PHYSICAL FUNCTION–TARDIVE DYSKINESIA (PFTD) ON CRITICAL PATIENTS IN INTENSIVE CARE UNIT

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ABSTRACT

Introduction: Critical patients are patients who potentially get reversible dysfunction in one or more life-threatening organs and require care in the Intensive Care Unit (ICU). **Methods:** The objective of this research is to analyse the physical function-tardive dyskinesia in critical patients with sedation in the ICU. The design of this research is cross-sectional. The population is all of the critical patients in the ICU of the Baptist Hospital in Kediri. The purposive sample population was 41 respondents based on the inclusion and exclusion criteria. The variables are 'giving the sedation' and 'physical function-tardive dyskinesia'. The data was collected using a Motor Activity Assessment, and the Sedation Scale for Critically Ill Patients and Tardive Dyskinesia Screening. **Results:** The results showed that giving sedation can slow physical function in the form of motor activity; the response of noxious stimuli (7.3%), response to touch or calling name (19.5%) and an increasing score of agitation and co-operative (4.9%). Symptoms of tardive dyskinesia increased after sedation in the form of tongue protrusion (4.9%), lip-smacking, puckering and pursing (2.4%), and rapid movements of the arms and legs. The administration of sedation in the first 24-hours in ICU patients affects the physical function of the critical patients ($p = 0.005$). **Conclusions:** Giving sedation affects the patients' physical functions. Therefore, the prevention of the effects of sedation and treatment during ICU is needed in order to avoid a decrease in the physical function of critical patients.

Keywords: critical patient, ICU, physical function, sedation, tardive dyskinesia

INTRODUCTION

Critical patients are patients who potentially get reversible dysfunction in one or more life-threatening organs, and require treatment in the Intensive Care Unit (ICU) (Ireland, 2011; Marianne, 2016). The prevalence of critical patients in ICUs continues to increase every year. The World Health Organization (WHO) in 2016 reported that deaths from critical illness through to chronic illness in the world increased by 1.1 to 7.4 million people and that there were 9.8 to 24.6 critical ill patients and treated in ICU per 100,000 population (Garland *et al.*, 2013). Post-ICU patients have a wide range of potential health problems from previous treatments in the ICU. Patients with post-ICU problems are commonly referred to as having post-intensive care syndrome (PICS). Post-Intensive Care Syndrome is a health problem that persists for long periods after the patient leaves the ICU and it is a very important nursing problem that needs to be resolved (Davidson *et al.*, 2013). Post-Intensive Care Syndrome is a collection of three symptoms of a given problem or disorder in the form of the worsening picture of the weakness status of physical function, cognitive function and anxiety (mental health) during critical illness and after the patient is out of the ICU (Needham *et al.*, 2012). Critical patients directly relate to the discomfort that has non-cooperative effects. The patient will describe pain with various verbal or non-verbal manifestations. Critical patients treated in an intensive space with discomfort will receive sedation therapy. Critical patients experience sedation due to the medical management performed by health workers in intensive care. Giving opioids to reduce the pain response, anxiety or involuntary motions is important because the pathological disease makes it necessary. Sedation in the form of opioids can affect the condition of the bodily functions and depress the central nervous system. Sleep Deprivation is the result of agitation-sedation. Sedation management can have the side effects of sedation and the risk factors are highest amongst the elderly to do with analgesic and sedative treatment (Carson *et al.*, 2006). Respiratory depression may occur as a frequent effect. Nurses should be able to identify and analyse the agitation state of the given sedation. The visible effects can be either verbal or non-verbal in relation to the patient response. If the nurse cannot know and analyse the end result of the sedation effect and the action to be taken, then the patient's condition may get worse because they cannot be assessed quickly by the nurse. The patient's

critical condition needs a quick and precise assessment.

