ORIGINAL ARTICLE

PREVALENCE AND CHARACTERISTIC OF POST-INTENSIVE CARE SYNDROME PATIENT IN INDONESIA: A MULTI-CENTRE PROSPECTIVE COHORT STUDY

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ABSTRACT

Background: Advances in critical care management have increased survival rates during intensive care unit (ICU) care. However, many survivors experience Post-Intensive Care Syndrome (PICS), a complex of physical, cognitive, and mental health disorders that progress from the ICU and hospital discharge. Still, data on PICS prevalence in Indonesia remain limited. This study aimed to determine the prevalence and characteristics of PICS among ICU survivors in tertiary hospitals.

Methods: This cohort study from July 2024 – 2025 across three tertiary teaching hospitals in Indonesia. Adult ICU survivors discharged for at least one month were assessed using the validated Indonesian version of the Post-Intensive Care Syndrome Questionnaire (PICSQ). Patient characteristics were categorized into pre-ICU, durante-ICU, and post-ICU variables. PICS diagnosis was established if impairment was present in at least one domain.

Results: A total of 132 subjects (53.8% male; mean age range 18–70 years) were included. The prevalence of PICS was 30.3%. Mental impairment was the most common (28%), followed by cognitive (19.7%) and physical impairments (16.7%). Combined impairments were also observed: cognitive–physical (6.9%), cognitive–mental (7.5%), physical–mental (10.6%), and all three domains (10.6%). Cardiovascular disease (46.2%) was the most frequent primary ICU diagnosis, and comorbidities were present in 67% of subjects. Early rehabilitation was provided to 62.1% of patients, though it did not significantly improve mental health outcomes. At discharge, 47.8% of subjects were independent, while the remainder showed varying levels of dependency.

Conclusion: Approximately one-third of ICU survivors in Indonesia experienced PICS within one month post-discharge, with mental impairment being the most prevalent domain. These findings highlight the urgent need for systematic post-ICU screening, multidisciplinary rehabilitation programs, and long-term follow-up to improve quality of life after discharge.

Keywords: Post-Intensive Care Syndrome, ICU survivors, prevalence, cognitive impairment, mental health, Indonesia

ABSTRAK

Latar Belakang: Kemajuan dalam manajemen perawatan kritis telah meningkatkan tingkat kelangsungan hidup selama perawatan di unit perawatan intensif (ICU). Namun, banyak survivor mengalami Sindrom Pasca Perawatan Intensif (PICS), yaitu kompleks gangguan fisik, kognitif, dan kesehatan mental yang berkembang setelah keluar dari ICU dan rumah sakit. Namun, data tentang prevalensi PICS di Indonesia masih terbatas. Studi ini bertujuan untuk menentukan prevalensi dan karakteristik PICS di antara survivor ICU di rumah sakit tersier.

Metode: Studi kohort ini dilakukan pada Juli 2024–2025 di tiga rumah sakit pendidikan tersier di Indonesia. Pasien dewasa yang selamat dari ICU dan telah dipulangkan setidaknya satu bulan dievaluasi menggunakan versi Indonesia yang telah divalidasi dari Kuesioner Sindrom Pasca-Perawatan Intensif (PICSQ). Karakteristik pasien dikategorikan menjadi variabel pra-ICU, selama ICU, dan pasca-ICU. Diagnosis PICS ditetapkan jika terdapat gangguan setidaknya pada satu domain.

Hasil: Total 132 subjek (53,8% laki-laki; rentang usia rata-rata 18–70 tahun) termasuk dalam studi. Prevalensi PICS sebesar 30,3%. Gangguan mental adalah yang paling umum (28%), diikuti oleh gangguan kognitif (19,7%) dan gangguan fisik (16,7%). Gangguan gabungan juga diamati: kognitif–fisik (6,9%), kognitif–mental (7,5%), fisik–mental (10,6%), dan ketiga domain (10,6%).

Penyakit kardiovaskular (46,2%) merupakan diagnosis utama ICU yang paling sering ditemukan, dan komorbiditas terdapat pada 67% subjek. Rehabilitasi dini diberikan kepada 62,1% pasien, meskipun hal ini tidak secara signifikan meningkatkan hasil kesehatan mental. Pada saat keluar dari ICU, 47,8% subjek dapat beraktivitas secara mandiri, sementara sisanya menunjukkan tingkat ketergantungan yang bervariasi.

