The Prevalence of Post-traumatic Stress Disorder as Part of Post-ICU Syndrome among Israeli ICU Survivors

Shiri Zarour MD[1], Esther Dahan MD[1], Dana Karol MD[1], Or Hanoch[1], Barak Cohen MD[1,2], and Idit Matot MD[1]

[1]Division of Anesthesia, Intensive Care, and Pain Management, Tel Aviv Sourasky Medical Center, Tel Aviv, Israel
[2]Outcomes Research Consortium, Cleveland, Ohio, USA

ABSTRACT **Background:** Survivors of critical illness are at increased risk of long-term impairments, referred to as post-intensive care unit (ICU) syndrome (PICS). Post-traumatic stress disorder (PTSD) is common among ICU survivors with reported rates of up to 27%. The prevalence of PTSD among Israeli ICU survivors has not been reported to date.

Objectives: To evaluate the prevalence of new onset PTSD diagnosed in a post-ICU clinic at a tertiary center in Israel.

Methods: We conducted a retrospective, single center, cohort study. Data were collected from medical records of all patients who visited the Tel Aviv Sourasky Medical Center post-ICU clinic between October 2017 and June 2020. New onset PTSD was defined as PTSD diagnosed by a certified board psychiatrist during the post-ICU clinic visit. Data were analyzed using descriptive statistics.

Results: Overall, 39 patients (mean age 51 ± 17 years, 15/39 females [38%]) attended the post-ICU clinic during the study period. They were evaluated 82 ± 57 days after hospital discharge. After excluding 7 patients due to missing proper psychiatric analysis, 32 patients remained eligible for the primary analysis. New PTSD was diagnosed in one patient (3%).

Conclusions: We found lower incidence of PTSD in our cohort when compared to existing literature. Possible explanations include different diagnostic tools and low risk factors rate. Unique national, cultural, and/or religious perspectives might have contributed to the observed low PTSD rate. Further research in larger study populations is required to establish the prevalence of PTSD among Israeli ICU survivors.

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KEY WORDS: intensive care unit (ICU), post-intensive care unit syndrome (PICS), post-intensive care unit clinic, post-traumatic stress disorder (PTSD)

The number of patients who survive hospitalization in the intensive care unit (ICU) constantly increases [1]. ICU survivors are at increased risk of physical, cognitive, and psychiatric impairments, with implications that last long after ICU discharge. These impairments are referred to as post-ICU syndrome (PICS) [2]. Incidence of PICS symptoms has been reported in 50–70% of critically ill patients, and co-occurrence of symptoms has been reported in 20% of patients [3].

The most common psychiatric impairments among survivors of critical illness include anxiety, depression, and post-traumatic stress disorder (PTSD) [3,4]. Data suggest that during the first year after critical illness at least one-third of ICU survivors experience anxiety or depressive symptoms, while PTSD symptoms affect one in every five adult critical care survivors [4-6].

Different nations and populations demonstrate different prevalence of PTSD among ICU survivors. A study conducted in England found a PTSD rate of 27% among British ICU survivors [7], while a study of ICU survivors in eastern India [8] found a much lower PTSD rate of 0.6%. The authors attributed the significantly lower PTSD prevalence to greater psychological resilience of religious communities and better stressor dealing skills due to unique features of the Indian culture.

Although the Israeli society has several unique aspects, data regarding the prevalence of PTSD among Israeli ICU survivors are scarce. We evaluated the prevalence of PTSD diagnosed in a post-ICU clinic in a single tertiary center in Israel.

PATIENTS AND METHODS

ABOUT THE CLINIC

The post-ICU clinic was established in October 2017 at the Tel Aviv Sourasky Medical Center. The clinic is multi-disciplinary, and its team includes an attending intensivist who is the case manager, an attending psychiatrist specialized in PTSD, an ICU department secretary, and a volunteer who assists the patient throughout the different stages of the clinic visit.

The clinic visit model was developed based on the literature describing post-ICU follow-up models [9-11], and the final selected model included the following interdisciplinary steps in chronological order:

1. Referring the patient to perform spirometry test and six-minute walk test at the pulmonary institute at the Tel Aviv Medical Center
2. Conducting a comprehensive interview with the patient and primary caregiver led by the case manager (an attending intensivist)
3. Performing a psychiatric interview by an attending psychiatrist specializing in PTSD
4. Preparing a summery letter, which reviews the findings by the team members, assessing and recommendations for the primary care provider

Patients were invited to the post-ICU clinic appointment only if they met all the following criteria:

- Critically ill adult ≥ 18 years old
- ICU length of stay ≥ 72 hours
- Post-institutional discharge ≥ 2 weeks
- Health maintenance organization payment commitment form for the post-ICU clinic appointment

Exclusion criteria for post-ICU clinic appointments included cognitive impairment prior to ICU admission, resident of a nursing facility, or drug abuse.

