Symptoms of anxiety, depression, and post-traumatic stress disorder 6 weeks and 6 months after ICU: Six out of 10 survivors affected

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Background. Mental health conditions such as depression, anxiety and post-traumatic stress disorder (PTSD) are being increasingly recognised as common adverse outcomes for critical illness survivors. These conditions can have lasting consequences on their wellbeing, ability to return to their pre-illness level of functioning and health-related quality of life. There is a paucity of South African data in terms of the psychological aspects of the post-intensive care unit (ICU) syndrome.
Objective. To identify and characterise patients who suffered from significant symptoms of mental health disease and poor mental health-related quality of life after ICU admission and who may benefit from appropriate referral, further investigation and medical intervention.
Methods. Critically ill patients in a multidisciplinary tertiary ICU were prospectively enrolled upon ICU discharge. Survivors were screened for anxiety, depression and post-traumatic stress syndrome at 6 weeks and 6 months after hospital discharge. The Hospital Anxiety and Depression Score (HADS) and the Impact Of Events Scale – Revised (IES-R) were used as screening tools. The mental component summary score (MCS) of the RAND short form-36 was used to determine the effect of psychological symptoms on health-related quality of life (HRQOL).
Results. The median age of the 107 ICU survivors was 42 years, and half of them were admitted for complications of COVID-19. Six out of every 10 ICU survivors experienced significant symptoms of anxiety, depression and/or PTSD at follow-up. At the 6-month study visit, 4 out of every 10 patients were experiencing significant psychological symptoms. Those affected had a significantly lower mental HRQOL when compared with those who were unaffected. More than half of those affected had co-occurrence of psychological symptoms. Significant symptoms of anxiety were common, with 5 out of every 10 participants experiencing significant symptoms at either, or both, of the study visits. More than 3 out of 10 of affected patients' symptoms only occurred after the 6-week visit. Associations for significant psychological symptoms comprised female sex, younger age, a diagnosis of trauma and frightening memories of the ICU admission.
Conclusion. The burden of mental health disease in ICU survivors is substantial, affecting their HRQOL. Six out of 10 patients experienced symptoms of anxiety, depression and PTSD, and more than half of those affected experienced co-occurrence of the conditions. A third of those affected developed these symptoms only beyond 6 weeks after hospital discharge. A potentially modifiable association with psychological symptoms was frightening memories of the ICU stay.
Keywords: critical care, psychological symptoms, depression, anxiety, post-traumatic stress disorder, depression, post ICU syndrome

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The post-intensive care unit (ICU) syndrome (PICS) is defined as a constellation of new or worsened impairments in physical, cognitive and/or mental health that persist beyond critical care and hospital discharge.[1] These deficits are often more related to the patients' ICU stay than the admission diagnosis and may therefore be unexpected. Mental health diseases such as depression, anxiety and post-traumatic stress disorder (PTSD) are increasingly being recognised as common outcomes for critically ill patients post hospital discharge, and can have lasting effects on their wellbeing, ability to return to their pre-illness level of functioning and health-related quality of life (HRQOL).[2,3]

The exact determinants of mental health disorders after critical illness are unknown, but it most likely occurs because of physiological and psychological stress associated with the effects of critical illness and its therapies on the brain.[4] Postulated mechanisms and triggers include organ dysfunction, medications, pain, altered sensory inputs including sensory deprivation, confinement, sleep deprivation, delirium, fear, frightening memories, elevated cytokines, stress-related activation of the hypothalamic pituitary axis, cerebral atrophy, hypoxaemia, neurotransmitter aberrations from brain injury, elevated catecholamine levels and acute mental stress. Physical and neurocognitive impairment following hospital discharge may also contribute to mental health symptoms.[5]

There is a paucity of South African (SA) data pertaining to psychological impairment beyond ICU discharge.[6]

