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The Application of Semi-Fowler Position to Oxygen Saturation in Chronic Kidney Disease Patients

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C*hronic Kidney Disease* (CKD) merupakan penurunan fungsi ginjal yang terjadi secara bertahap dalam waktu yang lama dan akan semakin parah seiring berjalannya waktu. Salah satu gejala klinis dari CKD adalah sesak nafas merupakan kurangnya oksigen yang masuk kedalam paru paru. Posisi *sem- fowler* sebagai salah satu tindakan keperawatan yang mampu mengurangi sesak nafas sehingga asupan oksigen meningkat dan sesak nafas berkurang. Studi ini bertujuan untuk menganalisis asuhan keperawatan dengan pemberian posisi *sem-fowler* pada pasien CKD dengan masalah keperawatan gangguan pertukaran gas. Metode yang digunakan pada penelitian ini adalah metode *deskriptif observasional* dengan pendekatan studi kasus. yang dilakukan dari tanggal 30 Januari – 01 Februari 2025. Subjek dalam karya ilmiah ini adalah melibatkan 1 orang pasien dengan kasus CKD. Pengumpulan data menggunakan teknik wawancara, observasi, dan pemeriksaan fisik. Implementasi yang dilakukan selama 3 hari berturut-turut, diiringi dengan pengukuran saturasi oksigen kapiler perifer (SpO_2) dengan menggunakan *Oxymeter* Mindray PM 60. Karakteristik pada pasien studi kasus ini yaitu pasien perempuan berusia 61 tahun dan mengalami CKD stadium akhir (Stadium V). Berdasarkan hasil nilai saturasi oksigen sebelum dilakukan penerapan dengan nilai 94% dan setelah dilakuan penerapan termasuk kategori normal dengan nilai 98% . Kesimpulan penerapan posisi *semi-fowler* ini mampu meningkatkan saturasi oksigen pada pasien CKD .

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Chronic Kidney Disease (CKD) is a decline in kidney function that occurs gradually over a long period of time and will get worse over time. One of the clinical symptoms of CKD is shortness of breath which is a lack of oxygen entering the lungs. Sem-fowler position as one of the nursing actions that can reduce shortness of breath so that oxygen intake increases and shortness of breath decreases. This study aims to analyze nursing care by giving sem-fowler position to CKD patients with nursing problems of gas exchange disorders. This research method uses a case study method conducted from January 30 - February 01, 2025. The subject in this scientific work involves 1 patient with CKD cases. Data collection using interview techniques, observation, and physical examination. Implementation carried out for 3 consecutive days, accompanied by measurement of peripheral capillary oxygen saturation (SpO2) using a Mindray PM 60 Oxymeter. The characteristics of this case study patient are a 61-year-old female patient and experiencing end-stage CKD (Stage V). Based on the results of oxygen saturation values before application with a value of 94% and after application including the normal category with a value of 98%. The conclusion of the application of the semi-fowler position is able to increase oxygen saturation in CKD patients.

Introduction

Globally, the prevalence of *Chronic Kidney Disease* was 2.3 million people at the end of 2008, but at the end of 2014 there was an increase of 3.37 million people, there was an increase of 46.5% within 6 years and is expected to continue to increase until 2030 In 2021, the prevalence of CKD in Southeast Asia was in 3rd place at 12.0% (7.7-17.0%), where Indonesia as one of the countries with the highest prevalence of CKD In Indonesia, the prevalence of CKD from 2017 to 2018 experienced a significant increase of 77,892 people and 132,142 people ((Filipska et al., 2021). (Suriyong et al., 2022). *Indonesian Renal Registry*, 2018). In Indonesia, CKD disease is one of the diseases that is included in the top 10 chronic diseases. The Indonesian Nephrology Association (Pernefri) reports that every year there are 200,000 new cases of end-stage chronic kidney disease (Wahyuni, 2018).