Critical patients during ICU will lose 20% of their muscle volume, and 70% of their proteins in a week (Pandharipande *et al.*, 2013). The study also found that out of 476,862 patients (60% -80% of total post-ICU patients), 30% of them were unable to return to work (non-productive) due to muscle loss of 1% -2% each day after the patient left the ICU (Cartwright, 2012; Davidson *et al.*, 2013). Patients with a loss of muscle function can be observed from the motor activity and reaction conditions of the sedation process. The decreased cognitive function is associated with decreased brain oxidative metabolism that causes neurotransmitter changes in the prefrontal and subcortical regions, or when there is a decrease in cholinergic and increased dopaminergic activity when serotonin levels and GABA (Gamma-Aminobutyric Acid) levels are significant (Nathan E, Brummel, James C. Jackson, 2013). The results showed that cognitive impairment occurred in 24% - 34% of the patient sample. The decrease in cognitive function is similar to that of traumatic brain injury (34%) and the patients are similar to those with Alzheimer's disease and delirium (24%). (Cartwright, 2012; Iwashyna *et al.*, 2012; Needham, 2012; Davidson *et al.*, 2013; Pandharipande *et al.*, 2013; Jackson *et al.*, 2014; T. J. Iwashyna, 2014; Sottile, Peter, Amy Nordon-Craft, Daniel Malone, Darcie M. Luby, Margaret Schenkman, 2015).

Physical and cognitive impairment is caused by a history of mechanical ventilation (33%), infection or sepsis (50%), spending 2 weeks to >1 week in ICU (> 50%), delirium and various critical illnesses or sepsis (70%), Coronary Heart Disease (36.6%), CHD Unstable Angina (UA) (41.5%), Hypertension (19.5%), Supraventricular Tachycardia (SVT) (2.4%), and the signs and symptoms of tardive dyskinesia (Davidson *et al.*, 2013; T. J. Iwashyna, 2014; Hoffman and Guttendorf, 2015; Suwardianto, 2016). The main causative factors are long-term care (≥2 days) and minimal mobilisation. Other causative factors include previous medical history (health status and previous disease history), acute illness, critical illness (liver disease, hypoxia, hypotension, glucose dysregulation, respiratory failure, shock, CHF (Congestive Heart Failure), sepsis and other diseases of similar severity, inflammation, loss of strength, sedation, and increased anxiety levels (Needham, 2012; Needham *et al.*, 2012; Hopkins, 2013; Jackson *et al.*, 2014; T. Iwashyna, 2014). If in ICU, then the problem will arise and impact on the health of post-ICU patients.

The impact of the decreased physical functions associated with motor degradation (motor activity) will worsen and weaken the function of the other organs if not immediately prevented in ICU (Nathan E, Brummel, James C. Jackson, 2013). The impact of physical function in ICU patients and after they are out of the ICU is down to the increased length of treatment, decreased cognitive function, decreased physical function (organs, muscle contractions, function and pain, vitality, fatigue), and worsening mental health (anxiety), emotional responsiveness, depression, reflectiveness, loneliness and the inability to perform activities and the use of instruments in everyday life. The phenomenon of post-ICU post-cognitive decline in relation to physical function and cognitive implications indicates a decline in the health of the patients, especially to do with the physical, cognitive and mental health functions of anxiety, and the need for intervention strategies in the ICU in its prevention. The prevention to minimise the incidences of post-ICU physical and cognitive impairment should be performed in accordance with the role of critical nurses.

MATERIALS AND METHODS

The design of this research is cross-sectional. The population is all of the critical patients in the Intensive Care Installation of Baptist Hospital, Kediri. The sample population size is 41 respondents according to the inclusion criteria of patients who received the first 24 hours of their treatment in Intensive Care. The data collected was done using an instrument of Motor Activity Assessment, the Sedation Scale for Critically Ill Patients and Tardive Dyskinesia Screening. The Motor Activity Assessment scale (MASS) was developed by Devlin in 1999. MAAS is valid and reliable for use on patients in the ICU (Devlin, 1999). The data collection has been done after completing the research proposal. The researcher get ethical clearance from KEPK Medical Faculty of Diponegoro University with letter number 150 / EC / FK-