Methods

In this single-centre prospective observational cohort study, consecutive patients admitted to the adult medical-surgical ICU at an urban tertiary hospital in Eastern Cape Province were screened

for eligibility. At the time of ICU discharge, or shortly thereafter in the hospital ward, the following categories of patients were deemed eligible for recruitment: patients aged ≥18 years who required either >48 hours' respiratory support (invasive or non-invasive mechanical ventilation, or high-flow nasal oxygen), or had an ICU stay >48 hours for shock and/or organ failure. Patients were ineligible for inclusion if they were prisoners, had a life expectancy that was gauged to be <6 months, resided >300 km from the enrolling centre, were unable to be interviewed in English or IsiXhosa, had active or recent psychosis, were admitted for self-harm or with central neurological pathology, or had pre-existing cognitive impairment (as determined by the Short Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE).[7] Patients were also excluded from the final data analysis if they did not survive until the 6-month follow-up or did not complete the end-of-study measurements.

Data collected included demographic and clinical information, and the retrospective baseline HRQOL was determined by completing the RAND SF- 36 questionnaire, hereafter referred to as the SF-36.[8] The SF-36 Mental Component Summary score (MCS) was determined.

Patients were followed up at 6 weeks and 6 months post hospital discharge. At these visits, information collected included return to previous life roles, including employment, studying and home making, as well as reasons for being newly unemployed. The interview included questions pertaining to the recollection of frightening memories, or being physically restrained, during the ICU admission. The Hospital Anxiety and Depression Score (HADS) and the Impact of Events Scale – Revised (IES-R)[9-11] were completed. Thresholds ≥8 when screening for depression and anxiety and ≥33 were used when screening for PTSD. When completing the IES-R when screening for PTSD, the patient was asked to answer in relation to their ICU stay and not in relation to any traumatic events that led to ICU admission e.g. a motor vehicle accident or interpersonal violence. All questionnaires were administrated by a healthcare worker fluent in the patient's language of choice.

Sepsis and septic shock were defined as per the sepsis-3 definition,[12] acute kidney injury as per KDIGO guidelines,[13] and acute respiratory distress syndrome (ARDS) as per the proposed new definition for ARDS.[14] The new definition for ARDS is similar to the Berlin definition,[15] but also includes the need for high-flow humidified nasal oxygen therapy with >30 L/minute airflow as criterion.

Data were exported from Excel (Microsoft, USA) and analysed with Rstudio: version 3.4.2 (Rstudio, USA). Continuous data were tested for normality using the Kolmogorov-Smirnov test. Normally distributed data are reported as mean (standard deviation (SD)) and skewed data as median (interquartile range (IQR)). Binary data are presented as numbers (percentages). *T*-tests for dependent and independent samples and the Mann-Whitney U test were used to compare continuous data. For comparison of binary variables, the χ^2 or Fisher's exact test were used, as appropriate, to test associations with predefined variables. Multiple logistic regression analysis was performed, and included risk factors that demonstrated an association with a *p*-value ≤0.1 on bivariate analysis, and/or had known associations with psychological conditions in ICU survivors. The level of significance is at 5%.

The study is part of a larger study that investigated the physical, psychological and neurocognitive after-effects on ICU survivors, as well as its effects on HRQOL and functionality. Participants received a travelling stipend per study visit. The Research and Ethics Committee of Nelson Mandela University provided ethical clearance for the study (ref. no. H20-HEA-PSY-001).

Results

Enrolment and data collection took place from 1 August 2020 to 31 May 2022. The starting date was shortly after the peak of the first local COVID-19 pandemic wave, and the study period included the second and third waves of the pandemic. The process of screening and inclusion is set out in Fig. 1.

A total of 107 (71.3%) of 150 enrolled patients completed the 6-month follow-up visit and were included in the final analysis. There were no significant differences between the patients who were lost to follow-up due to non-attendance, and those who completed the 6-month follow-up (appendix: https://www.samedical.org/file/2224 Table S1). The demographic and clinical characteristics of the patients who were analysed are set out in Table 1.

Overall, 63 (58.9%) of the 107 ICU survivors were affected by significant psychological symptoms at either one or both of the study visits. Overall, 59 (55%) patients were affected by significant symptoms of anxiety, 36 (33.6%) by symptoms of depression and 31 (30.0%) by symptoms of PTSD, at either one or both study visits. The results of the screening tests for anxiety, depression and PTSD are outlined in Table 2. The co-occurrence of significant symptoms at the 6-month study visit is depicted in Fig. 2.

