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Post-intensive care unit syndrome: the silent legacy of intensive care unit survival. Narrative review and strategies for its approach in intermediate respiratory care units

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Abstract

Advances in intensive care have increased survival rates among critically ill patients but revealed a new challenge: post-intensive care syndrome (PICS). This syndrome, affecting patients' physical, cognitive, and psychological well-being, also impacts their quality of life (QoL). Recognized in the early 21st century, PICS is now a research and clinical priority, particularly in specialized units like intermediate respiratory care units (IRCUs). This review aims to examine the evolution, clinical impact, and management strategies of PICS.
A narrative review approach was utilized. A systematic search was conducted in biomedical databases (PubMed, Scopus, and Google Scholar), identifying relevant studies on PICS, its manifestations, risk factors, and therapeutic strategies. The review included original articles and clinical guidelines published between 2010 and 2024. The findings are organized into emerging themes: clinical manifestations, risk factors, diagnostic tools, management strategies, and the role of IRCUs. Each theme was analyzed to identify recurring patterns and gaps in the current knowledge base.
IRCUs offer an ideal setting to address PICS-related sequelae, improving patients' QoL and facilitating their social reintegration. However, ongoing research is essential to optimize therapeutic strategies and develop more effective care models.

Key words: post-intensive care syndrome, rehabilitation, critical care, intermediate respiratory care unit.

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Introduction

Post-intensive care syndrome (PICS) is a common consequence of severe illness and prolonged stays in intensive care units (ICUs), affecting patients' physical, cognitive, and psychological health long after discharge. The impact of PICS is not limited to patients; their families may also experience related difficulties, known as PICS-F, highlighting the broader effects of critical illness [1,2].

Patients transitioning from ICUs to intermediate respiratory care units (IRCUs) continue to face significant challenges. IRCUs provide specialized care for individuals with complex respiratory conditions, but addressing PICS requires a comprehensive, multidisciplinary approach beyond respiratory support [3,4].

This review examines the manifestations, risk factors, and management strategies of PICS within the IRCU setting. By analyzing clinical evidence, guidelines, and practical interventions, it aims to provide healthcare professionals with insights to optimize post-ICU recovery and improve patient outcomes. The aim of this review is to explore narrative approaches to PICS, emphasizing its conceptual evolution, clinical impact, and the most relevant management strategies. Furthermore, it seeks to position IRCU as a pivotal setting for the comprehensive rehabilitation of these patients.

Materials and Methods

A narrative review approach was utilized, following RAMESES guidelines [5]. This method is particularly suited to exploring complex phenomena from multiple perspectives, integrating clinical, epidemiological, and contextual literature on PICS. A systematic search was conducted in biomedical databases (PubMed, Scopus, and Google Scholar), identifying relevant studies on PICS, searching in MeSH terms [PICS AND/OR Post-Intensive Care Syndrome], its manifestations, risk factors, and therapeutic strategies. To ensure a comprehensive review, 50 primary sources and clinical guidelines that met the publication criteria between 2010 and 2024 were thoroughly analyzed. These studies covered a broad spectrum of critically ill patients, including general, respiratory, cardiac, and neurological ICU cohorts, with an average sample size exceeding 200 patients. The majority of publications were original articles (80%), consisting of prospective and retrospective observational studies and systematic reviews, which allowed for the estab-

lishment of a robust evidence framework on PICS and its management. Publications focused exclusively on the acute phase of the critically ill patient without long-term follow-up, editorials without original data, and studies that did not use the PICS domains defined by the SCCM were primarily excluded.

Results

Surviving an ICU admission often marks the beginning, not the end, of a patient's battle. PICS is a term that encapsulates the lingering effects of critical care. Not all ICU survivors develop PICS, yet its incidence remains alarmingly high. Overall, 50% of ICU survivors experience new physical, mental, and/or cognitive problems 1 year after admission [6]. Understanding the risk factors associated with the syndrome offers a pathway to prevention and early intervention. These factors can be broadly categorized into patient-specific and ICU-related variables [1,2,7].

