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ORIGINAL RESEARCH

Health disparities in emergency department patients with severe mental illness and non-traumatic hollow organ perforation

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Abstract

Background: Patients with severe mental illness (SMI) face substantial health disparities and a higher burden of physical comorbidities. This study investigates whether disparities exist in emergency department (ED) care and outcomes for SMI patients presenting with non-traumatic hollow organ perforation in a healthcare system with universal coverage. **Methods**: We conducted a retrospective matched case-control study using data from seven major hospitals in Taiwan between 2007 and 2017. Patients with SMI were identified through psychiatric diagnoses prior to their index admission. After matching by age and gender, we compared ED treatment timelines, in-hospital outcomes, and expenditures between SMI and non-SMI patients. **Results**: Of the 25,893 overall patients, 7563 were included in the analysis. After matching for age and gender, a total of 92 SMI and 276 matched non-SMI patients were analyzed. There were no significant differences in presenting vital signs, laboratory tests, ED management, and mortality between the SMI and non-SMI groups. Also, no significant differences were found in ED treatment variables, including analgesic use and time to surgery. However, SMI patients experienced longer hospital stays (16.9 *vs*. 13.0 days, $p = 0.02$) and higher in-hospital expenditures (5752.6 *vs*. 4141.3 USD, $p = 0.04$). SMI remained an independent predictor of prolonged hospitalization in multivariable analysis. The SMI group exhibited higher rates of comorbidities and more severe Charlson Comorbidity Index stages. **Conclusions**: In a system with high healthcare accessibility, ED care for SMI patients with surgical emergencies appears equitable. Nonetheless, longer hospitalizations and increased costs suggest a need for tailored, multidisciplinary strategies to address the complex needs of SMI patients beyond the ED setting.

Keywords

Severe mental illness; Non-traumatic hollow organ perforation; Health disparity; Emergency department

1. Introduction

Patients diagnosed with severe mental illness (SMI) are recognized as a vulnerable group by the World Health Organization (WHO) [1]. Individuals with SMI have been shown to experience a shortened lifespan of 13 to 20 years compared with those without SMI in previous research. This mortality gap exceeds the impact of several well-established risk factors, including smoking, diabetes, and obesity [2, 3]. Even in countries with high-quality healthcare systems, the disparity in life expectancy persists and has widened over recent decades [4].

The mortality gap among patients with SMI is attributable to various multifactorial factors, which can be categorized into three key domains: patient-related, socioeconomic, and healthcare system-level factors. At the patient level, contributing factors include suicide risk, elevated incidences of accidental and violent deaths, inadequate self-care, and a greater burden of physical illnesses. Socioeconomic determinants such as limited financial resources, pervasive social stigma, and structural discrimination further exacerbate health inequalities. From a healthcare perspective, relevant factors include the adverse effects associated with certain psychiatric medications, underrecognition and under-treatment of physical comorbidities, and limited access to emergency healthcare resources [5–7]. Addressing these disparities requires improving the accessibility and quality of healthcare services for patients with SMI to reduce both health inequalities and the mortality gap.

Acute abdominal pain is a common presenting complaint in emergency departments (EDs), accounting for approximately 5%–10% of visits [8]. Among the differential diagnoses, hollow organ perforation should not be overlooked, as it is often considered a life-threatening condition [9]. The incidence of non-traumatic hollow organ perforation is 6.5 per 100,000 person-years, with a reported 30-day mortality rate ranges from 16% to 30% [10, 11]. The time interval between presentation and surgical intervention is a vital factor influencing patient prognosis in cases of non-traumatic hollow organ perforation, with a mortality rate increase of 2.4% per hour of delay in treatment [10]. Therefore, early diagnosis and prompt treatment are essential for improving patient survival. Abdominal computed tomography (CT) is typically used to make the diagnosis. Surgical intervention is considered essential, and may also serve as an indicator for evaluating equity in healthcare delivery within the framework of basic human rights [11, 12].

