The implementation of lean management in reducing waste in the emergency department

Rani Meidawati¹ | Merita Arini²,³

¹Master of Hospital Management, Post Graduate Programme, Universitas Muhammadiyah Yogyakarta, Bantul, Special Region of Yogyakarta, Indonesia.
²Department of Family Medicine and Public Health, School of Medicine, Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Yogyakarta, Bantul, Special Region of Yogyakarta, Indonesia.
³Sustainable Development Goals (SDGs) Center, Universitas Muhammadiyah Yogyakarta, Bantul, Special Region of Yogyakarta, Indonesia.

Abstract Emergency Department (ED) is the frontline unit of the hospital which becomes the entry door for emergency patients who need quick and efficient treatment. Prolonged doctor's response time results in complaints, patients feel neglected, and affect the quality of service in the emergency room. This study aims to identify waste in emergency department services and to formulate recommendations for improvement. Methods used in this study is action research. , n=10; emergency room patients/caretakers, n=10. Data were taken through in-depth interviews, data was recorded, transcribed verbatim, and content analysis was carried out. The results of this study found 4 themes; literacy and expectations of health service of waste; complexity of inhibitory factors of services; as well as potential service improvements from supporting factors. There are four types of waste including waiting time, overprocessing, motion, unnecessary inventory, and the trial carried out was shown that it can shortened the doctor’s response time by average of 1 minute 29 seconds 82 . Lean implementation is able to found waste that can be eliminated. It takes commitment from hospital staff and management to always improving and continuously evaluating the service system.

Keywords: lean, response time, waste

1. Introduction

Every healthcare facility must provide emergency services, and hospitals are among the facilities providing emergency services. The emergency department (ED) is the heart of a hospital and the entry door for patients who will receive health services at the hospital in an emergency (Improtta et al., 2018; Kementerian Kesehatan RI, 2018, p. 47). One of the functions of organizing the emergency room is to provide emergency services that aim to treat acute conditions, prevent disability, and save patients' lives (Ministry of Health of the Republic of Indonesia, 2018, p. 47). Patients who access hospital services through the emergency room are patients who need immediate treatment or are in an emergency. Procedures carried out while the patient is in the emergency room, such as initial action, triage and other procedures, take a long time (Yulianginsih et al., 2022). The bustling patients, overcrowding and excessive waiting time are very identical to those of EDs, which could lead to delays in service that could result in patient mortality and reduced efficiency in utilizing existing resources, which has an impact on patient and staff satisfaction (Improtta et al., 2018).

Overcrowding in the emergency room also has an impact on hospital occupancy; if this issue is not resolved, it will become a patient safety concern. According to a study by the Korean Society of Emergency Medicine, an increase in the length of stay (LOS), medical errors, and the number of patients at their own request and an increase in the number of patients who died were closely related to hospital occupancy rates (Mckenna et al., 2019). A 2019 2019 study of the Indonesian Hospital Association on Patient Safety Incidents reported 7465 cases: 2.3% (171) died, 1.7% (80) had serious injuries, 5% (372) had moderate injuries, 16% (1183) had minor injuries, and 75% (5659) had no injuries (Daud, 2020). The findings of a review of seven feasibility studies from Do Nascimento et al. (2021) suggest that boarding in the ER increases the occurrence of unfavorable outcomes and may be associated with increased incidence and adverse events. In addition, response time is related to patient satisfaction. Arya's research (2023) revealed that there is a relationship between response time and patient satisfaction in the emergency room of Bhayangkara Hasan Hospital Palembang (Do Nascimento et al, 2021; Arya, 2023). Two Johannesburg State Emergency Departments (JHB) reported that adverse events were also experienced by the health profession over a 12-month period. The top three adverse events experienced in these two emergency departments, namely, related to resources (lack of inpatient beds and shortage of health workers), medicines and medical equipment, play important roles in the quality of health care provided. In addition, fewer doctors than nurses reported adverse events...
In the private hospital emergency room, there were three patient safety incidents from October to December 2023, namely, patients who were diagnosed with reactive B20 syndrome and had DPJP advised to be referred but had to enter the ward first; critical value laboratory results reported in the emergency room were not conveyed to the inpatient staff, resulting in delays in therapy and DPJP advice; and patients from the ER-pro surgery had not attached an identity bracelet, detected when the patient arrived at the inpatient ward.

Health services in the emergency room are under constant pressure, and the service process can be affected by many factors. A long service flow starting from triage, examination and treatment by doctors; additional examinations; and patient transfers have made hospitals strive to provide effective and fast services so that the flow of emergency room services remains unhindered (Al Owad et al., 2018). The quality of health services greatly influences the quality of hospitals because safe, high-quality and standardized health services are the right of everyone who accesses health services (Permenkes, 2022a). The complexity of health service management may affect desired health outcomes (Pellini et al., 2021). An effective method is needed to overcome the prolonged waiting time in the emergency room. Lean management is an approach adopted by many hospital organizations in the manufacturing industry as an attempt to improve service effectiveness and efficiency (Firman, 2019; Graban, 2018).

In general, the principles of lean management include eliminating all existing waste, solving problems from the bottom, learning from/advanced, improving capabilities continuously, enhancing quality, and involving staff to prevent and stop an error or incident and to find a solution (Breen et al., 2020). Lean management enables better performance and improves efficiency and service quality while reducing bottlenecks, imperfections, and waiting times. Moreover, lean thinking refers to a management philosophy that aims to eliminate excessive and unnecessary effectiveness. Lean management relies on two pillars: value creation and waste elimination. Lean systems encourage operators to question the performance and management of companies or hospitals, aiming to continuously improve operational processes and customer satisfaction through the provision of quality services at lower costs while eliminating waste (Pellini et al., 2021). Lean management methods can involve tools that contain several components so that waste can be evaluated from the patient admitted to the emergency room until the patient is finally discharged from the emergency room. The outcome of the lean method itself depends on the commitment of the staff to implementing the tool in the ED (Breen et al., 2020).

