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Factors Associated with the Occurrence of Post Intensive Care Syndrome in Patients Post Ventilator Use at PMI Hospital Bogor in 2023

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ABSTRACT

Post-ventilator patients can experience Post Intensive Care Syndrome (PICS) problems. This includes physical, psychological and cognitive changes. This research aims to analyze the incidence of PICS in post-ventilator patients in Surabaya. The design of this study used a descriptive research method with research variables including physical, psychological and cognitive health. The population of post-ventilator patients amounted to 56 patients with a sample of 49 patients using the simple random sampling technique. The instrument used in this study was a questionnaire sheet. Which consists of 16 questions, divided into physical, psychological and cognitive aspects. Post intensive care syndrome in post-ventilator patients, the majority of the physical aspects are in the sufficient category, such as changes in fatigue and pain. In the psychological (mental) aspect, most are in the sufficient category marked by anxiety and sadness. The cognitive aspect is also mostly in the sufficient category which includes changes in patient memory. Post intensive care syndrome in the physical, psychological and cognitive aspects is in the sufficient category. This is marked by mild changes. The recommendation in this study is that patients need to get health education only if they experience PICS.

Keywords: *PICS, Ventilators*

1. INTRODUCTION

Intensive Care Unit (ICU) is one of the central service units in a hospital with special staff and special equipment, which is intended for observation, care and therapy of critical patients due to illness, trauma or life-threatening or potentially life-threatening complications. Critical patients are those who have the potential for reversible dysfunction in one or more organs that threaten life and require treatment in the ICU [1]. Post-ICU patients have various potential health problems due to previous care. Post-ICU problems are commonly referred to as Post Intensive Care Syndrome (PICS). Post-intensive care syndrome is a health problem that appears and persists for a long time after the patient leaves the ICU and is a very important nursing problem to be resolved immediately. [1]. Patients treated in the ICU are at high risk of nosocomial infections. The nosocomial infection that is quite often suffered by patients is pneumonia. Problems that arise in Post Intensive Care Syndrome patients if not handled properly result in worsening physical, cognitive and anxiety (mental health) function weakness status during critical illness and after the patient leaves the ICU [2].

The World Health Organization (WHO) in 2018 stated that the prevalence of critical patients in the ICU is increasing every year. It was recorded that 9.8-24.6% of critically ill patients were treated in the ICU per 100,000 population, and deaths from critical to chronic diseases in the world increased by 1.1-7.4 million people. In the ICU of hospitals in Asian countries including Indonesia, there are 1285 sepsis patients who use ventilators with an average duration of ventilator use of 3-10 days and 575 of them died [3]. In Indonesia, the number of critical patients on ventilators is two-thirds of all ICU patients in Indonesia [4]. Based on the phenomenon at the PMI Bogor Hospital in 2023 from the

results of the medical record report for April - June 2022, there were 40 critical patients treated in the ICU, 75% of whom were on mechanical ventilators.

Post intensive care syndrome is a collection of three symptoms of problems or disorders in the form of a worsening picture of the status of physical, cognitive, and anxiety (mental health) function weakness during critical illness and after the patient is discharged from the ICU [2]. Critical patients are directly related to discomfort that gives a non-cooperative effect, patients will describe pain with various manifestations verbally or nonverbally. The impact of decreased physical function in the form of decreased motor (motor activity) will worsen and weaken the function of other organs if not immediately prevented in their care in the ICU [5]. The impact of decreased physical function in ICU patients and after discharge from the ICU is an increase in the length of treatment time, decreased cognitive function, physical function.

Post-intensive care syndrome (PICS) results from a combination of factors. ICU care can be intensive due to the patient's serious medical condition such as respiratory failure, sepsis due to the use of life-sustaining devices such as endotracheal tubes, mechanical ventilators and the use of sedatives, pain medications and other medications that have mind-altering side effects (including delusions). Exposure to all of these unique stressors can impact many aspects of the ICU survivor's life.

Anyone who survives a critical illness requiring admission to an intensive care unit (ICU) is susceptible to developing post-intensive care syndrome (PICS). In addition to the critically ill patient, the family providing care and support also experiences some of the same mental and emotional symptoms of PICS, a condition called PICS-family (PICS-F). PICS impacts the quality of life of patients and families. [6] stated that post-intensive care syndrome (PICS) results in functional, cognitive and psychosocial problems, disorders acquired in the ICU occur in patients with mechanical ventilators, and the impact on the patient's family experiencing severe anxiety [7].

