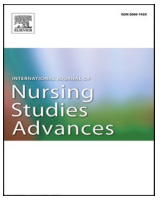
International Journal of Nursing Studies Advances 8 (2025) 100297

Contents lists available at ScienceDirect

International Journal of Nursing Studies Advances

journal homepage: www.sciencedirect.com/journal/international-journal-of-nursing-studies-advances



Effect of video-based trauma-informed care training for nursing staff on seclusion and restraint of psychiatric inpatients: A non-randomized controlled study

Michi Miyake [a], Megumi Hazumi [a], Kentaro Usuda [a], Takahiro Kawashima [b], Maiko Fukasawa [c], Hisateru Tachimori [b,d], Daisuke Nishi [a,e,*]

[a] Department of Public Mental Health Research, National Institute of Mental Health, National Center of Neurology and Psychiatry, Tokyo, Japan
[b] Department of Information Medicine, National Institute of Neuroscience, National Center of Neurology and Psychiatry, Tokyo, Japan
[c] Health Promotion Center, Fukushima Medical University, Fukushima, Japan
[d] Department of Health Policy and Management, Keio University School of Medicine, Tokyo, Japan
[e] Department of Mental Health, Graduate School of Medicine, The University of Tokyo, Tokyo, Japan

ARTICLE INFO

Keywords:
Trauma-informed care
Psychiatric hospital
Inpatient
Nursing staffs
Training program
Seclusion
Restraint

ABSTRACT

Background: Trauma-informed care, based on the belief that past traumatic experiences induce problematic behavior, is being promoted through various initiatives in the United States and other countries. The specific effect of training that focuses solely on trauma-informed care for reducing seclusion and restraint in psychiatric settings remains unknown. In this non-randomized controlled trial, we examined the effectiveness of a video-based trauma-informed care training program for nursing staff, with seclusion and restraint times as the outcome.

Methods: Six of the 11 participating hospitals interested in trauma-informed care training were allocated to the intervention group, while the remaining five were assigned to the control group. The intervention ran from November 2021 to January 2022 in Japan. Data were collected using a specialized psychiatric monitoring system from April 2020 to October 2021 pre-intervention and from February 2022 to January 2023 post-intervention. The difference-in-differences analysis compared seclusion and restraint times between the groups.

Results: During the data collection period, one hospital in the intervention group was excluded due to a change in ward function. Patients admitted to the remaining hospitals (5,050 in the intervention group and 4,830 in the control group) were included in the analysis. The analysis showed that the estimated difference-in-differences coefficient of average restraint time decreased significantly by -0.24 ($p = 0.01$) at 6 months post-intervention, although seclusion time was not significantly decreased.

Conclusions: From the results of this non-randomized controlled trial, we found that video training focused solely on trauma-informed care may effectively reduce restraint time for inpatients. This accessible approach has the potential for broader adoption in clinical practice and may help reduce the use of coercive measures.

Trial registration: The study was registered in the University Hospital Medical Information Network Clinical Trials Registry on 31 October 2021 (UMIN-CTR ID: UMIN000045879).

* Corresponding author at: Department of Mental Health, Graduate School of Medicine, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo, 113-0033, Japan.
E-mail address: d-nishi@m.u-tokyo.ac.jp (D. Nishi).

https://doi.org/10.1016/j.ijnsa.2025.100297
Received 2 September 2024; Received in revised form 13 January 2025; Accepted 20 January 2025
Available online 22 January 2025

What is already known about the topic

- While multi-component programs that include trauma-informed care have been reported to be effective in reducing seclusion and restraint, the effectiveness of trauma-informed care training solely has not been studied.
- Previous researchers on the effectiveness of multi-component programs that include trauma-informed care have conducted studies in small populations and under limited conditions.

What this paper adds

- Video-based trauma-informed care training for nursing staff may effectively reduce the use of restraints in psychiatric inpatients.
- The intervention did not significantly decrease seclusion time.
- Video training focused solely on trauma-informed care offers an accessible approach, potentially leading to wider adoption and further reductions in coercive measures.

1. Introduction

Coercive measures, such as seclusion and restraint, induce harmful physical and psychological consequences for inpatients. Reportedly, the estimated incidence of post-traumatic stress disorder after using seclusion or restraint ranges from 25 % to 47 % (Chieze et al., 2019). Furthermore, the trauma experienced through seclusion or restraint significantly affects subsequent recovery and ongoing relationships with services (Brophy et al., 2016). For this reason, the Convention on the Rights of Persons with Disabilities identifies the use of seclusion and restraint as an important issue affecting the rights of persons with disabilities (Szmukler, 2017). Thus, a reduction in the use of seclusion and restraint in psychiatric settings is needed based on its encroachment on human rights grounds and potential harm to patients. However, the latest 2023 data reported the number and incidence of seclusion and restraint among psychiatric inpatients in Japan as 12,513 (4.7 %) and 10,759 (4.2 %), respectively, indicating an increasing trend (*Mental Health and Welfare Materials*, 2023). Internationally, data only on restraints are available, showing that the average daily number of restraint events per 1 million people in 2017 was 98.8 in Japan, which was significantly higher compared to 0.37 in the United States (US), 0.17 in Australia, and 0.03 in New Zealand (Newton-Howes et al., 2020). Therefore, establishing methods for reducing seclusion and restraint is an apparent need in Japan.

The use of seclusion and restraint has been associated with various factors, including trauma, diagnosis (Chieze et al., 2021; Fukasawa et al., 2018), sex (Cullen et al., 2018; Noda et al., 2013), age (Chieze et al., 2021; Fukasawa et al., 2018), admission type (Valimaki et al., 2022), and ward type (Noorthoorn et al., 2015). Past traumatic experiences are significantly more likely to trigger a fighting response to stimuli. Higher rates of seclusion and restraint have been reported among those who have experienced childhood physical and sexual abuse (Hammer et al., 2011). Considering the association between the use of seclusion and restraint and traumatic experiences, treatment strategies focusing on posttraumatic experiences in psychiatric patients may help reduce the use of seclusion and restraint.

