

Review Article

Overview and management of post-intensive care syndrome

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ABSTRACT

Any patient suffering from critical life-threatening illnesses in most cases require hospitalization, in the care unit (ICU) where they can receive essential life-sustaining treatments. This has created an impact including more than 50 million individuals world-wide. Although advancements, in technology and healthcare have increased survival rates many individuals who survive these illnesses experience long-term impairments known as post-intensive care syndrome (PICS). PICS encompasses cognitive and emotional challenges that significantly affect patients' quality of life and ability to return to their normal routines. Caregivers may also face similar emotional hurdles, a condition referred to as PICS-family (PICS-F). The prevalence of PICS varies but can affect up to 50% of ICU survivors. Cognitive difficulties can be noticed in, around 70% of instances impacting abilities like memory, focus, and decision-making. These difficulties can lead to emotions such, as sadness worry, and a condition known as traumatic stress disorder (PTSD). Multiple factors, such as delirium, sedation, and pre-existing health conditions play a role, in the emergence and severity of PICS. Diagnosing PICS involves comprehensive assessments covering physical, cognitive, and emotional dimensions. Screening should ideally commence during the ICU stay and continue post-discharge. Assessment tools such as the Montreal cognitive assessment (MoCA) and emotional functioning screenings aid in identifying PICS. This manifests physically through muscle weakness and fatigue, impacting mobility and daily activities. Effectively managing ICUs requires the implementation of models and strategies that optimize resource utilization. However, these strategies may entail challenges such as data integration and stakeholder involvement. Preventing PICS involves proactive measures like reducing sedation, promoting early mobility, and offering rehabilitation services. Addressing PICS necessitates a proactive approach, comprehensive patient care, and collaboration among multidisciplinary teams. The successful implementation of these strategies depends on thorough evaluation and active engagement with all stakeholders involved in ICU management.

Keywords: Post-intensive care syndrome, Critical illness, Intensive care unit, PICS prevention and intervention, PICS

INTRODUCTION

Critical illness is a life-threatening condition that necessitates admission, to the care unit (ICU) and life-sustaining treatments. Essentially it refers to care provided to individuals with injuries and life-threatening circumstances. As per the World Health Organization (WHO), critical illness impacts over 50 million people.¹ This information comes from the WHO's collection of World Health Statistics released in 2022 covering the initial year of the COVID-19 pandemic. Thanks to advancements in technology and critical care practices the survival rate of ill patients has notably improved over recent decades.²⁻⁴ Nonetheless surviving an illness does not automatically guarantee a return, to normalcy. Many individuals who survive such conditions often endure impairments in their cognitive and emotional well-being, which impact their quality of life and ability to resume their previous roles and activities. These impairments are collectively referred to as intensive care syndrome (PICS).⁵⁻⁷

The abbreviation of PICS was first introduced by a group of specialists in the year of 2010 with the aim of drawing attention to giving patients intensive care unit (ICU) treatment. Not only do patients face the consequences of PICS, but their caregivers may also face similar challenges mostly emotional challenges, like anxiety, depression, post-traumatic stress disorder (PTSD), or grief which this condition later named PICS-family (PICS-F).⁸

The occurrence of PICS can vary based on factors, including how it's defined the criteria used, the tools, for measurement of the population being studied, and the follow-up period. However, studies suggest that around 50% of people who have been in intensive care may experience impairments at some point after discharge. Additionally, cognitive impairments may affect up to 70% of ICU survivors and emotional impairments could impact up to 60% of them.⁹ This can range from month to year which may depend on several factors and the severity of the underlying cause as well as treatment received.

PICS can significantly impact a patient's quality of life by making it challenging for them to perform activities return to work or school maintain relationships cope with stressors and enjoy leisure activities. Furthermore, caregivers also face challenges due to PICS as they may experience increased burden and distress along with feelings of isolation and difficulties stemming from their caregiving responsibilities.

