Comparisonal Of Treatment Length And Laboratory Examination Comorbid And Non Comorbid Disease On Covid 19 Patients At Hospital Royal Prima

Nanda Terin Ibrena Sembiring[1], Tan Suyono[2*], Sri Lestari Nasution[3]

[1,2,3] Program Study Master Of Public Health Faculty Of Medicine, Dentaland Health Science, University Prima Indonesia
*Corresponding Author:
Email: tansuyono@unprimdn.ac.id

Abstract
Covid-19 is an infectious disease caused by a new type of coronavirus with symptoms of acute respiratory distress such as fever, cough, and shortness of breath. The type of research is comparative research with secondary data collection of as many as 280 comorbid patients and 280 non-comorbid patients in the month of august 2021 – January 2022. Data were analyzed univariately, bivariate with test Mann Withney. The results of this study are: Based on the mean length of stay for comorbid patients was 12.22 higher than that of non-comorbid patients, which was 5.28. The results of the laboratory examination of leukocytes in comorbid patients were higher at 13.17 than in non-comorbid patients, namely 10.07. In contrast, platelets were smaller, namely 268.87 than non-comorbid patients, namely 278.91. Neutrophils in comorbid patients were 76.28 higher than non-comorbid patients, namely 61.13. The lymphocyte of comorbid patients was 13.28 smaller than that of non-comorbid patients, which was 25.93. The D-dimer of comorbid patients was not too much different, namely 1259.85 than that of non-comorbid patients, namely 557.16. The conclusion in this study is that there is a significant difference between length of stay and laboratory tests (leukocytes, platelets, neutrophils, lymphocytes, D-dimer) for comorbid and non-comorbid diseases in Covid-19 patients at Royal Prima Hospital Medan.

Keywords: *Covid-19, length of hospitalization, laboratory examination, Hospital Royal Prima Medan.*

I. INTRODUCTION

Covid-19 is an infectious disease caused by a new type of coronavirus with symptoms of acute respiratory distress such as fever, cough, and shortness of breath. This virus has been named Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) and can move quickly from human to human through direct contact ((Q. Li et al., 2020),(Rothe et al., 2020)). The latest World Health Organization (WHO) data for Covid 19 disease in the world, the total confirmed cases as of January 21, 2021, were 95,612,831 cases with 2,066,176 deaths (Case Fatality Rate / CFR) 2.2%) in 222 infected countries and 184 transmission countries. local.The highest countries are the United States with 24,775,208 inhabitants, India with 10, 667,736 and Brazil 8,816,256. Meanwhile, Indonesia has reached 898,262 people with 27,835 deaths(WHO, 2020a).According to a report from the Ministry of Health of the Republic of Indonesia, as of January 21, 2021, it has reached 951,651 people, with details of 772,790 patients recovering and 27,203 deaths. The highest cases occurred in DKI Jakarta with 236,075 people, followed by West Java Province with 117,570 people, and Central Java with 107,875 people. The lowest cases occurred in West Sulawesi Province, amounting to 2,549 people. Meanwhile, North Sumatra Province has reached 19,879 people with a recovery rate of 17,230 and 719 people died(Ministry of Health, 2021).The clinical manifestations of COVID-19 patients have a broad spectrum, ranging from asymptomatic, mild symptoms, pneumonia, severe pneumonia, ARDS, sepsis, to septic shock.

About 80% of cases were classified as mild or moderate, 13.8% had a severe illness, and 6.1% of patients fell into a critical condition. The proportion of asymptomatic infections is not known. Viremia and high viral loads from nasopharyngeal swabs in asymptomatic patients have been reported(Thurs et al., 2020). according to the Indonesian Lung Doctors Association (PDPI) (2020)explained that anamnesis symptoms can be found, namely, three main symptoms: fever, dry cough (a small amount of phlegm), and difficulty breathing or shortness of breath. It should be noted, however, that fever may be absent in some circumstances, particularly in the geriatric age or in those who are immunocompromised. Additional symptoms include headache, muscle aches, weakness, diarrhea, and coughing up blood. In some conditions,

signs, and symptoms of severe acute respiratory infection (SARI) may occur. SARI is an acute respiratory infection with a history of fever (temperature 380C) and cough with onset in the last 10 days and requires hospitalization.The average duration of treatment for comorbid Covid-19 patients in the hospital varies, depending on the severity of symptoms. Patients without comorbidities are usually evaluated for up to about two weeks (14 weeks). Category 3 patients were the most among all cases of COVID-19 with DM requiring hospitalization at the RSDK (45.2%). The length of hospitalization varies from 1 day to 30 days with an average treatment period of 11.67 days(Minuljo et al., 2020).Royal Prima Hospital Medan with Type B Education status having its address at Jl. Father No. 68A Medan. The hospital building consists of two buildings, namely Building A and Building B. The Royal Prima Hospital Medan has 167 beds in Building A and 431 in Building B, a total of 598 beds.

The number of nursing human resources at the Royal Prima Hospital Medan in 2020 as many as 319 people consisting of 158 people on duty in Building A and 161 people on duty in Building B. The number of Covid-19 patients who have been treated at the Royal Prima Hospital for the period January to June 2021 is 4,147 patients consisting of 1,507 comorbid patients and 2,640 patients non-comorbid.Based on the results of the initial survey through observations of 10 Covid 19 patients consisting of 10 comorbid patients and 10 non-comorbid patients, it is known that the management of comorbid disease diagnoses is different from non-comorbid. Patients diagnosed with the comorbid disease have a longer hospital stay (±20 days) than non-comorbid patients with COVID-19 (±16 days).The results of blood tests in the laboratory showed that comorbid intensive care patients had a higher D-Dimer score, especially hypertensive patients (478.06-1.078) than non-comorbid patients (interval 250-267.5). While the results of the blood examination of comorbid patients, namely leukocytes (7.31-23.83), platelets (138-491), neutrophils (66.65-122.15), lymphocytes (14.7-22.7) also showed similar symptoms. the same, where the score is greater than non-comorbid patients, namely leukocytes (4.83-13.28), platelets (261-353), neutrophils (52.5-78.28), lymphocytes (7.5-13.4).

