

CHAPTER IV

RESULTS AND DISCUSSION

4.1 Research Result

This chapter describes the results of the study and discussion on the Relationship between Suction Duration and Oxygen Saturation and Respiratory Rate in Patients in the Puntadewa Intensive Care Unit (ICU) of Ngudi Waluyo Wlingi Hospital which was conducted in June 2025.

The results of this study are presented in specific data and general data. General study data includes a general description of the study location and participant characteristics. Specific study data includes the results of the analysis of the duration of each suction action. Other specific data includes the results of the analysis of differences in oxygen saturation values and respiratory rates before and after suction action.

4.1.1 Overview of Research Location

. This study was conducted at RSUD Ngudi Waluyo Wlingi . RSUD Ngudi Waluyo Wlingi is located at Jl. Dr. Sucipto No. 5, Beru, Wlingi District, Blitar Regency, East Java 66184. It was built in 1950 by providing outpatient and inpatient care with a capacity of 50 beds, then Wlingi Regional General Hospital was inaugurated on April 13, 1984 and changed its name to Ngudi Waluyo Wlingi Regional General Hospital. This study was conducted in the Puntadewa ICU

Room or intensive care unit. The facilities available are 14 beds, 9 Ventilators, 15 Patient Monitors.

4.1.2 Common Data

1. Respondent Characteristics (Numeric Data)

Tabel 4. 1 Frequency Distribution of Respondent Characteristics

Based on Age, In Patients in the Intensive Care Unit (ICU) of RSUD Ngudi Waluyo Wlingi in 2025 (n=43)

Respondent Characteristics	Minimum	Maximum	Mean	Std.Dev	CI (95%)	
					Lower	Upper
Age	18	84	60,84	14,668	56,32	65,35

Based on table 4.1, the minimum age of respondents is 18 years (late adolescence), maximum age is 84 years (elderly). The average age of respondents is 61 years which is included in the late elderly group.

2. Respondent Characteristics (Category Data)

Tabel 4. 2 Frequency Distribution of Respondent Characteristics

Based on Gender, Medical Diagnosis, Ventilator Mode and FiO2 In Patients in the Intensive Care Unit (ICU) of RSUD Ngudi Waluyo Wlingi in 2025 (n=43)

Responden Characteristics	Frequency (f)	Presentase (%)
Gender		
Male	21	48,8
Female	22	51,2
Total	43	
Medical Diagnosis		
Respiratory Disorders	23	53,5
Circulatory Disorders	8	18,6
Post Operation	12	27,9
Total	43	
Ventilator Mode		
PC-SIMV 12	16	37,2
PC-SIMV 18	17	39,5
VC-SIMV	10	23,3
Total	43	
FiO2		
21-40%	5	11,6
41-60%	10	23,3
61-100%	28	65,1
Total	43	100

Based on table 4.2, most of them are female (51.2%). The most common medical diagnoses or diseases suffered by respondents are respiratory disorders such as ARDS (Acute Respiratory Distress Syndrome), Pneumonia, COPD, Acute respiratory failure, Pulmonary TB. Pleural effusion (53.5%). The ventilator mode of respondents mostly Uses PC

SIMV 18 (39.5%). And the oxygen fraction (FiO₂) in the ventilator setting that is most often used is high FiO₂ 61-100% (65.1%).

4.1.3 Specific Data

1. Univariate Analysis

Specific data in this study consists of specific data on independent variables, namely suction duration and specific data on dependent variables, namely oxygen saturation (SaO₂) and respiratory rate (RR). The following is a table of frequency distribution of specific data on patients with ventilators in ICU RSUD Ngudi Waluyo Wlingi. .

1. Suction Duration

Tabel 4. 3 Duration of Closed Suction in Respondents in Intensive Care

Unit (ICU) RSUD Ngudi Waluyo Wlingi in 2025. (n=43)

Suction Duration	Minimum	Maximum	Mean	Std. Dev	CI (95%)	
					Lower	Upper
10-15 se	10	15	12,33	1,599	11,83	12,82

Based on table 4.3, it shows that in patients in the Intensive Care Unit (ICU) of Ngudi Waluyo Wlingi Hospital who underwent closed suction, the average duration of respondent suction was 12.33 seconds. (95% CI = 11.83-12.82), with a standard deviation of 1.599. The minimum suction duration was 10 seconds and the maximum was 15 seconds, from the interval estimation results it can be concluded that 95% believe that the average duration of respondent suction is in the range of 11.83-12.82 seconds.