The emergency room is synonymous with overcrowding and excessive waiting times, which subsequently have a significant impact on delays in service, increasing patient mortality and inefficiently using resources, which ultimately harms patient and staff satisfaction (Improta et al., 2018). The quality indicator of the emergency room includes the timeliness of patient transfer from the emergency room to the inpatient room, which is < 2 hours. Hospitals in Indonesia, which have various limitations, generally have difficulty reaching these indicators. The risk to patient safety also increases if the patient waits too long in the emergency room. Therefore, this study aimed to identify waste generated by using lean management in the emergency room, identify supporting and inhibiting factors in the emergency room response time, and formulate a service change process to reduce queue waste in the ED. This research can also provide an overview of how lean management describes the waste generated during the long process of service and identify the types of waste that should be eliminated so that the flow of services becomes more efficient and all resources in the emergency room can be optimized.

### 2. Materials and Methods

#### 2.1. Study setting

This study was conducted at Private Hospital in central Java, which is located in the subdistrict of Tasikmadu, Karanganyar Regency, Central Java. This hospital is a faith-affiliated hospital and not profit oriented. The hospital is a nonteaching type C health facility that has been accredited by the Hospital Accreditation Commission (KARS) and holds a perfect score. The data were obtained from the ED. The total number of hospital beds is 189. There were 13 specialists and 17 general practitioners. The average number of ED visits hovers approximately 73 patients per day. Here, we present the bed occupancy rate (BOR) in the ED in the third trimester between July and September of 2023 (table 1).

### Table 1 Bed occupancy rate (BOR) in the ED from July to September 2023.

<table>
<thead>
<tr>
<th>Month</th>
<th>Noninsured inpatient</th>
<th>Government-insured (BPJS) inpatient</th>
<th>Noninsured outpatient</th>
<th>Government-insured (BPJS) outpatient</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>July 2023</td>
<td>94</td>
<td>713</td>
<td>566</td>
<td>720</td>
<td>2093</td>
</tr>
<tr>
<td>August 2023</td>
<td>63</td>
<td>761</td>
<td>639</td>
<td>696</td>
<td>2159</td>
</tr>
<tr>
<td>September 2023</td>
<td>87</td>
<td>803</td>
<td>678</td>
<td>778</td>
<td>2342</td>
</tr>
</tbody>
</table>

#### 2.2. Study Design and Data Collection

The method used in this research is action research, and the extent of partner involvement in this research is in cooperation (Waterman, 2001; Utarini, 2021). The four stages of action research constitute the reference framework for the
research, which includes diagnosing action, planning action, taking action, and evaluating action and are described as follows (Waterman, 2001; Utarini, 2021):

The sampling technique used in this study was purposive sampling, with the subjects of 10 health care providers (staff) from the ED and 10 service recipients (patients/families). The instruments used in supporting this study were human instruments (researchers), interview guidelines, cellphones, notebooks and stationery. The data generated from the interviews were analyzed via content analysis. To test the reliability of this research, we used two methods, i.e., triangulation and member checking.

2.3. Diagnosing Action

The diagnostic stage was conducted to collect initial data, which aimed to identify problems. Data collection was conducted via in-depth interviews with two groups: health service providers (purposive sampling: criterion sampling) and health service recipients (patients/families) selected via consecutive sampling. Each group consisted of 10 respondents. The caretakers/patients who were interviewed were those who came during the visiting hours of sedan patients and hospital staff when they were able to take a break from their services; therefore, they did not interfere with the health service activities in the hospital. At this stage, problem analysis and mapping are carried out so that problems in the emergency room of the private hospital can be described. Problem identification is performed by making verbatim transcripts, and content analysis is carried out by collecting, reducing, verifying, and presenting the data descriptively and by drawing conclusions.

2.4. Planning Action

The planning stage is carried out to formulate a design for service flow that will be piloted at the later stage by involving emergency room HCPs. Participants arranged physician assistance flow designs tailored to the needs and characteristics of the emergency room of the private hospital.

2.5. Taking action

In the taking action stage, a trial was conducted using the new flow chart that was previously designed. The flow test was conducted on 10 patients who visited during peak hours and were selected by consecutive sampling and the doctor’s response time using a stopwatch.

2.6. Evaluating Action

The implementation of the physician assistance flow was evaluated to identify barriers, improve and maximize supporting factors, and solve problems identified during the implementation of the physician assistance flow. We analyzed whether the flow of physician assistance could be established as a standard operating procedure. A further evaluation was conducted to analyze whether the standard operating procedure is usable and safe for services in hospital emergency departments.

2.7. Participants

The subjects of this study were divided into two groups. The first group comprises ten healthcare professionals working in the ED. The second group included ten patients or their families who were receiving care in the ED. The trial implementation of doctor assistance was conducted by measuring the care time of ten patients. This trial was performed in a high-volume time frame, which hopefully reflects the reliability of the doctor’s assistance.

Purposive sampling was used as the sampling technique (Utarini, 2023) based on quota sampling due to the ease of finding and approaching the subjects of study. Moreover, judgment sampling was used to evaluate the healthcare professionals, whose design was purposefully chosen based on the goal of the study, which requires subjects who have a high understanding of the objective.

2.8. Data analysis

The data were analyzed using content analysis techniques by collecting, reducing, verifying, and analyzing the data and presenting the data descriptively. The steps of the data analysis are as follows:

1. Data collection: Data were collected through in-depth interviews, observation, and documentation.
2. Data Reduction: In the scheme, the transcripts are processed by rereading or repeating, and coding or coding is subsequently carried out by giving symbols or signs according to the themes of the groups of words/sentence in the transcript. The transcripts are subsequently collected/grouped in categories, after which the connections of each of these categories are analyzed.
3. Data display: The data are presented as brief descriptions in the form of narratives.
4. Conclusions: Statements and research aims compared to research purposes.
2.9. Trustworthiness

Data triangulation is used as a tool to test the credibility of this study, which aims to verify information, instructions, and explanations from several sources of information in different ways and at different times. Some of the triangulation methods used are as follows:

Source triangulation is carried out to verify, compare, review, and validate the trustworthiness of the information from several different sources. The triangulation technique applied in this study was used to verify the data that were obtained through key triangulation. The researchers used key triangulations and included ED health workers, patients, and families of patients who became respondents.