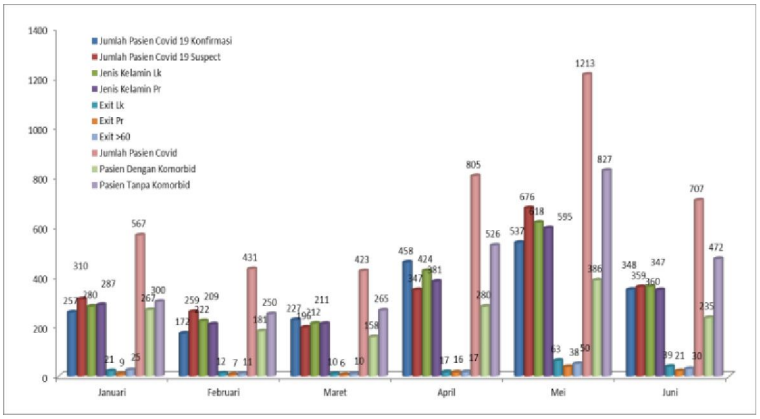

Fig 1. Graph of the Number of Covid 19 Patients for the January - June 2020 Period

Based on the graph showing bed usage from January to June 2021at RSU Royal Prima which is 45%. This value is still below the ideal BOR parameter of 60-85%. This is because at the beginning of the year, the number of patients with Covid-19 decreased and in the following months it increased.The number of days hospitalized for Covid 19 patients is generally above the national standard (> 6 days). The average number of days of bed use, an average of 1 day already meets the national standard, while the number of times the bed is used is still far from the set standard <40 times due to the length of stay for Covid-19 patients at the earliest 14 days, some patients even recovered after 30 days (1 month) especially the patient has symptoms of other diseases (comorbid) at the Royal Prima Hospital Medan.

II. LITERATURE REVIEW.

2.1. Definition of Covid.

Coronavirus is an RNA virus with a particle size of 120-160 nm. This virus mainly infects animals, including bats and camels. Before the COVID-19 outbreak, there were 6 types of coronavirus that could infect humans, namely alphacoronavirus 229E, alphacoronavirus NL63, betacoronavirus OC43,

betacoronavirus HKU1, Severe Acute Respiratory Illness Coronavirus (SARS-CoV), and Middle East Respiratory Syndrome Coronavirus (MERS-CoV).)(Riedel, S, et.al, 2019).COVID-19 itself is a new type of coronavirus that was discovered in Wuhan, Hubei, China in 2019. Therefore, this new type of Coronavirus is given the name Coronavirus disease-2019 which is shortened to COVID-19 and is an infectious disease caused by the acute respiratory syndrome. coronavirus 2 (severe acute respiratory syndrome coronavirus 2 or SARS-CoV-2). When attacking humans, Coronaviruses usually cause respiratory tract infections, such as the flu, MERS (Middle East Respiratory Syndrome), and SARS (Severe Acute Respiratory Syndrome). (Hui et al., 2020).

2.2. Epidemiology

Since the first case in Wuhan, there has been an increase in COVID-19 cases in China every day and peaked between late January to early February 2020. Initially, most of the reports came from Hubei and surrounding provinces, then increased to other provinces and throughout China ((Wu & McGoogan, 2020). As of January 30, 2020, there have been 7,736 confirmed cases of COVID-19 in China, and 86 other cases were reported from various countries such as Taiwan, Thailand, Vietnam, Malaysia, Nepal, Sri Lanka, Cambodia, Japan, Singapore, Saudi Arabia, South Korea, Philippines, India, Australia, Canada, Finland, France, and Germany. COVID-19 was first reported in Indonesia on March 2, 2020, a total of two cases. Data on March 31, 2020, showed that there were 1,528 confirmed cases and 136 deaths. The COVID-19 mortality rate in Indonesia is 8.9%, this figure is the highest in Southeast Asia(WHO, 2020c).Covid-19 cases as of March 30, 2020, there were 693,224 cases and 33,106 deaths worldwide. Europe and North America have become the epicenter of the COVID-19 pandemic, with cases and deaths already surpassing China. The United States ranks first with the most COVID-19 cases with the addition of 19,332 new cases on March 30, 2020, followed by Spain with 6,549 new cases. Italy has the highest mortality rate in the world, at 11.3%(WHO, 2020d)

2.3. Transmission

Currently, the spread of SARS-CoV-2 from human to human is the main source of transmission so the spread becomes more aggressive. Transmission of SARS-CoV-2 from symptomatic patients occurs through droplets released when coughing or sneezing (Han Y, 2020). In addition, it has been observed that SARS-CoV-2 is viable in aerosols (generated via a nebulizer) for at least 3 hours. (van Doremalen et al., 2020). WHO estimates the reproductive number (R0) for COVID-19 to be 1.4 to 2.5. However, another study estimated an R0 of 3.28(Liu et al., 2020).The stability of SARS-CoV-2 in inanimate objects is not much different from that of SARS-CoV. Experiments conducted by Doremalen, 2020 showed that SARS-CoV-2 was more stable on plastic and stainless steel (>72 hours) than copper (4 hours) and cardboard (24 hours). Another study in Singapore found extensive environmental pollution in the rooms and toilets of COVID-19 patients with mild symptoms. Viruses can be detected in doorknobs, toilet seats, light switches, windows, cabinets, and ventilation fans, but not in air samples. (Ong et al., 2020).

2.4.Pathogenesis

The pathogenesis of SARS-CoV-2 is still not widely known, but it is suspected that it is not much different from SARS-CoV which is more widely known(Li et al., 2020). In humans, SARS-CoV-2 primarily infects cells in the airways lining the alveoli. SARS-CoV-2 will bind to receptors and make its way into cells. The glycoprotein contained in the viral spike envelope will bind to a cellular receptor in the form of ACE2 in SARS-CoV-2. Inside cells, SARS-CoV-2 duplicates genetic material and synthesizes the necessary proteins, then forms new virions that appear on the cell surface ((H. Zhang et al., 2020)and(Liu et al., 2020)).Similar to SARS-CoV, in SARS-CoV-2 it is suspected that after the virus enters the cell, the viral RNA genome will be released into the cell cytoplasm and translated into two polyproteins and structural proteins. Next, the viral genome will begin to replicate. The glycoproteins in the newly formed viral envelope pass into the endoplasmic reticulum or Golgi membrane of the cell. A nucleocapsid is formed which is composed of the RNA genome and nucleocapsid proteins. Virus particles will grow into the endoplasmic reticulum and Golgi cells. In the final stage, vesicles containing viral particles will fuse with the plasma membrane to release new viral components(De Wit et al., 2016).