Patient-specific factors include advanced age (especially more than 80 years), pre-existing mental health conditions, and comorbidities (immune insufficiency, AIDS, hematological neoplasia, metastatic neoplasia, cirrhosis, cardiovascular failure, chronic obstructive pulmonary disease, chronic dialysis or kidney failure). For instance, older adults are more vulnerable to cognitive decline, while individuals with a history of anxiety or depression may experience an exacerbation of symptoms post-ICU. ICU-related factors, on the other hand, often stem from the intensity of the critical care experience. Delirium—a common complication during ICU stays—is a strong predictor of both cognitive and psychological impairments. Similarly, the severity of illness, prolonged mechanical ventilation, and the use of sedatives and neuromuscular blockers have all been implicated in the development of PICS. Recognizing these risk factors is particularly relevant in IRCUs, where patients with complex respiratory needs often represent a high-risk group. Proactive screening for these factors can help identify individuals most at risk and tailor interventions accordingly [8,9].

PICS is characterized by impairments in three core domains: physical, cognitive, and psychological health. These impairments, while distinct, frequently overlap or co-occur, and consequently exacerbate one another, complicating recovery [10-12]. Physically, patients commonly experience ICU-acquired weakness (ICU-AW), a condition marked by profound muscle atrophy and diminished functional capacity. This weakness, which may result from prolonged immobilization, systemic inflammation, and the use of sedatives, manifests as a debilitating inability to perform even basic tasks. In a recent review and meta-analysis by Fazzini, it was stated that across 20 analyzed studies, the prevalence of ICU-AW varied between 43% and 55%, depending on the evaluation method used. Alongside muscle weakness, issues such as dysphagia, a swallowing difficulty often tied to prolonged intubation, add further layers of complexity. In an observational study evaluating dysphagia post-extubation in 933 patients, 10.3% had it upon ICU discharge, and of these, 60.4% continued to experience it upon hospital discharge [3,13-16].

The presence of dysphagia in these patients is associated with increased morbidity, prolonged hospital stays, and a higher rate of readmissions. For physical assessment, tools such as the Medical Research Council (MRC) scale and handgrip dynamometry provide valuable insights into muscle strength and overall functional capacity [17]. In the MRC test, strength is measured in three muscle groups of the arms and three of the legs bilaterally, with scores ranging from 0 (no visible muscle contraction) to 5 (maximum strength). The total score ranges from 0 to 60 points, with an MRC score of <48 indicating significant weakness and <36 severe weakness [17-19].

Pulmonary function must also be rigorously evaluated to guide respiratory rehabilitation efforts, as patients with PICS have been shown to have reduced lung function and decreased respiratory muscle strength [20-22]. Respiratory muscle strength is determined by measuring maximal inspiratory pressure. Lung function evaluation provides insights into the potential benefits of respiratory muscle training and other pulmonary rehabilitation interventions [23,24].

Cognitively, the aftermath of critical illness often includes memory loss, attention deficits, and executive dysfunction. Studies indicate that ICU survivors are at an increased risk of long-term cognitive decline, with some even developing dementia-like symptoms. The Montreal Cognitive Assessment (MoCA) is a widely used tool designed to detect mild cognitive impairment, covering areas such as attention, executive function, memory, language, visuospatial skills, calculation, and orientation. It has been proposed in recent consensus guidelines as a standard tool for PICS assessment [25,26]. The Mini-Mental State Examination (MMSE) is another commonly used test, consisting of 30 items to assess general cognitive functions, including temporal and spatial orientation, short-term memory, attention, calculation, language, and the ability to follow simple instructions. It is widely used among the elderly to detect cognitive impairment [26].

The Short Memory Questionnaire (SMQ) is a brief tool designed to evaluate memory. Although less well-known than the MMSE, it correlates well with it, is reliable, and can effectively detect memory issues. The SMQ can also be administered *via* telephone interviews or self-report questionnaires, making it useful for continuous monitoring of critically ill patients [17]. These cognitive deficits hinder independence and create ongoing challenges for reintegration into daily life. The mentioned tools not only quantify impairments but also track progress, offering a roadmap for targeted interventions [27-29].