Kesimpulan: Sekitar sepertiga dari pasien yang selamat dari ICU di Indonesia mengalami Sindrom Pasca-Intensive Care (PICS) dalam satu bulan setelah keluar dari rumah sakit, dengan gangguan kognitif sebagai domain yang paling umum. Temuan ini menyoroti kebutuhan mendesak akan skrining sistematis pasca-ICU, program rehabilitasi multidisiplin, dan pemantauan jangka panjang untuk meningkatkan kualitas hidup setelah keluar dari rumah sakit.

Kata kunci: Sindrom Pasca-Intensive Care, pasien yang selamat dari ICU, prevalensi, gangguan kognitif, kesehatan mental, Indonesia

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Background

Advances in health science and technology over the past few decades have increased survival rate of critically ill patients during intensive care and their outcome after hospital discharged. Survival rate of patients after critical illness post-ICU long-term is reported to be 80-90%. Data from Dr. Cipto Mangunkusumo Hospital in 2022-2023 showed a comparable survival rate of 86%. However, most survivors experience quality of life (QoL) decrease that develops during ICU care and hospital admission, which described as Post-Intensive Care Syndrome (PICS). This syndrome has recently been described for deterioration of physical and mental condition among ICU survivors. PICS can manifests from physical and cognitive impairment to mental health problems and affects socioeconomic burdens resulting from their care during the ICU and recovery after discharge.[1-4]

PICS were defined as syndrome comprising a combination of physical symptoms (e.g., stiffness, muscle weakness, fatigue, mobility limitations, pain, and sexual performance), cognitive (e.g. memory deficits, attention and concentration difficulties, disorientation, language and calculation problems, and difficulty performing simultaneous tasks), and psychiatric disorder (e.g., depression, anxiety, or post-traumatic stress disorder (PTSD) in less common in some populations) which appears after the critical period and continues after the acute care phase until discharge from hospital care. To restore the physical and mental condition of patients after ICU treatment so that they can return to a quality of life close to that before they were ill, the Physical Medicine and Rehabilitation divisions play important role in the prevention, diagnosis, and strategies for managing PICS-related disabilities.[2,5]

One of the instruments used is the Post-Intensive Care Syndrome Questionnaire (PICSQ) which is arranged as risk assessment for ICU survivors to develop the risk of PICS after discharge which has previously been tested for validity and reliability. This tool offers several advantages: it covers all three PICS domains, is practical to administer, can be used in studies evaluating long-term outcomes, does not require special equipment or certified assessors, and can even be administered remotely without requiring patients to visit the hospital—an especially valuable feature for patients with limited access to healthcare facilities.[6-9] There is limited data prevalence of PICS patient in Indonesia. This study aims to identify prevalence and characteristic of PICS patient in Indonesia, especially to reduce risk of disabilities.

Materials and Methods

This prospective cohort study was performed at ICU from three tertiary teaching hospital in Indonesia including Dr. Cipto Mangunkusumo General Hospital, University of Indonesia Hospital, and Persahabatan Hospital from July 2024 until July 2025. This study had been approved by three institution from Ethics Committee from Dr. Cipto Mangunkusumo Hospital (RSCM) (KET-1152/UN2.F1/ETIK/PPM.00.02/2024), Ethics Committee of University of Indonesia Hospital (RSUI) (S-069/KETLIT/RSUI/III/2025), and Persahabatan Hospital (RSP) (HK.03.01/D.XX/3737.5/2025).

Inclusion criteria were ICU patients who admitted in RSCM, RSUI and RSP, aged more than 18 years old, have history of ICU care who has been discharged from the hospital for at least one month, able to understand and answer the questionnaire and doesn't have any problem of communication, able to read and to understand the instruction in Bahasa Indonesia, assessed as PICS based on Indonesian version of PICSQ and also agree to participate in this study. The research instrument consists of the patient's medical record, informed consent form, and the PICS questionnaire sheet in Bahasa Indonesia. All patients or their family has given written consent prior to the study.

The PICSQ has been validated to be composed in Indonesian version consisting of 18 self-reported questionnaire items. Respondents' assessments are based on a

Likert scale (0 - 3 = never - always), focusing on the presence of disability that developed after discharged compared to before hospital admission. The possible score range for each domain is 0 to 18. The reliability coefficient ranged from 0.77 to 0.87 during questionnaire development. Subjects were diagnosed with PICS if the score for each domain was ≥2 for cognitive, ≥3 for mental, and ≥7 for physical. Diagnosis of PICS can be established if at least one domain is fulfilled. [9,10] The outcome then divided into seven groups consist of cognitive domain; physical domain; mental domain; and each domains combination.