Several studies have suggested an association between mental health and various abdominal emergencies from a pathophysiological perspective. For instance, factors such as psychological stress, depression, and a history of psychological counselling have been linked to increased risk of developing peptic ulcer disease [13]. Patients with SMI, such as schizophrenia or bipolar disorder, may exhibit decreased pain perception and impaired symptom expression, which can lead to delayed diagnosis of acute abdominal conditions and subsequently worse outcomes [14, 15]. There have been several case reports that have documented patients with schizophrenia exhibiting a silent acute abdomen and lacking peritoneal signs [16, 17].

Some prior studies have identified a higher rate of appendiceal perforation among vulnerable groups, framing this as a manifestation of healthcare disparity [18, 19]. However, no existing studies have investigated whether patients with SMI who experience non-traumatic hollow organ perforation receive different levels of care compared with non-SMI patients. Furthermore, analyzing associated treatment expenditure is essential to understanding the economic burden associated with patients with SMI compared with those without. This information could help elucidate potential disparities in healthcare access, utilization, and outcomes in healthcare provision.

The objective of this study is to leverage a multi-center, nationwide database to assess differences in the ED management, in-hospital outcomes, and associated healthcare expenditure among patients with and without SMI who experience non-traumatic hollow organ perforation. This study seeks to provide valuable insights into the provision of healthcare for vulnerable populations and inform strategies for addressing healthcare disparities.

2. Methods

2.1 Study design and setting

This retrospective study utilized electronic medical records (EMR) collected as part of routine clinical practice. The data for this study was obtained from the Chang Gung Research Database (CGRD), which is the largest non-government EMR database in Taiwan. The CGRD contains de-identified data that was recorded using the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes before 2016 and subsequently transitioned to the use of ICD-10-CM codes. The database is composed of a network of seven branches of Chang Gung Memorial Hospital (CGMH), encompassing three district hospitals, two regional hospitals, and two medical centers spanning from northern to southern Taiwan. With a combined capacity of approximately 10,050 beds, these facilities admit over 2 million inpatients annually.

2.2 Study population

The study cohort was derived from the CGRD database, and encompassed the period from 01 January 2007 to 31 December 2017. The identification of cases of non-traumatic hollow organ perforation relied on the utilization of ICD codes derived from National Health Insurance (NHI) declaration data and discharging medical records. The coverage rate of Taiwan NHI has reached 99.9% in recent years and most of the hospital expenses were reimbursed by the NHI [20]. To confirm the presence of SMI, encompassing major depressive disorder, schizophrenia, and bipolar disorder, relevant ICD codes were cross-verified by a psychiatrist at the outpatient department at least once prior to the diagnosis of non-traumatic hollow organ perforation. Subjects were excluded from the study if they met any of the following criteria: patients with traumatic hollow organ perforation, incomplete medical records (including missing vital signs or lack of ED management), transfer from other medical facilities, or age below 18 years. Pertinent ICD codes for SMI and non-traumatic hollow organ perforation are shown in the **Supplementary material**.

2.3 Data collection

The data abstraction process primarily consisted of downloading specified fields from the electronic records, which include demographics such as age and gender, clinical variables such as vital signs, laboratory test results, CT scan findings, time intervals for key intervention, and in-hospital outcomes. Data on unscheduled 72-hour revisits were also collected to assess post-discharge outcomes.

Data abstraction was conducted by a team of trained research personnel, including two emergency physicians (SKH and MJH) and one research assistant (SYG), each with more than three years of experience in electronic medical record review. All data fields were extracted according to a standardized protocol and then double-checked by a senior investigator (CHC) for accuracy. Any discrepancies were resolved through discussion and consensus among the research team. Because every case was ultimately verified by the senior reviewer, a formal inter-rater reliability analysis was not performed.

2.4 Study outcomes and covariates

The study focused on three primary aspects: the treatment course in the ED, in-hospital outcomes, and in-hospital expenditure. The treatment course in the ED encompassed the administration of analgesics (both non-opioid and opioid), the time from triage to the first order, completion of CT scan, initiation of antibiotics, consultation with a surgical

specialist, and time to surgery. In-hospital outcomes included the duration of admission, length of stay in the intensive care unit (ICU), and in-hospital mortality rates. In-hospital expenses were obtained from national insurance declaration data, encompassing patient self-payments and health insurance reimbursements.