On the psychological front, anxiety, depression, and post-traumatic stress disorder (PTSD) are strikingly common. The ICU environment—with its invasive procedures, lack of natural light, and frequent delusional experiences—leaves an indelible mark on many patients [30]. Flashbacks, heightened emotional reactivity, and a pervasive sense of dread can haunt survivors for years. For the assessment of psychological problems, the Hospital Anxiety and Depression Scale (HADS) is the most widely used and validated tool. Other tests, such as the Impact of Event Scale-Revised (IES-R), are also validated for studying PTSD. Both HADS and IES-R were included in the minimum core outcome measures proposed by an international consensus for clinical research studies evaluating ICU survivors with acute respiratory failure [31,32].

The evaluation of health-related quality of life (HRQoL) plays a pivotal role in understanding the impact of PICS on patients. The EuroQol-5D-5L (EQ-5D-5L) is a widely used instrument for assessing HRQoL, offering a comprehensive evaluation of PICS and related physical activity levels. This tool is applied in both clinical practice and research to assess patients' health status from a general perspective [33].

The EQ-5D-5L evaluates five health dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each dimension is rated across five levels, ranging from no problems to extreme incapacity. Additionally, it includes a visual analog scale ranging from 0 (worst imaginable health) to 100 (best imaginable health), providing a subjective measure of overall health [34].

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Complementing the EQ-5D-5L, the ICU Mobility Scale (IMS) measures patients' mobility levels in the ICU. This validated scale rates mobility on a scale from 0 to 10, with 0 indicating total immobility and 10 representing independent walking. It is instrumental in monitoring functional capacity and guiding rehabilitation strategies [35,36].

The Barthel Index is another essential tool for assessing independence in basic activities of daily living, such as eating, personal hygiene, toileting, and mobility. Scores range from 0 (fully dependent) to 100 (fully independent), providing valuable insight into patients' physical functionality and autonomy [36].

Together, these instruments offer a robust framework for evaluating the multidimensional impact of PICS on patients' quality of life and functional outcomes.

The interplay between these domains highlights the multifaceted nature of PICS. For example, a patient struggling with ICU-AW may experience despair over their physical limitations, exacerbating depressive symptoms and impairing motivation for rehabilitation. Similarly, cognitive deficits may hinder adherence to treatment regimens, slowing recovery. A multidisciplinary strategy facilitates early recognition of these overlapping challenges, with each professional, nursing staff included, contributing valuable insight from their continuous contact with patients [37].

The cornerstone of PICS management lies in comprehensive evaluation. A structured approach to assessing physical, cognitive, and psychological domains is essential, beginning in the ICU and continuing throughout the patient's stay in the IRCU and beyond (Tables 1 and 2).

Discussion

The unique role of IRCUs in addressing PICS cannot be overstated. These units cater to patients who are no longer critically ill but still require specialized respiratory support, including weaning from mechanical ventilation and managing tracheostomies [4,38]. However, IRCUs are more than just step-down facilities, they are pivotal in laying the foundation for holistic recovery. Patients admitted to IRCUs often bear the scars of their ICU stay, with PICS serving as a formidable barrier to regaining pre-illness functionality [39]. The transition from ICU to IRCU represents a critical window of opportunity to implement targeted interventions. Early detection of PICS manifestations through systematic evaluation, by both medical and nursing staff, can inform individualized care plans that address not only respiratory needs but also physical, cognitive, and psychological rehabilitation.

Available data indicate that functional and psychological recovery after ICU discharge often extends over 6-12 months, with many patients showing incomplete recovery even at 1 year [6,21,33]. Studies implementing structured, multidisciplinary rehabilitation programs have demonstrated faster improvement in mobility, cognitive function, and quality of life compared to usual, uncoordinated follow-up [3,23,40]. These findings support the integration of targeted strategies within IRCUs to shorten recovery trajectories and optimize long-term outcomes.

Given the multifaceted nature of PICS, a multidisciplinary

Table 1. Summary of key studies addressing post-intensive care syndrome.