It is known that the entry of SARS-CoV into cells begins with the fusion of the viral membrane with the plasma membrane of the cell. In this process, the S2 protein plays an important role in the proteolytic cleavage process that mediates the membrane fusion process. In addition to membrane fusion, there is also a clathrin-dependent and clathrin-independent endocytosis that mediates the entry of SARS-CoV into host cells. (Wang et al., 2008).Viral and host factors play a role in SARS-CoV infection. The immune response caused by SARS-CoV-2 is also not fully understood but can be studied from the mechanisms found in SARS-CoV and MERS-CoV. When the virus enters the cell, the viral antigen will be presented to the antigen presentation cells (APC). Subsequent presentation of antigen stimulates the body's humoral and cellular immune responses mediated by virus-specific T and B cells(Li et al., 2020).In the humoral immune response, IgM and IgG are formed against SARS-CoV. IgM against SAR-CoV is lost by the end of the 12th week and IgG can persist long term.30 The results of a study of patients who had recovered from SARS showed that after 4 years, CD4+ and CD8+ memory T cells were specific for SARS-CoV, but their numbers were low. decreased gradually in the absence of antigen(YY Fan et al., 2009).

2.5. Mechanical Ventilation in COVID-19

When performing invasive mechanical ventilation, the operator must be alert, wear full personal protective equipment, and wear an N95 mask during the intubation procedure. Strive for rapid sequence intubation (RSI). The ventilation strategies recommended by the Society of Critical Care Medicine in the Surviving Sepsis Campaign: a) Maintain a low tidal volume (4-8 mL/kg predicted body weight); b) Target plateau pressure (Pplat) < 30 cm H2O; c) PEEP is higher in patients with severe ARDS, alert for barotrauma; d) Ventilation in pronation position for 12-16 hours (performed by experts); e) Paralytic agents can be given in moderate/severe ARDS for protection of pulmonary ventilation. Avoid continuous infusion of paralytic agents. Intermittent boluses are preferred; f) For refractory hypoxemia, consider Venovenous Extracorporeal Membrane Oxygenation (VV ECMO)(Society of Critical Care Medicine, 2020).

2.6.Prevention

COVID-19 is a newly discovered disease, therefore knowledge regarding its prevention is still limited. The key to prevention includes breaking the chain of transmission by isolation, early detection, and basic protection.

2.6.1.Vaccine

One of the efforts being developed is the manufacture of vaccines to create immunity and prevent transmission. Currently, 2 phase I clinical trials of the COVID-19 vaccine are underway. The first study from the National Institute of Health (NIH) used mRNA-1273 at doses of 25, 100, and 250 g(US National Library of Medicine, 2020).

2.6.2 Early Detection and Isolation

All individuals who meet the criteria for a suspect or have been in contact with a patient who is positive for COVID-19 must immediately seek treatment at a health facility. WHO has also made a risk assessment instrument for health workers who treat COVID-19 patients as a guide for recommendations for further action. For high-risk groups, it is recommended to stop all activities related to the patient for 14 days, check for SARS-CoV-2 infection and isolation. In the low-risk group, it is recommended to carry out daily self-monitoring of temperature and respiratory symptoms for 14 days and seek help if symptoms worsen. (WHO, 2020f).

2.6.3. Hygiene, Hand Wash and Disinfection

The WHO recommendation in dealing with the COVID-19 outbreak is to carry out basic protection, which consists of washing hands regularly with alcohol or soap and water, keeping a distance from someone who has symptoms of coughing or sneezing, practicing cough or sneezing etiquette, and seeking treatment when they have serious complaints. according to the suspect category. The recommended distance to be maintained is one meter(WHO, 2020f).

2.6.4. Personal protective equipment

SARS-CoV-2 is transmitted mainly through droplets. Personal protective equipment (PPE) is an effective method of preventing transmission as long as its use is rational. PPE components consist of gloves, face masks, protective goggles or face shields, and long-sleeved non-sterile gowns. Personal protective

equipment will be effective if it is supported by administrative controls and environmental and technical controls(WHO, 2020f).

2.6.5. Use of N95 Masks versus Surgical Masks

Based on CDC recommendations, healthcare workers caring for patients with confirmed or suspected COVID-19 can use standard N95 masks.130 N95 masks are also used when performing procedures that can generate aerosols, such as intubation, ventilation, cardiopulmonary resuscitation, nebulization, and bronchoscopy. (WHO, 2020a).

2.6.6. Body Handling

Handling of corpses with COVID-19 must comply with the procedures for using PPE both during external examinations or autopsies. All autopsy procedures that have the potential to form aerosols should be avoided. For example, the use of a chainsaw if you have to do it, add a vacuum to store aerosols. There is no data regarding the survival time of SARS-CoV-2 in corpses(WHO, 2020a).

2.7.Comorbid

Comorbidity is a condition in which two or more diseases occur simultaneously, regardless of whether or not these diseases are continuous. (Jakovljević & Ostojić, 2013). According to Valderas, Starfield, Sibbald, Salisbury, and Roland, comorbidity is a term to indicate a medical condition that is continuous or related to other conditions or diseases in the body of a patient who suffers from more than one disease. (Valderas et al., 2009).Cases of death due to COVID-19 tend to occur in victims who already have co-morbidities, or who have been exposed to a dangerous disease before being infected with SARS-CoV-2 which causes COVID-19 disease. (WHO, 2020b). This proves that COVID-19 tends to be more "vicious" towards victims who already have comorbidities and tends to be "benign" in victims who do not have comorbidities, although there are indeed deaths in groups that do not have these comorbidities. (WHO, 2020g).

III. METHODS

This type of research is a comparative quantitative approach. Comparative research is a study that compares the presence of one or more variables in two or more samples or at different times(Sugiyono, 2017). The research variables consisted of risk factor variables (X1) covering a length of stay and (X2) including laboratory examinations in the form of leukocytes, platelets, neutrophils, and lymphocytes. With Covid-19 patients (Y) non-comorbid and comorbid diseases were grouped.This research was conducted at RSU Royal Prima Medan On February - March 2022. The reason for choosing the research location is because this hospital is one of the Type B Teaching Hospitals. As a teaching hospital, this hospital accepts Covid-19 patients starting in April 2019. a population in this study were Covid-19 patients for the period August 2021 - January 2022 totaling 936 people.

