis, result of polymerase chain reaction (PCR) tests, frequency of outings and overnight stays before and after the pandemic, were compared.

Results: During the COVID-19 pandemic, the decrease in both outings and overnight stays among child psychiatric inpatients in Japan was statistically significant. As a result, home interactions with families decreased. In addition, diagnoses of hospitalized children increased significantly in cases of eating disorders and decreased in diagnoses of autism spectrum disorders.

Conclusion: These results underscore the need for flexible, individualized approaches to infection control that consider the mental health of hospitalized children.

KEYWORDS

adolescent, child, COVID-19, pandemic, psychiatric unit

INTRODUCTION

The COVID-19 pandemic has had a profound impact on people's lives worldwide, with children and adolescents with pre-existing mental health issues being particularly vulnerable. The pandemic exacerbated their symptoms due to school closures, reduced social activities, increased domestic stress, and anxiety about infection.[1,2] Furthermore, the pandemic's prolonged duration (over 4 years) has taken a toll on children's physical and mental well-being, which included anxiety, depression, and eating problems.[3–8]

The pandemic sparked a significant increase in awareness about children's mental health issues, particularly after the initial school closures, which led to increased demand for psychiatric care. Initially, the demand for treatment decreased; however, it subsequently surged, resulting in extended waiting periods.[9,10] Notably, there was a marked increase in cases of suicidal crises, anxiety disorders, eating disorders, and severe depressive episodes.[1,9,11,12]

The pandemic altered the mental health care landscape, showing a decrease in child and adolescent admissions but an increase in the age of those requiring hospitalization.[10] There was also a rise in psychiatric intensive care unit admissions, notably due to intentional drug overdoses.[13] However, many psychiatric services were partially shut down or adapted to accommodate COVID-19 patients,[11,14] facing staff and protective equipment shortages while maintaining responsiveness. Changes in emergency psychiatric responses included a decrease in visits but an increase in the age of visitors, with reasons for emergency care, such as suicidal ideation and mood disorders, remaining consistent.[10]

Overall, the pandemic had a profound impact on child and adolescent psychiatric care, marked by increased treatment demand, a higher average age of hospitalized patients, and a surge in telemedicine utilization. This necessitated organizational changes within psychiatric services and provided important lessons for future pandemic response and psychiatric care provisioning.

In Japan, the pandemic has exacerbated the strain on child psychiatric care, particularly due to the scarcity of specialized wards. Inpatient psychiatric treatment entails essential care and education for children with severe mental disorders, ensuring their human rights are protected. However, during the pandemic, infection-control measures have sometimes restricted patients' freedoms, including limitations on outings, overnight home stays, visitor access, and obligatory polymerase chain reaction (PCR) tests. While aimed at controlling infection, these measures may have unintended negative consequences, potentially affecting the mental health and recovery of hospitalized patients and their families.

In Japan, the lack of an integrated approach to evidence-based policy-making (EBPM) in psychiatric services is a significant challenge. While balancing free hospitalization with effective infection control is crucial, current policies and support for children's mental health lack a robust evidence-based foundation. To address this challenge, it is imperative to improve the psychiatric care system and mechanisms for data collection, analysis, and dissemination. However, there is a paucity of data about the activities of children in the child and adolescent psychiatric units in Japan.

This study examined the impact of the pandemic on the freedom of child psychiatric inpatients, emphasizing the urgent need for EBPM based on the US Centers for Disease Control and Prevention's model.[15,16] The hypothesis of this study was that restrictions on outings and overnight home stays for child and adolescent psychiatric inpatients during the pandemic were restricted as part of infection-control measures compared to before the pandemic.

METHODS

Study setting

This study population comprised patients who sought treatment at the Department of Child and Adolescent Psychiatry, Kohnodai Hospital, National Center for Global Health and Medicine (NCGM) in Japan between January 2016 and December 2022. All participants were under 15 years of age at their initial visit. The initial interview forms, containing demographic and clinical characteristics, were administered by psychologists and psychiatrists, and suicide-related behaviors, including suicide attempts and self-harm, were also identified at that time. Patients were diagnosed and treated by psychiatrists specializing in child and adolescent psychiatry according to the ICD-10 Classification of Mental and Behavioural Disorders.