According to Basic Health Research data (Riskesdas, 2018), CKD is included in the list of 10 non-communicable diseases. West Java Province is a province in Indonesia that contributes quite a lot to chronic kidney failure and continues to increase in 2016 there were 2,003 patients, in 2017 it increased to 2,412 patients, and in 2018 there were 3,038 patients (IRR, 2018). In 2022, the prevalence of deaths in CKD patients decreased per 1000 people every year, from 2010 to 2019 as many as 151.06 people and 129.01 people, but in 2020 there was a significant increase of 152.01 people. Globally, the mortality rate in patients receiving hemodialysis increased by 17% within 1 year from 2019 to 2020 (USRDS, 2022).

The ICU is a special room provided by the hospital for the treatment of patients with strict supervision. This room is usually equipped with a variety of medical equipment that is specifically designed to support the patient's treatment and recovery. While being treated in the ICU, patients will be observed for 24 hours by specialist doctors, duty doctors, and also nurses who are competent in intensive care. In most cases, patients will be treated in the ICU if they experience decreased consciousness or respiratory failure. *Chronic Kidney Disease* (CKD) that undergoes hemodialysis is CKD with the final stage (stage 5) of chronic kidney disease with *a glomerular fitration rate* of less than 15 ml/min (Scot IA et al., 2020). End-stage CKD is a progressive and irreversible deterioration of kidney function, where the body fails to maintain fluid and electrolyte balance resulting in an increase in urea CKD disease that is increasing every year will affect aspects of a person's life, which will cause kidney function to become

progressive and failure to return to normal so that CKD becomes a public health problem around the world (Karmiyati, 2021). (Narsa et al., 2022).

CKD is one of the causes of a decrease in the strength of the respiratory muscles. Patients with CKD typically experience uremic syndrome that affects many systems including the respiratory system with complications such as pleural effusion, pulmonary hypertension, pulmonary parenchyma disorders, and respiratory disorders (de Medeiros et al, 2017). The condition of a decrease in respiratory muscle strength can interfere with the oxygenation process which inhibits oxygen intake into the lungs so that there is a decrease in oxygen uptake in the blood. Reduced uptake of oxygen in the blood (SaO2) results in a decrease in the amount of oxygen delivered throughout the body by the heart, resulting in a decrease in the supply of oxygen to the tissues (SpO2). CKD occurs when the kidneys experience a fairly severe decline in function. This decline in kidney function will occur gradually over a long period of time and will get worse over time. This causes reabsorption disorders because the body is unable to maintain fluid and electrolyte metabolism. CKD with progressive deterioration and poor conditions requires patients to receive special care in the *Intensive Care Unit* (ICU) room.

One of the nursing problems that is often found in the ICU is gas exchange disorders. One of the nursing interventions that can be carried out is by adjusting positions. Positioning is the first approach in preventing pulmonary atelectasis and increasing gas exchange (Patil S, 2015). The position arrangement given is in the form of giving *a semi-fowler* position which is done to ease the inspiration and expiration of the client so that it makes it easier for the body to carry out the oxygenation process (El-Moaty M et al, 2017). Research conducted by showed that (Kurnia Sari et al., n.d.) *the semi-fowler* position can increase the oxygen saturation value. One of the nursing problems often found in the ICU is gas exchange disorders. One of the nursing interventions that can be carried out is by adjusting positions. Another study found that the highest average oxygen saturation value was when the *semi-fowler* position was given compared to other positions such as *the supine, right and left lateral* positions (Utami S, 2021). Research conducted by Sari et al shows that the semi-fowler position can increase oxygen saturation. Based on the above phenomenon, the author is interested in conducting research on the application of *the semi-fowler* position to increase oxygen saturation in nursing care in

Chronic Kidney Disease clients with nursing problems with gas exchange disorders in the ICU room of Gunung Jati Hospital, Cirebon City in 2025.