RSDK / IV / 2017, and the researcher submitted and achieved research permission from Diponegoro University Semarang to Director of RS. Baptist Kediri. The researchers also obtained approval from the Director of the Hospital, Baptist Kediri, and initiated data collection at the ICU. The researcher obtained informed consent before doing the research. The subjects, if willing, signed the approval sheet. The researcher gave clear information to the respondent's family/guardian regarding the purpose and procedure of the research before collecting the data. The researcher convinced the respondent's family that the research had an adverse effect on the prospective respondent, and the researcher gave the opportunity for them to ask if it was not clear. The study was conducted for 1 month in July 2017. The data was collected by direct measurements from the patients and an observation of the patient's response. The data analysis was done with distribution frequency, cross-tabulation and an Independent T-Test with < 0,05.

Table 1. Characteristics of Respondent (n=41)

Characteristics	Frequency (f)	Percentage (%)
Gender		
Male	15	36,6
Female	26	63,4
Age		
< 35	1	2,4
35 – 39 Years	1	2,4
40 – 44 Years	4	9,8
45 – 49 Years	7	17,1
50 – 54 Years	3	7,3
> 55 Years	25	61,0
Medical diagnosis		
CHD	15	36,6
CHD UA	17	41,5
CHD UA+HT	8	19,5
CHD SVT	1	2,4
Sedation		
Morphine 2,5 mg IV prn	41	100

Note: CHD: Coronary heart disease;
UA: unstable angina; HT: Hypertension;
SVT: Supraventricular Tachycardia;
mg: milligrams; prn: Pro Re Nata.

RESULTS

The results of the research of critical patients in relation to general data, cardiac workload, Sedation Scale for the Critical Ill and Physical Function-Tardive Dyskinesia are described in Table 1.

Table 1 shows that most of the respondents are male (63.4%). Most of the respondents are >55 years of age (61.0%). The respondents diagnosed with UA (unstable angina) was 41.5% of respondents. All of the respondents were given morphine sedation of 2.5 mg IV prn. The demographic data of the critical patients in ICU shows that most of the women were aged >55 years old. This is possible because after 55 or 60 years (menopausal stage), hypertension is more prevalent in women (estrogen-prevalent hormone loss) than in men (Suwardianto and Selvia, 2015). The respondents, in the first 24-hours of assessment in ICU, showed that the patients were installed heart monitors, oximetry monitors to measure oxygen saturation, and identification of the patient's gender, age, and medical diagnosis. When the critical patients had anxiety and showed non-cooperative behaviour, then the nurses gave them morphine; 2,5 mg IV.

Table 2 shows that there was a decrease in systolic blood pressure (SBP) (7.0 mmHg), diastolic blood pressure (DBP) (6.4 mmHg), heat rate (1.5 times/min) and respiration rate (0.5 Times / min). An increase in oxygen saturation was as high as 0.2%. The data shows the systolic blood pressure before giving sedation consisting of morphine 2.5 mg having a mean of 131.7 mmHg and 15 minutes after sedation decrease 7.0 mmHg with a mean systolic blood pressure of 124,7 mmHg. The diastolic blood pressure prior to morphine sedation of 2.5 mg was the mean of 88.1 mmHg and 15 minutes after sedation; this decreased by 6.4 mmHg with a mean of diastolic blood pressure of 81.7 mmHg. Heart rate before being given morphine of 2.5 mg had a mean of 87.0 times / minute and 15 minutes after sedation; this decreased the heart rate by 1.5 times per minute with a mean of 85.5 times per minute. Respiration rate prior to morphine sedation od 2.5 mg had a mean of 24.4 times / min (Tachypnea) and 15 minutes after sedation this decreased by 0.5 times per minute with a mean respiration rate of 23.4 times per minute (Tachypnea). Oxygen

Table 2. Characteristics of Cardiac Workload Respondents (n=41)