We analyzed clinical data about elementary and junior high school students from the Child and Adolescent Mental Health Registry. This registry, approved by the Ethics Committee of the NCGM, contains comprehensive clinical information on children who visited the Department of Child and Adolescent Psychiatry at Kohnodai Hospital, NCGM, since January 2016. The registry was created using an opt-out consent process, and all data were anonymized to ensure confidentiality.

Study design

Data regarding the following variables were retrieved from the registry: age, gender, diagnosis, dates of admission and discharge, duration of admission, number of outings and overnight home stay with their families, and the number and results of PCR tests received by inpatients. There are preset rules for conducting PCR tests on hospitalized children. Although it is mandatory to perform PCR before hospitalization, this PCR test was not included in this study because it is an outpatient test and a positive result would not allow hospitalization. In addition, PCR testing was performed if the patient had an overnight homestay of 4 nights and 5 days or more during hospitalization. PCR testing was performed using nasal swabs if the patient had symptoms such as sore throat or fever; in the absence of these symptoms, saliva was used. Nasal examination was also performed as a screening test if a family member or a patient in the same room had symptoms.

We performed statistical tests to determine if there was a significant difference in the number of outings and overnight home stays between the pre-pandemic period and after the onset of the pandemic. This study defined the pandemic period as starting in March 2020 based on the decision made by the government Headquarters for COVID-19 Response on February 25, 2020.

Our child and adolescent psychiatry unit has maintained an annual bed occupancy rate of over 96% from pre-pandemic to post-pandemic, and the number of children admitted and discharged from the hospital has varied extremely widely from year to year. Therefore, in order to utilize more prepandemic real-world registry data, the following target groups of data were defined. Since the Children's Mental Health Registry has been accumulating data since January 2016, the registry data until the end of 2023 were used for the analysis of inpatient treatment data and were divided into two groups: the before-the-pandemic group, from January 2016 to February 2020 (49 months); and the during-the-pandemic group, from March 2020 to December 2023 (35 months).

Statistical analyses

Categorical variables were compared between the pre-pandemic and pandemic periods using Fisher's exact test (primary outcome). To identify factors affecting the positivity rate, regression analysis was conducted using the following variables: age, hospitalization days, number of outings, number of overnight home stays, number of PCR tests, and PCR test methods (saliva or nasal swabs).

All statistical tests were two-tailed, and $ps < 0.05$ were considered indicative of statistical significance. Variables with a significant difference ($p < 0.05$) in terms of the primary outcome were included in the multivariate logistic regression analysis (secondary outcome). Statistical analyses were performed using PRISM Version 14.0.

RESULTS

Description of inpatient number, age, gender, and diagnosis

Table 1 shows the age and gender distribution of the hospitalized patients. There was a significant difference in the gender distribution before and during the pandemic, particularly a decrease in the number of boys and an increase in the number of girls during the pandemic. However, there was no significant difference in age between the pre-pandemic and pandemic periods.

Table 2 shows the number of patients in each diagnostic category from F1 to F9 in ICD-10 before and during the pandemic. Comparisons in terms of number of patients are not appropriate due to the differences in the reference periods. A notable finding is the significant increase in the number of patients with F5 (eating disorders) during the pandemic. The number of patients with F8 (pervasive developmental disorder) decreased significantly, from 78 to 40.

Number of admissions, outings, overnight stays, and PCR tests

Table 3 shows the statistics on the age of hospitalized patients, duration of hospitalization, number of outings and overnight home stays, and number of PCR tests and results. There was no significant change in the duration of hospitalization after the onset of the pandemic ($t(354) = 0.85$, $p = 0.396$). However, there was a significant decrease in the number of outings ($t(354) = 2.53$, $p = 0.012$) and the number of overnight home stays ($t(354) = 7.59$, $p < 0.001$) during the pandemic.