One of the treatment strategies is trauma-informed care, which is the concept of providing care based on the belief that past traumatic experiences induce problematic behavior. Trauma-informed care is the development of organizations and systems that are sensitive to trauma. This approach enables everyone involved to understand the effect of trauma, recognize the signs of trauma in clients, and integrate this knowledge into policies, procedures, and practices to avoid re-traumatization (SAMHSA, 2014). In the US, a federal government bill to promote trauma-informed care was previously considered (*Recognizing the importance and effectiveness of trauma-informed care.*, 2017; *Trauma-Informed Care for Children and Families Act of 2017*, 2017), and other countries are adopting similar initiatives. Trauma-informed care is a key concept for preventing seclusion and restraint in a multi-component program, and strategies for preventing the use of seclusion and restraint have been developed in the US (Huckshorn, 2004). Multi-component programs that include trauma-informed care have been effective in reducing seclusion and restraint (Azeem et al., 2011; Beckett et al., 2017; Blair et al., 2017; Borckardt et al., 2011; Duxbury et al., 2019; Hale and Wendler, 2023; Newman et al., 2018). These programs included de-escalation techniques (Azeem et al., 2011; Beckett et al., 2017; Hale and Wendler, 2023; Newman et al., 2018), environmental adjustments (Azeem et al., 2011; Blair et al., 2017; Borckardt et al., 2011), seeking alternatives to coercive measures (Newman et al., 2018), patient involvement in treatment planning (Borckardt et al., 2011), holding regular sessions (Duxbury et al., 2019; Hale and Wendler, 2023), and changing policies and guidelines (Blair et al., 2017). Researchers conducting a non-randomized controlled trial involving an intervention for adult psychiatric ward staff reported a significant reduction in inpatient restraint rates (Duxbury et al., 2019). Before-and-after comparative studies have also reported that multi-component programs for nurses and medical staff reduced seclusion and restraint in various ward types (Azeem et al., 2011; Beckett et al., 2017; Blair et al., 2017; Borckardt et al., 2011; Hale and Wendler, 2023; Newman et al., 2018). Nevertheless, conducting multi-component trainings effectively is burdensome in clinical settings with limited human resources and time. Therefore, an effective, low-intensity, trauma-informed care only intervention would be easier to implement and more widely disseminated.

However, no studies have been conducted exclusively on the use of trauma-informed care alone in psychiatric settings. Furthermore, previous researchers examining the effectiveness of multi-component programs that include trauma-informed care have conducted studies in a relatively small population and limited conditions, such as pediatric and adolescent wards, adult wards, and short-stay inpatient wards. Dementia and chronic care wards have been rarely investigated (Azeem et al., 2011; Beckett et al., 2017; Blair et al., 2017; Borckardt et al., 2011; Hale and Wendler, 2023; Newman et al., 2018). Therefore, examining the relationship between

facility and patient characteristics and the effectiveness of trauma-informed care training is essential; however, this has not been examined previously.

We administered video-based trauma-informed care training to nurses and nursing aides working at psychiatric hospitals. We examined the effectiveness of trauma-informed care training solely, instead of multiple components, on reducing seclusion and restraint time through a non-randomized controlled trial.

2. Methods

2.1. Study design and participants

This was a non-randomized controlled trial designed to evaluate the effectiveness of trauma-informed care training in reducing seclusion and restraint time among psychiatric inpatients. The perspective of this study focused on implementing trauma-informed care in psychiatric settings. The sample size was not predetermined, and the number of participants was unrestricted. Further, during the intervention, a background of changes in work and an increase in the amount of work due to the spread of COVID-19 infection were observed; thus, randomization and blinding were not feasible, considering the additional burden on the hospitals.

Data were collected through a specialized psychiatric monitoring system called RESCOPE. This system was designed to facilitate the monitoring of clinical practice and has been implemented across numerous psychiatric hospitals. RESCOPE automatically extracts specific medical information for each hospitalized patient from the electronic medical records on a daily basis, creating a database.

The hospital-level inclusion criteria were a) psychiatric hospitals in Japan using RESCOPE and b) hospitals in Japan that agreed to participate in the study. The patient-level inclusion criterion was an inpatient admission during the observation period. The hospital-level exclusion criteria were a) wards that had to shift in function because of COVID-19 outbreaks during the data collection period, and b) forensic wards. The patient-level exclusion criteria were a) patients who opted out and b) patients with missing data. Hospitals interested in the trauma-informed care video training were allocated to the intervention group, and the rest were assigned to the control group. The intervention group received trauma-informed care video training, while the control group did not. After the observation period, access to the trauma-informed care video training was provided on the website for both the control and intervention groups.

The data were collected using RESCOPE from April 2020 to October 2021 for pre-intervention, and from February 2022 to January 2023 for post-intervention. All patients hospitalized during these periods were included in the analysis unless they opted out. Although patients did not sign informed consents, a notice about the research was posted at the cooperating facilities, ensuring participants' right to refuse participation.

The study was registered in the University Hospital Medical Information Network Clinical Trials Registry on 31 October 2021 (UMIN-CTR ID: UMIN000045879) after approval by the Ethics Review Committees of the University of Tokyo (2021065NI) and the National Center of Neurology and Psychiatry (B2021–071).

2.2. Intervention

The trauma-informed care video training comprised five modules (Supplementary Material) and was developed based on Substance Abuse and Mental Health Service Administration guidelines (Kotake et al, 2024; SAMHSA, 2014). The training intervention was conducted from November 2021 to January 2022 for nurses and nursing aides working in the inpatient wards of hospitals that were part of the intervention group as of October 2021. The intervention group encouraged as many participants as possible to attend the training sessions.

