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## PROCEEDING BOOK

### *THE 4<sup>th</sup> INTERNATIONAL CONFERENCE ON HEALTH SCIENCE 2017*

### **“The Optimalization of Adolescent Health in The Era of SDGs”**

INNA GARUDA HOTEL YOGYAKARTA,  
INDONESIA  
November 5<sup>th</sup>, 2017



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**IDENTIFYING THE ROLE OF HEMOGLOBIN IN INTRADIALYTIC NAUSEA AND VOMITING IN PANEMBAHAN SENOPATI GENERAL HOSPITAL IN BANTUL**

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**ABSTRACT**

Chronic renal failure (CRF) is a progressive deterioration in kidney function that is also signified by a decrease in Glomerulus Filtration Rate (GFR)  $<60$  mL/min which generally ends in irreversible renal failure<sup>14</sup>. The hemoglobin levels of the patients experiencing CRF tend to decrease and can thus may undergo complications, one of them is anemia. The low hemoglobin levels may cause lassitude, fatigue and decreasing energy, including in the digestive system. This study purposed to determine the relationship between hemoglobin levels and the occurrence of intradialytic nausea and vomiting in Panembahan Senopati General Hospital Bantul. This is a quantitative research using observational analytic design and *cross sectional design*. This study refers to the whole accessible population (*total sampling*) on the entire shift as many as 142 respondents, with regard to sampling criteria. Most of the low hemoglobin levels found in male gender is of 96.6% and most of the low hemoglobin levels in female gender is 84.9%. Most of them experience intradialytic nausea and vomiting, which is of 79.6%. It can be concluded that there is a relationship between hemoglobin levels and the occurrence of intradialytic nausea and vomiting in Panembahan Senopati General Hospital Bantul with *p-value* of 0.011 for the male gender. There is a relationship between hemoglobin levels and the occurrence of intradialytic nausea and vomiting in Panembahan Senopati General Hospital Bantul with *p-value* of 0.015 for the female gender.

**Keywords:** Hemoglobin, Intradialytic Nausea and Vomiting, Hemodialysis

**INTRODUCTION**

Chronic renal failure (CRF) is a progressive deterioration in kidney function that is also signified by a decrease in Glomerulus Filtration Rate (GFR)  $<60$  mL / min and an increase of creatinine levels in the blood, which generally ends in *irreversible* renal failure<sup>10</sup>. CRF is an abnormality in the structure and function of kidney in which the kidney is unable to maintain the balance of electrolytes in the body<sup>15</sup>. The prevalence of CRF over the world has increased significantly and as many as 2.622.000 people have undergone CRF treatment by the end of 2010. In the United States, 90% of 142.448 people have undergone hemodialysis<sup>7</sup>. The prevalence of CRF or ESRD in Indonesia has reached approximately 13.758 people in 2014. In Yogyakarta, the number of patients with CRF has reached 567 people<sup>19</sup>. The number of the patients undergoing hemodialysis has increased in some countries. In every year, its prevalence is increasing, especially in developing countries, including Indonesia, in which it is estimated that there are approximately 40-60 cases per million populations per year<sup>10</sup>.

The function of kidney is to control the secretion of metabolic waste in the body, retain the useful substances, and control the balance of the fluids and electrolytes in the body. In addition, kidney also functions in producing erythropoietin (EPO) in the adrenal glands that is produced by endothelial cells of the peritubular capillaries in the

cortex and outer medulla. Erythropoietin is a protein that controls erythropoiesis process that serves to stimulate the formation of red blood cells by the bone marrow<sup>6</sup>. If the kidney has malfunctions then the formation of red blood cells in the bone marrow will decrease and the hemoglobin levels in the blood will decrease and eventually will stimulate the increase of EPO production.

For the patients who have undergone hemodialysis for a while, the metabolic wastes will build up. The metabolic wastes are the high levels of urea and creatinine in the blood. High urea will disrupt the production of the erythropoietin hormone. As a result, the number of red blood cell production decreases, or mostly known as anemia, so that the patient will experience Dialysis Disequilibrium Syndrome (DDS) or complications during the hemodialysis process. DDS occurs due to the process of rapid removal of fluid and urea from the blood during the hemodialysis process. The symptoms of DDS are sudden headaches, blurry vision, dizziness, nausea, vomiting and seizures. If DDS is not recognized, then it will lead to coma that eventually will lead to death<sup>16</sup>.