Member checking is carried out to ensure accurate data collection in qualitative research. The researcher explained to the respondent about the findings or results of the analysis of the diagnosing action stage. At this stage, the researcher conducted an in-depth interview with the respondent, namely, the supervisor of the emergency room at Private Hospital. This was done to confirm the findings and deepen the results of the research analysis.

3. Results

The results of this study are described in four stages of action research as follows:

3.1. Diagnosing Action

In the first stage, which involved diagnosis, the researcher identified problems based on the perspectives of the family/patient and the workers in the hospital, especially in the emergency room; thus, the problems identified can be viewed from different points of view (from the perspectives of staff/officers and recipients of health services).

Table 2 shows that patient/family respondents are dominated by women (60%). Based on age, most of them are 41-50 years old (40%), and the employment category is dominated by housewives (40%). At the time of the interview, the longest waiting time in the emergency room was 180 minutes or 3 hours. The length of time patients spend waiting for a doctor’s intervention is dominated by 5-10 minutes, and 10% of patients have to wait more than 10 minutes to wait for the doctor’s intervention. The dominance of waiting time used by patients to receive treatment from nurses is 0-5 minutes or 40% of the total number of patient/family respondents. The patients’ characteristic data are as follows:

<table>
<thead>
<tr>
<th>Variables</th>
<th>Category</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>&lt; 20 years</td>
<td>0</td>
<td>30%</td>
</tr>
<tr>
<td></td>
<td>21-30 years</td>
<td>3</td>
<td>30%</td>
</tr>
<tr>
<td></td>
<td>31-40 years</td>
<td>3</td>
<td>30%</td>
</tr>
<tr>
<td></td>
<td>41-50 years</td>
<td>4</td>
<td>40%</td>
</tr>
<tr>
<td></td>
<td>&gt;50 years</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td>Men</td>
<td>4</td>
<td>40%</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>6</td>
<td>60%</td>
</tr>
<tr>
<td>Job</td>
<td>Students</td>
<td>1</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>Housewife</td>
<td>4</td>
<td>40%</td>
</tr>
<tr>
<td></td>
<td>Laborer</td>
<td>2</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>Private</td>
<td>3</td>
<td>30%</td>
</tr>
<tr>
<td>Length of time in ED (during interview)</td>
<td>&lt; 30 min</td>
<td>3</td>
<td>30%</td>
</tr>
<tr>
<td></td>
<td>30 min</td>
<td>3</td>
<td>30%</td>
</tr>
<tr>
<td></td>
<td>60 min</td>
<td>1</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>120 min</td>
<td>2</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>180 min</td>
<td>1</td>
<td>10%</td>
</tr>
<tr>
<td>Length of time waiting for a doctor (ED in charge)</td>
<td>5-10 min</td>
<td>5</td>
<td>50%</td>
</tr>
<tr>
<td></td>
<td>11-15 min</td>
<td>1</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>Handled immediately</td>
<td>3</td>
<td>30%</td>
</tr>
<tr>
<td></td>
<td>30 min</td>
<td>1</td>
<td>10%</td>
</tr>
<tr>
<td>Length of time waiting for nurses</td>
<td>0-5 min</td>
<td>4</td>
<td>40%</td>
</tr>
<tr>
<td></td>
<td>6-10 min</td>
<td>1</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>11-15 min</td>
<td>2</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>Handled immediately</td>
<td>3</td>
<td>30%</td>
</tr>
</tbody>
</table>

The diagnosing stage in health care providers was carried out by in-depth interviews with private hospital emergency room staff. Interviews were conducted with 10 emergency room staff members. The respondents had different backgrounds and consisted of medical and nonmedical staff. With diverse characteristics, different work experiences can provide varied
perspectives and input for the results of this study. The educational category also varies from elementary school to medical doctor. Staff working in the emergency room is dominated by the length of time working in the emergency room unit (as much as 50%), the length of time practising the profession (as much as 50%), and the education of staff in the emergency room (as much as 60%). The data characteristics of the staff who participated as respondents in this study are presented in Table 3.

### Table 3 Characteristics of Emergency Room Staff Respondents at Private Hospital.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Category</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td>21-30 years</td>
<td>5</td>
<td>50%</td>
</tr>
<tr>
<td></td>
<td>31-40 years</td>
<td>4</td>
<td>40%</td>
</tr>
<tr>
<td></td>
<td>41-50 years</td>
<td>1</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>&gt;50 years</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td>Men</td>
<td>5</td>
<td>50%</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>5</td>
<td>50%</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td>Professional</td>
<td>6</td>
<td>60%</td>
</tr>
<tr>
<td></td>
<td>D3 Medical Records</td>
<td>2</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>Senior High School</td>
<td>1</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>Elementary School</td>
<td>1</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Job</strong></td>
<td>Doctor</td>
<td>3</td>
<td>30%</td>
</tr>
<tr>
<td></td>
<td>Nurse</td>
<td>3</td>
<td>30%</td>
</tr>
<tr>
<td></td>
<td>Registration</td>
<td>2</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>Laborer</td>
<td>2</td>
<td>20%</td>
</tr>
<tr>
<td><strong>Length of time working in ED</strong></td>
<td>&lt; 2 years</td>
<td>2</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>2-5 years</td>
<td>5</td>
<td>50%</td>
</tr>
<tr>
<td></td>
<td>6-10 years</td>
<td>3</td>
<td>30%</td>
</tr>
<tr>
<td></td>
<td>&gt; 10 years</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Length of time working in this profession</strong></td>
<td>&lt; 2 years</td>
<td>1</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>2-5 years</td>
<td>3</td>
<td>30%</td>
</tr>
<tr>
<td></td>
<td>6-10 years</td>
<td>5</td>
<td>50%</td>
</tr>
<tr>
<td></td>
<td>&gt; 10 years</td>
<td>1</td>
<td>10%</td>
</tr>
</tbody>
</table>

The results of interviews with patients/families and health workers at the diagnosing stage revealed 4 themes (Table 4): 1) literacy and expectations from health service recipients; 2) types of queuing waste; 3) complexity of service constraints; and 4) potential for service improvement based on supporting factors.