Nurses and nursing aides could view the videos at any time and by any means during the intervention period, including accessing the videos via the website on personal electronic devices, viewing them on computers in the wards, and participating in group training sessions. The completion of the intervention was defined as viewing all five modules of the trauma-informed care video training. The number of participants in the video training was tracked by instructing the viewers to record the date when they watched each video on a special form. In addition to the videos, worksheets related to the video training content and mini-brochures were provided, though their use was optional. Wards that conducted discussions using the worksheets reported the frequency and content of these sessions; however, the use of the mini-brochures was not tracked.

2.3. Study variables

The seclusion and restraint times were used as the primary outcomes. Seclusion was defined as the isolation of an individual patient in a room with soft walls and flooring, exclusion of hazardous materials, and other safety precautions. Restraints, such as an approved cotton-filled belt, were defined as mechanical restraints that restricted patients' movement. The data set included all inpatient admissions throughout the observation period. Episodes were defined from the start to the end of uninterrupted data entry; any interruption was considered the start of a separate episode. The total days of admission were calculated as the number of consecutive days based on data entries within the observation period. Regarding seclusion time, the total seclusion hours in each episode were divided by the total admission days to calculate the average seclusion time per day (total seclusion hours/total admission days). A similar calculation was performed to determine the average restraint time.

The covariates included individual- and ward-level characteristics. The individual-level characteristics collected were psychiatric diagnosis, age, sex, and admission type. Psychiatric diagnoses were classified into five categories according to the ICD-10 codes: F0

(Organic, including symptomatic, mental disorders), F1 (Mental and behavioural disorders due to psychoactive substance use), F2 (Schizophrenia, schizotypal and delusional disorders), F3 (Mood [affective] disorders), and others (diagnoses not included in F0–F3). The admission type was categorized as voluntary or involuntary. The ward-level characteristics collected were ward type, number of beds (Janssen et al., 2013), and COVID-19 cluster occurrence. According to the Japanese medical fee system, a ward is considered acute when the patient–nurse ratio is less than 13:1. Therefore, acute care was defined as a ward with fewer than 13 patients per nurse. COVID-19 cluster occurrence was considered if the start date of each admission episode fell during the month of cluster occurrence. Psychiatric diagnosis, age, and sex at admission, and the number of beds in October 2021, were recorded.

2.4. Analysis

First, descriptive statistics were calculated for individual- and ward-level characteristics, and the intervention and control groups were compared using the chi-square test or *t*-test. The main analysis employed difference-in-differences (DiD) analysis (Li et al., 2021) to compare changes in average seclusion and restraint times between the groups. The primary endpoint was set 6 months post-intervention, with secondary endpoints at 3 and 12 months. Before DiDs were performed, plots were drawn for assessing whether parallel trends assumptions were valid pre-intervention. In the plots, each episode was grouped according to the month of admission, and the seclusion and restraint times within each group were shown. We visually confirmed the parallel trends at baseline for the average seclusion and restraint times.

Additionally, DiDs were conducted by subgroups: hospital, psychiatric diagnosis, admission type, and ward type. Each hospital was compared with the entire control group.

All statistical analyses were performed using R (version 4.0.2 and later; R Foundation for Statistical Computing, Vienna, Austria). The statistical significance threshold was set at 0.05.

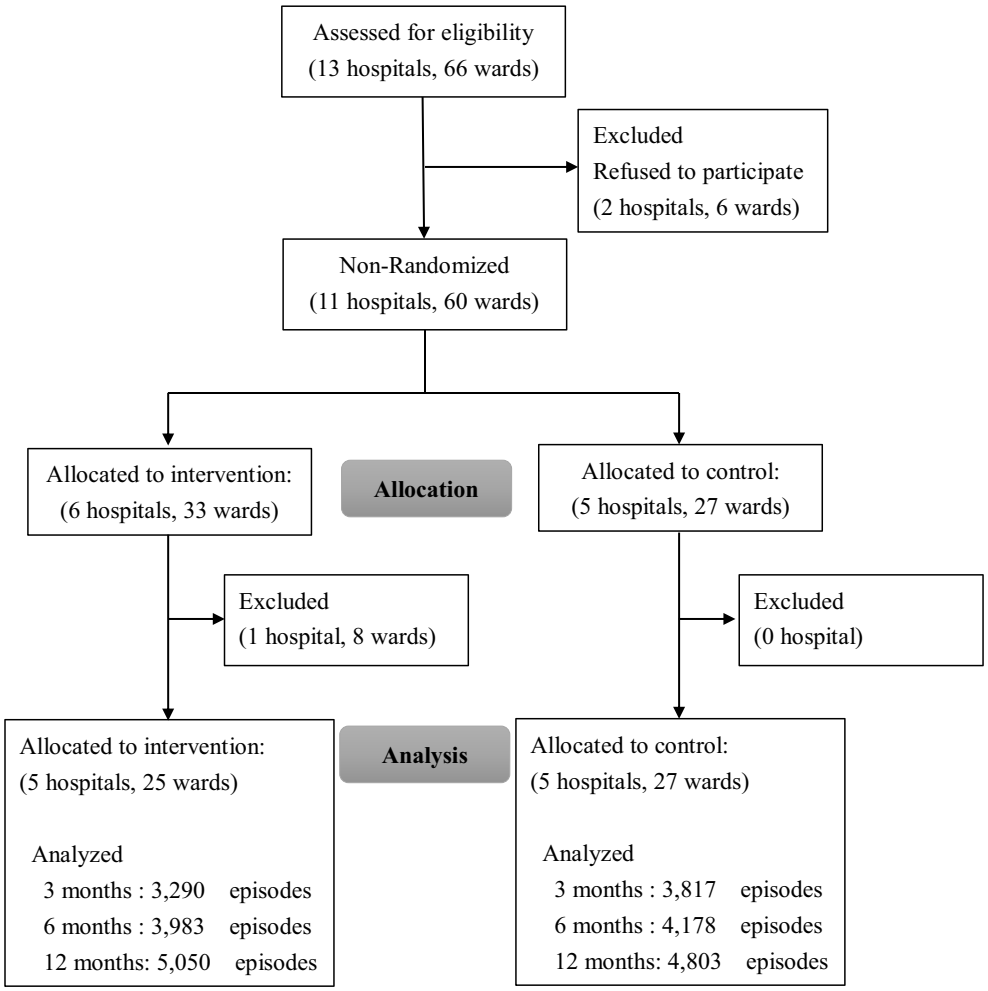


Fig. 1. Flow diagram of episode enrollment and grouping.