The causes behind PICS are intricate uncontrollable factors. They include not the effects of critical illnesses, like sepsis or acute respiratory distress syndrome but also other contributing factors that influence its development. ARDS, also known as organ failure can be influenced by factors, in the ICU.^{10,11} These factors include treatments and interventions like ventilation, sedation, or vasopressors. Furthermore, patients and their families

often go through stress. Trauma both during and following their time, in the intensive care unit (ICU). This stress may manifest as pain, delirium, sleep deprivation, or lack of communication. It's important to note that, these factors can interact with the patient's pre-characteristics such as age, gender, comorbidities, or cognitive reserve. These interactions ultimately play a role, in determining the development and severity of PICS.

Diagnosing Post Care Syndrome (PICS) involves assessing a patient's clinical condition and implementing screening tools that evaluate their physical, cognitive, and emotional well-being. While there is no consensus, on the timing, frequency, or methods of PICS screening it is recommended to initiate screening during the ICU stay and continue it after discharge from the ICU and hospital at intervals or as necessary. Some used screening tools for PICS include Physical functioning, (e.g. tools such as the Medical Research Council (MRC) scale for muscle strength the short physical performance battery (SPPB), or the 6-minute walk test (6MWT)). Cognitive functioning, (e.g. tools like the Montreal cognitive assessment (MoCA) the informant questionnaire on cognitive decline in the elderly (IQCODE) or the cognitive failures questionnaire (CFQ)) and emotional functioning, (e.g. screening tools such, as the hospital anxiety and depression scale (HADS) impact of event scale-revised (IES R) or post-traumatic stress syndrome 14 questions inventory (PTSS 14)). Despite all this, the purpose of this research is to review the available information about post-intensive care syndrome and as well as management.

METHODS

We conducted a thorough literature search on 04 September 2023, using the Medline and PubMed databases, with the medical topic headings (post-intensive care syndrome) and all related terms for each database. We also conducted a search, on Google Scholar starting with the papers we found and using their references as a reference point. We focused on papers that provided relevant information on the clinical presentation and management of PICS. We did apply restrictions on the date as no paper before 2008, language must be English. No additional restriction (e.g. age of participants, and type of publication) was applied. We included papers from various journals, such as BMC Journal, AJGP, RACGP, and important organizations, such as WHO.

DISCUSSION

PICS is now being recognized as a public health burden due to the associated neuropsychological and functional disability, however, its exact prevalence remains unknown. Cognitive problems have been observed in, around 25% of people who survive a care unit (ICU) stay. However, a few studies have shown that the incidence of impairment is significantly higher affecting over three-quarters of ICU survivors.¹² Several factors contribute to this risk, including the duration of delirium during the ICU stay,

acute brain dysfunction like stroke or alcoholism reduced oxygen supply (ARDS or cardiac arrest) blood pressure (sepsis or trauma) disruption in glucose regulation prolonged mechanical ventilation due to respiratory failure, severe sepsis, use of renal replacement therapy and acute respiratory distress syndrome (ARDS).^{13,14} Other factors that increase the risk are related to age or previous health conditions. Cognitive decline can have an impact, on aspects of thinking, including memory, focus, problem-solving skills, language abilities, and spatial awareness. It can make it difficult for ICU survivors to perform tasks or engage in work and social activities. Additionally, it raises the likelihood of experiencing depression anxiety disorders, and post-traumatic stress disorder (PTSD). In some cases, cognitive impairment may persist for months. Even years after leaving the ICU some individuals never fully recover their cognitive abilities. Therefore, it is crucial to evaluate and keep track of the function of ICU survivors using assessment tools like the Montreal Cognitive Assessment (MoCA) or informant questionnaire on cognitive decline, in the elderly (IQCODE). In the ICU one way to address decline is, by reducing the presence of risk factors like delirium, sedation, low oxygen levels, and low blood pressure. Additionally, cognitive rehabilitation programs such, as training, education, and counseling can contribute to enhancing the function and overall quality of life for those who have survived their ICU experience.