At the 6-week and 6-month study visits, respectively, 26 (24.3%) and 25 (21.5%) of the patients experienced significant symptoms of ≥2 psychological conditions. Among those who had significant psychological symptoms at either study visit, the chances of also having significant symptoms of a second or third condition were 52.0% and 56.8%, respectively.

Forty-five patients were referred for psychological assessment, while the others declined referral. Although many patients with significant psychological symptoms at 6 weeks improved either spontaneously or with therapy, some experienced significant ongoing symptoms at the 6-month study visit. In addition, there were also several new cases of significant symptoms of psychological conditions at the 6-month follow-up. The percentages of patients who were diagnosed with anxiety, depression and PTSD at 6 months were 30.5, 30.0 and 38.7, respectively. The trajectories of the cases with significant symptoms at 6 weeks, as well as the new cases at 6 months, are shown in Table 3.

If patients who reported previous mental health problems are excluded from the analysis, the incidence of any significant psychological symptoms is 38.3% at 6 weeks and 32.7% at 6 months.

Patients with significant psychological symptoms at 6 months had a significantly lower mean (SD) SF-36 MCS than those without significant symptoms of psychopathology: 38.9 (9.9) v. 54.5 (6.7), $p<0.001$ (Fig. 3).

Multiple logistic regression analysis included variables that had a *p*-value ≤0.1 on bivariate analysis. Independent associations between psychological impairment and variables are set out in Table 4. Specifically, younger age was found to be a significant independent predictor of mental health symptoms, with the odds increasing by a factor of 1.05 per younger life year. Other independent predictors were female sex, an admission diagnosis of physical trauma and frightening memories during their ICU admission. ICU length of stay was not an independent predictor of significant psychological symptoms.

Although 52 (48.6%) patients had to be physically restrained at some stage during their ICU stage, memories of this were not associated with psychological impairment. Only 28 patients received benzodiazepines for a median (IQR) of 2.5 (1 - 4) days. Although benzodiazepine use was not associated with psychological impairment, all five patients who had received it for longer than a week suffered from significant mental health symptoms on follow-up.