Indicators	*Mean*		x_1- x_2
	Before Sedation (x_1)	15 Minutes after Sedation (x_2)	
Systolic Blood Pressure (mmHg)	131,7	124,7	-7,0 mmHg
Diastolic Blood Pressure (mmHg)	88,1	81,7	-6,4 mmHg
Heart rate (beat/minute)	87	85,5	-1,5 time/minutes
Respiration rate (beat/minute)	24,4	23,4	-0,5 time/minutes
Oxygen saturation (%)	98,5	98,8	0,30 %

saturation prior to morphine sedation of 2.5 mg had a mean of 98.5% and 15 minutes after sedation this increased by 0.3% to 98.8% oxygen saturation. CHD patients treated at the Intensive Care Installation performed the overall observation using a pre-set cardiac monitor.

Based on Figure 1, it was found that the Sedation Scale for Critically Ill Patients before and after the patient got sedation was on a scale of 2 (36.6% to 34.4%).

Figure 2 shows that the decrease in physical function was found prior to sedation. Physical function of scale 2 (responsive to touch or name) was in as much as 15 respondents (36.6%), and after sedation, most critical patients had a physical function measurement of scale 3 (Calm and cooperative) in as many as 25 respondents (61.0%). Critical patients who had decreased physical function and cognitive function were patients observed as being agitated through to agitative. Physical Function occurred in the form of motor activity after sedation in conditions that were responsive only to noxious stimuli (7.3%), responsive to touch or name (19.5%) and had an agitation and co-operative score (4.9%).

The characteristics of physical dysfunction in patients with Tardive Dyskinesia signalling approach in patients with CHD before sedation showed 5 signs of Tardive Dyskinesia whereas 15 minutes after morphine sedation of 2.5 mg via IV, all signs of Tardive Dyskinesia arose, despite an increase in the respondents who showed no signs of Tardive Dyskinesia in 26 respondents to 30 respondents. The patients showed repetitive grimacing, lip smacking, puckering, pursing and rapid movements of the arms and legs. It is a response to the discomfort interpreted throughout the central nervous system after the termination of treatment. Signs and symptoms of Tardive Dyskinesia increased after sedation in the form of tongue protrusion (4.9%), lip smacking, puckering and pursing (2.4%), and rapid movements of the arms and legs.

A paired sample t-test was conducted to compare Tardive Dyskinesia before sedation and 15 minutes after sedation. There was no significant difference in the score before sedation and 15 minutes after sedation (p=0,317, Mean=9, SD=1.9). A paired sample t-test was conducted to compare Physical Function before sedation and 15 minutes after sedation. There was a significant difference in the score before sedation and 15 minutes after sedation (p=0.005, Mean=0.09, SD=2.4). These results suggest that sedation really does have an effect on the physical function of critically ill patients in ICU.

DISCUSSION

Based on the results of the study, the provision of sedation does not affect the changes in the physical function indicator of Tardive Dyskinesia (0.317). The characteristics of a physical function under Tardive Dyskinesia in critical patients before and after sedation shows that the patients have repetitive grimacing, lip smacking, puckering, pursing, and rapid movements of the arms and legs. It is a response to the discomfort interpreted through the myelin of the central nerves. The decline in the physical function aspect of Tardive Dyskinesia is a neurological syndrome associated with the prolonged use of neuroleptic drugs. The characteristics of tardive dyskinesia are repetitive facial movements, uncontrolled movements (involuntary) and unintentional movements. Tardive dyskinesia is found by the cessation of

