STRADA Jurnal Ilmiah Kesehatan
DOI: 10.30994/sjik.v10i1.679
ISSN: 2252-3847 (print); 2614-350X (online) Vol.10 No.1 May 2021 Page. 632-638

Critical Nursing Care With Nursing Problems, Impaired Gas Exchange and Inhibition of Spontaneous Ventilation in Patient with Coronary Heart Disease: A Case Study

Heru Suwardianto*
STIKES Baptis Hospital Kediri, East Java, Indonesia
** Correspondent Author: herusuwardianto@gmail.com*

ABSTRACT
Coronary heart disease is the highest cause of death and requires nursing care that is quite complex to overcome. The purpose of this study was to determine the description of nursing care on gas exchange disorders, nursing problems, and inhibition of spontaneous ventilation in patients with coronary heart disease.
The research method uses a case study. The study population was critical patients with a medical diagnosis of coronary heart disease who were admitted to the ICU. The study sample was critical patients with nursing problems, impaired gas exchange, and inhibition of spontaneous ventilation. The research variables were assessment, nursing diagnosis, intervention, implementation, and evaluation. The instrument used was the critical nursing care format.
The results showed that after two days of nursing care in patients with coronary heart disease in the ICU, the problems with gas exchange disorders and inhibition of spontaneous ventilation were partially resolved with results of pH: 7,464, pCO2: 26.3mmHg, pO2: 394.7 mmHg, BE: -2.3, SaO2: 98-100%, heart rate: 95 x / minute, breath rate 20x / minute, patient is still sedated, no use of breathing apparatus, vesicular breath sounds.
Nursing care that is systematic and measurable will be able to overcome the problem of gas exchange disorder nursing and spontaneous ventilation barriers in patients with coronary heart disease.

Keywords: Coronary Heart Disease, Impaired Gas Exchange, Inhibition Of Spontaneous Ventilation

Received February 16, 2021; Revised March 12, 2021; Accepted April 6, 2021

STRADA Jurnal Ilmiah Kesehatan
DOI: 10.30994/sjik.v10i1.679
ISSN: 2252-3847 (print); 2614-350X (online) Vol.10 No.1 May 2021 Page. 632-638

BACKGROUND

Coronary heart disease is a condition caused by inadequate supply of blood oxygen and oxygen to the myocardium, an imbalance of blood needs and supply. The main cause of coronary heart disease is atheroma plaque clogging in the coronary arteries (Tanto, 2014). Coronary heart disease is a change in the arterial intima variable which is the principal of fat (lipid), the main complex carbohydrates and the results of blood products, fibrous tissue and calcium deposits which are then followed by changes to the media layer. Clinical manifestations of coronary heart disease are, the appearance of pain is closely related to the receptors and the presence of stimulation. Factors that influence chest pain include age, gender, culture, attention, past experiences, support from social families, meaning of pain, pain perception, pain tolerance, reactions to pain, anxiety. Pain condition is a condition that affects the client's uncomfortable feeling as indicated by the appearance of symptoms and signs on the client. Pain is a very uncomfortable feeling and only people who experience it can explain and evaluate this feeling, in general, pain can be defined as a feeling of discomfort, both mild and severe (Mubarak, 2015).

Data from the *World Health Organization* (WHO) 2017 states more than 8.8 million people worldwide die from coronary heart disease. Data from the 2018 Basic Health Research shows that 1.5% or 15 of 1,000 Indonesians suffer from coronary heart disease. Data registration system in Indonesia says Akiba12.9% mortality of coronary heart disease (Kemenkes, 2018). Data from the Ministry of Health in 2013 in East Java based on a doctor's diagnosis of 0.5% or around 144,279 people with coronary heart disease.