Health care providers or health institutions must immediately save critical patients, we must also be aware of the potential long-term consequences of staying in the ICU, health workers with extra attention optimize the physical, cognitive, and mental health of ICU patients and their families. Doing this is not easy, but it is essential to ensure the best possible outcomes [2], [8]. The most important role of nurses is the implementation of preventive measures to prevent ongoing PICS, so nurses need to spend most of their time providing intensive care to these patients and providing non-pharmacological care by providing psychological assistance in the hope of reducing the symptoms of PICS. Based on the background above, the author is interested in conducting research according to the background above with the title "Post intensive care syndrome in patients after ventilator use at PMI Hospital Bogor in 2023".

2. LITERATURE REVIEW

2.1 Intensive Care Unit (ICU) Concept

Intensive Care Unit (ICU) is a part of a hospital that is independent (installation under the director of service), with special staff and special equipment intended for observation, care, and therapy of patients suffering from diseases, injuries or complications that are life-threatening or potentially life-threatening with a dubia prognosis. ICU is a special service for intensive medical care and close monitoring of patients in a hospital [9].

2.2 Mechanical Ventilator

A mechanical ventilator is a positive or negative pressure breathing aid that produces controlled airflow into the patient's airway so that it can maintain ventilation and oxygen delivery for a long period of time [10]. Mechanical ventilation is a form of artificial respiration that performs the tasks of the respiratory muscles normally. Mechanical ventilation allows oxygenation and ventilation in patients [11].

2.3 Weaning

Weaning is a series of processes of releasing patients from mechanical ventilation assistance and takes place gradually, the culmination of which is the process of extubation/removal of the artificial airway from the patient's body. Weaning from mechanical ventilation is the process of removing ventilator assistance which is carried out gradually or directly. Weaning patients from mechanical ventilation is an important thing in the Intensive Care Unit (ICU) [12].

2.4 Post Intensive Care Syndrome (PICS)

Post-intensive care syndrome (PICS) is a group of problems experienced by patients with life-threatening illnesses. More than half (50 percent) of all patients who survive a hospital stay in the intensive care unit (ICU) will have at least one problem seen with PICS. These problems can have a significant impact on the lives of critically ill survivors. The problems can be physical or mental and can affect a person's ability to think or function in daily life. Many patients are unable to return to work and do not have the same energy as they did before their illness [13].

3. METHODS

3.1 Research Design

This research design uses a descriptive research method. The type of research in descriptive research explains the phenomena found. The descriptive method aims to describe (explain) important events that occur in the present [14]. A survey is a design used to provide information related to the prevalence, distribution, and relationships between variables in a population [14].

3.2 Sampling

The sampling technique used in this study is probability sampling, namely simple random sampling, which is a sampling method with integrated object and subject opportunities, by collecting all patients who have been treated in the ICU of PMI Hospital Bogor in 2023 using a ventilator and have been extubated and have been discharged from the ICU of PMI Hospital Bogor in 2023.

3.3 Research Instruments

1. The demographic components of patients consist of age, gender, education, employment, marital status, regularity of taking medication and length of ventilator use, as well as patient comorbidities, use of sedation.
2. Post Intensive Care Syndrome (PICS) patient components

3.4 Data analysis

1. Univariate Analysis

   Univariate analysis is performed on a variable from the research results, which aims to explain or describe the characteristics of each research variable. In general, this analysis only produces the distribution and percentage of each variable studied [15].

2. Bivariate Analysis

Bivariate analysis tests the relationship between variables. In this study, bivariate analysis was conducted to determine post-intensive care syndrome in patients after ventilator use at PMI Hospital Bogor in 2023. This study used frequency tables and crosstabs.

4. RESULTS AND DISCUSSION

4.1 Overview of Research Site

The Dr. Ramelan Central Hospital of the Indonesian Navy, Surabaya is a type A government hospital (Ministry of Defense), namely a referral and educational hospital that serves the Indonesian Navy, Indonesian Army, Indonesian Air Force, families and the general public. The Dr. Ramelan Hospital in Surabaya was established on August 7, 1950, located on Jalan Gadung No. 1 Surabaya, occupying 2,508,250 m2 of land with a building area of 86,185 m2 under the current leadership of First Admiral TNI dr. Gigih Imanta J., Sp.PD., FINASIM., MM

4.2 Overview of Research Subjects

The subjects of this study were post-ventilator patients at PMI Hospital Bogor in 2023, the total number of research subjects was 49 patients, demographic data in the form of patient characteristics were obtained through questionnaires and patient observations.