A total of 356 saliva tests and 435 nasal swab tests were performed on hospitalized children during the pandemic. The positivity rate of saliva tests (0.84%) was significantly lower than that of nasal tests (8.05%, $p < 0.001$). A mean of 2.20 saliva tests and 2.69 nasal tests were performed during hospitalization. To compare these positive rates, we divided the positive rate of nasal tests by the positive rate of saliva tests and found that nasal tests were approximately 9.58 times more likely to be positive than saliva tests.

Table 4 shows the results of the regression analysis using mean, standard deviation (SD), coefficient, standard error, and *p*-value for each variable. The mean age was 13.32 years (SD = 1.4 years), the mean hospitalization duration was 282.62 days (SD = 192.22 days), the mean number of outings was 7.47 (SD = 14.39), and the mean number of overnight home stays was 12.49 (SD = 13.67). The respective regression coefficients and standard errors were 0 and all *p*-values were insignificant.

TABLE 1 Distribution of age and gender of inpatients.

	Before the pandemic Jan/2016–Feb/2020 (49 months)			During the pandemic Mar/2020–Dec/2023 (35 months)			
	Boys	Girls	Total	Boys	Girls	Total	*p*-value
Number	115	79	194	57	105	162	$p < 0.001$
Age (years)	13.0 ± 1.7	13.5 ± 1.3	13.2 ± 1.6	13.4 ± 1.3	13.4 ± 1.2	13.2 ± 1.4	NS
Abuse experiences	9.75%	16.43%	12.65%	42.86%	21.28%	23.23%	$p < 0.001$
School refusal	42.60%	53.52%	47.35%	50.00%	62.41%	61.29%	$p = 0.05$

In contrast, the regression analysis revealed significant effects for the mean number of PCR tests, saliva tests, and nasal swab tests. Specifically, the mean number of PCR tests (4.65, SD = 3.96) had a negative effect (regression coefficient −0.13, standard error [SE] 0.01, $p < 0.01$). However, the mean number of saliva tests (2.2, SD = 2.47) and nasal tests (2.69, SD = 2.52) both had positive effects, with regression coefficients of 0.12 (SE 0.01, $p < 0.01$) and 0.13 (SE 0.01, $p < 0.01$), respectively.

Table 5 shows the results of the regression analysis for outings and overnight home stays. The results showed that for each additional day of hospitalization, the number of outings increased by approximately 0.045, and that an increase in the number of PCR tests had no significant effect on the number of outings. However, the number of nasal and saliva tests also had no significant effects on the number of outings. Neither nasal nor saliva positivity rates had a significant effect on the number of outings. However, there was a tendency for the number of outings to decrease approximately 2.71 times during the pandemic, but this was not statistically significant.

Conversely, for every 1-year increase in age and every additional day of hospitalization, the number of overnight home stays increased. Conversely, for every additional PCR test, the number of overnight home stays decreased by approximately 0.77, a statistically significant decline. Neither the number of nasal tests nor saliva tests had a significant impact on the number of overnight home stays, nor did the positivity rates of these tests. However, the number of overnight home stays decreased by a factor of approximately 13.17 during the pandemic, a highly statistically significant finding ($p < 0.001$).

However, the coefficient of determination (R^2) for outing was 0.330, and that for overnight home stay was 0.648. This indicates that the model for the number of overnight home stays has a better ability to explain overnight behavior.

TABLE 2 Distribution of inpatients by diagnosis.

ICD-10 category	Before the pandemic	During the pandemic
F1	0	1
F2	3	5
F3	10	14
F4	54	52
F5*	19	34
F7	3	3
F8*	78	40
F9	26	13
Total	194	162

*$p < 0.001$.