Patients who met all the criteria were summoned to the post-ICU clinic. They were asked to arrive with their primary caregiver.

STUDY DESIGN AND POPULATION

We conducted a retrospective single-center cohort study. The study was approved by the institutional review board, which waived the need for individual informed consent. We included all patients who visited the Tel Aviv Medical Center post-ICU clinic between October 2017 and June 2020. Patients were excluded from the main outcome analysis due to missing proper psychiatric interviews. Data were retrieved from electronic medical records and manual chart review for the entire length of the index hospital stay and any of the post-ICU clinic visits. Data collected included demographic characteristics, medical history, and clinical variables regarding the ICU hospitalization period. We also retrieved data regarding the recovery status of the patients from the post-ICU clinic visit charts including results of physical tests, occupational status, and new diagnoses of psychiatric impairments.

STUDY OUTCOMES

The study was designed to examine the prevalence of psychiatric impairments among Israeli ICU survivors. For the primary analysis, we examined the prevalence of new onset PTSD, diagnosed during the post-ICU clinic session by a certified board psychiatrist according to the American Psychiatric Association's Diagnostic and Statistical Manual fifth edition (DSM-5) criteria. In secondary analyses, we investigated the prevalence of new onset anxiety, depression, or sleeping disorders. We also conducted a post hoc exploratory analysis investigating changes in occupational status.

STATISTICAL ANALYSIS

Data were analyzed using descriptive statistics. Categorical variables were summarized as frequency and percentage. Continuous variables were reported as mean ± standard deviation. Statistical analyses were performed using IBM Statistical Package for the Social Sciences statistics software, version 27 (SPSS, IBM Corp, Armonk, NY, USA).

RESULTS

DEMOGRAPHICS AND MEDICAL HISTORY

Overall, 873 patients were admitted to the general ICU at the Tel Aviv Medical Center during the study period; 716 survived the index admission. In total, 39 patient met all post-ICU clinic enrollment criteria and decided to attend the Tel Aviv Medical Center post-ICU clinic [Figure 1]. The mean follow-up duration from hospital discharge until the first post-ICU clinic visit was 82 ± 57 days.

The mean age of the study population was 51 ± 17 years; 15 patients (38%) were female. Regarding religious affiliation, all (39/39) were Jewish. Pre-existing medical conditions are shown in Table 1.

ICU ADMISSION DATA

Most of the patients were admitted to the ICU because of surgical and medical related conditions. Five patients (13%) were admitted due to obstetric causes. Mean ICU length of stay (LOS) was 10.6 ± 5.7 days. The mean mechanical ventilation period was 6.2 ± 4.1 days. As shown in Table 2, most patients were mechanically ventilated, and more than one-quarter underwent tracheostomy during ICU stay. More than half of the patients were diagnosed with sepsis, shock, or acute kidney injury. Eleven (28%) were documented to have at least one event of delirium during the ICU stay. Other medical data regarding ICU admission are shown in Table 2.

Figure 1. Flow chart of eligible patients

ICU = intensive care unit, TLVMC = Tel Aviv Sourasky Medical Center

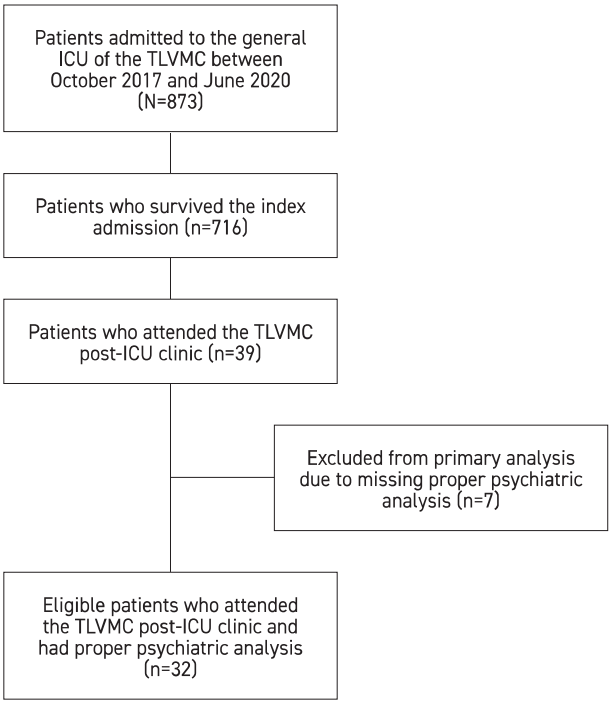

Table 1. Prevalence of pre-existing conditions prior to intensive care unit admission (n=39)