Data analysis in this study is divided into 2 parts, consisting of:

1) *Univariate analysis*

Univariate analysis is an analysis that describes the frequency distribution of each answer to the questionnaire of the independent and dependent variables and also the frequency distribution of the recapitulation. Univariate analysis was carried out by describing the frequency distribution of each of the variables studied, with the percentage and proportion of the independent variables and the dependent variable in the management of diagnosis and management, namely comorbid and non-comorbid diseases.

2) *Bivariate analysis*

Bivariate analysis is a method of processing research variables between independent and dependent variables. Bivariate analysis was carried out by analyzing the different independent variables, namely length of stay and blood tests laboratory (Leukocytes, Platelets, Neutrophils, Lymphophytes, D-dimers) with the dependent variable being comorbid disease of Covid 19 patients using the Mann Withney test with the assumption that the data are not normally distributed. If the value of $p<\alpha$, then Ho is rejected, Ha is accepted, the decision is that there is a difference between the independent variable and the dependent variable and if the value is $p>\alpha$, then Ho is accepted, Ha is rejected, the decision is that there is no difference between the independent variable and the dependent variable.

IV. ANALYZE AND RESULT

4.1. Univariate Analysis

The Royal Prima General Hospital Medan provides health services for people with Covid-19. The number of Covid-19 patients from August 2021 to January 2022 was 936 patients. Meanwhile, the results of the evaluation of hospital performance based on indicators of inpatient services for Covid-19 patients, namely BOR, ALOS, BTO, TOI, NDR, and GDR are presented in the following graph.

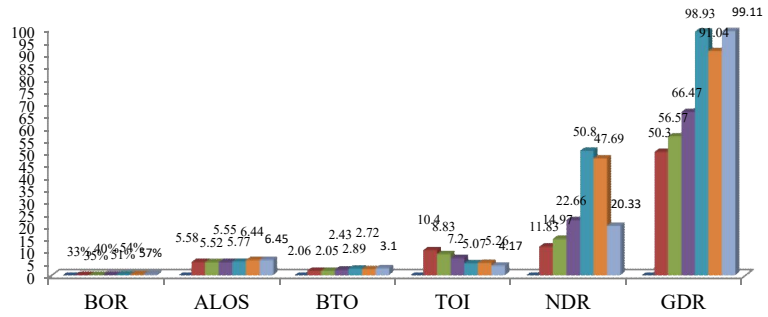

Fig 2. Graph of BOR, ALOS, BTO, TOI, NDR, and GDR
RSU Royal Prima Medan August - January 2022

Based on the graph above, it can be explained that:

1. BOR (Bed Occupancy Ratio) is the percentage of bed usage at a certain time. The average bed utilization rate in August 2021 - January 2022 at RSU Royal Prima is 45%. This value is still below the ideal BOR parameter of 60-85%.
2. ALOS (Average Length of Stay) is the average length of stay for a patient. The average length of stay for Covid-19 patients in August 2021 - January 2022 at Royal Prima Hospital is 5.89 times. The length of stay of the patient has not been efficient because it is still below the ideal value between 6-9 days.
3. BTO (Bed Turn Over) isthe frequency of use of the bed in one period, the number of times the bed is used in a certain time unit. The average frequency of bed use in January-June 2020 at RSU Royal Prima is 2.54 times. Ideally one bed is used on average 40-50 times in 1 year in the hospital.
4. TOI (Turn Over Interval) isthe average number of days a bed was not occupied from being filled to the next time it was filled. The average frequency of bed use in August 2021 - January 2022 at RSU Royal Prima is 6.82 days. But the value is directly above the ideal empty bed not filled is 1-3 days.
5. NDR(Net Death Rate) is the death rate 48 hours after being treated for every 1000 patients discharged. The average 48-hour death rate for Covid-19 patients in August 2021 - January 2022 at Royal Prima Hospital is 28.05%. This means that the death of Covid-19 patients in 48 hours is 28 per 1,000 patients. This value is considered very high because it is above the tolerable NDR value of less than 25 per 1,000.
6. GDR (Gross Death Rate) is the general death rate for every 1000 sufferers. The average death rate for Covid-19 patients in August 2021 - January 2022 at Royal Prima Hospital is 77.07%. This means that the death rate for Covid-19 patients is 77 per 1,000 patients. This value is very high when compared to the GDR which should not be more than 45 per 1000 sufferers (Kemenkes RI, 2011).

Furthermore, univariate analysis aims to describe the characteristics and variables of the study consisting of length of stay and laboratory tests described below.

4.2. Frequency Distribution of Research Variables

Characteristics of respondents consist of: gender, age, and current occupation.

4.2.1. Gender

The distribution of male respondents suffers more from Covid-19, both comorbid and non-comorbid, which is presented in the following table.

Table 1. Frequency DistributionGenderRespondents at RSU Royal Prima Medan

No	Gender	Comorbid		Non Comorbid	
		n	%	n	%
1.	Woman	110	42.3	160	61.5
2.	Man	150	57.7	100	38.5
	Total	**260**	**100.0**	**260**	**100.0**

The table above shows that the respondents had more comorbidities in males than females, where males were 150 (57.7%) and females were 110 (42.3%). More non-comorbid patients are women, namely 160 people (61.5%), while men are 100 people (38.5%)

4.2.2. Age

Based on the age of the respondents, it can be grouped based on 10 year intervals which are presented in the following table.

Tables 2. Frequency DistributionAgeRespondents at RSU Royal Prima Medan

No	Age	Comorbid		Non Comorbid	
		n	%	n	%
1.	<20 years	0	0.0	55	21.2
2.	20-30 years old	10	3.8	64	24.6
3.	31-40 years old	27	10.4	49	18.8
4.	40-50 years	41	15.8	43	16.5
5.	51-60 years old	77	29.6	18	6.9
6.	61-70 years old	71	27.3	29	11.2
7.	71-80 years old	24	9.2	2	0.8
8.	81-90 years old	7	2.7	0	0.0
8.	>90 years old	3	1.2	0	0.0
	Total	**260**	**100.0**	**260**	**100.0**

The table above shows that respondents have more comorbidities in the 51-60 year age group, namely 77 people (29.6%) and at least 3 people aged >90 years (1.2%). Non-comorbid respondents were more in the 20-30 year age group, namely 64 people (24.6%), followed by age <20 years 55 people (21.2%), and at least 2 people aged 71-80 years (0.8%). Comorbid patients tend to have an older age than non-comorbid patients.