3. Results

3.1. Subject of analysis

As Fig. 1 shows, out of 13 hospitals, 11 hospitals agreed to participate. Six hospitals were allocated to intervention group, and five hospitals were allocated to the control group. During the data collection period, one hospital from the intervention group was excluded due to a change in ward function, leading to an equal final allocation of five hospitals consisting of two public and three private hospitals in each group.

The analysis included patients admitted to participating hospitals during the data collection period: 5050 episodes in the intervention group and 4803 episodes in the control group (Fig. 1).

3.2. Trauma-informed care training

In the intervention group, all hospitals had individual video viewing, except for one hospital (Hospital 3) that provided group training. Of 695 nurses and nursing aides, 397 completed the trauma-informed care video training. Three of the five hospitals provided discussions using worksheets (up to eight times) (Supplementary Material).

3.3. Individual- and ward-level characteristics

Table 1 shows the comparison between the intervention and control groups in terms of individual-level and treatment-related characteristics. Compared with the control group, the intervention group tended to have younger subjects, a higher proportion of diagnoses other than F0–F3, a higher proportion of voluntary admissions, lower proportion of admissions to acute wards, shorter average seclusion time, and longer average restraint time.

As for other characteristics, the average number of beds in a ward was 250.5 ± 132.6 for the entire study population, and no significant difference was found between the intervention and control groups (264.2 ± 93.7 vs. 236.8 ± 174.1, respectively; $p = 0.67$). The COVID-19 clusters involved two wards in the intervention group and three wards in the control group.

3.4. Results of the difference-in-differences (DiD)

Plots showed the presence of parallel trends in the outcomes of both seclusion and restraint times pre-intervention (Supplementary Material).

We interpreted the results to indicate that the intervention led to a statistically significant reduction in average restraint time compared with the control group at 3 months, 6 months, and 12 months (Table 2). However, no statistically significant reduction was observed in the average seclusion time (Table2).

Tables 3 and 4 show that the intervention group demonstrated significant reductions in several subgroups compared with the control group. Significant seclusion time reductions during both of the observation periods were observed in Hospital 5 (at 6 months and 12 months), psychiatric diagnosis F3 (at 3 months), other diagnoses (at 3 months and 12 months), and other ward types (at 12 months). Significant restraint time reductions during either of the observation periods were observed in Hospital 3 (at 3 months, 6 months and 12 months), Hospital 5 (at 3 months, 6 months and 12 months), psychiatric diagnoses F1 (at 3 months), F2 (at 6 months), and F3 (at 12 months), other diagnoses (at 3 months), involuntary admissions (at 6 months), acute wards (at 6 months), and other ward types (at 12 months). Individual-level and treatment-related characteristics for each hospital are provided in the Supplementary Material.

4. Discussion

To the best of our knowledge, this study is the first non-randomized controlled trial to examine the impact of a video-based training intervention focused only on trauma-informed care in reducing seclusion and restraint times. A significant reduction in restraint time compared to the control group was observed for the primary endpoint at 6 months post-intervention, with similar reductions for the secondary endpoints at 3 and 12 months. On the other hand, no decrease in seclusion time was observed. We suggest that trauma-informed care training alone may effectively reduce restraint time and that this effect was sustained for 12 months.

This result was consistent with findings from previous research using multi-component programs, including trauma-informed care (Azeem et al., 2011; Duxbury et al., 2019; Hale and Wendler, 2023). However, this study differs from previous studies in that it investigated the effects of only trauma-informed care and used video training as the intervention. These differences indicate that even simple training using trauma-informed care or video training can be useful in reducing restraint time.

One reason for the decrease in restraint time was that nurses better understood that past traumatic experiences could influence the patient's condition. This understanding may enable them to assess whether seclusion or restraint could activate the patient's past traumatic experiences and to consider the possibility that the patient's conditions were induced by past trauma. In addition, such understanding may have induced an empathetic response toward the patient and more careful judgment by the nurse regarding the use of seclusion and restraints. Additionally, previous researchers have reported that the presence of several nurses with high empathy was related to a decrease in the use of seclusion and restraint (Yang et al., 2014). Establishing a treatment environment that is rich in empathy through nurses' education in trauma-informed care may have helped reduce the restraint time. Conversely, one possible

Table 1
Individual-level and treatment-related characteristics of the entire study sample and comparison between the intervention and control groups.