Patients who undergo hemodialysis therapy, they will experience anemia since during ultrafiltration, diffusion, and osmosis process, there are a lot of red blood cells that are filtered in the semipermeable membrane so that the red blood cells are broken, or hemolysis. The impact is that the oxyhemoglobin that has the role to carry oxygen to the blood flows will decrease and the oxygenation to the peripheral tissues will decrease as well, and thus the patients undergoing hemodialysis process will experience perfusion disruption that will lead to intradialytic nausea and vomiting complaints.

## PURPOSE

Based on preliminary study conducted by researchers at hemodialysis unit of Panembahan Senopati General Hospital in Bantul on October 8, 2016, there are 22 hemodialysis beds that are scheduled in 3 groups with visit schedule of two times a week, so that the total population of the patients is 198. Based on the observation and interview on October, 8 in 2016, in the morning shift the total patients were 10 persons. There were 7 patients out of 10 who were suffering from CRF and experiencing intradialytic nausea and vomiting. Meanwhile, the other 3 patients did not experience intradialytic nausea and vomiting. Therefore, the researcher aims at identifying the relationship between hemoglobin levels and the occurrence of intradialytic nausea and vomiting in Panembahan Senopati General Hospital.

## METHOD

This is a quantitative research using observational analytic design and *cross sectional design*. This study refers to the whole accessible population (*total sampling*) on the entire shift as many as 142 respondents, with regard to sampling criteria.

## RESULTS

### 1. Characteristics of Respondents

The age of the patients with chronic renal failure in Hemodialysis Unit in Panembahan Senopati Bantul Hospital is divided based on the classification of age consisting of the late teens (17-25tahun), Early adulthood (26-35tahun), late adulthood (36 - 45tahun), early elderly (46-55tahun), late elderly (56-65tahun) and the elderly (> 65tahun)<sup>4</sup>.

**Table 1. Distribution of Respondents by Age, Gender, and Hemodialysis Period in Hemodialysis Unit of Panembahan Senopati General Hospital in Bantul on April 2017 (n = 142)**

<b>Characteristics of Respondents</b>	<b>Frequency (f)</b>	<b>Percentage (%)</b>
<b>Age (years)</b>		
Teenager (17-25)	3	2.1
Early adulthood (26-35)	14	9.9
Late adulthood (36-45)	25	17.6
Early elderly (46-55)	46	32.4
Late Elderly (56-65)	36	25.4
Elderly (> 65)	18	12.7
<b>Gender</b>		
Male	89	62.7
Female	53	37.3
<b>Hemodialysis Period</b>		
<6 months	19	13.4
> 6 months	123	86.6

Based on Table 1, it can be seen that first, based on the characteristics of the age, most of the respondents are at the early elderly stage (46-55 years old), which is of 32,4%, and second, based on the characteristics of the gender, most of them are male, as many as 62,7%, and the last, based on the characteristics of the duration or the time of the hemodialysis, most of them have undergone the hemodialysis for more than 6 months, which is as many as 86,6%.

## 2. Frequency Distribution of the Hemoglobin Levels

Hemoglobin Levels of the Patients with CRF who are Conducting Hemodialysis Process in Panembahan Senopati General Hospital Bantul. The data of the hemoglobin levels in this research are categorized into normal and abnormal categories. The frequency distribution of the hemoglobin levels can be seen in Table 2.

**Table 2. Frequency Distribution of Hemoglobin Levels during Intradialytic Process in Hemodialysis Unit in Panembahan Senopati General Hospital on April 2017, (n=142)**

<b>Male Hemoglobin Levels</b>	<b>Frequency (f)</b>	<b>Percentage (%)</b>
Normal	3	3,4
Abnormal	86	96,6
<b>Female Hemoglobin Levels</b>	<b>Frequency (f)</b>	<b>Percentage (%)</b>
Normal	8	15,1
Abnormal	45	84,9

Based on Table 2, it can be seen that the hemoglobin levels in most of the male respondents are in the low hemoglobin levels (96,6%), and most of the female respondents are also in the low levels of hemoglobin (84,9%).