4.3 General Data on Research Results

General data from the research results is a description of the characteristics of health workers which include:

Table 1. Characteristics of Post-Ventilator Patients at PMI Bogor Hospital in 2023, January 2023 (n = 49)

Information	Frequency (f)	Percentage (%)
Age		
< 30 Years	18	36.7
31 – 40 Years	7	14.3
41 – 50 Years	8	16.3
> 50 years	16	32.7
Gender		
Man	29	59.2
Woman	20	40.8
Education		
SD	2	4.1
JUNIOR HIGH SCHOOL	11	22.4
SENIOR HIGH SCHOOL	19	38.8
Diploma/Bachelor	17	34.7
Work		
Doesn't work	22	44.9
Private	18	36.7
Indonesian National Armed Forces / Indonesian National Police	7	14.3
ASN	2	4.1
Marital status		
Marry	32	65.3
Not Married	17	69.3
Divorced	0	0

Table 1 shows the characteristics of post-ventilator patients at PMI Hospital Bogor in 2023, the majority were aged <30 years as many as 18 patients (36.7%), the majority were male as many as 29 patients (59.2%), the majority were high school education as many as 19 patients (38.8%), the majority were unemployed as many as 22 patients (44.9%), and the majority were married as many as 32 patients (65.3%).

Table 2. Characteristics during post-ventilator patient care at PMI Bogor Hospital in 2023, January 2023 (n = 49)

Information	Frequency (f)	Percentage (%)
Regularity of taking medication according to patient diagnosis		
Yes	15	30.6
No	34	69.4
Length of stay in ICU		
1 – 3 days	18	36.7
4 – 5 days	13	26.5
> 5 days	18	36.7
Duration of Ventilator Use		
12 – 24 hours	10	20.4
25 – 36 hours	6	12.2
37 – 48 hours	19	38.8
> 48 hours	14	28.6
KRS range with Data retrieval		
3 – 23 weeks	11	22.4
24 – 44 weeks	28	57.2
45 – 65 weeks	10	20.4
Sedation drugs are given		
Morphine Dormicum	17	34.7
Morphine + Dormicum	23	46.9
	9	18.4

Table 2 shows the characteristics during post-ventilator patient care at PMI Bogor Hospital in 2023, the majority of patients took medication irregularly as many as 34 patients (69.4%), the duration of treatment in the ICU was mostly for 1-3 days and > 5 days each as many as 18 patients (36.7%), the duration of ventilator use was mostly for 37 - 48 hours, namely 19 patients (38.8%), the range of KRS to data collection was mostly 24 - 44 weeks, namely 28 patients (57.2%), the type of sedation given was mostly morphine sedation, as many as 23 patients (46.9%).

4.4 Special Data Research Results

1. Post Intensive Care Syndrome Physically

Table 3. Results of Physical Observations of Post Intensive Care Syndrome in Patients After Ventilator Use at PMI Hospital Bogor in 2023, January 2023 (n = 49)

Post Intensive Care Syndrome (Physique)	Frequency (f)	Percentage (%)
Good	24	49
Enough	25	51
Bad	0	0
Total	49	100

Table 3 shows the observation of post-intensive care syndrome physically in patients after using a ventilator at the PMI Bogor Hospital in 2023, most of the Post-Intensive Care Syndrome seen from a physical perspective was sufficient as many as 25 patients (51%) and good as many as 24 patients (49%).

2. Post Intensive Care Syndrome psychologically (mentally)

Table 4 Results of Observations of Post Intensive Care Syndrome in Psychological (Mental) Terms of Post Ventilator Use in PMI Hospital Bogor in 2023, January 2023 (n = 49)

Post Intensive Care Syndrome in a way psychology (mental)	Frequency (f)	Percentage (%)
Good	11	22.4
Enough	38	77.6
Bad	0	0
Total	49	100

Table 4 shows observations of post-intensive care syndrome in terms of psychology (mentality) of patients after using a ventilator at the PMI Bogor Hospital in 2023. Most of the Post-Intensive Care Syndrome was seen in terms of psychology (mentality) as sufficient as 38 patients (77.6%) and good as 11 patients (22.4%).