2. Oxygen Saturation (SaO₂)

Tabel 4. 4 Saturasi Oksigen (SaO₂) Respondent in Intensive Care Unit (ICU) RSUD Ngudi Waluyo Wlingi in 2025. (n=43)

Variabel	Minimum	Maximum	Mean	Std. Dev	CI (95%)	
					Lower	Upper
SaO ₂	91	100	97,93	1,765	97,39	98,47

Based on table 4.4 shows that the oxygen saturation of respondents in the Intensive Care Unit (ICU) of Ngudi Waluyo Wlingi Hospital averaged 97.93% (95% CI = 97.39% - 98.47%), with a standard deviation of 1.765. The minimum oxygen saturation was 91% and the maximum was 100%, from the interval estimation results it can be concluded that 95% believe that the average oxygen saturation of respondents after suction is in the range of 97.39% - 98.47%.

3. Respiratory Frequency (RR)

Tabel 4. 5 Respiratory Frequency Respondent in Intensive Care Unit (ICU) RSUD Ngudi Waluyo Wlingi in2025. (n=43)

Variabel	Minimum	Maximum	Mean	Std. Dev	CI (95%)	
					Lower	Upper
RR	11	39	20,93	5,569	19,22	22,64

Based on table 4.5, it shows that the respiratory frequency of respondents in the Intensive Care Unit (ICU) of Ngudi Waluyo Wlingi Hospital averaged 20.93x/minute (95% CI = 19.22 - 22.64), with a standard deviation of 5.569. The minimum respiratory frequency was 11x/minute and the maximum was

39x/minute, from the interval estimation results it can be concluded that 95% believe that the average oxygen saturation of respondents before suction was in the range of 19.22 - 22.64.

2. Bivariate Analysis

1. *Shapiro-Wilk* Normality Test

Normality test is performed on both variables that are tested for hypothesis or correlation test, which aims to determine the statistical test to be used. Where in this study using non-parametric statistical test according to the results of the normality test. The sample in this study was 43 respondents so that the normality test used was the *Shapiro-Wilk* normality test.

Tabel 4. 6 *Shapiro-Wilk* Normality Test Suction Duration With Oxygen Saturation and Respiratory Frequency on Patient in Intensive Care Unit (ICU) RSUD Ngudi Waluyo Wlingi At 2025.

Normality Test	Statistic	df	Sig. (2-Tailed)
Duration Suction (second)	.168	43	.004
Oxygen Saturation/ SaO2 (%)	.283	43	.000
Respiration Rate/ RR (x/menit)	.194	43	.021

Based on 4.6 table normality test is performed on both variables that are tested for hypothesis or correlation test, which aims to determine the statistical test to be used. Where in this study using non-parametric

statistical test according to the results of the normality test. The sample in this study was 43 respondents so that the normality test used was the Shapiro-Wilk normality test.

2. Rank Spearman Correlation Test

The Spearman Rank Correlation Test was used to identify the relationship between the independent variable of suction duration with the dependent variables of oxygen saturation and respiratory rate in patients in the Intensive Care Unit (ICU) of RSUD Ngudi Waluyo Wlingi.

Tabel 4. 7 *Rank Spearman* Correlation Test Relationship between Suction Duration with Oxygen Saturation Patients in the Intensive Care Unit (ICU) of RSUD Ngudi Waluyo Wlingi in 2025

			Durasi Suction (detik)	Saturasi Oksigen/ SaO2 (%)
Spearman's Rho	Durasi Suction (detik)	Correlation Coefficient	1.000	.194
		Sig. (2-tailed)		.213
		N	43	43
	Saturasi Oksigen/ SaO2 (%)	Correlation Coefficient	.194	1.000
		Sig. (2-tailed)		
		N	43	43

Based on table 4.7 which describes the results of the Spearman Rank correlation test with a significance value between the suction duration variable and oxygen saturation (SaO2), namely Sig 0.213 because the sig

value > 0.05 means that there is no significant relationship between the suction duration variable and the oxygen saturation variable (SaO₂).