## 3. Frequency Distribution of Intradialytic Nausea and Vomiting

Intradialytic Nausea and Vomiting of the Patients who are Undergoing Hemodialysis in Hemodialysis Unit in Panembahan Senopati General Hospital Bantul. In this research, the data of intradialytic nausea and vomiting are categorized into "Yes" (nausea and vomiting) and "No" (no nausea and vomiting). Based on Table 3, it can be seen that most of the respondents experience intradialytic nausea and vomiting as many as 79, 6%.

**Table 3. Frequency Distribution of Intradialytic Nausea and Vomiting of the Patients during Intradialytic Process in Hemodialysis Unit in Panembahan Senopati General Hospital Bantul on April 2017, (n=142)**

Intradialysis Nausea and Vomiting	Frequency (f)	Percentage (%)
Yes	113	79,6
No	29	20,4

**Table 4. The Relationship between Hemoglobin Levels and Intradialytic Nausea and Vomiting in Panembahan Senopati General Hospital Bantul on April, (n=142).**

General Hospital Santa Cruz, April, (N=112)					
Men's HB level	Nausea and Vomiting				<i>p-value</i>
	Yes		No		
	f	%	f	%	
Normal	1	1,1	2	2,2	0,011
Abnormal	82	92,1	4	4,5	
Women's HB level	Nausea and Vomiting				<i>p-value</i>
	Yes		No		
	f	%	f	%	
Normal	1	1,9	7	13,2	0,015
Abnormal	29	54,7	16	30,2	

Based on Table 4, the bivariate analysis tested using Fisher's Exact Test shows that for male respondents, the *p-value* is 0,011 the bivariate analysis tested using Fisher's Exact Test shows that for female respondents, the *p-value* is 0,015.

## DISCUSSION

### 1. Characteristics of the Respondents

Based on the research result taken from 142 respondents in Hemodialysis Unit in Panembahan Senopati General Hospital in Bantul, the frequency of the majority of the age shows that most of the patients are at elderly stage, in which most respondents are at the age of 40-55 years old or early elderly of 46 respondents (32,4%) and those within the range of 56-65 years old are of 36 respondents (25,4%). At the late teens, there are 3 respondents (2,1%), those at early adulthood are of 14 respondents (9,9%), those at late adulthood are of 25 respondents (17,6%) and those at elderly stage are of 14 respondents (12,7%).

This research is similar to the previous research<sup>5</sup> that characteristics of the age of the patients are mostly found at the age of 40-55 years old (35,2%). Based on the previous research<sup>2</sup>, it shows that the physiological changes will decrease as people are aging, and the organs with the deteriorated function is the kidney, including the decrease of the glomerulus filtration rate, blood flows to the kidney, tubular secretion and kidney's mass. Therefore, if people do not have healthy life style, or they have already had comorbidity, then they will suffer from kidney failure. To improve the life quality, hemodialysis therapy can serve to help the work of the kidney. At early elderly, people may still have high motivation to improve their life quality.

Based on Table 1, the frequency distribution of the genders in Hemodialysis Unit in Panembahan Senopati General Hospital shows that most of the patients are male, as many as 89 respondents (62,7%), while females are of 53 respondents

(37,9%). This research is similar to the research by Hadi (2015) that suggests that based on the respondents' characteristics, most of the patients are males, as many as 29 respondents (53,7%).

According to previous research<sup>2</sup>, it shows that most respondents are male. The factors causing the males to experience CRF are life style, diet or eating habit. In addition, men tend to smoke, stay up late, and drink coffee. From those habits, men are prone to kidney failure, so that the percentage is higher than that of women. This research is similar to the previous research<sup>5</sup> that suggests that the number of male patients is more than the number of female patients.

Based on Table 1, the frequency distribution of the hemodialysis time in Hemodialysis Unit in Panembahan Senopati General Hospital, it is found out that most of the patients ( 123 respondents) have undergone hemodialysis for more than 6 months (86,6%), and those with less than 6 months are of 19 respondents (13,4%). These data signify that patients experiencing CRF really depends on the hemodialysis therapy to help the work of the kidney to maintain their life quality.

Based on the previous research<sup>5</sup>, the frequency distribution of the hemodialysis period or duration of the patients suffering from CRF in PKU Muhammadiyah Unit II Hospital shows that in the "long duration" category, there are 38 respondents (70,4%). Patients with CRF will depend on the hemodialysis therapy to help the work of the kidney in filtering the substances that are no longer needed in the body, and remove them along with the urine, or reabsorb those that can still be reused. This hemodialysis therapy aims at maintaining the life quality of the patients.

