

CHAPTER I

INTRODUCTION

1.1 Background Information

The coronavirus disease 2019 (COVID-19) is still a major problem in the world. COVID-19 is a pathogenic viral infection caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) that is highly transmissible (Shereen, 2020; WHO, 2020). The novel coronavirus was first found in Wuhan, Hubei Province of China on December 31, 2019 and was declared a global pandemic by the World Health Organization (WHO) on March 15, 2020 which had led to a dramatic loss of human life worldwide (WHO, 2020). Up to this very day, the high number of positive and death cases of COVID-19 and its rapid transmission imposes a problem to the world. COVID-19 cases have been gradually increasing day by day. As of May 3rd 2021, there is a total of 154,195,608 people that are diagnosed with COVID-19. Based on the continental spread, amongst the seven continents, Europe has the highest number of positive cases with 44,854,844 cases and 1,020,356 deaths. The second highest rank based on the continents is Asia with a total of 40,953,224 cases with 535,905 deaths. In Asia, half of the cases are found situated in India with a total number of 20,275,543 case and a total of 222,838 deaths. Indonesia placed fourth amongst the Asian countries with having a total case of 1,682,004 case with 45,949 deaths (Worldometers, 2021).

The spread of COVID-19 has caused a change in this world. Nationwide lockdowns are done to implement social distancing that has caused billions to be quarantined at homes. It is inevitable that the pandemic has also affected the socioeconomic, political psychosocial, and the health care system with its increase of burden and pressure (Banerjee and Rai, 2020). The increase burden of the healthcare

system comes in line with increasing demand of personal protective equipment (PPE), negative pressure rooms, overtime workers and backup workforces. Healthcare professionals are also in higher risk of suffering from stigmatization from the public which eventually can lead to fear, anxiety and depression (Kaye, 2020).

Multiple restrictions have been imposed to contain the spread of the virus. Effective reduction strategies includes preventing airborne and contact transmission that includes bioburden release, disinfection practices, ventilation controls and human factors (Kaye, 2020). One of the efforts in the health sector to reduce the number of deaths is through knowing the predicting factors of the outcome in COVID-19 patients. Therefore, knowing the predictive factors for COVID-19 patient outcome is very important especially in the use of health facilities.

Numerous studies about factors affecting COVID-19 outcome has been conducted. A literature review by Marin (2021) found that older age is a major predictor of mortality. A study conducted by Priya (2021) in Madurai, India, found that the median age of COVID-19 patients was 48 years old and that patients aged ≥ 70 years has the highest risk of mortality. Grasselli (2020) in Italy found patients aged > 64 years had higher mortality than younger patients. Other studies have also correlated gender with COVID-19 outcomes. A study conducted by Jin (2020) found that majority of the deceased patients were male (70.3%). Alshukry (2020) also found that in Kuwait, 90% of its deceased patients were male. In Italy, Grasselli (2020) found that 82% of its patients were male. The majority of male patients are also found in Indonesia with 53.3% COVID-19 positive male patients (Hafiz, 2020). Based on the clinical manifestations, the symptoms of COVID-19 differs in every country. In Wuhan, China the common symptoms were fever (98%), cough (76%), myalgia or fatigue (44%) (Huang, 2020). In Korea a study conducted by Kim (2020) found that the most common

symptoms were cough (40.1%), hyposmia (39.5%), sputum (39.5%) and asymptomatic patients (19.2%). In Kuwait, Alshukry, 2020, found that the common symptoms were fever (34.3%), dry cough (32.6%), and asymptomatic patients (39.3%). In Indonesia, common clinical symptoms were quite different in which patients present with dyspnea (73.3%) and dry cough (53.3%) (Hafiz, 2020). Symptoms of hypoxemia is also independently associated with in-hospital mortality. Patients that have received oxygen supplementation and present with higher oxygen saturation (SpO₂) levels are associated with reduce mortality independent of age and sex (Xie, 2020). Another factor that may affect patient mortality are co-morbidities. A study conducted by Jain and Yaun, 2020, found that the significant predictive factors for severe disease includes co-morbidities of chronic obstructive pulmonary disease (COPD), cardiovascular disease (CVD), and hypertension with a pooled odds ratio (OR) of 6.42, 2.70, and 1.97 respectively. A study in Surrey, United Kingdom, found that the common comorbidities were hypertension (45%) and diabetes (23%) (Knights, 2020). Similar comorbidities were also found in Indonesia such as diabetes (46.6%), hypertension (33.3%) and coronary artery disease (CAD) (33.3%) (Hafiz, 2020). Another factor that may be associated with COVID-19 mortality is the patient's smoking history. Knights (2020) found that ex or current smokers are predictive of death ($p < 0.05$). However, a study by Petrilli, 2020, found that tobacco smoking was not associated with increased risk of critical illness as 52% of its critically ill patients are non-smokers. A patient's nutritional status also affects COVID-19 outcome. Patients with a body mass index (BMI) of ≥ 40 are 2.45 more at risk for hospital admission and have greater risk of developing critical illness (Petrilli, 2020). Laboratorial results may also be used to predict COVID-19 mortality. A meta-analysis conducted by Simadibrata (2020) found that severe patients had higher levels of platelet to lymphocyte ratio (PLR) compared to non-severe patients. A study by Ma, 2020, also