DISCUSSION

The results of this study suggest that although the pandemic affected the number of people in certain psychiatric populations, there was no significant change in the age groups.[17]

This study confirmed the hypothesis that the novel coronavirus pandemic significantly restricted outings and overnight home stays for children hospitalized for psychiatric disorders. While these measures were necessary for infection control, they had varying impacts on the mental health of children. Previous studies have demonstrated that pandemic-related behavioral restrictions can increase the risk of poor mental health in children.[1–3,18–20] The high level of dissatisfaction and stress associated with these restrictions may exacerbate mental health issues, potentially increasing the risk of rehospitalization and suicide among children with severe mental illnesses. Japan has a Mental Health Welfare Law, which strictly regulates the protection of the human rights of all mentally ill patients, from children to adults. For example, voluntary hospitalization does not allow for restrictions on going out or staying overnight. Before the pandemic, the policy was that the patient was free to stay overnight or go out if his/her mental condition was stable in our child and adolescent psychiatric unit before the pandemic. Overnight stays on weekends when most children are out of school have been in place for many decades. These independent outings and overnight stays were integrated into the inpatient treatment strategy in this unit as a major factor in promoting children's independence.

Therefore, it is crucial to implement restrictions on outings and overnight home stays in a manner that also supports children's mental health. This can include regular mental health assessments, personalized interventions, and provision for alternative activities that promote social interaction and psychological well-being.

TABLE 3 Duration of hospitalization, going out, overnight stay, and polymerase chain reaction (PCR) tests.

	Before the pandemic			During the pandemic		
	Mean	SD	*n*	Mean	SD	*n*
Duration of hospitalization	305.3	280.9	194	282.6	192.2	162
Inpatient outings	14.8	35.6	194	7.5	14.4	162
Inpatient overnight home stays	35.1	34.1	194	12.5	13.7	162
Number of PCR tests	0.0	0.0	194	7.6	6.4	162

However, previous studies suggested that the number of children diagnosed with certain mental disorders had changed. The number of children worldwide with eating disorders increased after the pandemic.[17] The COVID-19 pandemic did not necessarily increase the prevalence of autism spectrum disorder (ASD) but has significantly exacerbated the psychiatric, behavioral, and emotional challenges faced by individuals with ASD.[21,22]

In this study of only hospitalized children compared before and after the pandemic, also uncovered two notable trends during the pandemic: an increase in eating disorders, and a decrease in ASD. The rise in eating disorders may have filled the limited number of beds available in child psychiatric wards, potentially preventing children with ASD from receiving necessary hospitalization for critical issues, such as suicide attempts. This is particularly concerning, given the rising rates of child suicide and neurodevelopmental disorders in Japan.[15,16] It is plausible that bed shortages prevented children with ASD from accessing essential inpatient services during the pandemic.

TABLE 4 Factors impacting polymerase chain reaction (PCR) positivity of children in the child and adolescent psychiatric unit.

	Coefficient	Standard error	*p*-value
Age	0	0	0.92
Duration of hospitalization	0	0	0.12
Inpatient outings	0	0	0.22
Inpatient overnight home stays	0	0	0.17
Number of PCR tests	−0.13	0.01	<0.01
PCR tests by saliva	0.12	0.01	<0.01
PCR tests by nasal swabs	0.13	0.01	<0.01

These findings suggest that restrictions on outings and overnight home stays with parents may have had a detrimental impact on parent–child relationships by exacerbating social isolation.

Regularly warm emotional interactions with family are indispensable in the psychiatric treatment of children who have experienced difficulties in their lives, including family relationships at home.

In Japan, a new Agency for Children and Families was established in 2022 to address the declining birthrate and aging society. Furthermore, the Japan Institute for Health Security will be established as a national center for infection control in Japan in 2025, as new infectious diseases are likely to spread in the future. Therefore, the issue of appropriate treatment for children's mental health with due consideration for human rights and measures to combat new infections is a major challenge. Clinicians for children's mental health should carefully assess the necessity of such restrictions and implement flexible measures that accommodate individual psychological needs. For instance, alternative activities, such as group therapy, virtual social interactions, and supervised outdoor activities, can help mitigate the adverse effects of these restrictions.

CLINICAL IMPLICATIONS

The primary reason for the reduction in outings and overnight home stays with the family during the pandemic was the implementation of infection-control measures aimed at preventing COVID-19 spread within the hospital. To minimize exposure risk, patients' activities were severely curtailed, with negative PCR test results often required before permitting outings or overnight home stays. The anxiety and stress associated with the pandemic may have also diminished patients' willingness to engage in these activities. Additionally, the broader societal impact of the pan-

TABLE 5 Regression analysis for inpatient outings and overnight home stays.