Characteristics of PICS subject were collected from medical records and interviews were divided into three groups; pre-ICU, durante-ICU, and post-ICU. Characteristic subjects of PICS pre-ICU were age, gender, married status, education, occupation, history of smoking category using Brinkman Index , history of alcohol using CAGE score, physical activity level using validated Indonesian version of IPAQ (*International Physical Activity Questionnaire*) score, body mass index, history of admission in ICU, and mental status before admission using validated Indonesion version of Mini ICD-10.

The characteristic subjects of PICS during ICU include admission diagnosis, comorbid, APACHE II (Acute Physiology and Chronic Health Evaluation II) score for severity level within 24 hours after admision, time to start rehabilitation, ICU duration, mobilization level after discharge from ICU, surgery, complication, duration of using mechanical ventilation, cardiovascular support, renal support, multiorgan failure, ICU-Acquired Weakness (ICU-AW) using Medical Research Council-Skeletal Scale (MRC-SS), duration of analgesic, duration of sedation, history of delirium, and duration of physical strain.

The characteristic subjects of PICS post-ICU were hospitalization duration and functional independence level using validated Indonesian version of Barthel Index after hospital discharged. The Barthel Index

categorized as indepence with total score of 20, mild depence with total score of 12-19, moderate dependence with total score of 9-11, severe dependence with total score of 5-8, and total dependence with total score 0-4. Analysis of the total questionnaire scores and subject characteristics was assessed based on their frequency using the Statistical Package for the Social Sciences (SPSS) version 24.0.

Results:

Between July 2024 and July 2025, 435 subjects were participated in this study and 132 subjects of them were asessed as PICS(tabel 1).

Tabel 1. PICS Prevalence (n=435)

Characteristics		n	%
PICS	No	303	69.7
	Yes	132	30.3

The 132 subjects assessed with PICS then divided into seven groups (graph 1 and table 2) with mental domain as the most frequent (37 subjects/28%), followed by cognitive domain as many as 26 subjects (19.7%), physical domain as many as 22 subjects (16.7%), all three domains as many as 14 subjects (10.6%), physical and mental domain as many as 14 subjects (10.6%), cognitive and mental domain as many as 10 subjects (7.5%), and cognitive and physical domain as many as 9 subjects (6.9%).
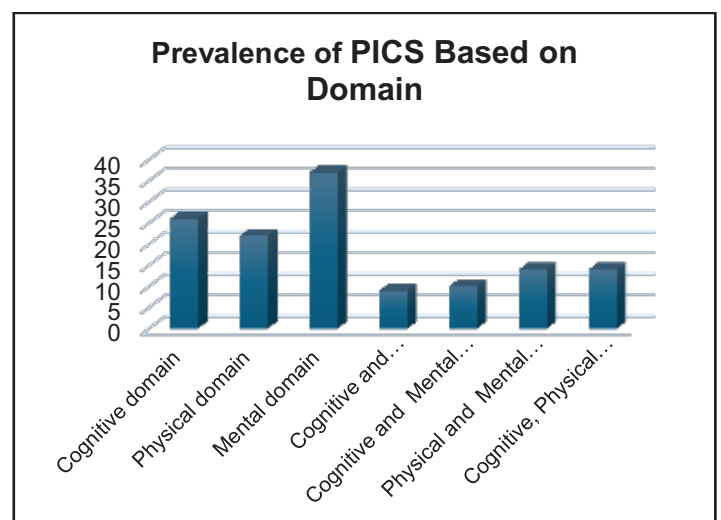
Graph 1. Prevalence of PICS Based on Domain

Table 2. Prevalence of PICS (n=132)

Characteristic		n	%
PICS	Cognitive domain	26	19.7%
	Physical domain	22	16,7%
	Mental domain	**37**	**28%**
	Cognitive and Physical domain	9	6.9%
	Cognitive and Mental domain	10	7.5%
	Physical and Mental domain	14	10.6%
	Cognitive, Physical and Mental domain	14	10.6%

Demographic characteristics of the subjects before ICU admission (table 3) showed most subjects were under 60 years of age (68.2%), with a slightly higher proportion of men (53.8%) compared to women (46.2%). The majority were married (74.3%). Based on level of education, 34.9% had completed high school, while 33.3% held a university degree, and 31.8% had lower education. More than half of the subjects were unemployed (52.3%). Most of the subjects were non smokers (57.6%) and non alcholism (88.6%). Most patients were physically inactive prior to ICU admission (67.4%) and 46.2% were overweight or obese. One-third (34.8%) had a history of previous ICU admission. Regarding mental health status prior to illness, 82.6% had no psychiatric disorder.