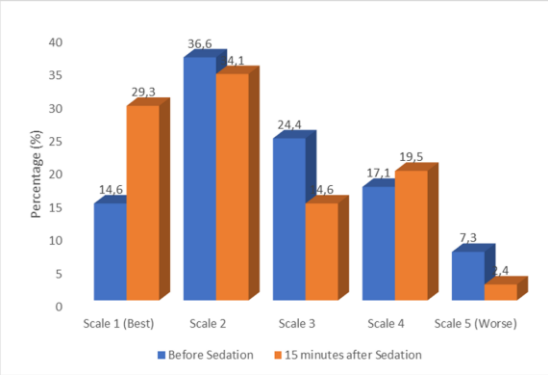
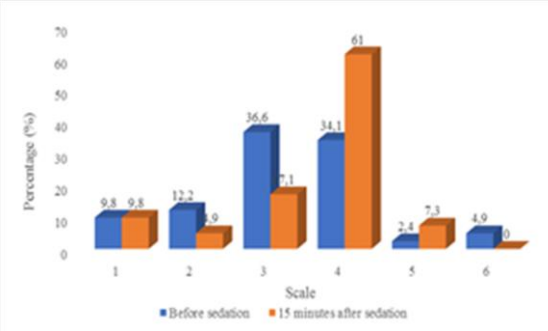


Figure 1. Characteristics of Sedation Scale for Critically Ill Patients on Critical patients in Intensive Care Unit (n=41)



Notes: (Barr *et al.*, 2013; Aitken, Marshall and Chaboyer, 2016): Scale 0: unresponsive; Scale 1: responsive only to noxious stimuli; Scale 2: responsive to touch or name; Scale 3: calm and cooperative; Scale 4: agitated; Scale 5: dangerously agitated uncooperative.

Figure 2. Physical Function on Critical patients in Intensive Care Installation (n=41)

suffix treatment. The symptoms may be present during treatment and after treatment was discontinued. Tardive Dyskinesia includes repetitive grimacing, tongue protrusion, lip smacking, puckering, pursing, rapid eye blinking, and rapid movements of the arms and legs. The results showed that no significant change was possible as the respondents still responded to neuroleptic associations and some of the respondents still received a strong sedation titration (Morphine). Tardive dyskinesia presented in the patients because of rapidly changing neurologic myelin due to changes in the sedation dose or the cessation of sedation.

Based on the results of the research, it was found that sedation has an influence significantly on Physical Function (p = 0,005) and the condition of the decreasing of physical and cognitive function manifests in the form of agitation. Based on the results of the research, it was found that the Physical Function measurements before being given sedation resulted in the patients responding when touched or called by their name manifested in 15 respondents (36.6%). Physical Function after the sedation of most critical patients resulted in them being calm and cooperative manifested in 25 respondents (61.0%). Physical Function, which is described as a decrease in physical and cognitive function, is possible in patients who get sedation and can lead to a state of agitation. The patients can be described as being unresponsive – those that cannot move or move with the noxious stimulus (suctioning, sternal pain response). The patients could also respond to noxious stimuli; i.e. opening their eyes, raising their eyebrows, turning their head and arm movements. The respondents could also show responsiveness towards touch or their name (scale 2), using their eyebrows, turning their head, arm movements by touch or calling their name aloud. The patients are expected to be calm and cooperative in their response (scale 3) i.e. no external stimulus that occurs for the occurrence of movement, and the patient means that they can adjust to the movement and follow the command. Restless and cooperative patients (scale 4) means that the patient can take a blanket or glass, cover himself, and follow orders. Patients experiencing agitated circumstances (scale 5) i.e. no external stimuli are patients trying to stand, have the movement of their arms out of bed and do not consistently follow commands. In this condition, the patients can be in a dangerously agitated and uncooperative (scale 6). Uncooperative patients are patients that withdraw their gastric tube or urinary catheter, whack/attack officers and are not calm when asked. The results showed that sedation significantly influenced Physical Function where the sedation response was in the form of morphine 2.5 mg. It could decrease the motor activity level of the patient which initially means that patients with agitation could be lowered to a more cooperative level. The role of the nurse in knowing the condition of the patient before and after the sedation changes

Table 4. Tardive Dyskinesia in Critical patients at Intensive Care Installation (n=41)*