The covariates considered in this study encompassed demographic information, triage records, the Charlson Comorbidity Index (CCI), laboratory data, operative methods, and unscheduled 72-hour revisits prior to the diagnosis of non-traumatic hollow organ perforation. Triage acuity was assessed using the Taiwan Triage and Acuity Scale (TTAS), a validated five-level tool adapted from the Canadian Triage and Acuity Scale. Level 1 indicates life-threatening conditions requiring immediate resuscitation; Level 2, emergent conditions requiring physician evaluation within 10 minutes; Level 3, urgent conditions needing evaluation within 30 minutes; Level 4, less-urgent conditions appropriate for evaluation within 60 minutes; and Level 5, non-urgent conditions suitable for evaluation within 120 minutes [21]. The CCI is a widely accepted and frequently referenced tool that scores the patient for 19 different comorbidities. The CCI score of each patient was determined based on at least two outpatient department (OPD) visits with the same diagnosis within one year. Patients were categorized into three groups according to their CCI scores: mild (CCI scores of 1–2), moderate (CCI scores of 3–4), and severe (CCI scores $\geq$5). The term "72-hour revisits" refers to instances where patients returned to the ED within 72 hours following their initial visit. Such returns could indicate potential issues, such as missed diagnoses or inadequate initial management, warranting further investigation in our study.

2.5 Statistical analysis

Continuous variables are presented as mean (standard deviation, SD), and categorical variables are presented as count (%). The comparisons of continuous variables between groups were conducted using the Student's *t*-test, while the chi-square test was employed for categorical variables. Moreover, the analysis encompassed baseline data comparison between the SMI and non-SMI cohorts, extending beyond mere outcome assessment. To ensure the total sample size remained within a manageable range for chart review, and to address the disparity in patient numbers between the SMI and non-SMI groups, a matched case-control study design was employed. Matching was performed using the Greedy algorithm at a 1:3 ratio (SMI:non-SMI). The variables used for matching were age ($\pm$5 years) and gender. We used Multivariate Imputation by Chained Equations (MICE), a statistical technique widely used in medical research, to manage variables with missing data [22]. A *p*-value of less than 0.05 was considered indicative of statistically significant results. To identify independent predictors of hospital length of stay, we constructed a multiple linear regression model. Candidate input variables were selected a priori based on clinical relevance and literature review, including age, sex, ED triage level, CCI category, and SMI status. Continuous variables, such as age and CCI, were treated as continuous unless otherwise specified. The final model adjusted for age, sex, ED triage level (Taiwan Triage and Acuity Scale 1–5), and CCI category (1–2, 3–4, $\geq$5). SMI status was the primary variable of interest. The statistical analysis is done using Statistical Analysis System (SAS) version 9.4 (SAS Institute Inc., Cary, NC, USA).

3. Results

Over an 11-year period, data from a total of 25,893 patients with non-traumatic hollow organ perforation were collected across seven hospitals. Of these patients, 18,330 patients were excluded from the analysis based on the predefined inclusion criteria, leaving 7563 patients for further analysis. Among the excluded patients, the reasons included being under 18 years old (3275 patients), transfer from other health facilities (11,374 patients), and incomplete medical records (3681 patients). The recruitment process is illustrated in Fig. 1.

The participants had a mean age of 59.2 $\pm$ 18.6 years, with 38% being female (Table 1). Among the patients in the SMI group, 48.9% of patients had depression, 34.8% had schizophrenia, and 16.3% had bipolar disorder. The SMI group had a greater prevalence of comorbidities, including cardiovascular disease, cerebrovascular disease, liver disease, and chronic renal disease. The SMI group also had a higher percentage of patients in severe CCI stages.

The matched cohort included all 92 patients with SMI and 276 patients without SMI. In this matched cohort the prevalence of comorbidities, including cardiovascular disease, cerebrovascular disease, liver disease, and renal disease, was still significantly higher in the SMI group. Additionally, the SMI group had a higher percentage of patients in mild and severe CCI stages.

