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ORIGINAL PAPER

Health consequences and nursing care needs of patients after ICU discharge: a retrospective observational study

Mara Alexandra Alves de Sousa[1], Soraia Cristina de Abreu Pereira[2,3,4], Armando Almeida[5], Liliana Andreia Neves da Mota[3,4], Fernanda Maria Príncipe Bastos Ferreira[3,4]

[1]*Entre Douro e Vouga Local Health Unit, Santa Maria da Feira, Portugal*
[2]*Abel Salazar Biomedical Sciences Institute, University of Porto, Porto, Portugal*
[3]*Red Cross Northern School of Health, Oliveira de Azemeis, Aveiro, Portugal*
[4]*Cintesis@RISE, Porto University, Porto, Portugal*
[5]*School of Health, University of the Azores, Azores, Portugal*

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Abstract

Aim: Advances in intensive care have reduced mortality rates but increased the number of survivors who face medium to long-term physical, cognitive, and psychological deficits. Nurses play a crucial role in aiding these individuals during their health transition process. The aim of this study was to examine the health consequences and nursing care needs of patients post-ICU. *Design:* Retrospective observational study. *Methods:* Data were collected between December 2017 and October 2020 through a retrospective analysis of 215 clinical processes. Descriptive and inferential statistical analyses were performed using SPSS, version 24. *Results:* While physical sequelae, such as respiratory and digestive issues, decrease over time, mental health issues persist. Quality of life, especially regarding mobility and daily activities, remains affected. Survivors face various self-care needs, including compromised ventilation, impaired swallowing, hallucinations, depressive mood, and anxiety, but also have potential for improving self-efficacy and daily task performance. Nursing interventions should focus on neuromuscular, gastrointestinal, psychological, and cardiorespiratory health. *Conclusion:* Survivors of critical illness experience significant changes that impact on their quality of life. Identifying their needs allows for more personalized nursing care and the development of a follow-up model that effectively addresses these challenges and highlights the benefits of nursing interventions on health outcomes.

Keywords: aftercare, intensive care, nursing care, patient discharge, survivors.

Introduction

Technological and scientific advancements in health care have contributed to a reduction in mortality associated with intensive care unit (ICU) hospitalization. However, they have also led to an increase in comorbidities related to critical illness and the nature of intensive care itself (Doig & Solverson, 2020).

Recent research advocates a more systematic follow-up approach as an integral component of intensive care, emphasizing defined goals and evaluation programs (Hanifa et al., 2018). This approach is crucial in preventing the neuropsychological and functional decline induced by critical illness. Nurses, as the healthcare professionals most closely connected to patients and their needs (Mota et al., 2011), play a vital role as "facilitators of the transition process". Understanding the primary needs of patients in the post-intensive care period is therefore essential for developing and implementing strategies that promote healthy transitions.

In 2010, the Society of Critical Care Medicine introduced the term "Post-Intensive Care Syndrome" (PICS) to describe a range of complications and sequelae that persist at physical, cognitive, mental, and socioeconomic levels for months or even years after critical illness. These complications not only impact patients but also their families, affecting their quality of life and work capacity (Needham et al., 2012). PICS patients require extensive healthcare resources, with high rates of readmission and mortality within five years of ICU discharge (Hill et al., 2016).

Physically, muscle weakness and loss of muscle mass are the most common changes, leading to walking difficulties, low exercise tolerance,

Corresponding author: Soraia Cristina de Abreu Pereira, Red Cross Northern School of Health, Oliveira de Azemeis, R. da Cruz Vermelha, 3720-126 Oliveira de Azeméis, Aveiro, Portugal; email: soraia.pereira@essnortecvp.pt

respiratory deterioration, and swallowing problems (Lane-Fall et al., 2019). Cognitive impairments, affecting 30–80% of ICU survivors, include memory issues, attention deficits, slow information processing, delirium, confusion, hallucinations, and impaired executive functions (Colbenson et al., 2019). The mental health disorders associated with PICS include depression, anxiety, and post-traumatic stress disorder (Zeleznik et al., 2021). Patients may also experience intrusive memories, night terrors, or nightmares related to their ICU confinement, which disrupt normal sleep-wake cycles (Doig & Solverson, 2020).