Table 3. Characteristic Subject of PICS pre-ICU (n=132)

Characteristic		n	%
Age	≥ 60 years old	42	31.8
	< 60 years old	**90**	**68.2**
Gender	Women	61	46.2
	Men	**71**	**53.8**
Married status	Unmarried	16	12.1
	Divorce	18	13.7
	Married	**98**	**74.3**
Educational	Below high school	42	31.8
	High School	**46**	**34.9**
	University	44	33.3

		n	%
Occupational	Unemployed	**69**	**52.3**
	Employed	63	47.7
Smoking history	Heavy smoker	19	14.4
	Mild smoker	37	28
	Non smoker	**76**	**57.6**
Alcohol history	Alcoholism	15	11.4
	Not alcoholism	**117**	**88.6**
Physical activity level	Inactive	**89**	**67.4**
	Minimal active	33	25
	Very active	10	7.5
Body mass index	Lean	22	16.7
	Normal	49	37.1
	Overweight and obesity	**61**	**46.2**
Readmission ICU history	Yes	46	34.8
	No	**86**	**65.2**
Mental status before admission	Anxiety	4	3
	Depression	7	5.3
	PTSD	3	2.3
	Other mental illness	9	6.8
	No psychiatric disorder	**109**	**82.6**

The clinical characteristics during ICU (table 4) showed the most common primary diagnosis at ICU admission was cardiovascular disease (46.2%), followed by other conditions (30.3%), respiratory failure (11.4%), metabolic disease (7.6%), and sepsis (4.5%). Comorbidities were present in 67% of subjects. Most patients were classified as having low risk of death (84.9%), has history of arly rehabilitation (62.1%) ,achieved level 4 mobilization at ICU discharge (53.8%), have history of prolonged ICU stay (81.8%), have history of surgical procedures (75%), have history of complications during ICU stay (54.5%), have no history of prolonged mechanical

ventilation (84%), have history of cardiovascular support (45.5%), no history of renal support (89.4%), have no multiorgan failure (65.9), no history of ICU-acquired weakness (98.2%), no history of prolonged use of analgesic (60.6%), no history of prolonged use of sedation (86.4%), no history of delirium (82.6%), and no history of prolonged restrain (77.3%).

Table 4. Characteristic of PICS Subject During ICU

Characteristic		n	%
Primary diagnosis at ICU admission	Septic	6	4.5
	Respiratory failure	15	11.4
	Metabolic disease	10	7.6
	Cardiovascular disease	**61**	**46.2**
	Other disease	40	30.3
Comorbid	Yes	**91**	**67**
	No	41	31
Severity of illness	High risk of death	20	15.1
	Low risk of death	**112**	**84.9**
Time to start rehabilitation	Standard rehabilitation	50	37.9
	Early rehabilitation	**82**	**62.1**
Mobilization level after ICU discharge	Level 1	25	19
	Level 2	28	21.2
	Level 3	8	6
	Level 4	**71**	**53.8**
Length of stay ICU admission	Prolonged (>7 days)	24	18.2
	Not prolonged (≤ 7 days)	**108**	**81.8**
Surgical history	Yes	**99**	**75**
	No	33	25
Complication	Yes	**72**	**54.5**
	No	60	45.5
Duration of mechanical ventilation	Prolonged (≥ 96 hours)	21	16
	Not prolonged (<96 hours)	**111**	**84**
Cardiovascular support	Yes	60	45.5
	No	**72**	**54.5**
Renal support	Yes	14	10.6
	No	**118**	**89.4**
Multiorgan failure	Yes	45	34.1
	No	**87**	**65.9**
ICU-Acquired Weakness (ICU-AW)	Yes	1	0.8
	No	**131**	**98.2**
Duration of analgesic	Prolonged (≥ 72 hours)	52	39.4
	Not prolonged (<72 hours)	**80**	**60.6**
Duration of sedation	Prolonged (≥ 72 hours)	18	13.6
	Not prolonged (<72 hours)	**114**	**86.4**
Delirium history	Yes	23	17.4
	No	**109**	**82.6**
Duration of Physical restrain	Prolonged (4 hours)	30	22.7
	Not prolonged (≤ 4 hours)	**102**	**77.3**

Based on the post ICU characteristics (table 5), most of the subjects have no history of prolonged hospital stay (83.3%). After hospital discharge, the majority of patients has dependency from various level while 47.8% of subjects were independent.