### Table 4 Theme and Category of Diagnosis Stage.

<table>
<thead>
<tr>
<th>No</th>
<th>Theme</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Literacy and expectations from the health service recipients</td>
<td>Low health literacy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Expectations for service improvement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Emergency service needs</td>
</tr>
<tr>
<td>2</td>
<td>Types of waste</td>
<td>Waiting time</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Motion</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Overprocessing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unnecessary Inventory</td>
</tr>
<tr>
<td>3</td>
<td>The complexity of service constraints</td>
<td>Obstructed patient’s flow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Infrastructure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Workload and number of human resources</td>
</tr>
<tr>
<td>4</td>
<td>The potential for service improvement based on supporting factors</td>
<td>Communication</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Commitment of healthcare workers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hospital Information System</td>
</tr>
</tbody>
</table>

3.1.2. Analysis of the Emergency Room Overview of Private Hospital

a) ER’s service pathway

The pathway of ED services begins when the patient arrives, triage is performed, and the health worker is assigned a code based on the patient’s condition. After triage, the patient’s family registers according to the triage findings, and some patients are directed to outpatient clinics or to inpatient care. For patients who receive further treatment in inpatient care, further actions are taken according to the patient’s needs. Health workers will consult with the doctor in charge to fill out medical records and conduct further examinations. After the examination is complete and the patient’s condition is stable, the patient can be transferred to the inpatient room (figure 1).
Figure 1 Services’ pathway in the Emergency Room of Private Hospital.

b) Value Stream Mapping (VSM)

Figure 2 VSM of Emergency Room Services of Private Hospital Based on Estimated Service Time.

Description:
LT: Lead Time
WT: Waiting Time
CT: Cycle Time
VA: Value added
NVA: Nonvalue added

Figure 2 shows that the total value-added time in the service process emergency room is 104 minutes or 1 hour 44 minutes, and the total nonvalue-added time is 96 minutes or 1 hour 36 minutes. The activities that are not value added are time spent waiting for the service process or action, as well as waiting to be transferred or allowed to be discharged from the hospital. Nonvalue-added activities are included in the type of waste and will slow down the production process.
The causes of waste from human factors in this study were caused by forgetting to prescribe drugs so that the drugs could not be given on time and lack of human resources doing the services so that the workload increased and piled up. However, from the method factor, the medical records recording system is still performed manually, and the service flow is quite long.

Environmental factors are caused by an unsystematic layout and limited space. Unsystematic layouts result in more movement and inefficiency, thus increasing processing time. While the equipment factor is damaged tools, out of sterile tools, an unsystematic tool layout leads to a longer service time.

3.1.3. Themes of Research Results

a) Theme 1: Literacy and Expectations of Healthcare Patients
This theme consists of 3 categories: low health literacy, expectations for service improvement, and emergency service needs.
1) 1st category: low health literacy
In general, it was found that the literacy of health service recipients (patients/families) about health is very low, and the answers given may have a positive bias where their answers or statements tend to be positive. Patients who come to private hospitals themselves cannot distinguish between emergency and nonemergency conditions; the reason for coming to the emergency room is to be treated immediately, and this is justified by the informant as follows:
"That is right (not being able to distinguish between emergency and nonemergency conditions), they want to be treated immediately, even patients who check up come to the emergency room because they want to be treated immediately." (Informant S8)

2) 2nd Category: Expectations for Service Improvement
In the 1st category, informants tended to provide positive information but also expressed their desire for improvements in the emergency room’s health services at private hospitals. Informant statements when asked to give feedback for the ED in the future, such as Patient 2:
"Even though..." (voice not heard clearly). If there are not enough nurses, maybe when it is crowded. When a patient is crowded, there must be noisy patients. That means more nurses must be added." (Informant P2)
"The service (must) be better." (Informant P1)

3) 3rd Category: Emergency Service Needs
The interview results also showed that not all patients admitted through the ER experienced an emergency. Many false emergency cases could increase the number of visits to the ER. This greatly affects or increases the number of visits to the emergency room, which should be specific to patients in an emergency. Some false emergency cases that are often encountered include diarrhea, URI, pain, and wound control. The reason why patients choose to visit the emergency room is that their symptoms can be treated immediately.

“Maybe if you can say a lot, diarrhea for only one day without dehydration, because there are complaints of pain, taken to the emergency room. Then, the URI common cold for only one or two days, and the condition is good. Wound control is also sometimes followed up in the emergency room because initially, the emergency room was handled in the emergency room, and patients were advised to visit the nearest facility for follow-up but still came to the emergency room again; we could not refuse so we handled it too.” (Informant S8)

b) Theme 2: Types of Waste

The results of in-depth interviews revealed four types of waste, i.e., waiting time, overprocessing, motion, and unnecessary inventory. In the patient/family group, two categories of waste were found, namely, waiting time and overprocessing. In the health worker group, four types of waste were found, i.e., waiting time, overprocessing, motion, and unnecessary inventory, which can be seen briefly in the figure below:

![Types of Waste in the Emergency Room of Private Hospital](image)

More than one problem was found in one type of waste identified. Table 5 describes several problems related to waste in the emergency room of private hospitals.