	Inpatient outings			Inpatient overnight home stays		
Variable	Coefficient	SD	*p*-value	Coefficient	SD	*p*-value
Age	−5.44	0.87	0.00	2.06	0.65	0.00
Duration of hospitalization	0.05	0.01	0.00	0.09	0.00	0.00
Number of PCR tests	−0.17	0.25	0.52	−0.77	0.19	0.00
Number of saliva tests	0.19	0.45	0.67	−0.21	0.34	0.53
Number of nasal tests	−0.55	0.83	0.51	−0.35	0.62	0.57
Gender	−3.84	2.60	0.14	−1.80	1.94	0.35
Positive rate of saliva tests	0.85	10.29	0.93	−2.66	7.68	0.73
Positive rate of nasal tests	−19.13	68.57	0.78	22.47	51.16	0.66
Before or during the pandemic	−2.71	3.43	0.43	−13.17	2.56	0.00

demic, including canceled events and reduced opportunities for social interaction, likely further limited these activities. The hospital's operational policies prioritizing infection control directly contributed to the reduction in outings and overnight home stays, with additional factors like public transportation risks and staff shortages exacerbating the situation. As practiced in other domestic institutes, it is important to convey correct information on infection control to children and their parents/guardians. In the event of a pandemic, contradictory information about infection-control measures may be found on the internet and other sources. Therefore, medical personnel should provide clear and sufficient communication of this information to patients and their families before they go out or stay overnight from the hospital.

LIMITATIONS

Some imitations of this study should be acknowledged. First, owing to the single-center scope of this study, the findings may not be representative of the situation in Japan. Second, variations in the frequency and criteria for conducting PCR tests may have influenced the restrictions on outings and overnight home stays, potentially introducing an element of bias. There were no studies discussed about restrictions of inpatients in the child and adolescent psychiatric unit. There are several papers on PCR in community samples, but the positive rates vary by region and period and are not comparable. The main hypothesis of the present article is a comparison of behavioral restrictions in children undergoing inpatient treatment during a pandemic. Third, the specific effects of these restrictions on children's mental health were not directly measured, making it unclear how these limitations impacted their psychological state and long-term health. Moreover, the study did not provide a detailed discussion of the background and other factors related to the decline in ASD patients.

AUTHOR CONTRIBUTION

Masahide Usami, Mayuna Ichikawa, Miki Matsudo, Mutsumi Ohashi, Yui Higashino, Yusuke Kono, Haruna Matsudo, Yuki Nomura, Minjae Ma, Yuuki Sakoh, Maiko Odaka, Kotoe Itagaki, Keita Yamamoto, Momoka Takahashi, Yuta Yoshimura, Saori Inoue, Masahiro Ishida, Kumi Inazaki, Yui Higashino, and Yuki Mizumoto acquired the data. Masahide Usami and Yoshinori Sasaki analyzed and interpreted the data. Masahide Usami wrote the paper.

ACKNOWLEDGMENTS

The authors would like to thank all their colleagues in the Department of Child and Adolescent Psychiatry, Kohnodai Hospital, National Center for Global Health. This study was funded by NCGM (24A1014 and 24rin005).

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

N/A.

ETHICS APPROVAL STATEMENT

We analyzed clinical data about elementary and junior high school students from the Child and Adolescent Mental Health Registry. This registry, approved by the Ethics Committee of the NCGM, contains comprehensive clinical information on children who visited the Department of Child and Adolescent Psychiatry at Kohnodai Hospital, NCGM, since January 2016.

PATIENT CONSENT STATEMENT

The registry was created using an opt-out consent process, and all data were anonymized to ensure confidentiality.

CLINICAL TRIAL REGISTRATION

N/A.

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How to cite this article: Usami M, Sasaki Y, Ichikawa M, Matsudo M, Ohashi M, Higashino Y, et al. The COVID-19 pandemic-induced behavioral restrictions and their impact on child and adolescent psychiatric units—Infection control or freedom. Psychiatry Clin Neurosci Rep. 2024;0:e70047. https://doi.org/10.1002/pcn5.70047