Pre-existing condition	Prevalence, n (%)
Hyperlipidemia	15 (38%)
Hypertension	13 (33%)
Chronic tobacco use	13 (33%)
Ischemic heart disease	9 (23%)
Diabetes mellitus	8 (21%)
Neurologic condition (including stroke)	6 (15%)
Chronic lung disease	5 (13%)
Malignancy	5 (13%)
Anxiety	3 (8%)
Stroke	2 (5%)
Chronic liver disease	2 (5%)
Chronic renal failure	0 (0%)

DISCHARGE STATUS

The mean in-hospital post-ICU discharge LOS was 9.9 ± 10.5 days. Overall, 15 patients (39%) underwent rehabilitation at a designated facility or with a home-based program. The mean LOS at a rehabilitation facility was 40.4 ± 29.6 days.

Table 2. Prevalence of severe medical conditions during ICU admission (n=39)

Medical condition	Prevalence, n (%)
Mechanical ventilation	35 (90%)
Sepsis	23 (59%)
Shock	22 (56%)
AKI	21 (54%)
Glucose disturbances	18 (46%)
Septic shock	15 (39%)
MODS	12 (31%)
Hyperglycemia	12 (31%)
Delirium	11 (28%)
Tracheostomy	10 (27%)
Neurologic Injury	9 (23%)
Hypoglycemia	9 (23%)
Recurrent ICU admission	3 (8%)
Renal replacement therapy	2 (5%)

AKI = acute kidney injury, ICU = intensive care unit, MODS = multiple organ dysfunction syndrome

POST-ICU CLINIC PSYCHIATRIC FINDINGS

After excluding seven patients due to missing proper psychiatric analysis, 32 patients remained eligible for the primary analysis [Figure 1]. New PTSD was diagnosed by the attending psychiatrist according to DSM-5 criteria in one patient (1/32, 3%). As for the secondary analysis, none were diagnosed with new anxiety or depressive disorders according to DSM-5 diagnostic criteria. In addition, 15 patients (15/39, 39%) reported a new sleeping disorder. Of these, 3 patients (3/15, 20%) required sleeping aid medications.

As for the post hoc exploratory analysis, 28 patients (72%) were employed prior to ICU admission. Of these patients, 15 (15/28, 54%) were employed at the time of the clinic visit (mean 82 ± 57 days from hospital discharge).

DISCUSSION

Psychiatric impairments following prolonged ICU stay are not rare. In the present study, we identified a relatively low prevalence of PICS-associated PTSD in Israeli patients, compared with the prevalence found in other populations in previous studies, as well as a low prevalence of anxiety and depressive disorders [2-7,12,13].

Our study identified a 3% prevalence of PICS-associated PTSD. This finding concurs with a similar study that

Table 3. Comparison of risk factors for PTSD and PTSD incidence

Risk factor	Our study (n=39)	Cuthbertson et al. 2004 (n=111) [13]
Female sex	39%	44%
Median age in years (IQR)	57 (37–67)	58 (18–87)
Median hospital stay period in days (IQR)	10 (7–14)	6 (1–51)
Median mechanical ventilation period in days (IQR)	6 (4–9)	2 (0–44)
PTSD incidence	3%	14%

ICU = intensive care unit, IQR = inter quartile range, PTSD = post-traumatic stress disorder

was conducted in eastern India [8], which found a low PICS-associated PTSD rate of 0.6%, presumably due to greater psychological resilience of religious communities and better stressor dealing skills due to unique features of the Indian culture. However, the 3% PICS-associated PTSD prevalence found in our study is significantly lower than most studies conducted in developed countries, indicating prevalence rates of 14–27% [2,7,12,13]. The prevalence gaps may be a result of several compelling reasons. The first reason might be the use of different diagnosis strategies for PTSD. For our study, we used a formal PTSD diagnosis made by a board-certified psychiatrist according to DSM-5 criteria after a comprehensive psychiatric interview. Most studies regarding PICS-associated PTSD used only questioners to assess PTSD [2,7,12]. Yet, a systematic review of PTSD in ICU survivors [12] found median point prevalence of 19% (range 10–39%) for clinician-ascertained PICS-associated PTSD, which implies that the diagnosis strategy was not a large contributor for the prevalence gap.