	3 months							6 months							12 months						
	Total		Intervention		Control			Total		Intervention		Control			Total		Intervention		Control		
	n= 7107		*n*= 3290		*n*= 3817			*n*= 8161		*n*= 3983		*n*= 4178			*n*= 9853		*n*= 5050		*n*= 4803		
	n/Mean	%/SD	*n*/Mean	%/SD	*n*/Mean	%/SD	*P*	*n*/Mean	%/SD	*n*/Mean	%/SD	*n*/Mean	%/SD	*P*	*n*/Mean	%/SD	*n*/Mean	%/SD	*n*/Mean	%/SD	*P*
Individual-level characteristics																					
Sex																					
Male	3328	46.8 %	1568	47.7 %	1760	46.1 %	0.20	3804	46.6 %	1883	47.3 %	1921	46.0 %	0.20	4571	46.4 %	2341	46.4 %	2230	46.4 %	0.90
Female	3779	53.2 %	1722	52.3 %	2057	53.9 %		4357	53.4 %	2100	52.7 %	2257	54.0 %		5282	53.6 %	2709	53.6 %	2573	53.6 %	
Age (years)	53.69	±23.04	47.84	±23.33	58.74	±21.54	<0.001	53.12	±22.98	47.46	±23.00	58.52	±21.62	<0.001	52.24	±23.01	46.55	±22.71	58.23	±21.77	<0.001
Psychiatric diagnosis																					
F0	1186	18.2 %	306	11.1 %	880	23.5 %	<0.001	1288	17.4 %	320	9.7 %	968	23.5 %	<0.001	1479	16.7 %	353	8.6 %	1126	23.8 %	<0.001
F1	480	7.4 %	193	7.0 %	287	7.7 %		597	8.1 %	282	8.5 %	315	7.7 %		777	8.8 %	409	9.9 %	368	7.8 %	
F2	2031	31.2 %	836	30.2 %	1195	31.8 %		2288	30.9 %	989	30.0 %	1299	31.6 %		2665	30.1 %	1202	29.1 %	1463	31.0 %	
F3	1429	21.9 %	625	22.6 %	804	21.4 %		1641	22.1 %	751	22.7 %	890	21.6 %		1984	22.4 %	955	23.1 %	1029	21.8 %	
Other	1392	21.4 %	805	29.1 %	587	15.6 %		1601	21.6 %	960	29.1 %	641	15.6 %		1949	22.0 %	1208	29.3 %	741	15.7 %	
Treatment-related characteristics																					
Admission types																					
Voluntary	2543	35.8 %	1608	48.9 %	935	24.5 %	<0.001	3015	36.9 %	1986	49.9 %	1029	24.6 %	<0.001	3751	38.1 %	2566	50.8 %	1185	24.7 %	<0.001
Involuntary	4564	64.2 %	1682	51.1 %	2882	75.5 %		5146	63.1 %	1997	50.1 %	3149	75.4 %		6102	61.9 %	2484	49.2 %	3618	75.3 %	
Ward types																					
Acute	5738	80.7 %	2515	76.4 %	3223	84.4 %	<0.001	6556	80.3 %	3019	75.8 %	3537	84.7 %	<0.001	7949	80.7 %	3832	75.9 %	4117	85.7 %	<0.001
Others	1369	19.3 %	775	23.6 %	594	15.6 %		1605	19.7 %	964	24.2 %	641	15.3 %		1904	19.3 %	1218	24.1 %	686	14.3 %	
Seclusion	2.7	±5.23	2.59	±5.30	2.80	±5.17	0.10	2.73	±5.26	2.64	±5.33	2.82	±5.20	0.12	2.76	±5.26	2.64	±5.33	2.89	±5.18	0.02
Pre	2.63	±5.06	2.54	±5.14	2.71	±5.00	0.20	2.61	±5.01	2.50	±5.04	2.70	±4.97	0.13	2.59	±4.96	2.48	±5.00	2.69	±4.94	0.11
Post	3.09	±6.06	2.90	±6.18	3.24	±5.96	0.40	3.09	±5.92	2.97	±5.96	3.24	±5.88	0.30	3.03	±5.68	2.85	±5.71	3.29	±5.62	0.02
Restraint	0.39	±1.99	0.47	±2.30	0.32	±1.68	0.002	0.41	±2.06	0.49	±2.36	0.33	±1.72	<0.001	0.42	±2.13	0.48	±2.37	0.35	±1.83	0.002
Pre	0.37	±1.89	0.46	±2.22	0.29	±1.55	<0.001	0.36	±1.87	0.45	±2.18	0.29	±1.54	<0.001	0.37	±1.88	0.46	±2.19	0.29	±1.57	<0.001
Post	0.49	±2.49	0.52	±2.75	0.47	±2.27	0.70	0.53	±2.51	0.57	±2.73	0.48	±2.21	0.40	0.50	±2.46	0.51	±2.58	0.48	±2.28	0.70

SD: standard deviation.
n: The number of admission episodes.
p: p-value.
F0: Organic, including symptomatic, mental disorders.
F1: Mental and behavioural disorders due to psychoactive substance use.
F2: Schizophrenia, schizotypal and delusional disorders.
F3: Mood [affective] disorders.

Table 2
Effects of intervention revealed by difference-in-differences analyses (Seclusion and Restraint).

	3 months			6 months			12 months		
Term	Est.	SE	*p*	Est.	SE	*p*	Est.	SE	*p*
Seclusion									
(Intercept)	3.15	0.39	<0.001	3.80	0.37	<0.001	3.80	0.33	<0.001
Time (post intervention)	−0.07	0.17	0.68	0.07	0.15	0.64	0.23	0.13	0.06
Intervention group	−0.05	0.13	0.71	−0.06	0.13	0.64	−0.03	0.13	0.82
Time × Intervention group (exposure)	−0.02	0.27	0.95	0.05	0.22	0.82	−0.28	0.19	0.13
Restraint									
(Intercept)	−0.28	0.17	0.11	−0.16	0.16	0.33	−0.18	0.15	0.22
Time (post intervention)	0.10	0.07	0.17	0.16	0.06	0.01	0.19	0.06	<0.001
Intervention group	0.39	0.06	<0.001	0.38	0.06	<0.001	0.40	0.06	<0.001
Time × Intervention group (exposure)	−0.23	0.12	0.04	−0.24	0.10	0.01	−0.19	0.08	0.02

Est.: Estimate.
SE: Standard error.
p: p-value.

Table 3
Effect of intervention revealed by difference-in-difference analyses of subgroups of hospitals, psychiatric diagnosis, admission form, and ward types. (Seclusion).