Coronary heart disease occurs due to blockage of arteries by plaque that blocks the vessels that supply oxygen to nutrients to the heart. Blood vessel blockage plaques do not just appear. The emergence of the avoidant in the form of fat or calcium deposits through a gradual process. Usually begins with the strength of the blood vessels, or commonly called atherosclerosis, then narrows the blood vessels, and gradually increases to blockage of the blood vessels (Dewi et al., 2018). Atherosclerosis causes the accumulation of lipids and fibrous tissue in the coronary arteries to form disability plaque, thus narrowing the vascular elements. Thus, the balance between supply and demand for oxygen becomes critical, causing angina pectoris. The disruption of blood circulation to the coronary arteries which are rich in oxygen also causes myocardial ischemia so that you are at risk of experiencing acute pain (Wijaya & Putri, 2017). Patients with coronary heart disease may experience respiratory failure which results in problems with impaired gas exchange as well as inhibition of spontaneous ventilation. If the nursing problem is not carried out systematically and measurable nursing care, the patient's prognosis will be worse. Nursing problems that often arise in patients with coronary heart disease with respiratory failure are gas exchange disorders and inhibition of spontaneous ventilation. Impaired gas exchange is due to the inability of the heart and lungs to provide adequate oxygen in the tissues. This becomes very dangerous if nursing care is not provided in a systematic and measured manner.

METHODS

This research has a case study design Critical Nursing Care. Samples were patients with a medical diagnosis of respiratory failure, coronary heart disease. Patients were subjected to nursing care in a two-day case study. Researchers and a team of critical nurses conducted nursing care from assessment, nursing diagnosis, determining interventions, to evaluation. Nursing diagnosis using NANDA, goal of nursing care using NOC, and nursing interventions using NIC. The assessment instrument uses a critical nursing care format. Data taken from primary data, namely direct patients, and also secondary data. Patients who

DOI: 10.30994/sjik.v10i1.679
ISSN: 2252-3847 (print); 2614-350X (online) Vol.10 No.1 May 2021 Page. 632-638

carried out case studies were treated at the ICU STIKES RS. Baptist Kediri. Data collection was carried out on April 7, 2019, the patient was admitted to the ICU on April 5, 2019.

RESULTS

A 59-year-old woman was admitted to the ICU on April 5, 2019. The patient was admitted with a medical diagnosis, namely respiratory failure, diabetes mellitus and coronary heart disease. The patient's complaints were expressed by the family, namely when at home the patient complained of breathlessness and heaviness, shortness of breath felt like diving in water, shortness increased when made activity and decreased when made to sleep on his back. Starting this morning, the breath was getting short and heavier. The history of the disease experienced, the family said the patient had shortness of breath, the shortness of breath was getting worse accompanied by palpitations. The family brought the patient to the emergency room at the Baptist Hospital in Kediri, where the ETT was installed directly with O2 15 Lpm. After an examination by a doctor, the patient was diagnosed with systemic CHD and required intensive care in the ICU. The patient came to the ICU on April 5, 2019 at 12.30 WIB. At 15.30 the patient experienced respiratory failure and a ventilator was installed. The family said the patient had a history of heart disease and Diabetes Mellitus but was not routinely controlled. The family said the patient's mother had a history of hypertension and diabetes mellitus. The physical examination showed that the general condition of the patient was weak, the patient was sedated, the patient's blood pressure was 118/61 mmHg, Pulse 123 x / minute, temperature 36.9 degrees Celsius, breath rate 36 x / minute. Richmond Agitation Sedation Scale (RASS): 2 (Agitation), CPOT is obtained with stiff facial expressions (1), no body movements (0), alarms often sound (2), the patient speaks grasping (1), muscle movements are stiff and tense (1): Total CPOT Score 5 (severe pain).