Interest in studying PICS is growing within the scientific community (Robinson et al., 2018). However, most studies have focused on specific subpopulations, interventions, or isolated complications related to ICU hospitalization (Doig & Solverson, 2020). These assessments are fragmented and do not represent the broader population affected by PICS.

Internationally, follow-up programs for ICU survivors are often under-resourced due to limited funding, ranging from non-existent programs to multidisciplinary consultations (Svenningsen et al., 2017). Consequently, the current scientific evidence is limited, and no standard exists for developing post-ICU follow-up programs (Jensen et al., 2017).

Meleis's middle-range theory (2010) provides a conceptual framework for this study, focusing on human responses to life, health, and illness processes (Meleis, 2010). From this perspective, and in the pursuit of a more humane, scientific, and holistic approach to nursing practice, the role of nursing is to help patients integrate therapeutic guidelines into their daily lives. These guidelines aim to mitigate the negative impacts of the transition experience, improve critical care outcomes, and ease the transition process. The focus is on assessing the patient's capacity and readiness to manage the effects of critical illness and its treatment on daily living activities, quality of life, and the detection of complications.

In this context, studies like the one presented here are crucial for progressively improving the quality of nursing care for ICU survivors. They enable nurses to address the actual needs of patients in a targeted and safe manner, thereby enhancing the quality and visibility of care.

Aim

To present an examination of the health consequences and needs of patients after discharge from the intensive care unit.

Methods

Design

An observational retrospective study was reported following the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) checklist.

Sample

This study was conducted as part of the follow-up service for patients discharged from the intensive care unit (ICU) of a hospital in central Portugal. We retrospectively reviewed the clinical records of all patients discharged from the ICU between December 2017 and October 2020. The inclusion criteria were as follows: ICU survivors who had undergone more than 48 hours of invasive and / or noninvasive mechanical ventilation and / or sedation during their ICU stay. Clinical records associated with readmissions to the ICU were excluded.

Data collection

Data were collected between February 15 and May 30, 2022. A retrospective documentary analysis was performed on 215 clinical records, specifically medical and nursing notes, in the B-Simple computer system. This analysis covered the ICU stay and four follow-up evaluations conducted at the sixth day, and at one, three, and six months after ICU discharge. The number of clinical cases monitored and evaluated decreased across the four assessments due to factors such as discharge from follow-up, patient death, transfer to another healthcare facility, or failure to attend the consultation.

Demographic data, including age at admission and gender, as well as clinical data, were collected. This data included length of stay in the ICU, number of days on invasive mechanical ventilation and / or sedation, cause of admission, presence of respiratory, digestive, neuromuscular, and cognitive sequelae, and scores on the Simplified Acute Physiology Score II (SAPS II) and Acute Physiology and Chronic Health Evaluation II (APACHE II) indices. The sequelae resulting from the ICU stay were assessed using a set of scales recommended by the ICU to monitor patients: the Barthel Index (Shah et al., 1989) to determine the degree of dependence on daily living activities; the Medical Research Council (MRC) Scale for Muscle Strength (Kovelis et al., 2008), which assesses muscle strength loss; the Mini-Mental State Examination (MMSE)

(Guerreiro et al., 1994) to detect cognitive changes; the Hospital Anxiety and Depression Scale (HADS) (Pais-Ribeiro et al., 2007) and the Post-Traumatic Stress Scale-14 (PTSS-14) (Twigg et al., 2008) to assess anxiety, depression, and post-traumatic stress disorder (PTSD), respectively; and the European Quality of Life 5 Dimensions (EQ-5D) (Ferreira et al., 2013).