Another possible explanation is the different diagnosis executer and location. Avoidance symptoms are an inseparable part of PTSD. The diagnosis strategy used in our study required the patients to visit a clinic located in the hospital in which they had been admitted and to attend a meeting with one of the doctors who treated them. Thus, it is plausible that patients presenting with avoidance symptoms refused to visit the clinic, leading to selection bias in the study population. Indeed, a study of post-ICU PTSD that took place in an ICU clinic, which was located at the facility where the participants were hospitalized and staffed by the ICU caregivers, also found a relatively low PTSD rate of 5% (3/62) [14]. This finding could also explain the low number of patients who attended the clinic in the Tel Aviv Medical Center.

Another possibility that may have contributed to the low PTSD prevalence in the present study is the low rate of risk factors for PTSD, such as young age, female sex, and history of diagnosed psychiatric impairments [12,15]. Yet, when comparing the rate of these known risk factors among our study's population to a prospective cohort study that studied clinician-ascertained PICS-associated PTSD [13], there was no apparent significant difference between the populations that were studied [Table 3]. This comparison is certainly limited by the lack of sufficient power to detect differences due to the small sample size of our study and the low rate of the studied outcome. An additional well-established risk factor for PICS-associated PTSD is ICU delirium. Our study found a 28% prevalence rate of ICU delirium, which correlates well with previous studies [3], thus suggesting that a low rate of risk factors for PTSD may not be the main explanation for the relatively low PTSD prevalence found in our cohort.

Last, susceptibility to PTSD, and hence development of PTSD among ICU survivors, might vary among different cultures, countries, and populations. Serval studies showed the resilience of individuals in the Israeli society to traumatic events and consequential PTSD symptoms in multiple settings [16,17], especially among the Jewish population, which constitutes the majority in Israel [18,19] and the population in the present study. These studies attributed the low rate of PTSD symptoms among Israeli citizens to unique features that are designated to the Jewish Israeli society, such as a sense of strong social identity, a sense of self-efficacy during a traumatic event, optimism, positive coping mechanisms, and habituation process as a result of continuous traumatic stress caused by frequent terrorist attacks and ongoing shelling over civilian population.

Of note, only half of the patients who were employed prior to ICU admission were employed at the time of the clinic visit, which was on average approximately 3 months after hospital discharge. The high prevalence of patients who did not return to work after a significant post-discharge period may suggest an impairment in higher functions or an inability to perform complex daily activities. The approximately 50% employment rate we found is slightly higher compared to a large meta-analysis that found a pooled return to work prevalence of 36% (95% confidence interval 23–49%) within a follow up of 1–3 months after discharge in various populations [20].

Our study has several strengths. It is the first study to assess PTSD as a part of PICS among the Israeli popula-

tion, which has unique national, cultural, ethnic, and religious features. In addition, the novel clinic established in the Tel Aviv Medical Center enabled a thorough investigation of this special population.

This study has several limitations. First, the small sample size of our study makes it more vulnerable to selection bias, especially since only 39 of the 716 patients who survived the index admission met all the post-ICU clinic enrollment criteria and agreed to attend the appointment after being approached. Second, as our study participants coincidentally were all Jewish, our conclusions are only relevant for Israeli Jewish patients and should not be generalized to other populations in Israel.

CONCLUSIONS

ICU survivors in Israel present low prevalence of PICS-associated PTSD when compared to studies conducted worldwide. Further research with larger and more diverse Israeli populations is required to establish the prevalence of PTSD among Israeli ICU survivors. If these studies find a differentiated prevalence of PICS-associated PTSD among different minority groups within the Israeli population, a redistribution of psychosocial resources will be needed.

Correspondence

Dr. S. Zarour
Division of Anesthesia, Intensive Care, and Pain Management, Tel Aviv Sourasky Medical Center, Tel Aviv 6423906, Israel
Phone: (972-3) 697-4093
Fax: (972-3) 697-3026
Email: shiriph@tlvmc.gov.il

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If I have ever made any valuable discoveries, it has been owing more to patient observation than to any other reason.

Isaac Newton (1642–1727), English physicist, mathematician, and philosopher
widely regarded as the single most important figure in the 17th century Scientific Revolution
for his three laws of motion and universal law of gravity