Analysing the matched cohort, there was no significant difference between the two groups in terms of vital signs in triage or results of laboratory tests. There was no significant difference in ED management parameters: prescription of opioid and non-opioid analgesics, time to first order, time to the first antibiotics treatment, time to surgical consultation, and time to surgery. There was no significant difference in the unscheduled 72-hour ED revisit.

Regarding in-hospital outcomes, in the matched cohort, the SMI group had a significantly longer duration of hospitalization (16.9 *vs*. 13.0 days, $p = 0.02$) and higher in-hospital expenditure (5752.6 *vs*. 4141.3 USD, $p = 0.04$) in univariable analysis (Table 2). After multivariable analysis adjusting for ED triage, CCI, and other demographic covariates, the SMI remained an independent predictor for a longer hospital stay ($p = 0.038$) (Table 3).

4. Discussion

This study aimed to investigate clinical outcomes and ED management to evaluate potential health disparities among SMI patients with non-traumatic hollow organ perforation in a healthcare system characterized by high insurance coverage and broad accessibility. Aligned with previous studies, we found that SMI group had a higher prevalence of comorbidities, including cardiovascular disease, cerebrovascular disease, liver disease, and renal disease, even after adjusting for age and sex. These findings indicate that individuals with SMI are at

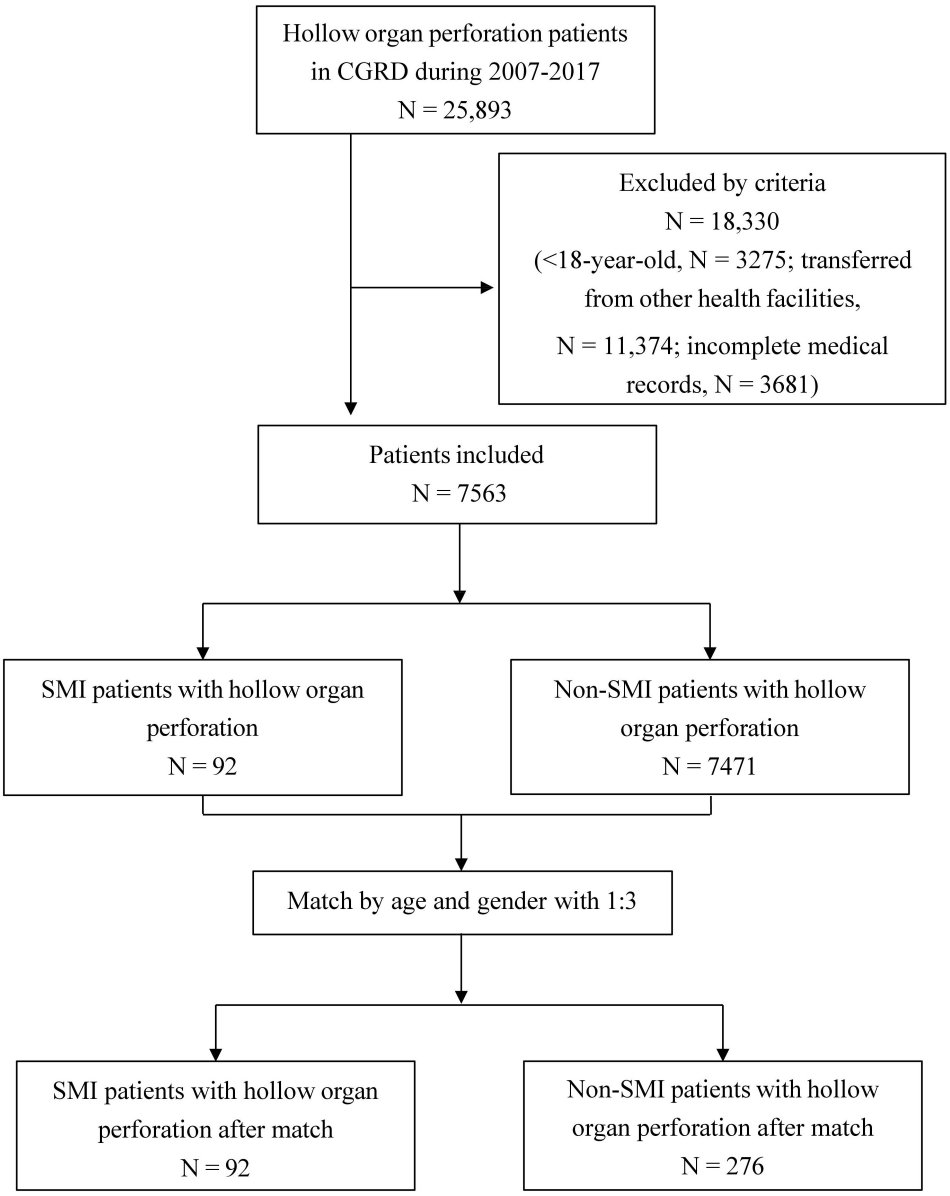

FIGURE 1. Flow chart of participant selection in the cohort study. CGRD, Chang Gung Research Database; SMI, severe mental illness.

increased risk for multiple chronic physical health conditions [23, 24]. Moreover, patients with SMI experienced a longer hospitalization, which in turn contributed to higher in-hospital expenditures, further highlighting the disproportionate health challenges faced by this population compared with the general population [25].