Data analysis

Data were extracted from the electronic information system into a database and subjected to descriptive statistical analysis using the Statistical Package for the Social Sciences, version 24. Nonparametric tests, including the Spearman correlation coefficient (rs) and the Point-Biserial correlation coefficient (rpb), were performed to analyze correlations across all evaluation moments. These correlations aimed to detect associations between the variables under study. A p-value of < 0.05 was considered statistically significant. The results and the conceptual and theoretical representation of nursing knowledge were presented using the Ontologia de Enfermagem (Ordem dos Enfermeiros – Portuguese Nurses Association, n.d.) to support the development of nursing decision-making systems (Agård et al., 2012).

Results

The study included 215 clinical records of ICU survivors. The average age of participants was 63 ± 15 years, ranging from 20 to 93 years. The majority of participants were male (63.7%, N = 137). The average length of stay was 14 ± 18 days, with 50% of survivors staying in the ICU for up to nine days and 28.7% staying longer than 15 days (Table 1). A total of 56.4% of the sample required mechanical ventilation for seven days, with the most common duration being six days. The primary cause of ICU admission was non-coronary medical conditions.

Table 1 Sample characteristics variable

Variable	n = 215
SAPS II score*	44.5 (16.2)
APACHE score*	19.1 (7.8)
length of stay* (days)	14 (18)
ventilation time* (days)	12 (17.7)
sedoanalgesia time* (days)	7.6 (6.9)
Cause of admission	
non-coronary medical**	151 (70.2%)
urgent surgery**	43 (20%)
elective surgery**	17 (7.9%)
coronary medical**	4 (1.9%)

**Data are reported as median (standard deviation); **Data are reported as number (%) of patients.*

Physical sequelae

In the physical domain, the most prevalent changes observed included the need for oxygen, ineffective cough, and the presence of a tracheostomy at the respiratory level, as well as feeding devices and compromised swallowing at the digestive level. Respiratory and digestive sequelae decreased over time. Regarding functional dependence on activities of daily living and muscle strength loss, as assessed by the Barthel Index and MRC scale, respectively, the first evaluation revealed severe dependence (scores between 50 and 26) and significant muscle strength loss (scores below 48) (Table 2).

Cognitive and mental sequelae

Cognitive function, assessed using the MMSE (lower scores indicate greater cognitive impairment), revealed cognitive changes in 14 (20.6%) out of 68 participants in the first evaluation; 8 (12.9%) out of 62 in the second; and 3 (10.3%) out of 29 in the third (Table 3), as scores fell below 20, regardless of educational level (not documented in the clinical records).

Table 2 Prevalence of respiratory and digestive sequelae and Barthel Index and MRC mean scores

	Up to day 6		Month 1		Month 3		Month 6	
Oxygen therapy*	63 (41.4%)	n = 152	11 (2.6%)	n = 87	0	n = 44	2 (5.6%)	n = 36
Tracheostomy*	31 (18.1%)	n = 164	11 (10.2%)	n = 108	1 (2.3%)	n = 50	1 (2.5%)	n = 40
Effective cough*	20 (29.9%)	n = 67	7 (14.3%)	n = 49	2 (7.1%)	n = 28	1 (16.7%)	n = 6
Indrawing*	3 (1.9%)	n = 158	0	n = 111	0	n = 50	0	n = 35
Cyanosis*	2 (1.3%)	n = 156	0	n = 111	0	n = 50	0	n = 36
Nausea*	1 (0.6%)	n = 164	2 (1.7%)	n = 116	2 (4.1%)	n = 49	0	n = 41
Vomiting*	1 (0.6%)	n = 165	2 (1.8%)	n = 114	1 (2%)	n = 49	0	n = 41
Compromised swallowing*	15 (21.8%)	n = 69	10 (20.8%)	n = 48	7 (26.9%)	n = 26	0	n = 7
Feeding device*	42 (27.3%)	n = 154	14 (13.2%)	n = 14	1 (2.3%)	n = 44	3 (7.9%)	n = 38
Barthel index**	44.4 (35.9)	n = 139	72.8 (33.7)	n = 110	88 (8.1)	n = 51	90.3 (18.9)	n = 39
MRC**	47.2 (11.4)	n = 133	54.1 (10.4)	n = 102	57.2 (4.9)	n = 45	59.1 (3.9)	n = 32