Clinical manifestation

PICS can manifest in different domains of functioning: physical, cognitive, and emotional. Each domain can have specific symptoms and consequences that may vary in severity, duration, and impact among patients and caregivers. Physical impairments are common among ICU survivors and may include muscle weakness, fatigue, decreased mobility, difficulty breathing, or insomnia.^{15,16} Muscle weakness is a debilitating issue that often arises after a critical illness. It is referred to as ICU-acquired weakness (ICU AW) or critical illness CINM). It affects as many, as 50% of individuals who have survived their stay in the intensive care unit. Muscle weakness can arise from factors, such, as extended periods of inactivity, inflammation, sepsis inadequate oxygen levels, elevated blood sugar, imbalances in electrolytes, or the use of medications, like corticosteroids or blocking agents.^{5,17} This condition affects both the muscles in our arms or legs and the respiratory muscles like the muscles leading to a decrease, in muscle mass, strength, and endurance. Ultimately muscle weakness can hinder a patient's ability to engage in activities such, as walking, climbing stairs, or getting dressed. It can also heighten the chances of experiencing issues like relying on ventilators developing pneumonia or developing pressure sores. Weakness, in the muscles might persist for months or even years after leaving the ICU. This may necessitate dedicated rehabilitation efforts to enhance muscle performance.

Fatigue is another common physical impairment after critical illness. It can be described as a feeling of tiredness

or exhaustion that persists, after getting rest. Fatigue can affect up to 80% of ICU survivors. Patients who are hospitalized may be more prone, to experiencing post care syndrome (PICS) as, per research findings. Moreover, individuals, with health conditions or cognitive impairments like dementia face an increased risk of experiencing worsened symptoms after being in the ICU. PICS can be influenced by factors associated with hospitalization including infections, acute respiratory distress syndrome, delirium decreased oxygen levels, and reduced blood pressure during illness. PICS F (family) is mainly linked to risk factors. These include communication among staff members involved in decision-making processes lower levels of education among family members and having experienced the loss of a loved one or being in close proximity to death Family members commonly struggle with challenges such, as lack of sleep, anxiety, depression, complicated grief, and post-traumatic stress disorder (PTSD).

Management

Before admitting any critical patients to the ICU care, it's very essential to conduct a thorough mental health checkup which covers their medical history, stress-coping process, current medications, physical and mental health status, as well as their family and social condition. Many patients who have been, in the ICU and their families often face long-term cognitive and psychological challenges even after they leave the ICU. This condition is called PICS and it affects a number of ICU survivors nearby to 80% individual. PICS can have an impact on a patient's quality of life and functional abilities for months or even years. There are multiple factors that can increase the risk or severity of PICS including age, gender, preexisting conditions the severity of illness the duration of ventilation delirium, and sedation. Therefore, it is crucial to screen and provide interventions, for patients at risk of developing PICS in order to support their recovery journey effectively. Several models have been developed to inform safe and timely ICU discharge decisions. Simple univariate risk factors include prolonged length of stay, unstable vital signs including tachypnea or tachycardia, and poor pulmonary function.¹⁸ In their study, Badawi and Breslow examined the factors influencing mortality after leaving the care unit (ICU).¹⁴ The likelihood of readmission, to the ICU. They conducted their analysis using a dataset that included, more than 700,000 individuals. They considered factors such, as the diagnosis upon admission the severity of illness, laboratory results, and physiological measurements taken in the final 24 hours of ICU stay. The stability and workload index for transfer score, and a model developed in France, have similar predictive precision for ICU readmission.^{19,20} Others have identified the potential for important reductions in mortality had triage models been used to avoid premature ICU discharge. All methods need prospective validation to effectively address ICU syndrome (PICS), a comprehensive approach is necessary, including identifying and addressing underlying causes, administering appropriate sedatives for

anxiety and psychosis, reducing or eliminating environmental stressors, and maintaining regular communication with both the patient and their family. Implementing models have both benefit and challenges. Implementing models and strategies, for ICU management and patient care offers advantages. One key benefit is optimizing the utilization of ICU resources while also minimizing the risk of events. during the COVID-19 pandemic, a hospital system in New York City redeployed physician teams to over 550 incremental ICU beds, structured around a supervised pyramid-staffing model. This approach enabled them to utilize the knowledge and skills of specialists, in care and deliver healthcare to a significant number of patients. Likewise, the ABCDE bundle is an intervention designed to decrease the occurrence of delirium and enhance the outcomes of patients in intensive care units. A controlled trial conducted randomly demonstrated that implementing the ABCDE bundle resulted in a reduction of delirium duration by 2.5 days and an increase in ventilator days by 3.7 days, per patient.²¹ A good example of using predictive models is to identify patients who are at high risk of mortality, readmission, or premature discharge can help triage patients and allocate resources accordingly. Likewise implementing structures that foster teamwork and effective communication, across disciplines and levels of healthcare can enhance the coordination and consistency of patient care, in the ICU. Furthermore, using strategies that prevent or treat PICS, such as limiting sedation, promoting mobility, monitoring delirium, keeping diaries, providing counseling and support, and offering rehabilitation services, can enhance the recovery and quality of life of ICU patients.²²