To evaluate potential disparities in EDs, we examined multiple parameters, including waiting times for medical evaluation and treatment. Previous studies have demonstrated that patients with mental illness often experience prolonged ED wait times before receiving physician assessment. To obtain a comprehensive understanding of clinical management in the ED, we analyzed several critical time intervals, including time to initial pain medication, time to antibiotic administration, time to surgical consultation, and time to definite surgery [26, 27]. None of these parameters displayed statistically significant differences between the SMI and non-SMI groups. Similarly, no significant differences were observed in ICU admission, ICU length of stay, or in-hospital mortality between the two groups. These findings may be explained by the comprehensive healthcare system in Taiwan, which has a high-density of health facilities, coupled with a high rate of health insurance coverage and the convenience of accessing medical services, these factors decrease the obstacles for seeking medical services among vulnerable groups, including patients with SMI. The high coverage rate of national health insurance was previously reported to have a positive influence in bridging the financial gap and improving healthcare outcomes for vulnerable populations, potentially mitigating the challenges of medical accessibility encountered by patients with SMI [28].

Previous studies have demonstrated the association between SMI and an elevated risk of physical health conditions. For example, individuals with schizophrenia are 2.83 times more likely to experience appendiceal perforation compared with the general population [13, 18]. Moreover, patients with schizophrenia who underwent surgery are significantly more

TABLE 1. Patient characteristics for overall, non-matched, and matched groups.