	Time × Intervention (Exposure)								
	3 months			6 months			12 months		
Term	Est.	SE	*p*	Est.	SE	*p*	Est.	SE	*p*
Hospital									
1	−0.47	0.91	0.61	−0.01	0.79	0.99	−0.41	0.65	0.52
2	0.37	0.41	0.37	0.19	0.34	0.57	0.05	0.28	0.86
3	0.11	0.45	0.82	0.11	0.39	0.77	−0.61	0.33	0.07
4	0.61	0.68	0.37	0.86	0.56	0.12	0.19	0.46	0.69
5	−0.48	0.42	0.26	−1.25	0.41	0.002	−1.43	0.40	<0.001
Psychiatric diagnosis									
F0	−0.84	0.49	0.09	−0.49	0.46	0.29	−0.15	0.43	0.73
F1	−0.58	0.84	0.49	−0.25	0.56	0.66	−0.15	0.45	0.74
F2	0.58	0.49	0.24	0.46	0.41	0.27	−0.17	0.36	0.63
F3	1.02	0.50	0.04	0.13	0.40	0.75	−0.15	0.33	0.65
Other	−1.51	0.68	0.03	−0.87	0.57	0.12	−1.06	0.47	0.03
Admission types									
Voluntary	−0.07	0.21	0.74	0.04	0.17	0.80	0.04	0.14	0.77
Involuntary	−0.04	0.42	0.92	0.21	0.36	0.56	−0.32	0.31	0.31
Ward types									
Acute	0.05	0.47	0.92	0.76	0.41	0.07	0.61	0.36	0.09
Other	−0.09	0.33	0.78	−0.48	0.26	0.07	−0.87	0.22	<0.001

Est.: Estimate.
SE: Standard error.
p: p-value.
F0: Organic, including symptomatic, mental disorders.
F1: Mental and behavioural disorders due to psychoactive substance use.
F2: Schizophrenia, schizotypal and delusional disorders.
F3: Mood [affective] disorders.

reason for the lack of a decrease in seclusion time is that seclusion may have been chosen as an alternative to restraints. Prior researchers have shown that seclusion and the use of restraints are complementary to each other (Stewart et al., 2010). Although those researchers reported a reduction in restraints, seclusion may have been implemented as an alternative; thus, the effects of restraints need to be examined further.

The number of study participants was significantly lower in Hospital 2, which participated in the intervention group, than in other participating hospitals due to a COVID-19 cluster. Having trauma-sensitive organizations and systems is crucial in the context of trauma-informed care. The presence of many staff members on the ward who are knowledgeable about trauma-informed care is thought to significantly reduce seclusion and restraint. However, the sparse number of participants in Hospital 2 may have hindered the widespread adoption of trauma-informed practices within the treatment environment on the ward.

Table 4
Effect of intervention revealed by difference-in-difference analyses of subgroups of hospitals, psychiatric diagnosis, admission form, and ward types. (Restraint).

	Time × Intervention (Exposure)								
	3 months			6 months			12 months		
Term	Est.	SE	*p*	Est.	SE	*p*	Est.	SE	*p*
Hospital									
1	−0.07	0.33	0.83	−0.13	0.30	0.66	−0.10	0.26	0.70
2	0.01	0.15	0.94	−0.17	0.13	0.19	−0.13	0.11	0.27
3	−0.47	0.20	0.02	−0.40	0.18	0.02	−0.46	0.16	0.003
4	−0.37	0.25	0.14	−0.26	0.22	0.23	−0.27	0.19	0.15
5	−0.36	0.17	0.03	−0.64	0.17	<0.001	−0.65	0.17	<0.001
Psychiatric diagnosis									
F0	−0.07	0.41	0.86	−0.46	0.38	0.23	−0.44	0.36	0.22
F1	0.64	0.23	0.01	0.09	0.11	0.42	0.11	0.10	0.25
F2	−0.33	0.20	0.09	−0.35	0.17	0.04	−0.09	0.15	0.57
F3	−0.18	0.20	0.37	−0.24	0.17	0.15	−0.31	0.15	0.03
Other	−0.70	0.23	0.002	−0.28	0.20	0.17	−0.24	0.17	0.15
Admission types									
Voluntary	−0.04	0.13	0.78	−0.05	0.10	0.62	−0.06	0.08	0.48
Involuntary	−0.33	0.18	0.06	−0.32	0.15	0.04	−0.16	0.14	0.24
Ward types									
Acute	−0.55	0.29	0.06	−0.60	0.25	0.02	−0.33	0.22	0.14
Other	−0.16	0.12	0.16	−0.18	0.10	0.06	−0.21	0.09	0.01

Est.: Estimate.
SE: Standard error.
p: p-value.
F0: Organic, including symptomatic, mental disorders.
F1: Mental and behavioural disorders due to psychoactive substance use.
F2: Schizophrenia, schizotypal and delusional disorders.
F3: Mood [affective] disorders.

The subgroup analysis revealed significant reductions in both seclusion and restraint times for several variables. The trends were generally consistent with those of the main analysis. Highly distinctive trends were observed in the significant reductions in seclusion and restraint times for Hospital 5 and reductions in restraint time for Hospital 3 based on subgroup analysis by hospital. Hospital 1 had the highest viewing percentage, whereas Hospitals 3 and 5 not only had a high viewing percentage but also conducted group reflection sessions. Combining multiple learning methods, compared with learning by video alone, is effective in improving learning effectiveness (Arthur et al., 2003). Thus, promoting high adherence and combining video and group work for reflection may strengthen the program's effectiveness.

Concerning the admission type and ward type, the possibility of restraint due to deviant behavior was higher for patients who had been admitted involuntary and acute wards than for those in the voluntary and chronic wards, and trauma-informed care may be effective in dealing with patients in the involuntary and acute wards. Conversely, an increase in the restraint times was observed in patients with an F1 psychiatric diagnosis. The limited effect of trauma-informed care interventions on this group may be attributed to the structured nature of their treatment, which could inherently be less affected by such interventions. However, the subgroup analysis must be interpreted with caution, and further research is warranted.