**Data are reported as number (%) of patients or median; **Data are reported as median (standard deviation).*

In the mental domain, data from the HADS scale (scores ≥ 11 on the anxiety and depression subscales suggest changes) and the PTSS-14 scale (scores ≥ 45 indicate PTSD) showed that mean values generally pointed to low levels of anxiety, depression, and PTSD. Physical and cognitive sequelae tended to decrease over time, while mental sequelae exhibited the opposite trend. Among the 108 clinical records documenting ICU memories one month after discharge, 76 (70.4%) described hospitalization memories, but only 26.4% recalled the entire ICU experience. Nonfactual memories were recorded in 46 cases (42.6%).

Changes in quality of life

Quality of life, assessed via the five dimensions of the EQ-5D scale six months after ICU discharge, showed that difficulties in mobility and performing usual activities were the most affected dimensions. Of 43 survivors, 19 (44.2%) still experienced difficulties with personal activities, and three (7%) were unable to perform them. Of the same group, 21 (48.8%) continued to have mobility issues. Among the 30 survivors evaluated at six months, 42.2% had not recovered fully.

Table 3 Prevalence of cognitive and mental sequelae and PTSS-14 and MMSE mean scores

	Up to day 6		Month 1		Month 3		Month 6	
Anxiety Subscale*	4 (3.1)	n = 100	3.8 (3.9)	n = 94	4.8 (4.6)	n = 44	4.8 (4.6)	n = 44
Depression Subscale*	3.2 (3.4)	n = 96	2.4 (3.5)	n = 95	3.2 (4.4)	n = 40	3.2 (4.4)	n = 40
Post-Traumatic Stress Syndrome 14-Questions Inventory* (PTSS-14)	15.5 (14.3)	n = 89	18 (16.2)	n = 91	22 (16.6)	n = 38	22 (16.6)	n = 38
Mini Mental State Examination*(MMSE)	22.6 (7.96)	n = 68	25.2 (6.5)	n = 62	25.6 (7.7)	n = 29	25.6 (7.7)	n = 29

**Data are reported as median (standard deviation).*

Other results

The data analysis revealed several important correlations related to the length of hospitalization. A significant positive correlation was found between the number of hospitalization days and both the duration of mechanical ventilation ($rs = 0.820$, $p < 0.001$) and the need for sedation and analgesia ($rs = 0.690$, $p < 0.001$). Conversely, a negative correlation was observed between hospitalization days and functional independence, as measured by the Barthel Index ($rs = -0.176$, $p = 0.001$), as well as muscle strength, assessed by the MRC scale ($rs = -0.194$, $p < 0.001$). Additionally, compromised swallowing was positively correlated with more hospitalization days ($rpb = 0.323$, $p < 0.001$), increased ventilation duration ($rpb = 0.326$, $p < 0.001$), and extended use of sedation and analgesia ($rpb = 0.327$, $p < 0.001$).

Further analysis showed a strong positive correlation between anxiety and depression scores ($rs = 0.687$, $p < 0.001$). The PTSS-14 scale, which measures post-traumatic stress symptoms, was positively correlated with both anxiety ($rs = 0.48$, $p = 0.00$) and depression scores ($rs = 0.42$, $p = 0.00$), but no significant correlation was found with physical domain scores. Negative correlations were identified between muscle strength (MRC scale) and anxiety ($rs = -0.120$, $p = 0.047$) and depression ($rs = -0.238$, $p < 0.001$) scores. Similarly, the Barthel Index, which assesses functional independence, showed negative correlations with both anxiety ($rs = -0.173$, $p = 0.005$) and depression ($rs = -0.371$, $p < 0.001$) scores. Females were more likely to have higher scores on the anxiety subscale ($rs = -0.139$, $p = 0.021$) and the PTSS-14 scale ($rs = -0.147$, $p = 0.020$), indicating a greater prevalence of post-traumatic stress and anxiety in this group.