Variable	Overall (N = 7563)	Non-match			Matched by age and gender (1:3)		
		SMI (N = 92)	Non-SMI (N = 7471)	*p* value	SMI (N = 92)	Non-SMI (N = 276)	*p* value
Age (yr)‡	59.2 (18.6)	58.0 (16.9)	59.2 (18.7)	0.54	58.0 (16.9)	58.0 (16.8)	1.00
Female§	2886 (38.2)	39 (42.4)	2847 (38.1)	0.46	39 (42.4)	117 (42.4)	1.00
Categories of SMI§							
Depression	45 (0.6)	45 (48.9)	-	-	45 (48.9)	-	-
Schizophrenia	32 (0.4)	32 (34.8)	-	-	32 (34.8)	-	-
Bipolar disorder	15 (0.2)	15 (16.3)	-	-	15 (16.3)	-	-
Categories of non-traumatic hollow organ perforation§							
Peptic ulcer with perforation	3334 (44.1)	39 (42.4)	3295 (44.1)	0.93	39 (42.4)	116 (42.0)	1.00
Perforation of intestine	1690 (22.4)	27 (29.4)	1663 (22.3)	0.12	27 (29.4)	61 (22.1)	0.16
Diverticulitis with perforation	149 (2.0)	3 (3.3)	146 (1.9)	0.26	3 (3.3)	4 (1.5)	0.24
Appendicitis with perforation	2390 (31.6)	23 (25.0)	2367 (31.7)	0.24	23 (25.0)	94 (34.1)	0.14
Comorbidities§							
Cardiovascular disease	1430 (18.9)	33 (35.9)	1397 (18.7)	<0.001*	33 (35.9)	50 (18.1)	<0.001*
Cerebrovascular disease	1505 (19.9)	36 (39.1)	1469 (19.7)	<0.001*	36 (39.1)	47 (17.0)	<0.001*
Pulmonary disease	1662 (26.4)	28 (32.6)	1634 (26.3)	0.24	28 (32.6)	60 (26.2)	0.33
Liver disease	1858 (24.6)	41 (44.6)	1817 (24.3)	<0.001*	41 (44.6)	59 (21.4)	<0.001*
Diabetes mellitus	1759 (27.9)	27 (31.4)	1732 (27.9)	0.55	28 (30.4)	68 (24.6)	0.34
Renal disease	1369 (21.7)	28 (32.6)	1341 (21.6)	0.02*	28 (32.6)	43 (18.8)	0.01*
Malignancy	1780 (23.5)	25 (27.2)	1755 (23.5)	0.48	25 (27.2)	60 (21.7)	0.35
AIDS	5 (0.1)	0 (0)	5 (0.1)	1.00	0 (0)	1 (0.4)	1.00
CCI 1–2	2862 (37.8)	26 (28.3)	2836 (38.0)	0.07	26 (28.3)	113 (40.9)	0.04*
CCI 3–4	1189 (15.7)	13 (14.1)	1176 (15.7)	0.78	13 (14.1)	45 (16.3)	0.74
CCI ≥5	3512 (46.4)	53 (57.6)	3459 (46.3)	0.04*	53 (57.6)	118 (42.8)	0.02*

Count data are expressed as numbers (percentage), and continuous values are expressed as mean ± SD.
SMI, severe mental illness; AIDS, acquired immune deficiency syndrome; CCI, Charlson Comorbidity Index.
**p < 0.05.*
‡*Student's t-test.*
§*Chi-Squared Test.*

likely to develop postoperative complications and face nearly threefold higher 30-day mortality rates than patients without mental disorders [29]. In the context of ED management, both analgesic prescribing patterns and unscheduled 72-hour ED revisits have been utilized as indicators to assess treatment disparities. Prior research has shown that women and racial minority groups often receive lower rates of analgesia in the ED for acute pain [30–32]. However, in our study, we found no significant differences in the prescription rates of analgesics, both opioid and non-opioid, nor in the 72-hour revisit rates between patients with and without SMI. These findings further support that, in a healthcare system with high accessibility and comprehensive insurance coverage such as Taiwan's, disparities in acute care provision may be attenuated, even for vulnerable populations like individuals with SMI.

Despite the absence of significant differences between the SMI and non-SMI groups in ED treatment, ICU admission, in-hospital mortality, or unscheduled 72-hour ED revisit, patients with SMI experienced a longer duration of hospitalization, which in turn contributed to higher in-hospital expenditures. Although our database did not capture structured variables that could identify the precise reasons for delayed discharge, existing literature provides several plausible explanations. Individuals with severe mental illness often carry a heavier burden of chronic physical comorbidities, such as cardiovascular, hepatic, and renal disease, which may complicate postoperative recovery and prolong inpatient management. In addition, coordination of psychiatric consultation and post-discharge placement has been reported to extend hospital stays for this population, even when the acute medical issue has stabilized. Limited social support and the need for multidisciplinary disposition planning can further delay discharge readiness. Taken together, these factors suggest that the prolonged hospitalization we observed is likely multifactorial, reflecting medical complexity and psychosocial challenges rather than differences in acute surgical or ED care. This

TABLE 2. Vital signs, laboratory test, ED treatment, and hospital outcomes for the matched group.