Indicators	Before Sedation (x_1)		15 Minutes after Sedation (x_2)		x_1- x_2
	Fr	%	Ff	%	%
There is no sign of Tardive Dyskinesia	26	63,4	30	73,1	9,7
Have signs and symptoms of Tardive Dyskinesia	15	36,6	11	26,9	-9,7
• Repetition grimacing	5	12,2	3	7,3	-4,9
• Tongue Protrusion	1	2,4	3	7,3	4,9
• Lip smacking, puckering, and pursing	0	0	1	2,4	2,4
• Rapid eye blinking	1	2,4	1	2,4	0
• Rapid movements of the arms and legs	11	26,8	7	17,1	-9,7

Notes: *) The patient may show more than one sign on the Tardive Dyskinesia indicator or even none at all. Sign (-) is a decline in value; Fr: Frequency)

Table 5. Analysis of Variables on Sedation administration in Critical patients at Intensive Care Installation (n=41)

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Tardive Dyskinesia	9.00000	1.90010	.40510	-.75155	.93337	.224	21	,317
Pair 2	Physical Function	.09091	2.44949	.52223	7.91396	10.08604	17.234	21	,005

the motor response due to relaxation. The nurse must be able to know the conditions through the motor activity indicator. Excessive motor responses can increase heart burden and anxiety in patients, but patients who are able to achieve relaxation with or without sedation will be warned of the potential parasympathetic activity of the nerves, particularly those of the Vagus (Suwardianto, 2014). This can decrease the cardiac workload in critical patients with anxiety.

Based on the results of the sedation studies, sedation affects the Sedation Scale for Critically Ill Patients (0.005). The result showed that the sedation scale for Critically Ill Patients before and after the patient got sedation was on a scale of 2 (36.6% to 34.4%). Poor agitation is where the movement of the body, unwillingness to undergo treatment/procedures or restrictions of the movement of the body significantly endangers both patients and officers. The Sedation Scale for Critically Ill Patients is an assessment tool specifically used by nurses in identifying the agitation scale in critical patients. Indicators of the Sedation Scale for Critically Ill Patients are consciousness, agitation, anxiety, sleep, and patients with attached ventilators. Consciousness identifies that the patient is awake, conscious of himself and the environment (good orientation). Agitation identifies that the patient affects the patient's body/patient safety. The anxiety indicator is that the nurses see the patient's anxiety (Faces Anxiety). The sleep indicator is when the nurse observes sleep and the sleep quality perceived by the patient. The indicator of the patient with an attached ventilator is where the nurse observes the respiratory pattern relative to the ventilator. The results show that there is a significant change in agitation scale that indicates that agitation decreases with sedation. The agitation scale gets worse; the worse the patient's condition, the more it also affects the condition of the patient's response in healing in the nursing area. Patients, after being given morphine sedation 2.5 mg IV, were at level 2 before and after. The better the patient and the patient’s cooperativeness, the

more the patient will be able to show good conscience.

The results show that there is a decrease in systolic blood pressure (SBP) (7.0 mmHg, diastolic blood pressure (DBP) (6.4 mmHg, Heat rate (1.5 times / min), respiration rate (0, 5 times / min.) and a 0.2% oxygen saturation increase. Critical patients with CHD have a disease condition in which the blood vessels that supply food and oxygen to the heart muscle are blocked. The blockage is most often the result of cholesterol build-up in the coronary vein wall (Kurniadi, 2013). The combination of hypoxia, decreased energy availability and acidosis rapidly will impair the function of the left ventricle. The contraction of the affected part of the heart muscle will decrease because the muscle fibres are not sufficiently shortened so that the strength and acceleration of the resulting flow decreases. Moreover, in the ventricular wall, an abnormal movement occurs in ischemia so that the blood circulated in each contraction will decrease. Blood through the coronary arteries will restore normal aerobic metabolism and cardiac contractility. However, if the blood flow cannot be recovered, then myocardial infarction will occur.