Author (year)	Study type/population	Main findings	Key outcomes
Geense *et al.*, 2021 [6]	Prospective multicenter study, 2345 survivors	New physical, cognitive, or mental health problems in >50% at 1 year	Persistent disability and reduced quality of life
Kawakami *et al.*, 2021 [7]	Prospective observational study, Japan (J-PICS)	PICS prevalence 54% at 3 months post-discharge	Highlighted need for structured follow-up programs
Lee *et al.*, 2020 [8]	Systematic review and meta-analysis	Identified delirium, mechanical ventilation, and sedation as major risk factors	Evidence base for prevention strategies
Fazzini *et al.*, 2023 [14]	Systematic review and meta-analysis of 20 studies	ICU-acquired weakness prevalence 43-55%	Emphasized early mobilization benefits
Iribarren-Diarasarri *et al.*, 2023 [33]	Observational study, post-COVID-19 ICU survivors	70% had at least one PICS domain affected 1 month after discharge	High rate of physical and psychological sequelae
Heesakkers *et al.*, 2022 [11]	Cohort study, ICU COVID-19 survivors	Persistent symptoms and HRQoL impairment at 1 year	Need for multidisciplinary rehabilitation

ICU, intensive care unit.

Table 2. Main tools for the evaluation of post-intensive care syndrome.

Domain	Assessment tools	Main variables evaluated
Physical	Medical Research Council scale, Handgrip dynamometry, ICU Mobility Scale, Barthel Index	Muscle strength, functional capacity, mobility level, independence in activities of daily living
Cognitive	Montreal Cognitive Assessment, Mini-Mental State Examination, Short Memory Questionnaire	Memory, attention, executive function, orientation, global cognition
Psychological	Hospital Anxiety and Depression Scale, Impact of Event Scale-Revised	Anxiety, depression, post-traumatic stress symptoms
Quality of life	EuroQol-5D-5L	Global health status, mobility, self-care, usual activities, pain/discomfort, anxiety/depression

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approach is indispensable. IRCU teams must include pulmonologists, physiotherapists, occupational therapists, psychologists, nurses, nutritionists, and speech and language therapists, particularly in cases of dysphagia, long-term tracheostomy, or prolonged nasogastric tube use. Each professional contributes their expertise to a unified, patient-centered care plan.

Managing physical impairments in PICS begins with early mobilization, a cornerstone intervention to prevent and address ICU-AW. This approach includes passive mobilization, assisted exercises, and progression toward active activities like walking. Tools such as the IMS are valuable for tracking functional improvement. Advanced techniques, including neuromuscular electrical stimulation and cycle ergometer training, have shown efficacy in enhancing muscle strength and ambulation capacity. Respiratory rehabilitation is equally critical, incorporating exercises to strengthen respiratory muscles and improve pulmonary function, thereby supporting overall physical recovery [40].

Addressing cognitive dysfunction in PICS focuses on early detection and tailored interventions. Tools like the MoCA and MMSE help evaluate areas such as memory, executive function, and attention. Cognitive stimulation activities, including memory exercises and orientation aids like calendars and clocks, are effective during recovery. Preventing delirium, a significant contributor to cognitive decline, involves implementing the ABCDEF bundle, emphasizing pain management, sensory orientation, and family engagement to create a supportive environment conducive to cognitive recovery [3,41,42].

The psychological management of PICS targets common issues such as anxiety, depression, and PTSD. Interventions include psychoeducation, psychotherapy, and resilience-building exercises. The involvement of caregivers is vital, as family education and support can enhance recovery. Tools like the HADS and the IES-R aid in monitoring psychological health. Early psychological therapy is crucial for managing symptoms, improving emotional well-being, and fostering long-term mental health stability [3,41]. In addition, sleep disruption, frequently reported among ICU survivors, contributes to cognitive and emotional instability and should be systematically assessed and addressed through sleep hygiene measures, environmental optimization, and, when necessary, pharmacological or behavioral interventions [42].

It is also important to recognize that the organization, structure, and objectives of IRCUs vary widely across countries and even between institutions. Some units have a primarily rehabilitative focus, while others are oriented toward acute respiratory management. These differences influence patient selection, available resources, and rehabilitation outcomes, and should be considered when interpreting the applicability of the proposed strategies.

Conclusions

PICS is a major challenge but also an opportunity. The IRCUs are key to bridging the gap between survival and recovery, providing multidisciplinary care that addresses physical, cognitive, and emotional sequelae. Through early detection and comprehensive follow-up, we can help patients regain autonomy and quality of life. PICS reminds us that survival is only the beginning: true success lies in helping patients truly recover and reintegrate into their lives.

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