Method

The method used in this study is an *observational descriptive* method with a case study approach. The subject of this study involved 1 CKD patient in the *Intensive Care Unit* (ICU). This research was carried out on January 30 – February 01, 2025. The measuring instrument used is *the Mindray PM 60* Oxymeter**.** The data collection tool uses nursing care sheets and observation sheets. The inclusion criteria in this sample were CKD patients, cooperative, RR shortness of breath above 22x/min, and oxygen saturation <95%. Data collection uses interview, observation, and physical examination techniques. The implementation was carried out for 3 consecutive days, the case study process was carried out when the respondent experienced shortness of breath and SpO2 <95%, before doing the *semi-fowler position* , the respondent was measured in shortness of breath and oxygen saturation, after which the respondent did the *semi-fowler* position 45o for 15 minutes and observation and observation of his breathing status was carried out. Evaluation of the increase in oxygen saturation was carried out after changes before and after the implementation of *the semi-fowler position.*

Research Results

The assessment carried out by the author on Mrs. A from January 30 to February 01, 2025 by means of a direct anamnesis to the patient, physical examination and obtaining medical support examination data. The discussion will start from: The data obtained on a patient named Mrs. A is 61 years old, a Javanese and Indonesian patient. Patients are Muslim, the last education of elementary school. The patient's status is married and has 3 children consisting of 1 male and 2 female, the patient lives with her husband and child number 3. At the age of over 60 years with a risk of impaired kidney function.

In CKD patients, the main complaints vary from little urine output to not being able to BAK, restlessness to decreased consciousness, lack of appetite (anorexia). In the case of Mrs. A, the main complaint was shortness of breath. Mrs. A has a history of diabetes mellitus since 6 years ago from her father, the cause of chronic kidney failure metabolic disease (DM). Patients with CKD disease show an increased cardiovascular risk that manifests as coronary artery

disease, heart failure, arrhythmias, and sudden cardiac death. End-stage chronic kidney disease shows a marked increase in cardiovascular incidence caused by chronic inflammation and the system contributes to the remodeling of blood vessels and myocardial infarction leading to atherosclerotic lesions, calcification of blood vessels, and aging of blood vessels as well as fibrosis and myocardial calcification in heart disease. In this case, CKD mimics rapid aging in the cardiovascular system (Jankowski et al., 2021)

Physical examination found several problems that are commonly used as data in establishing actual and still risky nursing diagnoses. The examination carried out is based on the following. In Mrs. A's assessment, it was found that there was a general state of composmentis before admission to the hospital there was tightness, and on the right extremity there was swelling, with 26x/min respiration, and received O2 High Flow Nasal Canula therapy 60 lpm with SPO2 94%, blood pressure 162/96 mmHg with a pulse of 119x/min, GCS 15 ((E4M6V5), the patient was fitted with a catheter with a size of 16 and urine tamping 200cc/24 hours, in the respiratory system with complaints of shortness of breath, tachypneune breathing pattern, there is nasal lobe breathing, symmetrical chest movements, no pressure pain, no crepitation, no lumps, no fractures, when in the sonorous percussion, when the vesicular breath sound is usculated, there is an additional sound of ronchi, the results of the PH blood gas analysis: 7.297 Low (7.350-7.450), BEecf -5.49 mmol/l High (-2 - +2), HCO3 20.0 mmol.l Low (22-26 mmol/l), PCO2 43.9 mmHg Normal (35-48 mmHg) (Gas Exchange Disorder). The secretion characteristics of the amount of secretions are between 20 -30 cc, the color of the secretion is thick green. The client's skin color is tanned, black hair but gray hair, the patient has oedema on the right lower extremity, the patient's rom with the patient's muscle strength, in the upper sclerema with a strength of 5 5 and in the lower extremity of the client with a strength of 5 5. In the urine system, there is a urine tamping inspection examination of 200cc/24 hours patients with 816cc/24 hours of input fluid with a total balance fluid of 616 cc (Positive).