Table 5. Characteristic of PICS Subject Post-ICU

Characteristic		n	%
Length of stay at hospital	Prolonged (<21 days)	21	16.7
	Not prolonged (≥ 21 days)	**110**	**83.3**
Level of dependency after discharge	Total dependency	8	6
	Severe dependency	10	7.6
	Moderate dependency	12	9
	Mild dependency	39	29.6
	Independent	**63**	**47.8**

DISCUSSION

This multicentre prospective cohort study is first study that investigate characteristics of PICS among ICU survivors in Indonesia settings. This study shows an ICU prevalence of 30.3% with the most prevalent domain was the mental domain at 28%. This data differs from previous systematic review studies. The average prevalence worldwide was found to be 54.35%. Based on the most prevalent domain, the most common domain is the physical domain at 61.95%. The prevalence in Asia (Japan and Korea) is 54.57%. For Asia, the most prevalent domain is cognition at 33.6-46.6%. One study that showed results almost similar result showed a PICS prevalence of 49.7% with the most prevalent domain being the mental domain at 13.5%. The differences in prevalence may be caused by the inconsistency of PICS measurement tools, diversity in ICU populations, and multiple morbidities. [11-15]

PICS was first described in 2010 for constellation of new or worsening impairments that commonly occur in ICU survivors after hospital discharge. PICS results from long-term complications associated with the underlying disease process and adverse effects of intensive care treatments. The pathophysiological mechanisms of PICS are primarily characterized by an inflammatory response to infection or injury during ICU care and restoring homeostasis after discharge. During early systemic inflammation, cellular stress or tissue injury released damage-associated molecular patterns (DAMPs), while pathogen-associated molecular patterns (PAMPs) induce from any microorganism provide signals to induce the immune system of pathogens presence are activated as triggers of the systemic inflammatory response of the immune system to any infection caused by a pathogen or any injury caused by the installation of life support devices in the ICU. Activation of this inflammatory response is mediated by growth factors molecules and pro-inflammatory cytokines to activation of mesenchymal and immune cells which can cause damaging important organs such as brain, heart, and lung. [10,16]

Mental impairment was the most significantly affected, despite the subject having no mental issue before admission. Patient-related factors include older age, female gender, history of mental disorders, disease severity, and poor ICU care experience. Factors during ICU care such as delirium, prolonged sedation and mechanical ventilation, and restraints utilization has important role in increasing PICS risk. This multifactorial combination suggests that the syndrome developed during ICU care may influence the patient's recovery response and have long-term consequences. Identified and managing these risk factors is important for physicians and healthcare providers to monitor post-ICU outcomes and identify patients at higher risk, particularly for patient planning throughout ICU care and discharge. [10,17]

There were several study limitations. First, the follow-up period was relatively short, limited to only one month after ICU discharge, which may not capture the long-term trajectory of PICS. Second, the sample was drawn exclusively from tertiary referral hospitals in Indonesia, which limits the results of these findings to other healthcare settings at lower levels, such as secondary hospitals or general hospitals commonly found in various provinces in Indonesia. Third, the study only focus on describe the characteristics of the subjects with PICS without analyzed the proportion of subjects with no PICS. Therefore, future studies need to focus on retrospectively identifying risk factors for comprehensive ICU care planning to reduce the risk of ICU progression after discharge.

For future research, we need to analyze the proportion between the subjects with PICS and no PICS with bigger sample, analyze the correlation of the risk factors especially for preventive recommendation, and long-term follow-up strategies to reduce PICS-related disabilities and improving outcomes after ICU dicharge. Multidisciplinary strategic management is needed with interdisciplinary

collaboration to provide empirical care that can be applied to various conditions both before, during, and after ICU care to increase the success of ICU survivors in having a quality of life as before.

Conclusion

The prevalence of ICU survivors experiencing PICS reached 30% of the total ICU survivors. Among the three domains, mental impairment was the most prevalent, followed by cognitive and physical impairments. These findings emphasize the significant burden of PICS on survivors, even in those without prior psychiatric disorders. Our results highlight the urgent need for structured post-ICU screening, multidisciplinary prevention programs, and long-term follow-up strategies to reduce PICS-related disability and to improve outcome among ICU survivors in Indonesia.

Declarations of interest

The authors declare no conflicts of interest.

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