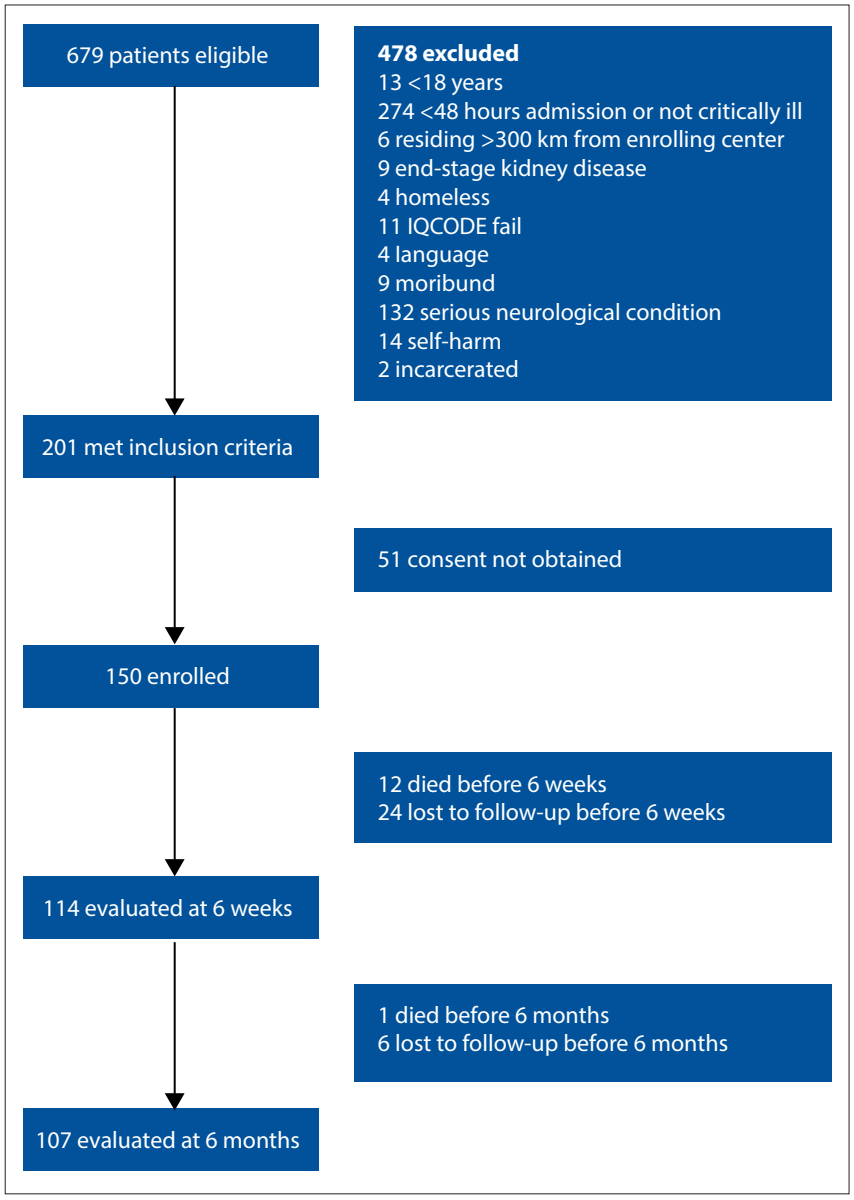

Fig. 1. Screening and enrolment of patients. (IQCODE = Short Informant Questionnaire on Cognitive Decline in the Elderly.)

Discussion

Six out of every 10 ICU survivors, 47% of whom were admitted with COVID-19, experienced significant psychological symptoms at the 6-week and/or 6-month follow-up. Four out of every 10 patients reported significant mental health symptoms at the 6-month study visit, which is higher than the 30% reported in a recent study from Brazil.[16] Symptoms of anxiety, depression and/or PTSD 6 months after hospital discharge were associated with a significantly lower mental HRQOL.

Symptoms of anxiety in the current study were common, affecting more than a third of patients at each of the study visits. In total, >5 out of every 10 ICU survivors were affected by anxiety over the study period. The proportions of patients affected by symptoms of anxiety (35%), depression (17%) and PTSD (19%) at 6 months are in keeping with the findings of other studies and meta-analyses. The reported rates of these conditions among critically ill survivors in the months after ICU discharge range from 32% to 40% for anxiety,[17-19] 19% to 34% for depression[19-21] and 9% to 27% for PTSD.[21-24] A large recent multicentre study from another BRICS country reported a 6-month prevalence of 24% for anxiety, 21% for depression and 15% for PTSD.[16]

The phenomenon of later-onset psychological symptoms has been described previously, in particular among ICU survivors admitted for trauma[25] and among females.[26] For some ICU survivors, the initial positive emotions related to survivorship may later be overshadowed by the subsequent realisation that full recovery is either unattainable or a slow process, with no guarantee of full recovery. Patients, their families and healthcare workers who follow up ICU survivors should therefore be counselled that patients may experience new or worsening mental health symptoms even months after hospital discharge. Several other studies mirrored our finding that HRQOL was significantly lower in those with psychological symptoms.[16,27-29]

A previous SA study that screened ICU survivors for psychological symptoms reported a somewhat higher incidence of symptoms of depression (28%), anxiety (48%) and PTSD (32%) than our study.[30] Patients in this older SA study were enrolled only if they were willing to identify themselves at the outpatient department, as opposed to prospective enrolment during the hospital stay.[30] This may have introduced selection bias, favouring inclusion of those with more serious medical problems who presented for medical follow-up and those who thought they could benefit from inclusion. Nonetheless, the previous study's findings, together with ours, point towards a considerable burden of mental health disease beyond ICU discharge.

