CHAPTER 1
INTRODUCTION

1.1. Background

Queues are the product of a discrepancy between the demand for a service and the available capacity to fulfill that demand. This mismatch is usually only transitory and attributable to inherent differences in the scheduling of specifications and the length of time taken to deliver operation (Green, 2006). In hospitals, the queuing system is generally used in the outpatient installation section, where many patients have to wait for their turn, either to register, to do consultations and examinations with doctors, or when they want to take medicines at the pharmacy. According to a 2015 report by Harvard Medical School, the average time spent by an individual for an outpatient visit to the hospital is 121 minutes, with only 15 minutes spent with the doctor. This long and ubiquitous queues are causing patient dissatisfaction and resulting medical conditions which can increase the cost of subsequent care and adverse health result. Besides, the long queues make it difficult for patients to do physical distancing which becomes a major concern in this pandemic era, as this situation might increase the risk of COVID-19 spread.

This uncertainty and the relationship between the process of arrival and operation makes the dynamics of service systems quite complicated. The traffic of health care is very difficult to determine as it is uncertain when people are ill or require health services. This significantly impacts the length of queues for health services at the hospital. With variations in patient arrivals at the service, it will certainly affect the performance and efficiency of existing medical personnel or workforce and affect patient satisfaction and comfort (Suryadhi and Manurung, 2009). This poses problems for health service, such as overtime at clinic sessions for physicians and nurses, and peak workloads for counter workers and pharmacists (Akinode and Oloruntoba, 2007). Given the concerns and adverse effects faced by patients due to inadequate healthcare queuing, a need for review and improvement of healthcare practices has become evident given these challenges.

One way to improve queuing process is by adopting scheduling system. An effective scheduling would prevent the disappointment of patients and doctors, and as such, is a significant determinant of treatment. However, patient's behavior is

unpredictable, there are still probabilities that they will come before or after the scheduled time. Arriving early may result in higher wait times and overcrowding in the waiting area. Patients' satisfaction with service may suffer as a result of this scenario, and clinic operating expenses may rise. Meanwhile, late attendance may add to the doctor's idle time and impair clinic efficiency. To reduce the risk of system disruption, it is important for the hospitals to design a proper estimation time scheduling by considering this factor.

Unfortunately, this queuing problem is also easily found in many hospitals in Indonesia. For example, in RSUD Haji Makassar, the time spends by a patient at the registration counter is 57.27 minutes (Wihdaniah *et al.,* 2018). In fact, after registering themselves, patients still have to queue for other processes. One of the possible causes is because there are still a few hospitals in Indonesia that have implemented a scheduling system through online registration. According to data from the Indonesian Directorate General of Health Services, there are 2,925 hospitals currently operating in Indonesia. However, there are only 485 hospitals in Indonesia that have implemented online registration based on websites, applications, via messages (SMS) and WhatsApp applications, as well as online registration through a computerized system (BPJS Kesehatan, 2018). In addition, not every hospital that have implemented online registration have also adopted scheduling system.

Therefore, this study is aimed to find a solution for minimizing the outpatient queuing process in the hospital in Indonesia. The focus of this study is determining inter-arrival scheduling with unpunctual patients to support the implementation planning of online registration in psychiatric department of hospital X. The observation will be conducted in the clinic under study to get more accurate data in analyzing and developing an improved system.

1.2. Problem Formulation

Based on the background, the problem that occurs in hospitals in Indonesia is that most hospitals are still struggling in facing the queuing problem that triggers patient distress and associated medical complications that can increase the cost of subsequent treatment and adverse health effects, and also make it impossible for patients to do physical distancing, as this circumstance may increase the risk of COVID-19 spread. So, the problems that can be addressed in this study are:

a. What are the deficiencies related to the existing queuing system in hospitals?

b. What is the possible improvement that can be implemented for minimizing the outpatient queuing process in the hospitals especially in Indonesia?

c. What is the optimized inter-arrival scheduling time for the clinic under study?

1.3. Research Objectives

The main goal of this study is to find a solution for minimizing the outpatient queuing process in the hospital. While the specific objectives are:

a. to identify the deficiencies related to the existing queuing system;

b. to analyze possible solution and develop an improved system;

c. to propose the optimized inter-arrival scheduling time for the clinic under study which the value might be used as the benchmark for another hospital in implementing scheduling system for minimizing the outpatient queuing process in the hospitals.

1.4. Research Limitations

The scopes of this research are:

a. the study uses the queuing discipline of the single-path model (M/M/1);

b. the data will be taken from hospital X as the sample;

c. the data will be collected externally by conducting physical observations;

d. the complexity of the model is limited to the capabilities of the software used.