The results of the research show that there is a change before and after being given sedation on cardiac workload, i.e. SBP decreased by 7.0 mmHg, DBP decreased by 6.4 mmHg, HR decreased 1.5 times/ min, RR decreased 0.5 times / minute, and there was an increase of 0.2% oxygen saturation in critical patients. The role of the nurse in identifying the cardiac workload needs to be improved, and there is a need for collaboration in nursing actions to improve the repair of the cardiac workload. The identified cardiac workload, i.e., blood pressure, HR, RR, and SaO2 have all changed from the baseline before sedation. The administration of sedation to provide a calming effect may result in a change in the value of the cardiac workload after 15 minutes after sedation in the form of morphine 2.5 ml. Giving sedation improves the parasympathetic response to the cardiac workload, so the nurses should be able to monitor meaningful changes after sedation. The role of the nurse becomes very important in identifying and implementing independent actions as the result of anxiety identification rather than strengthening the effects of sedation alone. They must be able to support patients in reducing anxiety, agitation, or pain by providing self-interventions and environmental modification. Critical nurses are expected to be able to apply effective management (transformation) by developing themselves in their communication, critical thinking and being able to change the environment (Suwardianto, 2015), so that nursing care in critical patients can have a gold standard in establishing the quality of nursing care in patients.

CONCLUSIONS

The characteristics of physical dysfunction in patients with Tardive Dyskinesia signalling approach in patients showed 5 common signs. Patients show repetitive grimacing, lip smacking, puckering, pursing and rapid movements of the arms and legs. It is a response to the discomfort interpreted throughout the central nervous system after termination of treatment. Signs and symptoms of Tardive Dyskinesia increased after sedation in the form of tongue protrusion, lip smacking. Puckering, pursing and the rapid movement of the arms and legs. The results of this research suggest that sedation really does have an effect on physical function in the critically ill patients in ICU. The research shows that patients with the administration of sedation in the first 24-hours of ICU care effects physical function. The results of the study on these interventions only measure the effectiveness of the long-term disruption of physical-cognitive function and when the patient returns from the hospital. As the result of the research into early activity intervention, intervention only measures the improvement of physical function in the post-ICU patient. The results of the cognitive therapy intervention study in critical patients in the ICU only measures the increase in physical function in isolation in post-ICU patients so any other problems will still occur.

As a recommendation, sedation can affect the physical functioning of critical patients. Deep and immeasurable sedation will further impair physical functioning. Sedation management is required in the provision of collaborative nursing care. Giving sedation significantly affects the decrease in physical function. Critical care nurses are expected to be able to identify the decline in physical and cognitive function in the ICU in order to

improve the quality of care and quality of life of the patient after discharge from the ICU.

Recommendations for nursing care that can be given include the management of pain and sedation. Proper management of pain and sedation is very useful in the determination of subsequent management. The ICU nurses prior to giving patients better sedation should perform pain management first. The decrease in physical function that occurs in critical patients in ICU can be countered with physical therapy to increase muscle strength and to avoid apoptosis.

REFERENCES

Aitken, L., Marshall, A. and Chaboyer, W. (2016) *ACCCN'S critical care nursing*. 3rd edn. Australia: Elsevier Health Sciences.

Barr, J. *et al.* (2013) 'Clinical practice guidelines for the management of pain, agitation, and delirium in adult patients in the intensive care unit', *Society of Critical Care Medicine, The American College of Critical Care Medicine (ACCM)*, 41(1), pp. 263–306.

Carson, S. S. *et al.* (2006) 'The changing epidemiology of mechanical ventilation: a population-based study', *J Intensive Care Med*, 21. doi: 10.1177/0885066605282784.

Cartwright, M. M. (2012) *The high incidence of post intensive care unit (ICU) anxiety and depression*, *Psychology Today*.

Davidson, J. E. *et al.* (2013) 'Post-intensive care syndrome', *Society of Critical Care Medicine*, 1(1), pp. 1–4.

Devlin (1999) 'Motor Activity Assessment Scale: a valid and reliable sedation scale for use with mechanically ventilated patients in an adult surgical intensive care unit', *Crit Care Med*, 27(7), pp. 1271–5.