Laboratory images of chronic kidney failure include decreased kidney function in the form of increased ureum (133.0 mg/dL) and serum creatinine (6.70 mg/dL) levels, with a GFR value of 8.3 ml/min/1.73 m2, decreased hemoglobin levels (9.8 g/dL), metabolic acidosis. The results of the examination needed to establish the diagnosis of Mrs. A who suffers from CKD with metabolic acidosis include complete laboratory results that have proven the existence of CKD

disease with metabolic acidosis. These results can be explained based on the results of supporting examinations, namely a complete blood test with leukocytes 9.100^3/uL, hemoglobin 9.8g/dL, hematocrit 28.5%, erythrocytes 2.78 10^6/uL, platelets 179 10^3/uL, GDS at 288, creatinine 6.70 mg/dL, sodium 137.3 mmol/L, potassium 5.51 mmol/L, chloride 101.0 mmol/L, because creatinine in patients is very high so that the patient experiences chronic kidney failure. The pattern of health function in patients with a diagnosis of CKD occurs shortness of breath so that the patient has difficulty resting or sleeping well. Patients with a diagnosis of CKD tend to experience excess fluid intake so that an odema occurs in the patient's right leg.

Based on the above assessment, the author raised 5 diagnoses of nursing problems, namely gas exchange disorders b.d changes in the capillary alveolus membrane (D.0003), hypervolemia b.d excess fluid intake (D.0022), airway clearance b.d inhibited secretions (D.0001), physical mobility disorders b.d decreased muscle strength (D.0054), risk of falls b.d decreased muscle strength (D.0143). Of the 5 diagnoses of nursing problems that emerged, there was a priority nursing problem, namely gas exchange disorder b.d change in the capillary alveolus membrane (D.0003) as for the elaboration of the output and intervention plan of the diagnosis with the aim of action after nursing intervention for 24 hours in 3 days, gas exchange increased (L.01003) with the following outcome criteria: decreased dyspnea, additional breathing sounds, decreased restlessness, nasal lobe breath decreases, breathing patterns improve. Interventions carried out respiratory monitoring (I.01014) observation: breath pattern monitor, oxygen saturation monitor, AGD value monitor, therapeutic: administer oxygen, *position semi-fowler*. The implementation carried out in this case study combined with *evidence-based nursing* is position regulation with *a semi-fowler* position.

Discussion

The assessment is the initial stage of the preparation of nursing care. This assessment was carried out on Mrs. M from January 30 to February 01, 2025. From the description of the results of the research above, based on the assessment that has been carried out, it was found that nursing problems are gas exchange disorders related to changes in the capillary alveolus membrane (D.0003). Gas exchange disturbance is an excess or lack of oxygenation and/or

carbon dioxide elimination in the alveolus-capillary membrane (SDKI DPP PPNI Working Group Team, 2017). Gas exchange disorders are a common occurrence in CKD patients. Mrs. A is a 61-year-old patient who has been doing hemodialysis therapy since 1 year ago, causing Mrs. A to be required to do dialysis in 1 week 2x. Mrs. A's condition suffering from CKD disease can cause shortness of breath based on previous research due to the amount of *Glomerulus Filtration Rate* (GFR) in the entire nephron mass will drop below normal which will result in impaired protein secretion, there will be a decrease in sodium and erythroprotein retention so that uremia syndrome will occur which will be followed by an increase in stomach acid (nausea) and pruritus (bleeding). In this case, the patient experiences shortness of breath due to excess fluid, so the kidneys have to work hard in carrying out the filtering process. Interventions carried out during the 3 days of treatment included (Putranto et al., t.t.) observation (breath pattern monitor, oxygen saturation monitor, AGD value monitor), therapeutic action (*semi-fowler position* and administer oxygen). In addition to the *semi-fowler position* , there is an increase in oxygen saturation, there are other factors that affect it, namely the provision of oxygen.