## 2. Intradialytic Hemoglobin Levels

The research result shows that based on Table 2, it is found out that the respondents with low hemoglobin levels in Hemodialysis Unit in Panembahan Senopati General Hospital in Bantul are 96,6% for male gender, and 84,9% for female gender. This research is similar to the previous research<sup>10</sup> that the average value of hemoglobin level is 9,76 gr/dl, in which it signifies that the patients with hemodialysis therapy have low hemoglobin level.

Based on the previous research<sup>7</sup>, the average of the hemoglobin level is 8,18 gr/dl, and prone to complications. Before the hemodialysis (pre hemodialysis), all respondents have low hemoglobin and after hemodialysis (post hemodialysis), most of the patients will have lower hemoglobin level than before. Patients with CRF tend to have decreased hemoglobin level, and thus they may have complications, such as anemia, due to the decreased hemoglobin level in the blood. Automatically, there will be less oxygen that is bound by the hemoglobin, and eventually there will be less oxyhemoglobin that will be used in metabolism<sup>11</sup>. Patients with low hemoglobin level will get blood transfusion to increase the hemoglobin level in the blood<sup>11</sup>.

Based on the analysis result about the intradialytic hemoglobin levels in Hemodialysis Unit in Panembahan Senopati General Hospital Bantul, the researcher assumes that patients who undergone hemodialysis therapy will experience a decrease of the hemoglobin levels in his or her blood. During the ultrafiltration and diffusion process, the red blood cells will lyse or will be broken and the hemoglobin levels in the blood will decrease due to the process. In the ultrafiltration and diffusion process, there are different concentrations pressures from high concentration to low concentration in the body and from the dialyzer tool, the blood will lyse. In addition, the reducing erythropoietin production also causes the lower hemoglobin level. Erythropoietin is produced in the kidney. In this research, the patients undergo hemodialysis because their kidney cannot work properly, so that the kidney cannot do its function well, and therefore the production of erythropoietin decreases as well. Erythropoietin has the function to stimulate the formation of red blood cells in bone marrow, if the production of erythropoietin decreases, then automatically the



production of red blood cells will decrease as well, and it worsens as the patients who have kidney malfunction undergoes the hemodialysis therapy. Hemoglobin is found in red blood cells, so if the red blood cells break down, or lysis, then the hemoglobin levels in the blood will decrease as well.

### 3. Intradialytic Nausea and Vomiting

Based on Table 3, it can be seen that the patients with CRF who are conducting hemodialysis in Hemodialysis Unit in Panembahan Senopati General Hospital Bantul who are experiencing intradialytic nausea and vomiting complications are 113 respondents (79,6%), and those who are not experiencing intradialytic nausea and vomiting are of 29 respondents (20,4%). From this research result, it can be concluded that most of the patients with CRF who are conducting hemodialysis in Hemodialysis Unit in Panembahan Senopati General Hospital Bantul are experiencing intradialytic nausea and vomiting complications with the percentage of 79,6%.

This research is similar to the research conducted by previous researcher<sup>1</sup> suggesting that most of the patients with CRF who are conducting hemodialysis are experiencing intradialytic nausea and vomiting complications. Even though the hemodialysis therapy is very recommended for patients with CRF, this therapy has its own impacts, such as the intradialytic nausea and vomiting complications. The nausea and vomiting complications are of 40%. The complications stated here occur approximately 1 hour after the insertion<sup>7</sup>. Most of the patients undergo hemodialysis to survive. Even though hemodialysis equipment has reached a great advance, but complications still occur. Nausea and vomiting are common complications during hemodialysis that cause the uncomfortable feeling for the patients.

Intradialytic complications are complications that are often found in the patients with CRF who are undergoing hemodialysis therapy, and these complications reach 20-30%. Intradialytic complications are still crucial clinical problems since the symptoms like nausea and vomiting, muscle cramps, hypotension or hypertension, and headache influence the continuity of the patients' life quality<sup>3</sup>.