found that neutrophil to lymphocyte ratio (NLR) is associated with clinical deterioration and mortality of COVID-19 patients. Complete blood count results like leukopenia and lymphopenia were majorly seen and severe lymphopenia was observed until death in non-survivors (Zhou, 2020; Huang, 2020). A study by Yang (2021) reported that hyperglycaemia during admissions increases the risk of mortality by 3.45 times and risk of complications and severity by 2.08 times. Elevated liver biomarkers such as aspartate aminotransferase (AST) and alanine aminotransferase (ALT) are more likely to be seen in patients in critical or end organ damage. The presence of hypoalbuminemia may increase risk of mortality by 6.394 times and can be used as an independent predictor of COVID-19 mortality (Marin, 2021; Huang, 2020). The renal function measured through the estimated glomerular filtration rate (eGFR) were decreased on admission within the deceased patients (Knights, 2020).

Global domination of the evolving COVID-19 strain, specifically the G614 variant, induced greater fatality rates and is associated with higher viral loads (Korber, 2020; Becerra-Flores, 2020). Patients with acute hypoxemic respiratory failure that require respiratory support are referred to the intensive care unit (ICU). The ICU mortality rates are as high as 26% as patients usually have higher levels of plasma cytokines suggesting a cytokine storm (Grasselli, 2021; Hu, 2021). The length of stay in the ICU differs in different cities. In Florida, it was reported that the length of ICU stay were 9.5 days for deceased patients (Oliveira, 2021). However, Rees (2020) reported that length of ICU stay outside of China were 7 days. Clinically, there are still limited data regarding the predictive factors of COVID-19 that is associated with patient outcome. This situation puts clinicians in a dilemma as disease progression could not be predicted as soon as possible. By taking into account the problem above, this study aims to know the correlation between the predictive factors of COVID-19

with the outcome of ICU patients hospitalized at Rumah Sakit Universitas Airlangga, Surabaya from January to June 2021.

1.2 Formulation of the Problem

Are there any correlation between the predictive factors of COVID-19 to the outcome of ICU patients with COVID-19 at Rumah Sakit Universitas Airlangga, Surabaya from January to June 2021?

1.3 Purpose of Research

1.3.1 General Purpose

In order to know the outcome of ICU patients with COVID-19 based on the predictive factors at Rumah Sakit Universitas Airlangga, Surabaya from January to June 2021.

1.3.2 Specific Purpose

- a) To analyse the predictive factors that may affect the outcome of ICU patients with COVID-19 at Rumah Sakit Universitas Airlangga, Surabaya from January to June 2021
- b) To know the main predictive factors that is associated with the outcome of ICU patients with COVID-19 at Rumah Sakit Universitas Airlangga, Surabaya from January to June 2021

1.4 Benefit of Research

1.4.1 Theoretical Benefit

To provide scientific information about the predictive factors of COVID-19 with the outcome of ICU patients with COVID-19 at Rumah Sakit Universitas Airlangga as a foundation further research development.

1.4.2 Practical Benefit

If it is proven that there is a correlation between the predictive factors towards the outcome of ICU patients with COVID-19 at Rumah Sakit Universitas Airlangga Surabaya, curative management and appropriate preventive efforts can be done to prevent further disease progression, complications and hopefully to reduce mortality and improve prognosis.