4.2.3. Work

The work distribution of respondents who suffer from Covid-19 is grouped into 2 parts, namely working and not working, which is presented in the following table

Tables 3. Frequency DistributionProfessionRespondents at RSU Royal Prima Medan

No	Age	Comorbid		Non Comorbid	
		n	%	n	%
1.	PNS/BUMN	28	10.8	19	7.3
2.	TNI/Polri	4	1.5	4	1.5
3.	Employees/private employees/lecturers/doctors	97	37.3	42	16.2
4.	Entrepreneur/trader	40	15.4	49	18.8
5.	Farmer	5	1.9	4	1.5
6.	Retired	3	1.2	5	1.9
7.	Student/student	12	4.6	79	30.4

8.	Does not work	6	2.3	14	5.4
8.	IRT	65	25.0	44	16.9
	Total	**260**	**100.0**	**260**	**100.0**

The table above shows that respondents who have comorbidities are more likely to work as employees/private employees/lecturers/doctors in 97 people (37.3%), followed by housewives 65 people (25%) and at least 3 people work as retirees. (1.2%). Non-comorbid respondents were more students/students, namely 79 people (30.4%), followed by working as entrepreneurs/traders 49 people (18.8%), and at least 4 people working as TNI/Polri and farmers (1, 5%). Comorbid and non-comorbid respondents tend to have routine activities that are carried out outside the home every day.In this study, the mean length of stay of comorbid patients was 12.22 higher than that of non-comorbid patients, which was 5.28. According to researchMinuljo et al., (2020)concluded that the length of stay for Covid 19 patients at the Dr. Kariadi March–July 2020, varied from 1 day to 30 days with an average treatment period of 11.67 days.The incubation period for COVID-19 is between 3-14 days, marked by levels of leukocytes and lymphocytes that are still normal or slightly decreased, and the patient has not yet experienced symptoms. Subsequently, the virus begins to spread through the bloodstream, mainly to ACE2-expressing organs and the patient begins to experience mild symptoms. Four to seven days from the onset of symptoms, the patient's condition begins to worsen marked by the onset of dyspnea, decreased lymphocytes, and worsening of the lesions in the lungs.

If this phase is not resolved, Acute Respiratory Distress Syndrome (ARSD), sepsis, and other complications can occur. Clinical severity is related to age (over 70 years), comorbidities such as diabetes, chronic obstructive pulmonary disease (COPD), hypertension, and obesity (Wardani, 2021).Based on the statistical analysis of the Mann Withney test, the results of the p value = 0.000 are smaller than 0.05, which means that there is a significant difference between the length of treatment for COVID-19 patients with and without co-morbidities.SIn general, the recovery time for Covid-19 patients has a median of 16 days of treatment, with the lower limit of the median confidence interval being 10 days of treatment and the upper limit of the median confidence interval being 18 days.(Sulantari & Hariadi, 2020).The average duration of treatment for comorbid Covid-19 patients in hospital varies, depending on the severity of symptoms. Patients without comorbidities are usually evaluated for up to about two weeks (14 weeks).Category 3 patients were the most among all cases of COVID-19 with DM requiring hospitalization at the RSDK (45.2%). The length of hospitalization varies from 1 day to 30 days with an average treatment period of 11.67 days(Minuljo et al., 2020). For high-risk groups, it is recommended to stop all activities related to the patient for 14 days, check for SARS-CoV-2 infection and isolation. In the low-risk group, it is recommended to carry out daily self-monitoring of temperature and respiratory symptoms for 14 days and seek help if symptoms worsen.(WHO, 2020f).

V. CONCLUSION

Based on the results of the study, the authors can conclude:

1. Covid-19 patients experience symptoms of the disease (comorbid) as the length of stay increases andThere is a significant difference between the length of stay for comorbid and non-comorbid Covid-19 patients.
2. Covid-19 patients experience symptoms of the disease (comorbid) along with increasing leukocyte levels and there is a significant difference between the levels of leukocytes on comorbid and non-comorbid Covid-19 patients.
3. Covid-19 patients experience symptoms of the disease (comorbid) along with decreased platelet levels and there is a significant difference between the levels of platelets on comorbid and non-comorbid Covid-19 patients.
4. Covid-19 patients experience symptoms of disease (comorbid) along with increasing levels of neutrophils and there is a significant difference between the levels of neutron phylon comorbid and non-comorbid Covid-19 patients.

5. Covid-19 patients experience symptoms of the disease (comorbid) along with increasing levels of lymphocytes and there is a significant difference between the levels of lympho phyteon comorbid and non-comorbid Covid-19 patients.

6. Covid-19 patients experience symptoms of the disease (comorbid) along with increasing levels of d-dimer and there is a significant difference between the levels of-dimer on comorbid and non-comorbid Covid-19 patients.

REFERENCES

[1] Arentz Matt, Eric Yim, Lindy Klaff, Sharukh Lokhandwala, MScFrancis X. Riedo, Maria Chong, ML (2015). Environmental Contamination and Viral Shedding in MERS Patients during MERS-CoV Outbreak in South Korea. Clinical Infectious Diseases, 62(6), 755–760. https://doi.org/10.1093/cid/civ1020

[2] Burhan et al. (2020). COVID-19 MANAGEMENT GUIDELINES (1st ed.). PDPI, PERKI, PAPDI, PERDATIN, IDAI.