The assessment of the respiratory system found that patients with dyspnea, irregular breathing patterns and use of the breathing muscles. The patient has additional breath sounds, namely wheezing and rhonchi. The patient is attached to an AC mode ventilator, FiO2: 70, Rate: 14, I: E = 1: 2, Vt: 400 ml, Plimit 35, PEEP 5, Patient response is obtained that is MU-E: 8.8, Ut-E: 226 ml, Ppeak: 23 cmH20, Pmin 5 cmH20, O2-I: 74%, Respiration Rate 22 x / min. BGA results were pH: 7,167mmHg, PCO2 18.1 mmHg, PO2 129.9mmHg, Saturation O2: 98.0%, HCO3 8.3mmol / L. Assessment of the cardiac system found patients with chest pain, PVC Sinus ECG Monitor, weak pulse, MAP 80 mmHg, GCS E1V (ventilator) M1. The urine out comes 350 ml / 24 hours or about 14 cc / hour. The patient is attached with a Nasogastric tube (NGT), the patient eats via NGT, the type of filter dilutes 200 cm x 4 times per day. The patient has bad breath, dry mucosa, intestinal peristalsis 8 times / minute. GDS result 341 mg / dl, hbA1c: 6.9%. Muscle strength 1111/1111. Patients received Clopidogrel 1x75mg orally, Laxadine Syrup 1x1 orally, Atorvastatin 20 mg 1x1 orally, Sucralfate 3x10cc orally, Furosemide injection 3x1 amp, Levemir injection 6 units Subcutis, NTG 1 ampoule in NS 100 cc if MAP> 70 steps 1.5 meq, Dobutamine 1 amp in NS 100cc to MAP > 70 way 10 meq, NE 2 amp in NS100cc street 0.2 meq, Pantoprazole 1 x 1 vial, Novorapid injection 6x2 SC unit, Rocum 1 ampoule, Xylocain according to protection.

STRADA Jurnal Ilmiah Kesehatan
DOI: 10.30994/sjik.v10i1.679
ISSN: 2252-3847 (print); 2614-350X (online) Vol.10 No.1 May 2021 Page. 632-638

Tabel 1. Result of Examination

No.	Type of Examination	Result	Reference Value	Interpretation
1.	**Complete Blood**			
	HGB	17.1	12.3-15.3 mg / dl	Increase
	RBC	6.33	4.10-5.10 uL	Normal
	HCT	54.1	35.0-47.0%	Increase
	WBC	9.87	4.50-11.30 uL	Normal
	PLT	282	177-393 uL	Normal
	MPV	11.5	6.8 -10.0 fL	Increase
	PCT	0.32	0.17-0.35%	Normal
2.	**Blood Chemistry**			
	GDS	341	< 200 mg / dl	Increase
	hbA1c	6.9	<= 6.5	Increase
	SGOT	80	8-33 uL	Increase
	SGPT	59	4-36 uL	Increase
	BUN	14	7-22 m / dl	Normal
	Blood urinary	31	10-50 mg / dl	Normal
	Creatinine	1.16	0.67-1.17 mg / dl	Normal
	Troponin I	1.74	0.00-0.02 mg / dl	Increased
	sodium	142	136-146 mmol / L	Normal
	Potassium	3.9	3.5-5.0 mmol / L	Normal
	Ca ++	1:04	1:15 to 1:29 mmol / L	Descending
3.	**BGA**			
	pH	7167	7:35 to 7:45mmHg	Descending
	pCO2	18.1	35.0-45.0mmHg	Descending
	pO2	129.9	75.0-100.0mmHg	Ascending
	SaO2	98.0	90-100%	Normal
	HCO3	8.3	22.0-26.0mmol / L	Descending
4.	**Photo of Thorax**			
	Impression of Bronchopneumonia, Left Pleural Effusion			
5.	**ECG Monitor**			
	PVC Sinus			

DISCUSSION

Based on the results of the study showed that the patient experienced respiratory failure, due to various factors. tor in his assessment. The patient has impaired gas exchange as a result of this Alveolar capillary membrane changes. This is evidenced by the existence of major supporting data. Major data obtained were patients with sedation, hypoxia, cold acral, pale skin, patients using an AC model ventilator with FiO2 = 70 setting mode, Tidal Volume = 400, IE 1: 2, PEEP = 5, Blood gas analysis results showed metabolic acidosis, Oxygen saturation decreased to 96.6%, and the results of Thorax Photo: Sinistra Pleural Effusion. The goal in nursing care is to increase the respiratory status (patenting of the airway) in accordance with NOC 0401. The expected and planned performance indicators are changes in respiratory frequency, breathing rhythm, no dyspnea, and no use of the auxiliary muscles. The outcome to be achieved next is mechanical ventilation response with NOC 0412. The indicators of achievement are improvement of respiratory rate, depth of

DOI: 10.30994/sjik.v10i1.679
ISSN: 2252-3847 (print); 2614-350X (online) Vol.10 No.1 May 2021 Page. 632-638

inspiration, PaO2, PaCO2, difficulty breathing on a ventilator, and oxygen saturation. The last NOC is improvement of gas exchange respiratory status with indicators of PaO2, PaCO2, arterial pH, oxygen saturation and consciousness. These problems need a systematic intervention in carrying out therapy or rehabilitation in hospitals with other multidisciplinary disciplines (Martin et al., 2017). This will show quality nursing care not only from physical but also psychological improvements of the patient (Li, 2019; Suwardianto, 2013; Suwardianto et al., 2018; Suwardianto & Richard, 2017; Suwardianto & Rimawati, 2018).