3. Post Intensive Care Syndrome cognitively

Table 5. Results of Observations of Post Intensive Care Syndrome Cognitively in Patients After Ventilator Use at PMI Bogor Hospital in 2023, January 2023 (n = 49)

Post Intensive Care Syndrome (cognitive)	Frequency (f)	Percentage (%)
Good	16	32.7
Enough	33	67.3
Bad	0	0
Total	49	100

Table 5 shows observations of post-intensive care syndrome cognitively in patients after ventilator use at PMI Hospital Bogor in 2023, most of the Post-Intensive Care Syndrome seen from a cognitive perspective was sufficient as many as 33 patients (67.3%) and good as many as 16 patients (32.7%).

Discussion

1. Post Intensive Care Syndrome Physically in Patients After Ventilator Use at PMI Hospital Bogor in 2023

Table 2. shows the observation of post-intensive care syndrome physically in patients after using a ventilator at the PMI Bogor Hospital in 2023, most of the Post Intensive Care Syndrome seen from a physical perspective was quite as many as 25 patients (51%), post-intensive care syndrome physically in patients who were quite marked by patients who experienced shortness of breath when climbing stairs and fatigue and pain in the body such as the head or stomach, in terms of the recovery process, it cannot be separated from the role of health workers during treatment in the ICU such as providing installation and removal of ventilators, weaning and motivational support for nurses to these patients. Research by [16] revealed that the role of nurses in caring for patients using mechanical ventilators while in the ICU is very important in mechanical ventilation management interventions, nurses are tasked with carrying out care, one of which is changing position, changes

in position in patients with mechanical ventilators are not entirely carried out on patients with mechanical ventilators, the majority of nurses expressed concern that there would be major changes in the patient's status. patients with good physical condition as many as 24 patients (49%), this cannot be separated from the role of the patient's family during home care after treatment in the ICU, based on patient data from 10 patients whose KRS range with data collection for 45 - 65 weeks is a fairly long time in terms of physical recovery of patients which cannot be separated from the role of the family in terms of support in care during home such as regulating daily diet, motivation to recover for patients and others.

Post Intensive Care Syndrome is a collection of three symptoms of problems or disorders in the form of a worsening picture of the status of weakness, one of which is function during critical illness and after the patient is discharged from the ICU [5]. The impact of decreased physical function in the form of decreased motor (motor activity) will worsen and weaken the function of other organs if not immediately prevented in their care in the ICU [5]. The impact of decreased physical function in ICU patients and after discharge from the ICU is an increase in the length of treatment time so that there is also a decrease in cognitive function, physical function (organs, muscle contractility, functional capacity and pain, vitality, fatigue), and worsening mental health (anxiety), emotional response, depression, reflection, loneliness, inability to perform activities. The phenomenon of decreased physical function and post ICU based on these impacts shows a decline in patient health, especially in physical function. Prevention to minimize the incidence of decreased physical and cognitive function post ICU should be able to be implemented in accordance with the role of critical care nurses.

Based on the factors of accompanying illnesses on changes in post-intensive care syndrome physically, namely in good changes dominated by patients with brain and nerve disorders and also pancreatic disorders, namely 7 patients (70%) each and in physical changes moderately dominated by patients with respiratory/lung disorders, namely 10 patients (76.9%) this is because it is disturbing such as a feeling of shortness of breath often experiencing shortness of breath, also shortness of breath there is an increase in respiratory effort and an increase in the need for energy so that it will cause fatigue.

Based on the factor of the duration of ventilator use on physical changes in post-intensive care syndrome, namely in patients with a duration of ventilator use of 12-24 hours, most experienced good physical changes, namely 6 patients (60%) and in ventilator use > 48 hours, most experienced sufficient physical changes, namely 9 patients (64.3%).

2. Post Intensive Care Syndrome in Psychology (Mental) of Post Ventilator Patients at PMI Hospital Bogor in 2023.

Table 3 shows the Observation of Post Intensive Care Syndrome in terms of psychology (mental) of patients after using a ventilator at PMI Hospital Bogor in 2023, most of the Post Intensive Care Syndrome seen from a psychological (mental) perspective was sufficient, as many as 38 patients (77.6%), this is indicated by patients who feel burdened and stressed by the disease they are experiencing, good psychological (mental) changes in patients after using a ventilator cannot be separated from the role of the family in motivating patients psychologically. [17] stated that family support is an important factor in efforts to increase motivation so that it can have a positive effect on psychological health.