<table>
<thead>
<tr>
<th>Types of Waste</th>
<th>Problem Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waiting</td>
<td>1. Waiting for the nurse's intervention</td>
</tr>
<tr>
<td></td>
<td>2. Waiting for emergency room doctor's treatment</td>
</tr>
<tr>
<td></td>
<td>3. Waiting for consultation with the doctor in charge</td>
</tr>
<tr>
<td></td>
<td>4. Waiting for patient transfer to inpatient care</td>
</tr>
<tr>
<td>Motion</td>
<td>1. Unsystematic room layout resulting in a lot of unnecessary movement.</td>
</tr>
<tr>
<td></td>
<td>2. Damaged and malfunctioning infrastructure that slows down movement.</td>
</tr>
<tr>
<td>Overprocessing</td>
<td>1. Explain the patient’s condition to the family over and over repeatedly</td>
</tr>
<tr>
<td></td>
<td>2. Explaining the process of BPJS service repeatedly</td>
</tr>
<tr>
<td></td>
<td>3. Explaining bed availability repeatedly</td>
</tr>
<tr>
<td>Unnecessary Inventory</td>
<td>1. Run out of medicine</td>
</tr>
<tr>
<td></td>
<td>2. sterilized tool is out of stock</td>
</tr>
</tbody>
</table>

1) 1\textsuperscript{st} Category: Waiting Time

Waiting is a type of waste that can be found in almost all patient/family informants. Patients were asked to wait for a nurse or doctor in charge of the emergency room, wait for the doctor in charge, or wait when waiting to move to the inpatient care unit. When waiting for a nurse to take action on a patient in the emergency room, it takes 3 to 15 minutes for the patient to progress. Only 30% of patients who arrive in the ER are immediately treated; for example, patients who have accident cases or patients who are in labor. Some patient statements regarding the length of time waiting for the nurse to take action:

“Approximately 10 minutes to 12 minutes.” (Informant P1)
"10 minutes to 15 minutes." (Informant P2)

The time patients spend waiting for the duty doctor to take action in the emergency room is 5 to 15 minutes. Ten percent of the total patients had waited for 30 minutes and had not been treated by a doctor. Informant P8 was in the emergency room for half an hour but was not treated by a doctor; she was treated by only a nurse. However, the wait time for patients to wait for the doctor in charge is longer than that for patients to wait for the doctor in the emergency room. When waiting for a doctor’s intervention, some patients understand that the doctor must prioritize patients who are in a more urgent state.

In contrast to health service recipients (patients/families), whose waiting time is approximately 0-15 minutes, the time needed for health service providers to receive a doctor’s intervention is less than 5 minutes. The duration of action of some informants can increase depending on the state of the emergency room, the need to perform additional examinations on other patients, the number of patients, the number of patients arriving at the same time, and the presence of other emergency patients who need immediate treatment.

"Because of the long queue." (Informant S6)

"It depends on the patient; if there are many patients, it is likely that the time required is also quite a lot. However, if the emergency room is low, the response is usually fast." (Informant S4)

"Due to the condition of the emergency room, it is very crowded, and there are some patients who need to be treated first or maybe the patient's condition is more urgent or previously examining other patients or consulting with specialists." (Informant S2)

2) 2nd Category: Overprocessing

Overprocessing waste occurs when the same activity is performed or when the same thing is performed more than once or repeatedly. This could occur when the patient’s illness is repeatedly explained to the patient and family. The flow of using BPJS was also explained.

"BPJS process." (Informant P6)

"Usually, I explain about the patient's illness and the action plan that I will do, and there may also be results of any supporting examinations that I need to explain. For example, sometimes there are several families who visit, and they do not come at the same time, so I need to explain several times." (Informant S2)

Doing the same thing repeatedly is time consuming and requires a lot of energy, which could have been used to do other work. Staff or officers at the emergency room of Private Hospital sometimes have to carry out the same work repeatedly. For example, explanations should be provided to patients and families regarding BPJS, disease status, bed availability, etc. This happens because the same question is asked by different families of patients so that officers have to repeat the answers that have been explained previously.

"Maybe what I explain most is when the patients ask if there are any beds available, when to move to their ward, maybe some of that." (Informant S5)

"I still have to explain that the room currently being used is still on hold. Because it is just in the process of cleaning or there are patients who have not been discharged yet... " (Informant S9)

Repeated explanations about hospital administrative procedures, for example, for BPJS patients regarding procedures for changing classes and traffic accident patients who need reports from other related agencies; Sometimes the patient or family has received an explanation, but if another family member comes to help with letters and other matters, the patient and family will ask the staff again, so they have to explain repeatedly. Furthermore, because of the availability of beds, patients can be transferred from the emergency room to the inpatient care unit. When the inpatient room is full, it takes a long time to transfer the patient. Patients and families often ask repeatedly about their room and when they will be transferred from the emergency room.

"I have explained many times, especially for BPJS patients, about upgrading or downgrading classes, room fees, surgery fees and room facilities. (Informant S6)

"Usually, there is something that needs to be explained many times in regard to this matter; right, if a patient has a traffic accident, it usually requires a police report. Usually, that is what we have to explain many times so the patients can understand the flow and procedures. However, a form has been provided from the emergency room to make it very easy." (Informant S3)

3) 3rd Category: Motion

The room’s unsystematic layout allows staff to perform their work by making excessive movements that are not necessary. Excessive movement can lead to increased processing time. Damaged supporting facilities such as jammed trolley wheels could worsen the amount of rapid movement.

"If the layout is efficient, maybe it is just the facilities like the trolley that can hinder. Therefore, the lack of speed, like the trolley wheels, is also not good, like that ma'am." (Informant S9)
Thus far, there was time when we often look for equipment, but yes, thus far, there are no obstacles." (Informant S9)

"Thus far, there have been no obstacles." (Informant S1)

4) 4th Category: Unnecessary Inventory

Medicine and sterile equipment removed from stock when they are used are very harmful to all units, including the ER. The emergency room requires rapid movement and a quick response in several emergency cases. There are several explanations for why the stock of drugs is empty because they are unavailable from distributors, because of national drug stock shortages, because of the high number of patients and because they are out of stock. The shortage of sterile medical devices has also been experienced in the emergency room because of the use of the CSSD unit or unit for sterilization. Some of the informants described their experiences with the shortage of sterile medical equipment:

"As for the stock of emergency room drugs, a few times…there are some drugs that are not available. For the reason, as far as I remember from the pharmacy, when I asked, the stock was empty in the warehouse or there was shortage from the distributors." (Informant S1)

"We have, usually due to stock shortages from the pharmacy, like that. Or national stock shortages. For simple tools such as cannula runs out, IV catheter runs out, that is usually because the flow of its use is high so it has not been restocked yet." (Informant S3)

"Once ma’am, the cause may be that the doctor or our friend forgot to prescribe. To overcome that, we asked the pharmacy first, like that ma’am." (Informant S9)

"I have, but not often. Maybe the cause is from the CSSD team that hinders the delivery of the tool." (Informant, S5)

"It was once like that, maybe because the central surgical installation also troubled because the sterile equipment there was also piling up." (Informant 4)

c) Theme 3: Complexity of Service Constraints Factors

Some informants provided information about obstacles that are often found in the emergency room, namely, cohesiveness or teamwork, infrastructure, lack of human resources, limited beds, incomplete tools, damaged tools or equipment, and stock vacancies; these obstacles can also interfere with service performance in the emergency room. Theme 3 includes three categories, i.e., patient exchange flow, infrastructure, and human resources.

1) 1st Category: Patient flow/exchange

A full bed is also an obstacle that is often found. Making the flow of patient exchange longer and more difficult could lead to patient buildup in the ER.

"These obstacles, usually like this; when the inpatient room is full, the ward is full. Patients are usually in the emergency room, so patients accumulate in the emergency room. For incoming patients, the flow of services is usually somewhat reduced. This is because of the limitations of the new patient's ability to bed earlier. The duration of counseling to the doctor in charge of patients who night is usually constrained because we need to wait for the doctor in charge, as a result of which patients cannot be transferred; this is usually an obstacle. However, the others are already good." (S3 informant)

2) 2nd category: Infrastructure facilities

Infrastructure facilities become obstacles that often occur, which can disrupt services and danger service recipients, especially emergency patients. Some infrastructure may need repair or refurbishment. Facilities and infrastructure can support the smooth operation of services in the emergency room. With infrastructure that is able to support emergency room services, the performance of the emergency room team will also be much better at providing services to patients, allowing patient satisfaction to increase.

"The obvious obstacles are that the tools are not complete. Both tools in examination and in emergency therapy." (S2 informant)

"For tools like, what is it, and the gurneys need to be renewed, because sometimes we also have shortages and gurneys need to be renewed because many are damaged." (S4 informant)

3) 3rd Category: Workload and Human Resources

According to the informants, a lack of human resources is also an obstacle in the emergency room. A large workload, piled up patients, and limited manpower cause emergency room staff to tend to be more easily exhausted and stressed, which can result in a decrease in service quality and will have an impact on patient safety.

"There are many patients, but there are fewer nursing personnel." (S7 informant)

"The obstacles that can reduce performance efficiency in the emergency room are because the workload and reality are not appropriate. Therefore, to computately exceed the capacity of the workers." (S8 informant)

Calculation of human resource needs of Private Hospital 2023. The model of approach for calculating the number of required nurses was based on the standard formula for nursing professionals published by the Health Department of
Indonesia in 2005. While an ED requires 26 nurses, only 17 are currently available; therefore, eight additional nurses are still necessary.

d) Theme 4: Potential Service Improvements from Supporting Factors

Some supporting factors and inputs to improve the performance of emergency room services from the informant’s point of view include communication, additional human resources, limits on waiting for patient transfer, and teamwork. The informants stated that communication and teamwork in the emergency room became the most basic things for staff comfort and smooth service. The categories in this theme are divided into four categories: communication, HR, patient transfer waiting time limits, and hospital information systems.

1) 1st Category: Communication

Communication is one way to reduce misunderstandings between fellow workers, and communication aims to reduce patient safety incidents due to misunderstandings between workers, increase cohesiveness and maximize teamwork.

"Maybe maintain mutual communication between doctors, nurses and workers so that later they can provide maximum service." (S5 informant)

"Maybe being much more compact in teamwork can help." (S6 informant)

"Yes, maybe it was just now that the person concerned should remain compact and solid, like that, ma'am. Enough." (S9 informant)

2) 2nd Category: Commitment of Health Workers

One of the supporting factors for emergency room services is the addition of human resources; because emergency room staff feel that to meet the quality of emergency room services, human resources must still be added. The addition of staff at the emergency room of a private hospital truly needs to be considered for the comfort and smooth operation of health services in the emergency room. This is one of the points that stands out during in-depth interviews. A lack of human resources in the emergency room can hamper service, and other impacts of less than optimal service due to lack of human resources, quality of service and patient safety, can become very risky. A high workload is needed because you have to serve many patients and need fast service. Several services in the emergency room unit are unique because they require accurate and quick action because the emergency room is intended to serve as an entrance to emergency services.

"For staff, maybe it can be added because considering the emergency room at Private hospital is quite crowded and the staff, I think it is not balanced with the number of patients who come." (S1 informant)

"Actually, it depends on the situation, but if, for example, the patient’s condition is very crowded, in my opinion, the number of doctors is only one person, which is quite difficult. Therefore, if possible, the number of general practitioners is at least two, but actually, if the emergency room condition is ordinary, standard or even quiet, one doctor is enough." (S2 informant)

3) 3rd Category: Hospital Information System

Information on the transfer of patients to the inpatient unit is also a supporting factor for smooth service in the emergency room. Limitations in waiting for DPJP and patient transfer time strongly affect the flow in and out of patients, so there is no buildup in the emergency room.