[3] Cascella, M., Rajnik, M., Cuomo, A., Dulebohn, SC, & Di Napoli, R. (2020). Features, Evaluation and Treatment of Coronavirus (COVID-19). StatPearls. http://www.ncbi.nlm.nih.gov/pubmed/32150360

[4] De Wit, E., Van Doremalen, N., Falzarano, D., & Munster, VJ (2016). SARS and MERS: Recent insights into emerging coronaviruses. Nature Reviews Microbiology, 14(8), 523–534. https://doi.org/10.1038/nrmicro.2016.81

[5] Di Gennaro, F., Pizzol, D., Marotta, C., Antunes, M., Racalbuto, V., Veronese, N., & Smith, L. (2020). Coronavirus diseases (COVID-19) current status and future perspectives: A narrative review. ***International Journal of Environmental Research and Public Health,*** 17(8). https://doi.org/10.3390/ijerph17082690

[6] Docherty, AB, Harrison, EM, Green, CA, Hardwick, H., Pius, R., Norman, L., Holden, KA, Read, JM, Dondelinger, F., Carson, G., Merson, L., Lee, J., Plotkin, D., Sigfrid, L., Halpin, S., Jackson, C., Gamble, C., Horby, PW, Nguyen-Van-Tam, JS, … Semple, MG (2020). Features of 16,749 hospitalized UK patients with COVID-19 using the ISARIC WHO Clinical Characterization Protocol. MedRxiv. https://doi.org/10.1101/2020.04.23.20076042

[7] Fan, BE, Chong, VCL, Chan, SSW, Lim, GH, Lim, KGE, Tan, GB, Mucheli, SS, Kuperan, P., & Ong, KH (2020). Hematologic parameters in patients with COVID-19 infection. ***American Journal of Hematology***, 95(6), E131–E134. https://doi.org/10.1002/ajh.25774

[8] Fan, YY, Huang, ZT, Li, L., Wu, MH, Yu, T., Koup, RA, Bailer, RT, & Wu, CY (2009). Characterization of SARS-CoV-specific memory T cells from recovered individuals 4 years after infection. Archives of Virology, 154(7), 1093–1099. https://doi.org/10.1007/s00705-009-0409-6

[9] Gao, Y., Li, T., Han, M., Li, X., Wu, D., Xu, Y., Zhu, Y., Liu, Y., Wang, X., & Wang, L. (2020). Diagnostic utility of clinical laboratory data determinations for patients with the severe COVID-19. ***Journal of Medical Virology,*** 92(7), 791–796. https://doi.org/10.1002/jmv.25770

[10] Guan, W., Ni, Z., Hu, Y., Liang, W., Ou, C., He, J., Liu, L., Shan, H., Lei, C., Hui, DSC, Du , B., Li, L., Zeng, G., Yuen, K.-Y., Chen, R., Tang, C., Wang, T., Chen, P., Xiang, J., … Zhong, N. (2020). Clinical Characteristics of Coronavirus Disease 2019 in China. ***New England Journal of Medicine***, 382(18), 1708–1720. https://doi.org/10.1056/nejmoa2002032

[11] Guo, L., Ren, L., Yang, S., Xiao, M., Chang, D., Yang, F., Dela Cruz, CS, Wang, Y., Wu, C., Xiao, Y., Zhang, L., Han, L., Dang, S., Xu, Y., Yang, QW, Xu, SY, Zhu, HD, Xu, YC, Jin, Q., … Wang, J. (2020). Profiling early humoral response to diagnose novel coronavirus disease (COVID-19). Clinical Infectious Diseases, 71(15), 778–785. https://doi.org/10.1093/cid/ciaa310

[12] Han H, Luo Q, Mo F, Long L, ZW (2020). SARS-CoV-2 RNA more readily detected in induced sputum than in throat swabs of convalescent COVID-19 patients. The Lancet, 20(January), 655–656.

[13] Huang, C., Wang, Y., Li, X., Ren, L., Zhao, J., Hu, Y., Zhang, L., Fan, G., Xu, J., Gu, X., Cheng, Z., Yu, T., Xia, J., Wei, Y., Wu, W., Xie, X., Yin, W., Li, H., Liu, M., … Cao, B. (2020). Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. The Lancet, 395(10223), 497–506. https://doi.org/10.1016/S0140-6736(20)30183-5

[14] Hui, DS, I Azhar, E., Madani, TA, Ntoumi, F., Kock, R., Dar, O., Ippolito, G., Mchugh, TD, Memish, ZA, Drosten, C., Zumla, A ., & Petersen, E. (2020). The continuing 2019-nCoV epidemic threat of novel coronaviruses to global health — The latest 2019 novel coronavirus outbreak in Wuhan, China. ***International Journal of Infectious Diseases***, 91, 264–266. https://doi.org/10.1016/j.ijid.2020.01.009

[15] Isbaniah, et al. (2020). Guidelines for Preparedness for Coronavirus Disease (COVID-19). Director General of

Disease Prevention and Control.

[16] Jakovljević, M., & Ostojić, L. (2013). Comorbidity and multimorbidity in medicine today: challenges and opportunities for bringing separated branches of medicine closer to each other. In Psychiatria Danubina: Vol. 25 Suppl 1 (pp. 18–28).

[17] Kam, KQ, Yung, CF, Cui, L., Pin Lin, RT, Mak, TM, Maiwald, M., Li, J., Chong, CY, Nadua, K., Hui Tan, NW, & Thoon, KC (2020). A well infant with coronavirus disease 2019 with high viral load. Clinical Infectious Diseases, 71(15), 847–849. https://doi.org/10.1093/cid/ciaa201

[18] Ministry of Health, R. (2021). Latest Situation of the Development of Coronavirus Disease (COVID-19) January 21, 2021. https://infectionemerging.kemkes.go.id/situasi-sepsi-emerging/situasi-terkini-perkembangan-coronavirus-disease-covid-19-21-januari- 2021

[19] Li, Q., Guan, X., Wu, P., Wang, X., Zhou, L., Tong, Y., Ren, R., Leung, KSM, Lau, EHY, Wong, JY, Xing, X ., Xiang, N., Wu, Y., Li, C., Chen, Q., Li, D., Liu, T., Zhao, J., Liu, M., … Feng, Z. (2020) . Early Transmission Dynamics in Wuhan, China, of Novel Coronavirus–Infected Pneumonia. ***New England Journal of Medicine,*** 382(13), 1199–1207. https://doi.org/10.1056/nejmoa2001316

[20] Li, X., Geng, M., Peng, Y., Meng, L., & Lu, S. (2020). Molecular immune pathogenesis and diagnosis of COVID-19. Journal of Pharmaceutical Analysis, 10(2), 102–108. https://doi.org/10.1016/j.jpha.2020.03.001

[21] Lippi, G., & Plebani, M. (2020). Laboratory abnormalities in patients with COVID-2019 infection. Clinical Chemistry and Laboratory Medicine, 58(7), 1131–1134. https://doi.org/10.1515/cclm-2020-0198