The analysis also identified key post-ICU needs that are critical for nursing practice and optimizing follow-up care (Figure 1). These needs primarily revolve around self-care, a fundamental area of nursing intervention due to its significant impact on health outcomes.

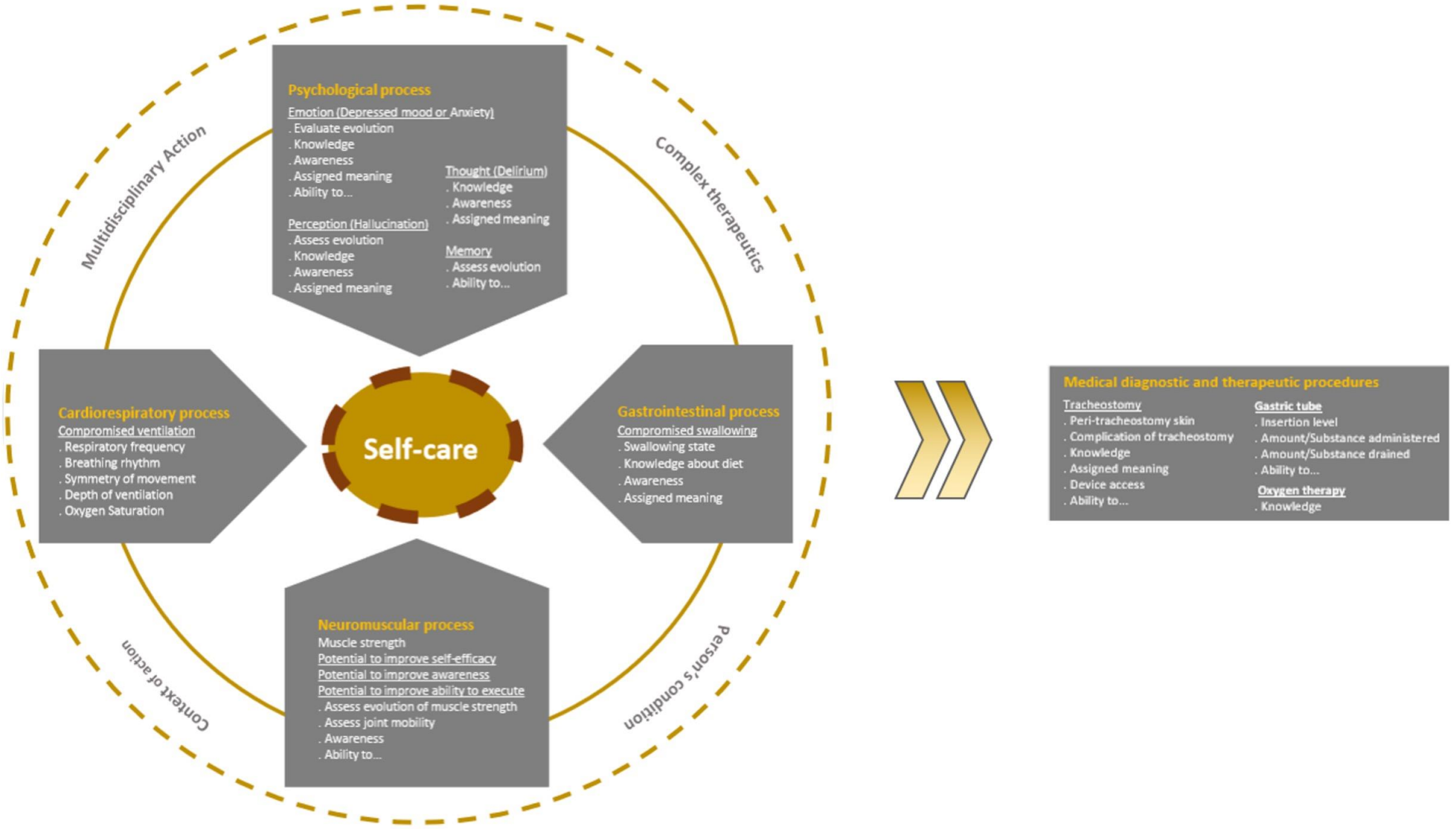

Figure 1 Main needs of the person post-ICU and relevant health aspects for nursing practice