"The efficiency of moving to ward also need to be improved. I do not know if it is possible to arrange for patients in the ward to go home early so that patients, especially those morning patients who are very crowded, can move to the ward faster. Yes, so that performance in the emergency room is also more efficient and not hampered." (S2 informant)

"The input, it is like this. In my opinion, yes, there must be a limit to waiting, usually the time for the doctor in charge of patient consultation, for me personally. Usually, the cutoff time in the emergency room is defined as the duration, 6 hours or how long. For example, you have not... or whether the patient should be moved to a ward or should already have a regular inpatient room. That is it, the others are good." (Informant, S3)

3.2. Planning Action

After going through the diagnostic stage, the planning stage continued to formulate the flow of doctor assistance. The main priority of the team formulating the flow of physician assistance is to reduce the waiting time (response time) of doctors during patient treatment in the emergency room to avoid emergency patient safety incidents that are not handled immediately. For the service stages to be well organized, the fastest solution that can be done immediately is the creation of a doctor’s assistance flow as a reference for the emergency room team of private hospital.

The Formulation Team of Doctor’s Assistance Pathway comprises indicators of needs in accordance with the characteristics of the emergency room of Private Hospital in accordance with the diagnostic results. There are two schemes
used in the draft procedure: doctor assistance, namely, if patients come together in large numbers of more than 5 people and if the bed/emergency room bed is full and patients start arriving. Doctors and assistance staff are planned in this Doctor Assistance Flow Plan by using additional staff from inpatient care. Doctors on duty in the ER can contact doctors in inpatient care to help with services in the ER.

3.3. Taking action

At the taking action stage, a trial of the doctor’s assistance pathway was carried out, which had been designed or prepared previously at the planning stage to be recommended to become the SOP (Standard Operating Procedure) of the hospital. The trial was conducted at the emergency room of Private Hospital. This trial was conducted on one group of 10 people, and the response time of the emergency room doctor was measured using the doctor’s assistance pathway. The trial will be conducted for one day on June 6, 2023, from 11.00-14.30 WIB. A trial of the doctor’s assistance pathway is carried out when patient visits the emergency room are crowded; this process is performed so that the flow of doctor assistance is tested for its ability, which is in accordance with the need to become the recommendation of the SOP and the development of the SOP, which is intended for when patients are crowded in the emergency room. Table 6 shows the doctor’s response time after applying the doctor’s assistance flow.

### Table 6 Response Time of the ER’s Doctor to the Doctor’s Assistance Pathway.

<table>
<thead>
<tr>
<th>No</th>
<th>Duration of Response Time of the ER’s Doctor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Minute</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
</tr>
</tbody>
</table>

The calculation of the doctor response time of the ER at Private Hospital by applying the doctor’s assistance pathway revealed an average time of less than 3 minutes, which was 1 minute 29 seconds 82 milliseconds (1:29:82). The longest follow-up time was 2 minutes, 50 seconds, 10 milliseconds (2:50:10), and the shortest follow-up time was 50 seconds, 56 milliseconds (50:56).

The results of the doctor’s assistance pathway, which was carried out in the emergency room, showed that the doctor’s response time decreased because the patients did not have to wait too long to receive a doctor’s treatment. This approach can overcome one of the wastes waiting, which is the main obstacle in the emergency room of private hospitals. This assistance pathway is highly worthy of recommendation as an SOP.

3.4. Evaluating Action

The results of the trial showed that the doctor’s assistance pathway can be applied, and the doctor is eligible to be recommended as an SOP in the emergency room of a private hospital. The use of the doctor’s assistance pathway when patients are crowded could shorten the waiting times. The time needed for doctors to handle patients becomes faster, at less than 3 minutes per patient; this is very useful for expediting the flow of services in the ER. The use of the doctor’s assistance pathway increases the efficiency of working in the emergency room. The diagram below shows the excellent improvement in response time for emergency room services.

The implementation of the doctor’s assistance pathway was evaluated to identify obstacles and resolve issues found during the implementation of the doctor’s assistance pathway. After testing the use of the doctor’s assistance pathway in the ER, several obstacles may be faced in the implementation of the doctor’s assistance pathway later if it has been determined to be an SOP, i.e.,

- a) Patient conditions in inpatient care are unpredictable, so the ward’s doctor cannot immediately move to the emergency room because he must address the patient’s emergency in the inpatient room.
- b) Patients cannot fully accept the idea that examinations are prioritized based on the level of emergency, not based on the order of patient arrival.
- c) ER quality indicators regarding the response time of the attending doctors are still assessed for all patients, not only for patients with red triage or for patients with emergencies who should receive treatment in <5 minutes.
- d) Many false emergency cases increase the number of visits to the emergency room. A fast track lane must be made to unravel false emergency patients.
Recommendations in the next stage are reviewed with the director, management, and hospital staff so that the doctor’s assistance pathway from this research can be applied as the hospital’s SOP so that services in the emergency room of the private hospital are maximized.

4. Discussion

The results of the diagnosing action stage revealed four types of waste in the emergency room unit of Private Hospital. The four types of waste are waiting, overproduction, motion, and unnecessary. Informants with family characteristics reported two types of waste, namely, waiting and overproduction. Moreover, four types of waste were found among the informants with staff characteristics, namely, waiting, overproduction, motion, and unnecessary inventory. Waste is an activity that is not valuable or helpful to the patient during the healthcare process; it is an action that is not beneficial in an activity and must be eliminated (Graban, 2018). The four types of waste found in this study, i.e., waiting, overprocessing, inventory, and motion, will be further elaborated upon in the following discussion.

4.1. Waiting

Waiting is a type of waste that often occurs in the emergency room. The patients were asked to wait for nurses to provide assistance, wait for doctors to provide treatment, wait for patient transfer time, or wait for the doctor in charge of patients to consult. The characteristics of the emergency room, which requires fast, responsive, and efficient service to aim for emergency services, can be disrupted if waiting is not handled properly. Emergency services are medical actions needed by emergency patients in the shortest possible time, aiming to save lives and prevent disability in individuals who receive services (patients) (Ministry of Health of the Republic of Indonesia, 2018, p. 47).

The time spent waiting for transfer to inpatient care in the emergency room of Private Hospital varies; at the time of the interview, the patient reported that he had been waiting 2 to 3 hours in the emergency room. The impact of this is that the flow of patients is not smooth, patients are built up in the emergency room, the limited capacity of the emergency room cannot accommodate the number of patients, and the limited human resources can interfere with services in the emergency room. This finding is in line with Yulianingsih’s research (2022). Her study suggested that the waiting time from the emergency room to inpatient care should be more than 2 hours and that the waiting time doubles when the COVID-19 pandemic occurs (Yulianingsih et al., 2022).