Tabel 4. 8 Correlation Test *Rank Spearman* Relationship between Suction Duration with Respiratory Frequency Patients in the Intensive Care Unit (ICU) of RSUD Ngudi Waluyo Wlingi in 2025

			Durasi Suction (detik)	Frekuensi Pernafasan/RR (x/menit)
Spearman's Rho	Durasi Suction (detik)	Correlation Coefficient	1.000	.307*
		Sig. (2-tailed)		.045
		N	43	43
	Frekuensi Pernafasan/RR (x/menit)	Correlation Coefficient	.307*	1.000
		Sig. (2-tailed)		
		N	43	43

Based on table 4.8 which describes the results of the Spearman Rank correlation test with a significance value between the suction duration variable and the respiratory frequency (RR) which is Sig 0.045 because the sig value < 0.05 then there is a significant relationship between the suction duration variable and the respiratory frequency variable. The correlation coefficient value obtained is 0.307, meaning that the level of correlation strength between the two variables has a fairly strong relationship, with a positive relationship direction which means that the longer the suction duration, the higher the respiratory frequency (RR) value in patients in the Intensive Care Unit (ICU) of RSUD Ngudi Waluyo Wlingi.

4.2 Discussion

4.2.1 Identifying Suction Duration in Patient intensive Care Unit (ICU) RSUD Ngudi Waluyo Wlingi

Based on the results of the study related to the duration of suction, it was found that the average duration of suction for most respondents was 12.33 seconds. Most respondents who were suctioned were on average 61 years old, which is included in the late elderly group. This is in line with the research of Arianto, et al. (2022) the percentage of patients in the critical area of women (58%) is higher. According to WHO, the age range of 60-74 years is included in the elderly group. As age increases, the elderly's organs experience decreased function and ability to maintain balance (homeostasis), in addition, the elderly's immune system also decreases so that they are more susceptible to infections that can cause complications in various organs at once (Vera, 2020).

This study is in line with the study of Ebrahimian, et al. (2019) regarding the duration of suction, the results showed that there were 56 respondents who were divided into two groups of pre-test-post-test nurses providing 100% oxygenation for 2 minutes then suctioning for 14 seconds with a pressure of <120 mmHg. This is in line with the guidelines from the American Association for Respiratory Care (2010) which states that the optimal duration for each suction session on the artificial airway is a maximum of 15 seconds. In addition to the duration of suction, pre-oxygenation before suctioning is also important to prevent hemodynamic

changes during the procedure. Suction is carried out according to clinical indications such as additional breath sounds, decreased oxygen saturation or signs of airway obstruction. Complications that can occur due to suctioning that is not in accordance with the procedure include: decreased oxygen saturation, hypotension, hypoxemia, cardiac dysrhythmias and increased cranial pressure (Hudak & Gallo, 2019).

Based on the results of the analysis conducted by the author in observing the duration of suction in the Intensive Care Unit (ICU) of RSUD Ngudi Waluyo Wlingi , it was found that all respondents' duration was no more than 15 seconds. This duration is in accordance with existing guidelines or standards, the researcher assumes that the duration of suction according to the standard, which is no more than 15 seconds in each session, can minimize the side effects of the suction procedure such as pneumonia and atelectasis due to secretion retention.

4.2.2 Identifying Oxygen Saturation in Patient Intensive Care Unit (ICU) RSUD Ngudi Waluyo Wlingi

Based on the results of the study related to oxygen saturation values, the average oxygen saturation of respondents was 97.93%. This study is in line with Wulan's (2022) study regarding changes in oxygen saturation after suction, showing that the average oxygen saturation before suction was 93.38% and after suction was 94.19%. With a p value = 0.009 ($\alpha < 0.05$). Showing that there is an effect of suction action on changes in

oxygen saturation values. Previous research by Yogasara (2023) obtained results that the average SaO₂ after the intervention increased to 96.93%. With a P Value = 0.001 proving that there is an effect of suction action on changes in SaO₂. The majority of respondents in this study were female, as many as 22 respondents (51.2%). The results of previous research by Sari & Iqbal (2019) showed that most patients in the ICU of Mardi Rahayu Hospital Kudus were female, namely 21 (60%). The higher prevalence of women than men treated in the ICU is due to several factors. As women age, they experience a decrease in estrogen after menopause which can be a trigger for serious illnesses that can trigger critical conditions (Ardiansyah, 2022).

Oxygen saturation represents the adequacy of tissue oxygenation or perfusion. Decreased SaO₂ levels can cause failure of oxygen transport. Oxygen delivery in the body is mostly carried out by hemoglobin found in red blood cells and in blood plasma. Increased oxygen saturation after suction is caused by a more open airway with no obstruction in the airway, allowing oxygen to flow in more easily. In addition, the patient's position during the suction procedure such as the head up or semifowler position can help increase lung ventilation and support increased oxygen saturation after the procedure (Irawati, 2021).