Garland, A. *et al.* (2013) 'Epidemiology of critically ill patients in intensive care units: a population-based observational study', *Critical Care*, 17(5), p. R212. doi: 10.1186/cc13026.

Hoffman, L. A. and Guttendorf, J. (2015) *Post Intensive care syndrome: risk factors and prevention strategies*, *AHC media*.

Hopkins, R. O. (2013) 'Strategies to ensure long-term quality of life in ICU survivors', *Society of Critical Care Medicine*, 1(1), p. 1.

Ireland (2011) *National standards for adult critical care services*. Ireland: Joint Faculty of Intensive Care Medicine of Ireland (JFCMI) in association with The Intensive Care Society of Ireland (ICSI).

Iwashyna, T. (2014) 'What you need to know about post-intensive care syndrome (PICS)', *Health System-University of Michigan*, 1(1), pp. 1–3.

Iwashyna, T. J. *et al.* (2012) 'Population burden of long-term survivorship after severe sepsis in older americans', *Journal compilation © 2012, The American Geriatrics Society*, 60(6), pp. 1070–1077.

Iwashyna, T. J. (2014) 'Post-intensive care syndrome: improving the future of icu patients', *24nd Critical Care Congress Review*, 1(1), pp. 13–16.

Jackson, J. *et al.* (2014) 'Depression, post-traumatic stress disorder, and functional disability in survivors of critical illness in the brain-icu study: a longitudinal cohort study', *The Lancet Respiratory Medicine*, 2(5), pp. 369–379.

Kurniadi, H. (2013) *Stop Gejala Penyakit Jantung Koroner*. 2013: Familia.

Marianne (2016) 'About critical care nursing', *American Association of Critical-Care Nurses*, p. 1.

Nathan E, Brummel, James C. Jackson, T. D. G. (2013) 'A combined early cognititive and physical rehabilitation program for people who are critically Iil: The activity and cognitive therapy in the intensive care unit (ACT-ICU) trial', *Physical Therapy Critical Illness*, 92(12), pp. 1580–1592.

Needham, D. M. *et al.* (2012) 'Improving long-term outcomes after discharge from intensive care unit: report from a stakeholders' conference', *the Society of Critical Care Medicine and Lippincott Williams & Wilkins*, 40(2), pp. 502–509.

Needham, D. M. (2012) 'Improving long-term outcomes after discharge from intensive care unit: Report from a stakeholders' conference', *Critical Care Medicine*, 40(2), pp. 502–509.

Pandharipande, P. *et al.* (2013) 'Long-term cognitive impairment after critical illness', *The New England Journal Medicine*, 369(14), pp. 1306–1316. doi: 10.1056/NEJMoa1301373.

Sottile, Peter, Amy Nordon-Craft, Daniel Malone, Darcie M. Luby, Margaret Schenkman, M. M. (2015) 'Physical therapis treatment of patients in the neurogical intensive care unit: description of practice', *Physical Therapy*, 95(7), pp. 1006–1014.

Suwardianto, H. (2014) 'The effectiveness of deep breathing and slow stroke back massage to decrease the blood pressure on a patient with hypertension', *Indonesian Nursing Journal of Education and Clinic (INJEC)*, 1(1), pp. 1–12.

Suwardianto, H. (2015) *Buku ajar keperawatan kegawatdaruratan (perspektif, konsep, prinsip, dan penatalaksanaan kegawatdaruratan)*. 1st edn. Surabaya: PT. REVKA PETRA MEDIA.

Suwardianto, H. (2016) 'Tardive dyskenesia, motor activity, sedation scale, and cardiac workload in baptis kediri hospital', *Tardive Dyskenesia, Motor Activity, Sedation Scale, Dan Cardiac Workload*, 4(1), p. 1.

Suwardianto, H. and Selvia, D. (2015) *Buku Ajar Keperawatan Kegawatdaruratan (Perspektif, Konsep, Prinsip, dan Penatalaksanaan Kegawatdaruratan)*. Surabaya: PT. REVKA PETRA MEDIA.