However, there are challenges that need to be tackled when implementing models and strategies, for managing ICUs and delivering care. For example, some of these models and strategies may require data collection, analysis, and integration. This can potentially increase the workload and complexity of ICU operations. Additionally, it's important to consider that not all models and strategies may be suitable or practical in situations or environments such as during a pandemic or, in resource-constrained settings. Hence it is crucial to assess the efficiency, dependability, and suitability of these models and strategies for implementing them. Furthermore, involving and educating all stakeholders involved in ICU management and patient care including physicians, nurses, therapists, patients, and families is essential to ensure their acceptance of and adherence to these models and strategies. Preventing PICS is the optimal approach to managing it. Proven prevention strategies involve limiting potent sedative use, encouraging early mobility in the ICU, and implementing intensive physical and occupational therapy through a collaborative effort among healthcare professionals. The ABCDE bundle serves as a valuable tool for PICS prevention, encompassing awakening patients from sedation, promoting autonomous breathing, coordinating care and communication among various specialties, monitoring and managing delirium, and facilitating early

ambulation in the ICU.²³ Additional preventative measures include avoiding low blood sugar and oxygen levels, keeping ICU diaries by family members or healthcare providers to reduce PTSD symptoms, establishing post-ICU clinics for counseling and support, educating patients and families about rehabilitation resources, and ensuring proper nutrition and sleep quality.

CONCLUSION

Taking care of patients, in the ICU involves in the difficulties that arise from PICS. Cognitive impairment, a prevalent component of PICS, can significantly impact survivors' lives, affecting their daily functioning and mental health. Preventing PICS through strategies like reducing sedation, promoting early mobility, and employing intensive therapy is paramount. The ABCDE bundle, with its multiple components, offers a comprehensive approach to PICS prevention. Additional measures such as monitoring blood sugar and oxygen levels, maintaining ICU diaries, establishing post-ICU clinics, and providing rehabilitation resources further mitigate PICS risk. Dealing with the physical difficulties faced by patients, in the ICU necessitates a comprehensive and collaborative approach. This involves utilizing both medication-based and non-medication-based treatments as implementing comprehensive rehabilitation programs. Implementing models and strategies for ICU care can optimize resource utilization, but they come with challenges like data collection and adaptation. Successful implementation heavily relies on evaluation and active engagement of stakeholders.

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REFERENCES

1. World Health Organization. World Health Statistics 2022. 2022. Available at: <https://www.who.int/news/item/20-05-2022-world-health-statistics-2022>. Accessed on 12 June 2023.
2. Pallanch O, Ortalda A, Pelosi P, Latronico N, Sartini C, Lombardi G, et al. Effects on health-related quality of life of interventions affecting survival in critically ill patients: a systematic review. *Crit Care*. 2022;26(1).
3. Bose S, Hoenig B, Karamourtopoulos M, Banner-Goodspeed V, Brown S. Beyond survival: identifying what matters to survivors of critical illness. *Crit Care*. 2021;25(1).
4. Saqib M, Iftikhar M, Neha F, Karishma F, Mumtaz H. Artificial intelligence in critical illness and its impact on patient care: a comprehensive review. *Front Med*. 2023;10.
5. Rousseau AF, Prescott HC, Brett SJ, Weiss B, Azoulay E, Creteur J, et al. Long-term outcomes after critical illness: recent insights. *Crit Care*. 2021;25(1):108.