Nursing intervention planning that is given through the NIC is a breathing monitor (NIC 3350) with the hope that the goals of nursing care in patients can be achieved with a variety of planned nursing interventions. Interventions provided include monitoring speed, rhythm, depth, and difficulty breathing, monitoring speed, rhythm, depth, and difficulty breathing, monitoring additional breath sounds such as snoring or wheezing, recording changes in O2 saturation, educating families about ventilator installation, and Consultations with other health professionals regarding the use of oxygen and administering a nebulizer. Nursing planning also needs to pay attention to *clinical pathways* and integrated interdisciplinary team collaboration in patients with coronary heart disease (Everett & Davidson, 2019; Watanabe et al., 2018).

For problems with inhibition of spontaneous ventilation, the planned and administered intervention is artificial airway management (NIC 3180). The nursing actions given are monitor balloon pressure every 4 to 8 hours, monitor sound in the airway, auscultate the right and left lungs, perform endotracheal tube suction, change the ET strap every 24 hours, perform oral care, raise the head 30 degrees, teach to family to wash hands before and after visiting patients, and Collaboration of general anesthesia. Collaboration in cardiac rehabilitation is also urgently needed in nursing care (Bahador et al., 2017; Souza, 2017). The patient had a decrease in saturation condition to 80%, respiratory rate 26 x / minute, blood pressure 120/60 mmHg, heart rate 140 x / minute. After the nursing care was carried out in the next shift, there was still no significant improvement in the breathing pattern. Setting PEEP to 5cm, heart rate 123 x / minute, breath rate 24 x / minute, and oxygen saturation of 84-86%. The results of nursing care during the first day there were still disturbances in gas exchange, it was proven that the patient was still on a ventilator, respiratory rate 26 x / min, irregular breathing rhythm, the patient was sedated, pH: 7,167, pO2: 129.9 mmHg, pCO2: 18.1 mmHg, HCO3: 8.3 mmHg, BE: -15.3, O2 saturation: 96.6%. Providing good medication will reduce patient morbidity and mortality (Schulz et al., 2019). Patients during treatment will also experience psychological disorders in patients with coronary heart disease (Lin et al., 2020). The provision of nursing care on the first day is still unable to show the effectiveness of the intervention because of the possibility of the patient's disease prognosis that needs to be continuously improved through multidisciplinary collaboration. Nursing care on the second day there was an improvement in the condition of the patient's blood gas disorders even though the patient was still sedated. The results obtained are pH: 7,167, pO_2 : 129.9 mmHg, pCO_2: 18.1 mmHg, HCO_3 : 8.3 mmHg, BE: -15.3, Saturation 2 : 96.6%, Awareness is sedated, Respiration rate 20 x / minute, Rales breath sounds . Nursing care that is systematic and measurable will improve the quality of care in patients with coronary heart disease, so that patients can quickly improve and can eventually be extubated from the ventilator machine.

CONCLUSION

Assessing patients with coronary heart disease in dealing with gas exchange disorders, it is necessary to monitor the rate, rhythm and depth of breathing. Identify

DOI: 10.30994/sjik.v10i1.679
ISSN: 2252-3847 (print); 2614-350X (online) Vol.10 No.1 May 2021 Page. 632-638

additional voices. Changes in oxygen saturation over time need to be well documented, and education to families regarding ventilator placement in patients. Collaboration with other critical care teams to find problems and solve the etiology of existing problems. Systematic and measurable critical nursing care for two days can show the quality of care in overcoming gas exchange disorders.