Rates of between 17% and 66% have been reported for the co-occurrence of psychopathologies.[28,30-34] The ICON[31] study evaluated the prevalence of psychological symptoms among nearly 13 000 ICU survivors in the UK, and reported that when one psychological condition was present, there was a 65% chance that it co-occurred with others, and that 17% of patients demonstrated symptoms of all three conditions. Similarly, the current study found that at 6 weeks and 6 months, respectively, 50.0% and 56.8% of the patients had co-occurrence of >1 mental health condition.

The finding that younger patients and females were at higher risk for psychological symptoms in the months after ICU stay is in keeping with previous findings.[27,35-37] Healthcare personnel should be aware of the higher risk in these demographic groups. Although it did not reach statistical significance, there was a trend for patients who had an ICU stay >1 week to experience psychological symptoms.

In alignment with the methodology described in other recent studies,[16,20,32] patients who reported a history of mental health problems (with the exception of active psychosis) were not excluded from this study. Factors considered for supporting

Table 1. Demographic and clinical characteristics of the cohort (*N*=107)

Characteristic	All, *N*=107	No significant psychopathology, *n*= 44 (41.1%)	Significant symptoms of psychopathology, *n*= 63 (58.9%)	*p*-value
Female sex, *n* (%)	58 (54.2)	17 (38.6)	41 (65.1)	0.007*
Median age, years (IQR)	42 (33 - 51)	45 (36.0 - 58.3)	38 (30.5 - 48.0)	0.008*
Clinical Frailty Scale score, median (IQR)	2 (2 - 2)	2 (2 - 3)	2 (2 - 2)	0.209
Charlson Comorbidity Index, median (IQR)	0 (0 - 0)	0 (0 - 1)	0 (0 - 0)	0.610
Pre-admission employed or studying, *n* (%)	72 (67.3)	32 (72.7)	40 (63.5)	0.316
Previous mental health problems, *n* (%)	11 (10.3)	2 (4.5)	9 (14.3)	0.120
SAPS 3 score, median (IQR)	48 (43 - 55)	49 (44.8 - 53)	47(43 - 55.5)	0.713
Highest SOFA score, median (IQR)	4 (4 - 9)	4.5 (4.0 - 9.3)	4.0 (4.0 - 8.0)	0.492
Hospital days, median (IQR)	7 (5 - 14)	21 (11.0 - 32.5)	24 (15.0 - 36.0)	0.186
ICU days, median (IQR)	7 (5 - 14)	6 (5.0 - 10.0)	8 (5.5 - 17.0)	0.067
ICU stay >7 days, *n* (%)	51 (47.6)	16 (36.4)	35 (55.6)	0.050
ARDS, *n* (%)	74 (69.2)	28 (63.6)	46 (73.0)	0.301
PF ratio in mmHg, median (IQR)	121 (82 - 233)	118 (83 - 269)	125 (81 - 209)	0.484
Invasive ventilation, *n* (%)	47 (43.9)	18 (40.9)	29 (46.0)	0.693
Days invasive ventilation, median (IQR)(*n*=47)	7 (3 - 17)	7 (2 - 22)	7 (2 - 22)	0.992
Ventilated >7 days, *n* (%)	19 (17.8)	5 (11.4)	14 (22.2)	0.148
COVID-19 related admission, *n* (%)	50 (46.7)	21 (47.7)	29 (46.0)	0.862
Diagnostic category: surgical, *n* (%)	21 (19.6)	11 (25)	10 (15.9)	0.242
Diagnostic category: medical, *n* (%)	64 (59.8)	28 (63.6)	36 (57.1)	0.500
Diagnostic category: trauma, *n* (%)	22 (20.6)	5 (11.4)	17 (27.0)	0.049*
Sepsis, *n* (%)	86 (80.4)	37 (84)	49 (77.8)	0.418
Septic shock, *n* (%)	7 (3 - 17)	9 (20.5)	15 (23.8)	0.682
Memories of restraints, *n* (%)	21 (19.6)	7 (15.9)	14 (22.2)	0.418
Frightening memories, *n* (%)	36 (33.6)	7 (15.9)	29 (46.0)	0.001*
Delirium, *n* (%)	29 (27.1)	10 (22.7)	19 (30.2)	0.394
Vasopressor treatment, *n* (%)	31(29.0)	13 (29.5)	18 (28.6)	0.913
Benzodiazepine sedation, *n* (%)	28 (26.1)	10 (22.7)	18 (28.6)	0.499
Median benzodiazepine days (IQR), *n*=28	2.5 (1 - 4)	1.5 (1 - 3)	3 (2 - 7)	0.126
Non-benzodiazepine sedation, *n* (%) (propofol and/or ketamine)	36 (33.6)	11 (25)	25 (39.7)	0.114
Opiate treatment, *n* (%)	73 (68.2)	31 (70.5)	42 (66.7)	0.679
Antipsychotic medication, *n* (%)	18 (16.8)	5 (11.6)	13 (20.6)	0.207
Corticosteroid treatment, *n* (%)	78 (72.9)	33 (75.0)	45 (71.4)	0.682