6. Huggins EL, Bloom SL, Stollings JL, Camp M, Sevin CM, Jackson JC. A clinic model: post-intensive care syndrome and post-intensive care syndrome-family. *AACN Adv Crit Care*. 2016;27(2):204-11.
7. Ramnarain D, Aupers E, den Oudsten B, Oldenbeuving A, de Vries J, Pouwels S. Post Intensive Care Syndrome (PICS): an overview of the definition, etiology, risk factors, and possible counseling and treatment strategies. *Expert Rev Neurother*. 2021;21(10):1159-77.
8. Berger P, Braude D. Post-intensive care syndrome: Screening and management in primary care. *Aust J Gen Pract*. 2021;50:737-40.
9. Ohtake PJ, Lee AC, Scott JC, Hinman RS, Ali NA, Hinkson CR, et al. Physical Impairments Associated With Post-Intensive Care Syndrome: Systematic Review Based on the World Health Organization's International Classification of Functioning, Disability and Health Framework. *Phys Ther*. 2018;98(8):631-45.
10. Raman R, DesAutels SJ, Lauck AM, Scher AM, Walden RL, Kiehl AL, et al. Instruments Assessing Cognitive Impairment in Survivors of Critical Illness and Reporting of Race Norms: A Systematic Review. *Crit Care Explor*. 2022 D;4(12):e0830.
11. Marra A, Pandharipande PP, Girard TD, Patel MB, Hughes CG, Jackson JC, et al. Co-Occurrence of Post-Intensive Care Syndrome Problems Among 406 Survivors of Critical Illness. *Crit Care Med*. 2018;46(9):1393-401.
12. Pandharipande PP, Girard TD, Jackson JC, Morandi A, Thompson JL, Pun BT, et al. Long-Term Cognitive Impairment after Critical Illness. *N Engl J Med*. 2013;369(14):1306-16.
13. Dean EA, Biehl M, Bash K, Weleff J, Pozuelo L. Neuropsychiatric assessment and management of the ICU survivor. *Cleveland Clin J Med*. 2021;88(12):669-79.
14. Gordon SM, Jackson JC, Ely EW, Burger C, Hopkins RO. Clinical identification of cognitive impairment in ICU survivors: insights for intensivists. *Intens Care Med*. 2004;30(11):1997-2008.
15. American thoracic society. Patient Education | Information Series. Available at: <https://www.thoracic.org/patients/patient-resources/>. Accessed on 12 June 2023.
16. Rawal G, Yadav S, Kumar R. Post-intensive Care Syndrome: an Overview. *J Transl Int Med*. 2017;5(2):90-2.
17. Medrinal C, Prieur G, Bonnevie T, Gravier FE, Mayard D, Desmalles E, et al. Muscle weakness, functional capacities and recovery for COVID-19 ICU survivors. *BMC Anesthesiol*. 2021;21(1):64.
18. Hopkins RO, Weaver LK, Collingridge D, Parkinson RB, Chan KJ, Orme JF, Jr. Two-year cognitive, emotional, and quality-of-life outcomes in acute respiratory distress syndrome. *Am J Respir Crit Care Med*. 2005;171(4):340-7.
19. Rawal G, Yadav S, Kumar R. Post-Traumatic Stress Disorder: A Review from Clinical Perspective. *The Int J Indian Psychol*. 2016;3:156-64.
20. Jackson JC, Pandharipande PP, Girard TD, Brummel NE, Thompson JL, Hughes CG, et al. Depression, post-traumatic stress disorder, and functional disability in survivors of critical illness in the BRAIN-ICU study: a longitudinal cohort study. *Lancet Respir Med*. 2014;2(5):369-79.
21. Balas MC, Vasilevskis EE, Olsen KM, Schmid KK, Shostrom V, Cohen MZ, et al. Effectiveness and safety of the awakening and breathing coordination, delirium monitoring/management, and early exercise/mobility bundle. *Crit Care Med*. 2014;42(5):1024-36.
22. Valsø Å, Rustøen T, Småstuen MC, Ekeberg Ø, Skogstad L, Schou-Bredal I, et al. Effect of Nurse-Led Consultations on Post-Traumatic Stress and Sense of Coherence in Discharged ICU Patients With Clinically Relevant Post-Traumatic Stress Symptoms-A Randomized Controlled Trial. *Crit Care Med*. 2020;48(12):e1218-25.
23. Schweickert WD, Pohlman MC, Pohlman AS, Nigos C, Pawlik AJ, Esbrook CL, et al. Early physical and occupational therapy in mechanically ventilated, critically ill patients: a randomised controlled trial. *Lancet*. 2009;373(9678):1874-82.

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