Anyone who survives a critical illness requiring admission to an intensive care unit (ICU) is susceptible to developing post-intensive care syndrome (PICS). PICS impacts the patient's quality of life. [6] stated that post-intensive care syndrome (PICS) results in psychological functional impairment in the ICU, occurring in patients on mechanical ventilators, as well as impacting the patient's family with severe anxiety.

Based on the factors of accompanying illnesses on changes in post-intensive care syndrome psychologically (mentally), namely good changes are dominated by patients with pancreatic

disorders, namely 4 patients (40%) and moderate psychological changes are dominated by patients with respiratory/lung disorders, namely 12 patients (92.3%).

Based on the factor of the length of ventilator use on changes in post-intensive care syndrome physically, namely in patients with a ventilator use of 12-24 hours, the majority experienced sufficient psychological changes, namely 7 patients (70%) and in ventilator use >

48 hours, most of them experienced sufficient psychological changes, namely 12 patients (85.7%).

3. Post intensive care syndrome cognitively in patients after using a ventilator at PMI Hospital Bogor in 2023

Table 4 shows the Observation of Post Intensive Care Syndrome cognitively in patients after ventilator use at PMI Hospital Bogor in 2023, most of the Post Intensive Care Syndrome seen from the cognitive aspect was sufficient as many as 33 patients (67.3%) seen from the answers with the highest score of 81 revealed that patients often had difficulty concentrating, patients who had previously been treated in the ICU with the installation of a ventilator can affect cognitive changes such as reduced concentration and good as many as 16 patients (32.7%).

Cognitive change factors in patients can also be influenced by factors other than ventilators such as the length of treatment in the ICU, it was seen that patients with a length of treatment from 18 patients with ICU treatment for > 5 days mostly experienced significant cognitive changes, this is in line with research by [2] which revealed that health care providers or health institutions must immediately save critical patients, health workers with extra attention optimize cognitive abilities by educating and motivating. Doing this is not easy, but it is very important to ensure the best possible results, and the most important role of nurses is the implementation of preventive measures to prevent PICS by providing education to the patient's family to motivate the patient continuously, so nurses need to spend most of their time providing intensive care for these patients and providing non-pharmacological care by providing psychological assistance in the hope of reducing the symptoms of PICS.

Based on the factors of accompanying illnesses on changes in post-intensive care syndrome cognitively, namely good changes are dominated by patients with pancreatic disorders, namely 5 patients (50%) and moderate cognitive changes are dominated by patients with respiratory/lung disorders, namely 12 patients (92.3%).

Based on the factor of the length of ventilator use on changes in post-intensive care syndrome physically, namely in patients with a ventilator use of 12-24 hours, most experienced sufficient cognitive changes, namely 6 patients (70%) and in ventilator use > 48 hours, most experienced sufficient cognitive changes, namely 12 patients (85.7%).

4. Research Limitations

The limitations in this study are:

a. This data collection was taken at a long time after the patient left the ICU, so the researcher did not directly see the care process while in the ICU.
b. The questionnaire used by the researcher has not been tested for validity and reliability.

5. CONCLUSION

Based on the data analysis in the research that has been conducted, the following conclusions can be drawn:

1. *Post intensive care syndrome*Physically, post-ventilator patients at PMI Hospital Bogor in 2023, most of the Post Intensive Care Syndrome patients were considered to be physically adequate.

2. *Post intensive care syndrome*Psychologically (mentally) in patients after ventilator use at PMI Hospital Bogor in 2023, most of the Post Intensive Care Syndrome cases were considered sufficient in terms of psychology (mentality).
3. *Post intensive care syndrome*cognitively, in patients after ventilator use at PMI Hospital Bogor in 2023, most of the Post Intensive Care Syndrome patients were cognitively considered to be sufficient.

SUGGESTION

Based on the research findings, several suggestions were submitted to related parties as follows:

1. Theoretically

This research is expected to be used as a source of information to develop nursing science in the field of critical care related to research on physical, psychological and cognitive changes in patients after using a ventilator.

2. For Writers

This research is expected to increase knowledge in overcoming changes in post-intensive care syndrome in patients after ventilator use.

3. For Institutions

This research is expected to be used as evaluation material in handling changes to minimize changes in patient status after using a ventilator.

4. For Health Workers

This research is expected to increase the role of nurses for patients after ventilator use in reducing the risk of PICS by providing motivation to patients.

5. For further researchers

The results of the study are expected to be literature in studying post-intensive care syndrome in post-treatment patients by developing other than the use of ventilators such as sedation and others as well as conducting validity and reliability tests on the questionnaire for further researchers.

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