Variable	SMI (N = 92)	Non-SMI (N = 276)	*p* value
Triage[†,§]			
1	7 (7.6)	14 (5.1)	
2	23 (25.0)	86 (31.2)	
3	59 (64.1)	170 (61.6)	
4	3 (3.3)	5 (1.8)	
5	0 (0.0)	1 (0.4)	
Vital signs in triage[‡]			
GCS	14.5 (1.6)	14.8 (1.2)	0.15
Pulse Rate (times/min)	101.6 (23.5)	96.5 (20.0)	0.06
Systolic blood pressure (mmHg)	132.0 (31.2)	134.9 (28.0)	0.40
Diastolic blood pressure (mmHg)	83.2 (36.8)	79.5 (17.3)	0.37
Respiratory rate (times/min)	19.3 (2.4)	19.0 (2.3)	0.38
Body temperature (°C)	36.8 (1.1)	36.9 (1.0)	0.28
Laboratory test[‡]			
White cell count (1000/μL)	13.5 (6.7)	13.0 (6.3)	0.48
Hemoglobin (g/dL)	12.6 (3.0)	13.0 (2.6)	0.27
Platelet (1000/μL)	251.7 (111.4)	248.2 (95.4)	0.77
Creatinine (mg/dL)	1.63 (2.0)	1.35 (1.3)	0.20
Na (mEq/L)	136.3 (4.4)	136.5 (4.5)	0.72
K (mEq/L)	4 (0.9)	3.89 (0.7)	0.25
ALT (U/L)	35.2 (41.1)	30.9 (42.6)	0.40
Sugar (mg/dL)	141.1 (61.5)	150 (88.0)	0.29
CRP (mg/L)	93 (105.8)	109.2 (116.5)	0.29
Unscheduled 72-h ED revisit[‡]	10 (10.9)	38 (13.8)	0.59
ED treatment			
Analgesics[§]	59 (64.1)	171 (62.0)	0.80
Opioid analgesics[§]	57 (62.0)	184 (66.7)	0.49
Non-opioid analgesics[§]	35 (38.0)	92 (33.3)	0.49
Time to 1st order (min)[‡]	16.2 (8.6)	17.1 (10.0)	0.49
Time to 1st antibiotics (min)[‡]	172.7 (253.1)	198.2 (372.7)	0.50
Time to surgical consultation (min)[‡]	212.9 (288.4)	226.2 (497.4)	0.76
Time to surgery (min)[‡]	1025.3 (664.7)	805.6 (568.3)	0.10
In-hospital outcome			
Admission duration (d)[‡]	16.9 (13.5)	13.0 (10.9)	0.02*
ICU admission[§]	26 (28.6)	52 (19.1)	0.08
ICU stay length (d)[‡]	22.6 (15.4)	20.2 (14.2)	0.40
In-hospital mortality[§]	11 (11.9)	21 (7.6)	0.28
In-hospital expenditure (USD)[‡]	5752.6 (6929.1)	4141.3 (4832.0)	0.04*

Count data are expressed as numbers (percentage) and continuous values are expressed as mean ± SD.
SMI, severe mental illness; GCS, Glasgow Coma Scale; ALT, alanine aminotransferase; CRP, C-reactive protein; ED, emergency department; ICU, intensive care unit; USD, US dollar.
[†]*Five-Level Taiwan Triage and Acuity Scale.*
*$p < 0.05$.
[‡]*Student's t-test.*
[§]*Chi-Squared Test.*

TABLE 3. Multivariable analysis on factors influencing hospital length of stay.

Variable	Coefficients (β)	95% Confidence Interval	*p*-value
Intercept	6.31		
ED triage = 1	9.18	(−12.8, 31.2)	0.2651
ED triage = 2	4.75	(−16.8, 26.3)	
ED triage = 3	3.68	(−17.8, 25.1)	
ED triage = 4	1.57	(−21.2, 24.3)	
CCI 1–2	3.24	(−0.42, 6.91)	0.0033
CCI 3–4	6.54	(2.74, 10.4)	
Age	0.01	(−0.09, 0.12)	0.8169
Sex = F	2.54	(0.03, 5.05)	0.0466
SMI	2.92	(0.15, 5.68)	0.0381

ED, emergency department; CCI, Charlson Comorbidity Index; SMI, severe mental illness; F, female.

finding underscores the urgent need to address the systemic challenges faced by these patients. Potential interventions could include the early integration of a multidisciplinary care team, encompassing psychiatrists, dietitians, social workers, and chronic care personnel, to holistically manage the complex needs of patients with SMI and improve care continuity across the treatment spectrum.