This study has several limitations. First, because we included institutions that used RESCOPE, only institutions that were originally motivated to treat and care for patients may have participated, limiting the generalizability of the results. Furthermore, the participants in the intervention group may have been more actively involved, thereby potentially overestimating the effect of the intervention. Second, some hospitals were reluctant to participate in the study due to the burden on healthcare staff caused by the spread of COVID-19, thereby making randomization impossible. Similarly, this burden prevented the implementation of blinding. Consequently, these limitations may have overestimated the effect of the intervention. Third, the assignment of intervention and control groups was based on the preferences of the participating hospitals. It is possible that the hospitals allocated to the control group had already implemented initiatives not related to trauma-informed care to reduce seclusion and restraints, which may have minimized differences from the intervention group. Fourth, although restraint was reduced, seclusion may have been used as a substitute. However, in RESCOPE, data on the total hours per day for seclusion and restraint were collected separately, which prevented analysis of the composite outcome. Fifth, factors that influence seclusion and restraint include ward culture and illness severity; however, these factors were not adjusted for because they were not included as variables. Sixth, the inability to randomize indicated a significant limitation of this study's design, thereby potentially affecting the results due to differences in the characteristics of the two groups. Future studies are warranted to incorporate randomization to obtain more reliable data. Seventh, the notably small number of participants in Hospital 2 may have led to underestimating the effect of the intervention. Finally, records of seclusion and restraint in Japan are mandated by the Mental Health and Welfare Act and are subject to regular audits. A key strength of this study is that information on seclusion and restraint was directly extracted from electronic medical records that are routinely used in clinical practice, thereby minimizing the risk of data entry omissions.

5. Conclusion

This non-randomized controlled trial suggests that video training focused solely on trauma-informed care may effectively reduce restraint time. This accessible approach may lead to broader adoption and consequently reducing the use of coercive measures.

Funding statement

This study was supported by Health Labour Sciences Research Grant (202218007A and 23GC1019).

CRediT authorship contribution statement

Michi Miyake: Writing – original draft, Methodology, Investigation, Data curation. **Megumi Hazumi:** Writing – review & editing, Methodology. **Kentaro Usuda:** Writing – review & editing, Methodology, Investigation, Data curation. **Takahiro Kawashima:** Writing – review & editing, Formal analysis, Data curation. **Maiko Fukasawa:** Writing – review & editing, Methodology. **Hisateru Tachimori:** Writing – review & editing, Formal analysis, Data curation. **Daisuke Nishi:** Writing – review & editing, Supervision, Project administration, Methodology, Funding acquisition, Conceptualization.

Declaration of competing interest

DN received personal fees outside the submitted work from MD.net and an honorarium from Takeda Pharmaceutical Co. and Otsuka Medical Devices Co., Ltd. MM, MH, KU, TK, MF, and HT declare no conflicts of interest related to this study.

Acknowledgments

We thank the staff of the nursing and administrative departments of the hospitals that participated in this study.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.ijnsa.2025.100297.

References

Arthur, W., Bennett, W., Edens, P.S., Bell, S.T., 2003. Effectiveness of training in organizations: a meta-analysis of design and evaluation features. J. Appl. Psychol. 88 (2), 234–245. https://doi.org/10.1037/0021-9010.88.2.234.

Azeem, M.W., Aujla, A., Rammerth, M., Binsfeld, G., Jones, R.B., 2011. Effectiveness of six core strategies based on trauma informed care in reducing seclusions and restraints at a child and adolescent psychiatric hospital. J. Child Adolesc. Psychiatr. Nurs. 24 (1), 11–15. https://doi.org/10.1111/j.1744-6171.2010.00262.x.

Beckett, P., Holmes, D., Phipps, M., Patton, D., Molloy, L., 2017. Trauma-informed care and practice: practice improvement strategies in an inpatient mental health ward. J. Psychosoc. Nurs. Ment. Health Serv. 55 (10), 34–38. https://doi.org/10.3928/02793695-20170818-03.

Blair, E.W., Woolley, S., Szarek, B.L., Mucha, T.F., Dutka, O., Schwartz, H.I., Wisniowski, J., Goethe, J.W., 2017. Reduction of seclusion and restraint in an inpatient psychiatric setting: a pilot study. Psychiatr. Q. 88 (1), 1–7. https://doi.org/10.1007/s11126-016-9428-0.

Borckardt, J.J., Madan, A., Grubaugh, A.L., Danielson, C.K., Pelic, C.G., Hardesty, S.J., Hanson, R., Herbert, J., Cooney, H., Benson, A., Frueh, B.C., 2011. Systematic investigation of initiatives to reduce seclusion and restraint in a state psychiatric hospital. Psychiatr. Serv. 62 (5), 477–483. https://doi.org/10.1176/ps.62.5.pss6205_0477.

Brophy, L.M., Roper, C.E., Hamilton, B.E., Tellez, J.J., McSherry, B.M., 2016. Consumers' and their supporters' perspectives on barriers and strategies to reducing seclusion and restraint in mental health settings. Aust. Health Rev. 40 (6), 599–604. https://doi.org/10.1071/AH15128.

Chieze, M., Hurst, S., Kaiser, S., Sentissi, O., 2019. Effects of seclusion and restraint in adult psychiatry: a systematic review. Front. Psychiatry 10, 491. https://doi.org/10.3389/fpsyt.2019.00491.

Chieze, M., Kaiser, S., Courvoisier, D., Hurst, S., Sentissi, O., Fredouille, J., Wullschleger, A., 2021. Prevalence and risk factors for seclusion and restraint in old-age psychiatry inpatient units. BMC Psychiatry 21 (1), 82. https://doi.org/10.1186/s12888-021-03095-4.

Cullen, A.E., Bowers, L., Khondoker, M., Pettit, S., Achilla, E., Koeser, L., Moylan, L., Baker, J., Quirk, A., Sethi, F., Stewart, D., McCrone, P., Tulloch, A.D., 2018. Factors associated with use of psychiatric intensive care and seclusion in adult inpatient mental health services. Epidemiol. Psychiatr. Sci. 27 (1), 51–61. https://doi.org/10.1017/S2045796016000731.