*$p<0.05$.
IQR = interquartile range; SAPS 3 = Simplified Acute Physiology Score; SOFA = Sequential Organ Failure Score; ICU = intensive care unit; ARDS = acute respiratory distress syndrome; PF ratio = arterial oxygen/fraction of inspired oxygen.

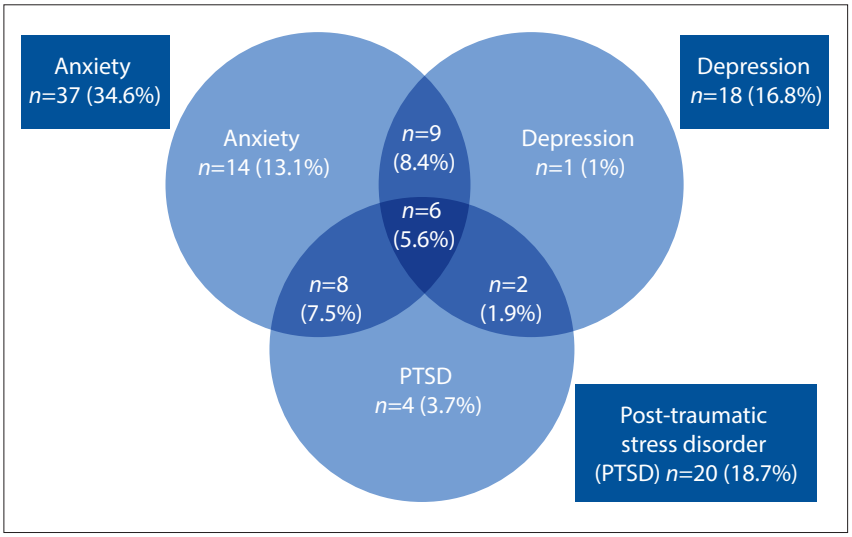

Fig. 2. Co-occurrence of psychopathology 6 months after hospital discharge. (PTSD = post-traumatic stress disorder.)

their inclusion included that patients may have had controlled disease at the time of admission, or may have experienced worsening of their condition, or may have developed additional mental health conditions after ICU stay. If the nine patients with pre-existing mental health disease were omitted from the analysis, the incidence of significant symptoms at the 6-month visit would have been 32.7%, v. the reported 44%. Clearly the incidence then still remains substantial, and is comparable with previous reports. Although there was a higher proportion of patients with a history of previous mental health problems among those who experienced physiological symptoms on follow-up, it was not found to be statistically significant.

Patients who were admitted to the ICU for complications of physical trauma were

Table 2. Significant symptoms of anxiety, depression and PTSD

Symptom	6-week visit	6-month visit
Anxiety, *n* (%)	41 (38.3)	37 (34.6)
Depression, *n* (%)	24 (22.4)	18 (16.8)
PTSD, *n* (%)	19 (17.8)	20 (18.7)
Anxiety, depression and PTSD, *n* (%)	8 (7.5)	6 (5.6)
Anxiety and depression, *n* (%)	10 (9.3)	9 (8.4)
PTSD and anxiety, *n* (%)	8 (7.5)	8 (7.5)
PTSD and depression, *n* (%)	0	2 (1.9)
Patients with significant symptoms of any of the three psychological conditions, *n* (%)	50 (46.7)	44 (41.1)

PTSD = post-traumatic stress disorder.