[22] Liu, Jing, Li, S., Liu, J., Liang, B., Wang, X., Wang, H., Li, W., Tong, Q., Yi, J., Zhao, L., Xiong , L., Guo, C., Tian, J., Luo, J., Yao, J., Pang, R., Shen, H., Peng, C., Liu, T., Zhang, Q., … Zheng, X. (2020). Longitudinal characteristics of lymphocyte responses and cytokine profiles in the peripheral blood of SARS-CoV-2 infected patients. EBioMedicine, 55. https://doi.org/10.1016/j.ebiom.2020.102763

[23] Liu, K., Fang, YY, Deng, Y., Liu, W., Wang, MF, Ma, JP, Xiao, W., Wang, YN, Zhong, MH, Li, CH, Li, GC, & Liu , HG (2020). Clinical characteristics of novel coronavirus cases in tertiary hospitals in Hubei Province. ***Chinese Medical Journal***, 133(9), 1025–1031. https://doi.org/10.1097/CM9.0000000000000744

[24] Liu, Y., Gayle, AA, Wilder-Smith, A., & Rocklöv, J. (2020). The reproductive number of COVID-19 is higher compared to SARS coronavirus. ***Journal of Travel Medicine***, 27(2), 1–4. https://doi.org/10.1093/jtm/taaa021

[25] Longato, E., Di Camillo, B., Sparacino, G., Gubian, L., Avogaro, A., & Fadini, GP (2020). Cardiovascular outcomes of type 2 diabetic patients treated with SGLT-2 inhibitors versus GLP-1 receptor agonists in real-life. BMJ Open Diabetes Research & Care, 8(1). https://doi.org/10.1136/bmjdrc-2020-001451

[26] Mantovani, A., Byrne, CD, & Zheng, M. (2020). Since January 2020 Elsevier has created a COVID-19 resource center with free information in English and Mandarin on the novel coronavirus COVID-19 . The COVID-19 resource center is hosted on Elsevier Connect, the company's public news and information. January.

[27] Minuljo, TT, Anindita, YPC, Seno, HNH, Pemayun, TGD, & Sofro, MAU (2020). Characteristics and Outcomes of COVID-19 Patients with DM at the Dr. Kariadi (Patient review period March-July 2020). Medica Hospitalia : Journal of Clinical Medicine, 7(1A), 150–158. https://doi.org/10.36408/mhjcm.v7i1a.473

[28] Ong, SWX, Tan, YK, Chia, PY, Lee, TH, Ng, OT, Wong, MSY, & Marimuthu, K. (2020). Air, Surface Environmental, and Personal Protective Equipment Contamination by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) from a Symptomatic Patient. ***JAMA - Journal of the American Medical Association,*** 323(16), 1610–1612. https://doi.org/10.1001/jama.2020.3227

[29] Padmanabhan Srivatsan. (2020). Potential dual therapeutic approach against SARS-CoV-2/COVID-19 with Nitazoxanide and Hydroxychloroquine. Preprint, March. https://doi.org/10.13140/RG.2.2.28124.74882

[30] Indonesian Lung Doctors Association (PDPI). (2020). Covid-19 Pneumonia: Diagnosis & Management in Indonesia. Indonesian Lung Doctors Association.

[31] Poggiali Erika, Alessandro Dacrema, Davide Bastoni, Valentina Tinelli, Elena Demichele, Pau Mateo Ramos, Teodoro Marcianò, Matteo Silva, Andrea Vercelli, and AM (2009). Letters to the Editor. ***Tumori Journal***, 95(1), 131–131. https://doi.org/10.1177/030089160909500127

[32] Richardson, S., Hirsch, JS, Narasimhan, M., Crawford, JM, McGinn, T., Davidson, KW, Barnaby, DP, Becker, LB, Chelico, JD, Cohen, SL, Cookingham, J., Coppa, K., Diefenbach, MA, Dominello, AJ, Duer-Hefele, J., Falzon, L., Gitlin, J., Hajizadeh, N., Harvin, TG, … Zanos, TP (2020). Presenting Characteristics, Comorbidities, and Outcomes among 5700 Patients Hospitalized with COVID-19 in the New York City Area. ***JAMA - Journal of the American Medical Association,*** 323(20), 2052–2059. https://doi.org/10.1001/jama.2020.6775

[33] Riedel, S,, Morse, S,, Mietzner, T,, Miller, SJ, Melnick, & A. (2019). Medical Microbiology (28th ed.). McGraw-Hill Education/Medical.

[34] Rothan, HA, & Byrareddy, SN (2020). Since January 2020 Elsevier has created a COVID-19 resource center

with free information in English and Mandarin on the novel coronavirus COVID-19 . The COVID-19 resource center is hosted on Elsevier Connect, the company's public news and information. January.

[35] Rothe, C., Schunk, M., Sothmann, P., Bretzel, G., Froeschl, G., Wallrauch, C., Zimmer, T., Thiel, V., Janke, C., Guggemos, W., Seilmaier, M., Drosten, C., Vollmar, P., Zwirglmaier, K., Zange, S., Wölfel, R., & Hoelscher, M. (2020). Transmission of 2019-nCoV Infection from an Asymptomatic Contact in Germany. New England Journal of Medicine, 382(10), 970–971. https://doi.org/10.1056/nejmc2001468

[36] Salehi, S., Abedi, A., Balakrishnan, S., & Gholamrezanezhad, A. (2020). Coronavirus disease 2019 (COVID-19): A systematic review of imaging findings in 919 patients. ***American Journal of Roentgenology***, 215(1), 87–93. https://doi.org/10.2214/AJR.20.23034

[37] Shen, C., Wang, Z., Zhao, F., Yang, Y., Li, J., Yuan, J., Wang, F., Li, D., Yang, M., Xing, L., Wei, J., Xiao, H., Yang, Y., Qu, J., Qing, L., Chen, L., Xu, Z., Peng, L., Li, Y., … Liu, L. (2020). Treatment of 5 Critically Ill Patients with COVID-19 with Convalescent Plasma. ***JAMA - Journal of the American Medical Association,*** 323(16), 1582–1589. https://doi.org/10.1001/jama.2020.4783

[38] Shi, H., Han, X., Jiang, N., Cao, Y., Alwalid, O., Gu, J., Fan, Y., & Zheng, C. (2020). Radiological findings from 81 patients with COVID-19 pneumonia in Wuhan, China: a descriptive study. The Lancet Infectious Diseases, 20(4), 425–434. https://doi.org/10.1016/S1473-3099(20)30086-4

[39] Society of Critical Care Medicine. (2020). Surviving Sepsis Campaign: Guidelines on the Management of Critically Ill Adults with Coronavirus Disease 2019 (COVID-19). https://www.sccm.org/SurvivingSepsisCampaign/Guidelines/COVID-19

[40] Sugiyono. (2017). Research Methods Quantitative, Qualitative and R&D. Alphabet.