This study utilized an 11-year retrospective cohort across 7 major hospitals in Taiwan. The large-scale, multi-center dataset enabled the examination of a relatively small but clinically significant patient subgroup. We also employed several objective and quantifiable parameters, including time to physician evaluation and time to key clinical interventions, to assess potential disparities in emergency care. However, several limitations should be acknowledged. First, as the data were derived solely from hospitals in Taiwan, the generalizability of the findings to other healthcare systems may be limited. Second, the retrospective design may introduce selection and information biases, and certain clinically relevant time intervals, such as the duration from symptom onset to ED presentation, were not available. Nonetheless, we believe that these potential sources of bias are non-differential between groups and therefore unlikely to significantly alter the overall findings. Third, although the database analyzed in this study covers the period from 2007 to 2017 and may be considered relatively outdated, the epidemiology of severe mental illness and the management strategies for hollow organ perforation have not undergone substantial changes in the past decade. Therefore, despite the age of the data, we believe it remains relevant and provides valuable insights for current clinical practice and evaluation of health equity. Future prospective studies with larger and more diverse populations in varied healthcare contexts are warranted to validate our results and to further elucidate the mechanisms underlying the disparities observed.

5. Conclusions

In this multi-center, retrospective matched case-control study, we found that patients with SMI who presented with non-traumatic hollow organ perforation had significantly higher rates of physical comorbidities, longer hospital stays, and greater in-hospital expenditures compared with those without SMI. Despite these differences in disease burden and resource utilization, no disparities were observed in ED management metrics—including treatment timelines and analgesic use—or in key clinical outcomes, such as ICU admission or mortality. These findings suggest that, within the context of a healthcare system characterized by near-universal health insurance coverage and broad facility access, the equity of acute care delivery for SMI patients may be preserved.

Nevertheless, the persistent excess in hospitalization length and cost highlights the need for more integrative, multidisciplinary care approaches to address the complex health needs of this vulnerable population. Future prospective studies across diverse health systems are warranted to validate these findings and explore targeted interventions that reduce disparities beyond the ED setting.

ABBREVIATIONS

SMI, severe mental illness; ED, emergency department; WHO, World Health Organization; CT, computed tomography; EMR, electronic medical records; CGRD, Chang Gung Research Database; ICD, International Classification of Diseases; NHI, National Health Insurance; ICU, intensive care unit; CCI, Charlson Comorbidity Index; OPD, outpatient department; CGMH, Chang Gung Memorial Hospital; TTAS, Taiwan Triage and Acuity Scale; SD, standard deviation; MICE, Multivariate Imputation by Chained Equations; CM, Clinical Modification; SAS, Statistical Analysis System.

AVAILABILITY OF DATA AND MATERIALS

The datasets generated and/or analyzed in the current study are available from the corresponding author upon reasonable request.

AUTHOR CONTRIBUTIONS

SKH, MJH, CHH—conceptualization. KHW, HYL, CHL—data curation. SYG, SYC—formal analysis. SYG, CHC, HYC—methodology. MJH, SKH, WCC—investigation. CHC, HYL—resources. CHC—supervision. MJH, SKH—writing.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This retrospective study received institutional review board approval at the Chang Gung Medical Foundation (IRB: 202201637B0). The requirement for informed consent was waived by Institutional Review Board of Chang Gung Medical Foundation.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

SUPPLEMENTARY MATERIAL

Supplementary material associated with this article can be found, in the online version, at https://oss.signavitae.com/mre-signavitae/article/1999021751944527872/attachment/Supplementary%20material.docx.

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