Table 3. Trajectory of cases with significant symptoms of anxiety, depression and PTSD

Symptom	Cases at 6-week visit	Resolved cases by the 6-month visit	Ongoing cases at 6-month visit	New cases at 6-month visit
Anxiety, *n* (%)	41 (38.3)	22 (20.5)	19 (17.8)	18 (16.8)
Depression, *n* (%)	24 (22.4)	18 (16.8)	6 (5.6)	12 (11.2)
PTSD, *n* (%)	19 (17.8)	11 (10.3)	8 (7.5)	12 (11.2)

PTSD= post-traumatic stress disorder.

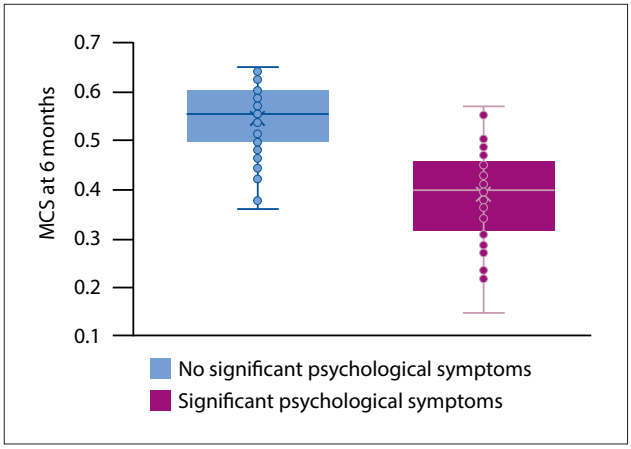

Fig. 3. SF-36 Mental Component Summary Score (MCS) in patients with and without significant psychological symptoms at 6 months.

at higher risk for psychological symptoms. This finding has also been observed in previous metanalyses and reviews.[35,38] The attributable impact of pre-ICU health and events, critical illness, ICU experiences and post-ICU disabilities on the mental health of ICU survivors remains unclear. Some participants who had sustained physical trauma may have developed psychological symptoms related to their injury rather than their critical care admission. In view of this, the questions in the IES-R were specifically directed to memories and the effects of their ICU stay. It should be acknowledged that not all trauma patients develop psychological problems, and ICU admission has been shown to be an independent risk factor for psychological impairment among trauma patients.[39,40] Therefore, although a diagnosis of trauma may serve as a confounder, excluding trauma patients when studying PICS will lead to under-diagnosis and missed opportunities to alter the course of recovery.

A large number of studies and metanalyses have shown that experiencing frightening memories, e.g. memories of panic, anxiety, thirst, cold, pain and loneliness during ICU stay, is associated with psychological impairment after discharge.[23,24,35,41-43] The importance of this finding is that it may be an (at least partially) modifiable risk factor. It signals the need for health professionals to identify and reduce stressors in the ICU, with the aim of attenuating psychological stress and its after-effects. The nature of critical care, which often includes managing confused or sedated patients, the complexity of disease processes, the number of daily generated observations and test results to be reviewed, and the 'life and death' stakes, may all lead to a certain degree of personal disconnect between staff and patients. This has been recognised by healthcare professionals in the field, and there has been advocacy for 'humanising intensive care', including improved communication with patients and families and a more patient-centred environment.[44] Improving the ICU environment so that patients may have better sleep is another intervention that aids in the prevention of psychological stress. Lastly, the use of ICU diaries to fill in memory gaps after discharge has also been shown to reduce the incidence of PTSD.[23,45,46]