The author argues that the change in oxygen saturation values after suctioning tends to increase, this is because the suction procedure improves the patient's ventilation and oxygenation. After suctioning, the airway

becomes patent (open) and there is no secretion that blocks the respiratory tract, causing a significant increase in oxygen saturation after suctioning.

4.2.3 Identifying Respiratory Frequency in Patient Intensive Care Unit (ICU) RSUD Ngudi Waluyo Wlingi

Based on the results of the study related to respiratory frequency, the average respiratory frequency of respondents was 20.93x/minute. This study is in line with Nofiyanto's study (2013) which found that there was a significant difference between respiratory frequency before and after suction. with a P-value <0.05 , namely 0.000 each. This means that suction increases the patient's respiratory frequency. Most respondents in this study used the PC-SIMV ventilator mode, as many as 33 respondents (76.7%). This is supported by Kristiani's study (2020) which stated that 14 respondents (40%) used the PSIMV ventilator mode. The PSIMV ventilator mode is a ventilator mode given to patients who have spontaneous breathing efforts but are not yet adequate and still depend on patient activity.

The respiratory rate is regulated by the respiratory center located in the medulla oblongata and pons. This center receives signals from receptors that measure oxygen, carbon dioxide and pH levels in the blood (Syaifuddin, 2019). If carbon dioxide levels increase or oxygen levels decrease, the respiratory center will send a signal to increase the frequency and depth of breathing. Therefore, the respiratory rate is a parameter that

measures the inspiratory and expiratory cycles. In patients with mechanical ventilation, there is often a mismatch (dissynchronization) between breathing efforts and the ventilator cycle, which can cause patients to breathe faster as compensation (Sklar, 2019).

The author argues that changes in respiratory rate are caused by the accumulation of secretions that stimulate the cough reflex and increase the workload of breathing. In addition, the suction procedure is a physical stressor for the body that can trigger activation of the sympathetic nervous system by increasing the respiratory rate as part of the body's natural response. After the secretions are cleared through the suction procedure, the body will also spontaneously increase the respiratory rate to fill the previously collapsed or obstructed lung volume.

4.2.4 Analysis Relationship between Suction Duration with Oxygen Saturation and Respiratory Frequency in Patient Intensive Care Unit (ICU) RSUD Ngudi Waluyo Wlingi

Based on the results of the analysis of the relationship between suction duration and oxygen saturation and respiratory rate in patients in the Intensive Care Unit (ICU), it can be seen that the results of the correlation test using Rank Spearman between the suction duration variable (Independent) and the oxygen saturation variable (Dependent) have a significance value of Sig 0.213 because the sig value > 0.05 means that there is no significant relationship between the suction duration variable and the

oxygen saturation variable. While the results of the correlation test between the suction duration variable and the respiratory frequency variable have a significance value of Sig 0.045 because the sig value <0.05 means that there is a significant relationship between the suction duration variable and the respiratory frequency variable. The correlation coefficient value obtained is $r = 0.307$, meaning that the level of correlation strength between the two variables has a fairly strong relationship. The direction of the positive relationship means that the longer the suction duration, the higher the respiratory frequency in patients in the Intensive Care Unit (ICU) at RSUD Ngudi Waluyo Wllingi.

This study is in line with the study conducted by Elsaman et al (2021) which showed that inserting a suction catheter for more than 15 seconds resulted in increased HR, decreased MAP, decreased SaO₂ and PaO₂ and an increase in PaCO₂. Suction duration that is too long causes irritation, disconnection from the ventilator and hemodynamic disturbances.

The author is of the opinion that the duration of suction performed on the respondents is in accordance with the existing guideline standards, which is no more than 15 seconds. The duration of suction does not have a significant relationship with oxygen saturation, which may be because before suction, the respondents were given hyperoxygenation or increased FiO₂ (Fraction of Inspired Oxygen) which aims to prevent hypoxemia (decreased oxygen saturation) so that the respondents did not experience a significant decrease or increase in oxygen saturation after the suction

procedure. Meanwhile, the increase in respiratory rate that has a significant relationship with the duration of suction may be because the long duration of suction reduces the effectiveness of temporary ventilation, causing CO₂ to accumulate in the blood, then the body responds by increasing the frequency and depth of breathing.

4.3 Research Limitations

The limitation of this study is that this study uses a small sample size (n = 43) so that it can provide limitations on the validity, generalization and statistical power of the research results. The results of research from small samples will be difficult to generalize to a wider population and only apply to one group. This study also has limitations, namely that the measurement time was only one measurement and the duration measured was only up to 15 seconds, which had an impact on the results of the statistical analysis.