REFERENCES

Bahador, R., Nouhi, E., & Jahani, Y. (2017). Quality of Life and its Related Factors in Patients with CHF, Referring to Jiroft Imam Khomeini Hospital. *Iran Journal of Nursing*, *30*(105), 23–33. https://doi.org/10.29252/ijn.30.105.23

Dewi, A., Sukendar, A., & Herawansah, B. (2018). *Modul Pelatihan Keperawatan Intensive Dasar* (Ketiga). In Media.

Everett, B., & Davidson, P. M. (2019). Managing approaches to nursing care delivery. *Transitions in Nursing EBook: Preparing for Professional Practice*, 129.

Kemenkes. (2018). *Jantung Harapan Kita Pengumpulan Rujukan Kardiovaskuler*. Kementerian Kesehatan RI.

Li, X.-Q. (2019). Effects of high-quality nursing care on psychological outcomes in patients with chronic heart failure. *Medicine*, *98*(41). https://doi.org/10.1097/MD.0000000000017351

Lin, Y., Su, Z., & Yu, S. (2020). Effect of advanced nursing care on psychological condition in patients with chronic heart failure: A protocol of systematic review and meta-analysis. *Medicine*, *99*(23). https://doi.org/10.1097/MD.0000000000020355

Martin, S., Anderson, B., Vincenzo, J. L., & Zai, S. Y. (2017). A retrospective comparison of home telehealth and nursing care with or without rehabilitation therapy on rehospitalization rates of individuals with heart failure. *Journal of Cardiopulmonary Rehabilitation and Prevention*, *37*(3), 207–213. https://doi.org/https://doi.org/10.1097/HCR.0000000000000221

Mubarak. (2015). *Buku Ajar Ilmu. Keperawatan Dasar*. Salemba Medika.

Schulz, M., Griese-Mammen, N., Anker, S. D., Koehler, F., Ihle, P., Ruckes, C., Schumacher, P. M., Trenk, D., Böhm, M., & Laufs, U. (2019). Pharmacy-based interdisciplinary intervention for patients with chronic heart failure: results of the PHARM-CHF randomized controlled trial. *European Journal of Heart Failure*, *21*(8), 1012–1021. https://doi.org/https://doi.org/10.1002/ejhf.1503

Souza, N. D. (2017). Rehabilitative Care of A Patient with IHD and LVF. *Asian Journal of Nursing Education and Research*, *7*(1), 123. https://doi.org/10.5958/2349-2996.2017.00025.8

Suwardianto, H. (2013). Deep breathing relaxation as therapy to decrease blood preassure on hypertension patients. *In Proceedings Faculty Of Nursing Of Airlangga The Fourd Internasional Nursing Conference Improving Quality Of Nursing Care Though Nursing Research and Innovations*, *1*(1), 1–12.

Suwardianto, H., Prasetyo, A., & Utami, R. S. (2018). Effects of Physical-Cognitive Therapy (PCT) on Criticaly ill Patients in Intensive Care Uni. *Hiroshima Journal of Medical Sciences*, *67*(1), 63–69.

Suwardianto, H., & Richard, S. D. (2017). *Asuhan Keperawatan Kegawatdaruratan dan Penatalaksanaan Tindakan Kegawatdaruratan*. CV Adjie Media Nusantara.

Suwardianto, H., & Rimawati. (2018). Explicit Instruction Model (EIM): Daily Training Emergencies Preparedness (DTEP) Toward Skills of Participants the Youth Red Cross. *Conferences, The 2nd Joint International*, *2*(2), 403–410.

DOI: 10.30994/sjik.v10i1.679
ISSN: 2252-3847 (print); 2614-350X (online) Vol.10 No.1 May 2021 Page. 632-638

Tanto. (2014). *Kapita Selekta Kedokteran*. Media Aesculapius.

Watanabe, N., Morikawa, G., Kubota, K., Okazawa, K., Tanaka, C., & Horiuchi, M. (2018). A clinical pathway based on medical and nursing teamwork in drug management facilitates integrated community care for elderly patients with chronic heart failure. *Yakugaku Zasshi: Journal of the Pharmaceutical Society of Japan*, *138*(6), 797–806. https://doi.org/10.1248/yakushi.17-00209-4

Wijaya, & Putri. (2017). *Keperawatan Medikal Bedah*. Nuha Medika.