Sedation is sometimes indicated to facilitate mechanical ventilation and patient safety in the ICU. Benzodiazepine exposure has been associated with ICU delirium, and may disrupt patients' cognitive capacity for developing a cohesive narrative of their ICU stay.[47] Furthermore, benzodiazepines have also been associated with subsequent psychological impairment among ICU survivors.[5,23,24,35,48-50] Evidence suggests that PTSD is closely related to delusional or frightening memories, or of a lack of factual recollection of the ICU stay. It may also be that benzodiazepine administration is a surrogate marker for agitation and hyperactive delirium requiring sedation, but avoiding benzodiazepines has been shown to reduce distorted memories. The lack of an association between benzodiazepine prescription and poor psychological outcomes in the current study may well be explained by the relatively low use of the agent in the study population. The local ICU analgo-sedation policy is one of benzodiazepine avoidance where possible. However, in a few clinical scenarios it may present as the most appropriate option, and therefore some of the participants did receive benzodiazepines. It is noteworthy that all patients who had received benzodiazepines for >1 week had psychological symptoms on follow-up, and this is in keeping with previous studies that have reported that the association between benzodiazepines and psychological symptoms is likely dose-related.[49] Although delirium is reported to be strongly

Table 4. Predictors included in multiple logistic regression analysis

Predictor	Adjusted odds ratio	95% confidence interval	*p*-value
Age	1.05	1.01 - 1.09	0.014
Female sex	5.9	2.12 - 18.05	0.001
Trauma admission	7.5	1.96 - 33.45	0.005
Frightening memories	4.8	1.64 - 15.73	0.005
ICU length of stay	1.03	0.98 - 1.09	0.290

ICU = intensive care unit.

associated with subsequent psychopathology in ICU survivors, it was not found to be a significant association in our study.[51,52] Hypoactive delirium (as opposed to hyperactive delirium) can be easily missed if a detailed cognitive assessment is not performed daily, and it may have been underdiagnosed owing to extreme staff shortages during the COVID-19 pandemic. Future studies should aim to document the dose of benzodiazepine exposure and screen patients for hypoactive delirium.

We did not find severity of disease to be a predictor of psychological symptoms, and this is aligned to previous reports.[24,35,53] Although organ failure – in particular respiratory and cardiovascular failure – has been demonstrated to be a risk factor in a few previous studies,[27,42] it was not associated with psychological impairment in the current study. As discussed earlier, a previous history of mental health disease is a risk factor for having post ICU psychopathology, and healthcare workers should be aware of this association.[16,20,28,53]

Study limitations

A limitation of the study is that since it coincided with the COVID-19 pandemic, it is not known if the circumstances of the pandemic eventuated into a higher incidence of psychological symptoms in comparison with the non-pandemic scenario. COVID-19 survivors in this study were more likely to have been admitted to ICU during the pandemic waves when there was high ICU mortality, but they were not more likely to be affected compared with the patients with other admission diagnoses.

Conclusion

In this SA study, 6 out of every 10 ICU survivors were affected by significant symptoms of anxiety, depression and/or PTSD. The high incidence of psychological symptoms, as well as co-occurrence of symptoms, are in keeping with findings from studies from higher-income countries. Symptoms of anxiety affected >5 out of every 10 patients at either, or both, the study visits. ICU survivors and their families, as well as healthcare providers who follow up ICU survivors, should be made aware that new symptoms of depression, anxiety and PTSD may well appear only months after hospital discharge.

Being younger and female, an admission diagnosis of trauma and having frightening memories of the ICU stay were identified as risk factors for experiencing significant psychological symptoms at follow-up.

The association between psychological symptoms and a lower mental HRQOL underscores the burden of mental health disease among ICU survivors. While definitive treatment for all components of PICS may not been established as yet, there certainly are proven therapeutic strategies for depression, anxiety and PTSD. In order to improve their quality of life, it is imperative to screen ICU survivors for psychological symptoms. Additionally, screening patients merely once at 6 weeks may be insufficient to identify those with later-onset symptoms.

Data availability. Data set is available from first author on request.

Declaration. None.

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Author contributions. EvdM, FP and LS conceptualised the study. NvV, MM, TF and EvdM collected the data. GS analysed the data. EvdM wrote the manuscript and GS, FP, LS and TF revised the manuscript. All authors approved the manuscript for publication.

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Conflicts of interest. None.

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