According to the Indonesian Nursing Intervention Standard (2016), position regulation is to place body parts to improve physiological and/or psychological health. The provision of *a semi-fowler position* aims to reduce shortness of breath experienced by patients. Position adjustment can increase lung expansion or development as the patient breathes. The semi-fowler position is the position of the patient with the head and chest higher than the pelvic and leg positions. Lilis Suryani et al. (2016) The semi-fowler position of the head and chest is raised with a degree of inclination of 30o – 45o, namely by using gravitational force can increase intrapleural pressure and also intra-alveolar pressure at the base of the lungs. The force of gravity increases the amount of effort required to ventilate the suspended part of the lung. This causes air exchange in the vents where the ventilation of this part decreases and the ventilation of other parts of the hanging area increases. Thus the oxygen intake needed by the body is met. Setting *the semi-fowler* position based on *evidence-based practice* in patients with gas exchange disorder is one of the interventions and can be provided in reducing complaints felt by patients. The act of positioning the patient at a 45-degree inclination can increase oxygen saturation, stabilize breathing at the normal range, and stabilize the patient's breathing pattern. This position stabilizes breathing thereby increasing oxygen saturation within normal limits. The *semi-fowler*

position increases intrapleural and intra-alveolar pressure and helps to develop the lungs so that air exchange occurs more in the upper part of the lungs than in the lower part The implementation is carried out by the way the patient previously took a SpO (Kurnia Sari et al., n.d.). 2 measurement and then lifted the head from the bed to the right surface of about 45o. From the results of the study on semi-fowler position patients is a half-seated sitting position or with the head higher between 30 and 45 degrees. This position is designed to create a comfortable position and make breathing easier. This technique can increase the body's oxygen capacity and make the parasympathetic nerves and associated muscles more relaxed. The diaphragm muscles positioned at 45 degrees will be pulled downwards so that they contract and the volume of the chest will increase causing the lungs to enlarge and ventilation to be maximized (Kurnia Sari et al., p. t).

Based on previous research, it shows that there is a significant influence on the positioning of respiratory muscles. The strength of the respiratory muscles that have been trained will increase lung compliance and prevent the elveoli from collapsing This study is based on the results of 6 articles that have gone through a review process by researchers and found accurate results based on data that have been researched that (Hidayati et al., n.d.). *the semi-fowler* position can reduce shortness of breath disease in various medical conditions. In addition, *the semi-fowler position* can make an increase in lung expansion making it easier for the patient to breathe. Increased blood flow to the lungs can increase the amount of oxygen available to the body. The results of the evaluation obtained in the implementation diagnosis for the diagnosis of gas exchange disorder were related to changes in the capillary alveolus membrane, namely, on day 3, namely S: the patient said tightness was reduced O: the patient seemed calm and not restless, with NRM oxygen 10 Lpm, Spo2: 99%, RR 22x/minute, A: Nursing problems were partially resolved, P: Intervention was stopped, the patient was transferred to a regular inpatient room. This is in line with research from Rinta (2023) on 7 respondents with pleural effusion problems were given actions in the form of *semi-fowler* position and *respiration rate* monitoring and oxygen saturation measurement which showed a change in breathing frequency before a change in position where RR was obtained 23-29 x/min after 3 days of intervention there was a change in breathing frequency to 19-22 x/min, and SpO2 measurements on day 1 of the intervention were in the range of 94-96%, after the administration of *the semi-fowler* position

intervention on day 3 showed an SpO2 range of 98-99%. Based on Dahlia's research, Lid (2018) the results of this study have the advantage that *the semi-fowler* position is more effective in lowering *the respiratory rate* (RR) because in the *semi-fowler* position the diaphragm muscles are pulled downwards so that lung expansion is more optimal and oxygen is easier to enter the lungs. In addition, the *semi-fowler* position can maintain comfort and facilitate respiratory function. Meanwhile, the shortcomings in this study were only carried out for 3 days of semi-fowler position and breathing frequency measurements were carried out only 3 times. So that the results obtained are not clear and maximum.

Conclusion

The administration of *a semi-fowler* position intervention for patients with CKD disease can help reduce complaints of shortness of breath that are felt especially in patients with nursing problems of gas exchange disorders.

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