Duxbury, J., Baker, J., Downe, S., Jones, F., Greenwood, P., Thygesen, H., McKeown, M., Price, O., Scholes, A., Thomson, G., Whittington, R., 2019. Minimising the use of physical restraint in acute mental health services: the outcome of a restraint reduction programme ('REsTRAIN YOURSELF'). Int. J. Nurs. Stud. 95, 40–48. https://doi.org/10.1016/j.ijnurstu.2019.03.016.

Fukasawa, M., Miyake, M., Suzuki, Y., Fukuda, Y., Yamanouchi, Y., 2018. Relationship between the use of seclusion and mechanical restraint and the nurse-bed ratio in psychiatric wards in Japan. Int. J. Law Psychiatry 60, 57–63. https://doi.org/10.1016/j.ijlp.2018.08.001.

Hale, R., Wendler, M.C., 2023. Evidence-based practice: implementing trauma-informed care of children and adolescents in the inpatient psychiatric setting. J. Am. Psychiatr. Nurses Assoc. 29 (2), 161–170. https://doi.org/10.1177/1078390320980045.

Hammer, J.H., Springer, J., Beck, N.C., Menditto, A., Coleman, J., 2011. The relationship between seclusion and restraint use and childhood abuse among psychiatric inpatients. J. Interpers. Violence 26 (3), 567–579. https://doi.org/10.1177/0886260510363419.

Huckshorn, K.A., 2004. Reducing seclusion restraint in mental health use settings: core strategies for prevention. J. Psychosoc. Nurs. Ment. Health Serv. 42 (9), 22–33. https://doi.org/10.3928/02793695-20040901-05.

Janssen, W.A., Noorthoorn, E.O., Nijman, H.L., Bowers, L., Hoogendoorn, A.W., Smit, A., Widdershoven, G.A., 2013. Differences in seclusion rates between admission wards: does patient compilation explain? Psychiatr. Q. 84 (1), 39–52. https://doi.org/10.1007/s11126-012-9225-3.

Kotake, R., Otsu, E., Asaoka, H., Sawada, U., Miyamoto, Y., & Nishi, D. (in press). Effect of video-based trauma-informed care training for psychiatric nurses: a non-randomized controlled trial. *Psychiat. Clinic. Neurosci. Rep.*. https://doi.org/10.1002/pcn5.70052.

Li, L., Cuerden, M.S., Liu, B., Shariff, S., Jain, A.K., Mazumdar, M., 2021. Three statistical approaches for assessment of intervention effects: a primer for practitioners. Risk Manag. Healthc. Policy 14, 757–770. https://doi.org/10.2147/rmhp.S275831.

Mental Health and Welfare Materials. (2023). Retrieved from https://www.ncnp.go.jp/nimh/seisaku/data/630.html.

Newman, J., Paun, O., Fogg, L., 2018. Effects of a staff training intervention on seclusion rates on an adult inpatient psychiatric unit. J. Psychosoc. Nurs. Ment. Health Serv. 56 (6), 23–30. https://doi.org/10.3928/02793695-20180212-02.

Newton-Howes, G., Savage, M.K., Arnold, R., Hasegawa, T., Staggs, V., Kisely, S., 2020. The use of mechanical restraint in Pacific Rim countries: an international epidemiological study. Epidemiol. Psychiatr. Sci. 29, e190. https://doi.org/10.1017/S2045796020001031.

Noda, T., Sugiyama, N., Sato, M., Ito, H., Sailas, E., Putkonen, H., Kontio, R., Joffe, G., 2013. Influence of patient characteristics on duration of seclusion/restrain in acute psychiatric settings in Japan. Psychiatry Clin. Neurosci. 67 (6), 405–411. https://doi.org/10.1111/pcn.12078.

Noorthoorn, E., Lepping, P., Janssen, W., Hoogendoorn, A., Nijman, H., Widdershoven, G., Steinert, T., 2015. One-year incidence and prevalence of seclusion: dutch findings in an international perspective. Soc. Psychiatry Psychiatr. Epidemiol. 50 (12), 1857–1869. https://doi.org/10.1007/s00127-015-1094-2.

Recognizing the importance and effectiveness of trauma-informed care. (2017).

SAMHSA, 2014. SAMHSA's Concept of Trauma and Guidance for a Trauma-Informed Approach. https://ncsacw.acf.hhs.gov/userfiles/files/SAMHSA_Trauma.pdf.

Stewart, D., Van der Merwe, M., Bowers, L., Simpson, A., Jones, J, 2010. A review of interventions to reduce mechanical restraint and seclusion among adult psychiatric inpatients. Issues Ment. Health Nurs. 31 (6), 413–424. https://doi.org/10.3109/01612840903484113.

Szmukler, G, 2017. The UN Convention on the Rights of Persons with Disabilities: 'Rights, will and preferences' in relation to mental health disabilities. Int. J. Law Psychiatry 54, 90–97. https://doi.org/10.1016/j.ijlp.2017.06.003.

Trauma-Informed Care for Children and Families Act of 2017. (2017). Retrieved from https://www.congress.gov/bill/115th-congress/senate-bill/774.

Valimaki, M., Lam, Y.T.J., Hipp, K., Cheng, P.Y.I., Ng, T., Ip, G., Lee, P., Cheung, T., Bressington, D., Lantta, T, 2022. Physical restraint events in psychiatric hospitals in Hong Kong: a cohort register study. Int. J. Environ. Res. Public Health 19 (10). https://doi.org/10.3390/ijerph19106032.

Yang, C.P., Hargreaves, W.A., Bostrom, A, 2014. Association of empathy of nursing staff with reduction of seclusion and restraint in psychiatric inpatient care. Psychiatr. Serv. 65 (2), 251–254. https://doi.org/10.1176/appi.ps.201200531.