Discussion

Survivors of critical illness in this study developed a set of complications and sequelae that affected them physically, cognitively, and mentally, significantly impacting their quality of life, consistent with findings from other studies (Needham et al., 2012; Robinson et al., 2018).

Self-care is recognized as an essential indicator of quality care and a criterion for professional practice excellence (Portuguese Nurses Association, 2012). The study emphasized the importance of personalized and targeted nursing care, adapted to each survivor's condition, the specific context of their care, and the complex therapies they received. A multidisciplinary team's involvement is crucial to address the diverse needs of these survivors, aiming to promote the most comprehensive recovery possible.

In the physical domain, a high prevalence of respiratory sequelae was observed up to six days after transfer from the ICU. These limitations largely resulted from muscle weakness acquired during hospitalization. Dyspnea at rest or with exertion and ineffective cough were clinical signs of changes in lung function and respiratory muscles, respectively (Zeleznik et al., 2021).

The mean values of the Barthel Index and the MRC scale highlighted the impact of physical sequelae on self-care, a relevant focus for nursing practice with a strong influence on the patient's health and well-being. Initial evaluations showed that patients had a severe degree of dependence and a significant loss of muscle strength, limiting their ability to perform daily activities. A recent randomized study led by nurses, involving 54 patients across four different ICUs, found that implementing an early mobility protocol with adequate intensity reduced ICU stay and enhanced muscle strength gains (Winkelman et al., 2018).

Inferential analysis suggested that an increase in ventilation days and sedation was associated with prolonged ICU stays, consistent with other studies (Canelhas et al., 2022; Lynch et al., 2020). Canelhas et al. (2022) compared functional capacities and muscle strength in patients ventilated for up to six days with those ventilated for more than seven days, concluding that longer ventilation times led to greater muscle strength and functionality loss, impacting the length of stay. Current knowledge highlights the importance of reducing the length of stay to the clinically appropriate level to improve the quality of care, reduce costs, and prevent excessive resource use.

In the physical domain, digestive changes, particularly compromised swallowing and the presence of feeding devices, were significant at the initial evaluation. Given that compromised swallowing increases the risk of comorbidities, lengthens ICU stays, and raises healthcare costs, developing and implementing a swallowing assessment instrument and therapeutic program for rehabilitating patients with oropharyngeal dysphagia would be valuable for early diagnosis and treatment (Rodrigues et al., 2015).

In the mental domain, the prevalence of anxiety and depression was initially low but increased at months one and three before dropping again by month six, with no recorded cases. These results may be explained by the idea that physical rehabilitation precedes psychological rehabilitation, as some studies suggest (Agård et al., 2012; Hanifa et al., 2018).

At six months post-ICU transfer, a quality-of-life questionnaire showed that of the 48 participants, 12 (28.6%) reported feeling moderately anxious or depressed, and two (4.8%) considered themselves extremely anxious or depressed. The differences in findings may be attributed to the fact that the HADS scale is not a validated tool for assessing depression and anxiety in this specific population (National Institute for Clinical Excellence, 2009).

The prevalence of PTSD was low across all evaluation points and followed the same upward trend as anxiety and depression. Moraes et al. (2023) estimates that PTSD prevalence after ICU stays ranges from 5% to 63% among survivors of critical illness and is associated with a poorer quality of life. Differences in study findings may be due to variations in evaluation protocols, instruments used, timing of assessments, and the different intervention models of each ICU (Moraes et al., 2023).