The prior research<sup>7</sup> supports this research and it researched about the duration of hemodialysis and the decreasing appetite of the patients with CRF in Hemodialysis Unit in Ulin General Hospital in Banjarmasin. The result was that 31 patients who underwent hemodialysis for a while experienced mild decreasing appetite (79,5%), and 79 patients who underwent hemodialysis for long enough experienced considerable decreasing appetite (82,3%), and 35 patients who underwent the hemodialysis for the longest period experienced considerable decreasing appetite (89,7%).

It can be concluded that patients with hemodialysis therapy within short and long period of time experience decreasing appetite so that it will trigger the production of gastric acid and reflux and eventually will cause nausea and even vomiting. Analysis result using chi-square shows that  $p = 0,000 < \alpha = 0,05$ , meaning that there is a relationship between the duration of hemodialysis and the decreasing appetite.

Patients who undergo hemodialysis therapy are prone to malnutrition since the patients who have undergone hemodialysis for long time will have high urea and creatinine levels in their blood. The increasing urea and creatinine levels will stimulate the production of gastric acid, so that it may cause gastrointestinal problems, like nausea and vomiting<sup>13</sup>.

#### 4. The Relationship between Hemoglobin Levels and Intradialytic Nausea and Vomiting

The research results show significant result about the relationship between hemoglobin levels and the intradialytic nausea and vomiting in Hemodialysis Unit in Panembahan Senopati General Hospital Bantul. Using Fisher's Exact Test, the cross tabulations are differentiated into two, which are the hemoglobin levels for male and hemoglobin levels for female. Then they are cross tabulated with the intradialytic nausea and vomiting. The result of the cross tabulation of the hemoglobin levels of the male and the intradialytic nausea and vomiting is  $p\text{-value of } 0,011 < \alpha (0,05)$  the cross tabulation of the hemoglobin levels of the male and the intradialytic nausea and vomiting is  $p\text{-value of } 0,015 < \alpha (0,05)$ .

Hemodialysis aims at helping the work of the kidney, however, it may cause various physical, psychological, and social complications. Nausea and vomiting are the most common physical complications during hemodialysis process. Even though the nausea and vomiting complications do not threaten patient's life, but they can decrease the life quality of the patients, and some of the respondents also mention that they feel uncomfortable with such condition<sup>1</sup>.

Based on prior research<sup>17</sup>, the anemia levels are divided into three, which are mild anemia of 2 respondents (5,1%), moderate anemia of 26 respondents (66,7%), and severe anemia of 11 respondents (28,2%). Therefore, it can be concluded that all patients who are doing hemodialysis suffer from anemia. In the previous research<sup>18</sup> patients with hemodialysis also suffer from anemia. This research also proves that most of the patients who are conducting hemodialysis have low levels of hemoglobin with the average of 10,2 gr/dl and the patients who experience nausea and vomiting are 79,6%.

A prior research<sup>8</sup> also states that 96% of the patients with hemodialysis therapy experience intradialytic complications. The complications are nausea and vomiting. The impact of hemodialysis is hemolysis, in which the hemoglobin levels will decrease that lead to lassitude, fatigue, and decreasing energy, including in the digestive system. The intradialytic nausea and vomiting are caused by an imbalance of plasma volume that stimulates mucosa in the gastrointestinal organ to produce hormone like serotonin through enterocromaffin cell so that it stimulates the work of chemoreceptor trigger zone (CTZ) as a center for nausea and vomiting.

## CONCLUSION

1. Most of the patients are at early elderly age (46-55 years old) of 32,4% and at late elderly age (56-65 years old) of 25,4%. The male respondents are more than the female of 62,7%. Most of the patients have been conducting hemodialysis for more than 6 months (86,6%).
2. Most of the low hemoglobin levels in male respondents are of 96,6% and most of the low hemoglobin levels in female respondents are of 84,9%.
3. Most of the patients experience intradialytic nausea and vomiting as many as 79,6%.
4. There is a relationship between hemoglobin levels and the intradialytic nausea and vomiting in Panembahan Senopati General Hospital Bantul with the  $p\text{-value of } 0,011$  ( $p\text{-value} < 0,05$ ) for males.
5. There is a relationship between hemoglobin levels and the intradialytic nausea and vomiting in Panembahan Senopati General Hospital Bantul with the  $p\text{-value of } 0,015$  ( $p\text{-value} < 0,05$ ) for females.

## RECOMMENDATION

Nurse should pay attention to the patients' condition during hemodialysis by assessing the hemoglobin levels and nausea and vomiting complaints.



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