[41] Sulantari, S., & Hariadi, W. (2020). Analysis of Survival Time to Recover Covid-19 Patients in Banyuwangi Regency. Transformation: ***Journal of Mathematics and Mathematics Education,*** 4(2), 375–386. https://doi.org/10.36526/tr.v4i2.1001

[42] US National Library of Medicine. (2020). Safety and Immunogenicity Study of 2019-nCoV Vaccine (mRNA-1273) to Prevent SARS-CoV-2 Infection. https://clinicaltrials.gov/ct2/show/NCT04283461 ***Journal***

[43] ***Main,*** S. (2005). Understanding the Phenomenon of Hospital Patient Satisfaction. Health Management, 09(1), 1–7.

[44] Valderas, JM, Starfi, B., & Sibbald, B. (2009). Understanding Health and Health Services. Annals Of Family Medicine, 357–363. https://doi.org/10.1370/afm.983.Martin

[45] van Doremalen, N., Bushmaker, T., Morris, DH, Holbrook, MG, Gamble, A., Williamson, BN, Tamin, A., Harcourt, JL, Thornburg, NJ, Gerber, SI, Lloyd-Smith, JO , de Wit, E., & Munster, VJ (2020). Aerosol and surface stability of HCoV-19 (SARS-CoV-2) compared to SARS-CoV-1. MedRxiv. https://doi.org/10.1101/2020.03.09.20033217

[46] Wang, C., Li, W., Drabek, D., Okba, NMA, van Haperen, R., Osterhaus, ADME, van Kuppeveld, FJM, Haagmans, BL, Grosveld, F., & Bosch, BJ (2020) . A human monoclonal antibody blocking SARS-CoV-2 infection. Nature Communications, 11(1), 1–6. https://doi.org/10.1038/s41467-020-16256-y

[47] Wang, F., Nie, J., Wang, H., Zhao, Q., Xiong, Y., Deng, L., Song, S., Ma, Z., Mo, P., & Zhang, Y. (2020). Characteristics of Periphe***ral Lymphocyte Subset Alteration in COVID-19 Pneumonia. The Journal of Infectious Diseases,*** 221(11), 1762–1769. https://doi.org/10.1093/infdis/jiaa150

[48] Wang, H., Yang, P., Liu, K., Guo, F., Zhang, Y., Zhang, G., & Jiang, C. (2008). SARS coronavirus entry into host cells through a novel clathrin- and caveolae-independent endocytic pathway. Cell Research, 18(2), 290–301. https://doi.org/10.1038/cr.2008.15

[49] Wang, Z., Qiang, W., & Ke, H. (2020). A Handbook of 2019-nCoV Pneumonia Control and Prevention. Hubei Science and Technology Press, 1–108.

[50] WHO. (2020a). Advice on the use of masks in the community, during home care, and in health care settings in the context of COVID-19.

[51] WHO. (2020b). Clinical management of severe acute respiratory infection when novel coronavirus (nCoV) infection is suspected.

[52] WHO. (2020c). Coronavirus disease 2019 (COVID-19) Situation Report - 51.

[53] WHO. (2020d). Coronavirus disease 2019 (COVID-19) Situation Report – 70. World Health Organization. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200330-sitrep-70-covid-19.pdf?sfvrsn=7e0fe3f8_2

[54] WHO. (2020e). Coronavirus disease 2019 (COVID-19) Situation Report – 42. World Health Organization. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200302-sitrep-42-covid-19. pdf?sfvrsn=224c1add_2.

[55] WHO. (2020f). Infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected.

[56] WHO. (2020g). Laboratory testing for coronavirus disease 2019 (COVID-19) in suspected human cases.

[57] Wu, Z., & McGoogan, JM (2020). Characteristics of and Important Lessons from the Coronavirus Disease 2019 (COVID-19) Outbreak in China: Summary of a Report of 72314 Cases from the Chinese Center for Disease Control and Prevention. ***JAMA - Journal of the American Medical Association,*** 323(13), 1239–1242. https://doi.org/10.1001/jama.2020.2648 Yan Gabriel, Chun Kiat Lee, Lawrence TM Lam, Benedict Yan, Ying Xian Chua, Anita YN Lim, Kee Fong Phang, Guan Sen Kew, Hazel Teng, Chin Hong Ngai, Li Lin, Rui Min Foo, Surinder Pada, LCN (2020). Covert COVID-19 and false-positive dengue serology in Singapore. The Lancet, January, 19–20.

[58] Yonata, A., Science, B., Dalam, P., Medicine, F., & Lampung, U. (2016). Effect of Comorbidity on the Occurrence of Gram Negative MDR Bacteremia in Hospitalized Patients The Effect of Comorbidity on MDR Gram Negative Bacteremia among Hospitalized Patients. 1, 211–214.

[59] Zhang, H., Penninger, JM, Li, Y., Zhong, N., & Slutsky, USA (2020). Angiotensin-converting enzyme 2 (ACE2) as a SARS-CoV-2 receptor: molecular mechanisms and potential therapeutic target. Intensive Care Medicine, 46(4), 586–590. https://doi.org/10.1007/s00134-020-05985-9

[60] Zhang, L., Yan, X., Fan, Q., Liu, H., Liu, X., Liu, Z., & Zhang, Z. (2020). D-dimer levels on admission to predict in-hospital mortality in patients with Covid-19. ***Journal of Thrombosis and Haemostasis,*** 18(6), 1324–1329. https://doi.org/10.1111/jth.14859

[61] Zou Lirong, Feng Ruan, Mingxing Huang, Lijun Liang, Huitao Huang, Zhongsi Hong, Jianxiang Yu, Min Kang, Yingchao Song, Jinyu Xia, Qianfang Guo, Tie Song, JH (2020). An Animal Model of Inhaled Vitamin E Acetate and EVALI-like Lung Injury. ***New England Journal of Medicine,*** 382(12), 1175–1177. https://doi.org/10.1056/nejmc2000231