A positive correlation was found between PTSD and anxiety and depression, corroborating Moraes' et al. (2023) findings that associate PTSD with psychiatric comorbidities, such as anxiety and depressive disorders. Introducing ICU visits as part of treatment could promote exposure therapy and initiate the coping process (Hanifa et al., 2018).

This study found that female gender was associated with higher anxiety and post-traumatic stress scores. These results may be linked to the tendency of men to distance themselves from and avoid discussion of their health conditions (Hanifa et al., 2018), highlighting the importance of considering gender perspectives in nursing care.

The analyzed documentation did not allow for classification of the type of illusory memories. However, non-factual memories and absence of memories were reported by 42.6% and 29.7% of participants, respectively, in a total of 108 people during the second evaluation. Memory loss for real events results in their replacement by illusory memories, which can impair future psychological health, recovery, and quality of life. Introducing diaries in the ICU could be a viable strategy for patients to cope with the traumatic consequences of hospitalization (Halm, 2019).

Given the prevalence of non-factual memories in this study (which ranges from 60% to 80% in elderly patients, adults on mechanical ventilation, and / or patients with ICU stays longer than 48 hours) and their association with higher mortality rates and comorbidity (Lynch et al., 2020), creating a work instruction that includes specific non-pharmacological interventions focused on modifiable risk factors related to the environment, sleep promotion, and pain management would be a promising strategy to prevent delirium during ICU stays and could reduce the development of PTSD after critical illness (Contreras et al., 2021).

From the analysis of medical and nursing records, the lack of follow-up by psychiatry and psychology in flagged cases suggests a possible deficit in mental health support after hospital discharge, which is conceivable in health systems that prioritize physical recovery over mental recovery (Hanifa et al., 2018). There is growing evidence that early use of psychotherapy in the ICU, along with tools such as diaries, can improve recovery for these patients (Heydon et al., 2020). Peer or support groups are also recommended strategies to reduce psychological morbidity (Heydon et al., 2020).

The lack of documentation on patients' professional status prevented determining the prevalence of incapacity to work due to hospitalization. However, data from the EQ-5D questionnaire administered six months after ICU transfer revealed that, out of 43 participants, 19 still had difficulty performing personal activities, and three were unable to perform them. Given that usual activities include professional tasks, it may be inferred that these individuals were unable to return to work. The social and economic significance of a patient's professional status requires that these cases be properly identified and reported to social services to adopt preventive measures to reduce the impact on the patient's quality of life.

Conclusion

The analysis of medical records allows nurses to use observational scales for essential data collection, crucial for medical decision-making, although the nursing process primarily focuses on data collection without affecting the outcomes. After ICU discharge, survivors develop physical, cognitive, and mental sequelae that impact social, professional, and economic aspects of life, consistent with Post-Intensive Care Syndrome (PICS). Key issues include compromised ventilation, the potential for improved self-efficacy, awareness, ability to perform tasks, swallowing difficulties, hallucinations, depression, and anxiety. Decision-making in nursing care post-critical illness is vital for enhancing patient adaptation and performance, optimizing environmental influences, and improving self-care capabilities.

Ethical aspects and conflict of interest

Authorization for the study was obtained from the Board of Directors and the Hospital's Health Ethics Committee, which issued a favorable opinion (CA-0037/2022-0t_MP/CC) granting access to clinical informatics records. Data collected during the study did not include elements identifying individual clinical records, patients, or healthcare professionals. Personal data were securely stored in a restricted-access location, accessible only to the principal investigator via a password. The investigators declare no conflicts of interest in this study.

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Author contributions

Conception and design (MS, AA, LM, FF), data collection (MS), data analysis and interpretation (MS, SP, AA, LM, FF), manuscript draft (MS, FF), critical revision of the manuscript (MS, SP, AA, LM, FF), final approval of the manuscript (MS, LM, SP, FF).

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