A long waiting time for patients to be hospitalized can result in the accumulation of patients in the emergency room, and stabilized patients should be immediately transferred to inpatient care. Because it is not yet possible to transfer patients to the ward, the patients who have been stabilized still remain in the emergency room. This is contrary to the main purpose of the emergency department, which is to receive, triage, stabilize, and provide acute health services for patients, including patients who need resuscitation and patients with certain levels of emergency (Australian College for Emergency Medicine, 2014). After triage and stabilization, patients should be immediately transferred to inpatient or other related units as needed so that the flow of patients to the emergency department becomes smoother.

False emergencies and the accumulation of patients in the emergency room could cause delays in accessing these services. Research by Ainiyah (2014) suggested that the phenomenon occurs in the emergency room of several hospitals.
because not all patients who visit the emergency room are life-threatening or emergency cases, but there are also false emergency patients (Ainiyah, 2014). This is different from the purpose of the emergency room, which should be intended for emergencies. According to the Minister of Health Regulation No. 47 of 2018, activities in the emergency room are generally performed as providers of emergency services, with the aim of dealing with or overcoming acute conditions or saving lives, preventing patient disability. The acceptance of referral patients with emergencies that require further services from other health facilities also occurs through the ER. The ER may also make referrals to other health care facilities if the hospital is unable to provide further services (Ministry of Health RI, 2018, p. 47).

4.2. Overprocessing

The types of overproduction that occur in the emergency room of a private hospital include giving the same explanation many times to the patient's family and asking for bed availability to the inpatient ward repeatedly. The impact of this waste is that it increases working time because the same action or thing is performed more than once or repeatedly. Yulianingsih's research (2022) also revealed waste overprocessing, where emergency room officers made calls to inpatient wards repeatedly asking about bed availability. Hospitals may be able to use computer-based information systems so that room availability can be monitored through the application. Like the research at the Air Force Hospital. Dr. M. Salamun, the information system regarding the availability of beds, still uses the telephone; after analysis and trials using a website that can be accessed by staff and the public, 80% of users feel that the website or application is better than using the telephone (Pujilestari et al., 2023).

When patients visit simultaneously or are crowded, limited human resources in the ER, staff or nurses are sometimes still required to perform administrative paperwork, which is another challenge in emergency room services. Other studies have shown that the same types of waste are present during processing, such as when nurses also work as administrators. Accordingly, there are no special officers who handle administration; additionally, many administrative points must be filled in while services and treatment must be provided to many patients, making it difficult to input data on time, write patient records in emergency rooms, receive and make calls (for consultation and transferring patients), and complete medical records (Nurhidayat et al., 2020; Wati et al., 2022).

4.3. Motion

Motion occurs due to making unnecessary movements and does not add value to the quality of service. The unsystematic and efficient room layout and medical equipment cause staff to make many unnecessary movements. Research by Wati et al. (2022) revealed that many movements are not needed because the layout of the emergency room requires renovation so that movement can be more efficient (Wati et al., 2022).

Emergency room staff sometimes have to search for equipment when taking action on a patient. This approach can extend the service time and become slightly inefficient. Some of the causes of workers making unnecessary movements include poor layout and housekeeping, disorganized workplaces and storage locations, unclear work instructions, unclear processes and material flows. Wasteful movements can disrupt and delay the start of work (Domingo, 2015).

4.4. Unnecessary Inventory

A lack of planning regarding the availability of drugs and sterile equipment can result in vacancies of drugs and equipment when they are used, which can affect emergency room services. This finding is in line with Domingo's theory (2015) that unnecessary inventory often occurs due to lack of planning and failure to match purchases with actual consumption or usage rates of certain resources. Another example is the storage of slow-moving and obsolete stocks, such as tools and materials (Domingo, 2015).

Zahrotun et al. (2018) reported that unnecessary inventory can be caused by the order system used for stock or inventory, a lack of production tools, or the underutilization of existing resources (Zahrotun & Taufiq, 2018). This happens in the emergency room of Private Hospital when the stock of sterile equipment has not been delivered or is still sterile while the equipment is about to be used; then, drug vacancies occur because the patients forget to prescribe the equipment or because the drug stocks are vacant in the hospital or nationally.

4.5. Constraints and Supporting Factors

Infrastructure facilities are a constraining factor that was often expressed by informants during in-depth interviews. Broken trolley wheels, damaged beds, damaged service support tools. Hospital service qualifications must be supported by the availability of buildings, infrastructure, and medical equipment, which meet the technical requirements for the provision of comprehensive individual health services in outpatient, inpatient, and emergency departments in accordance with hospital classification (Permenkes, 2022b). Patients in the emergency room require an efficient and fast response time aimed at improving their quality of life. One of the factors that can affect this response time is infrastructure and stretcher facilities (Hania et al., 2021).
The maintenance programme of medical facilities or equipment in hospitals must be continuous, uninterrupted and well managed to improve health services. Equipment maintenance can be divided into two categories: preventive maintenance inspection and corrective maintenance. Preventive maintenance inspections include planned and scheduled activities to ensure equipment function and prevent damage or failure; these inspections are usually scheduled and planned not only for maintenance but also for extending the life of the equipment. While corrective maintenance involves repair and troubleshooting, repair activities are carried out when problems occur during use (Permenkes, 2022b).

Hospital facilities and infrastructure may affect patient satisfaction when patients receive health services. Sharon’s study (2017) explained that facilities have a significant effect on service quality, facilities have a positive effect on hospital image, and facilities have a positive and significant effect on patient satisfaction (Sharon & Santosa, 2017).

In addition to facilities and infrastructure, limited human resources are also among the factors hindering the continuity of health services in the emergency room of private hospitals. Limited human resources and high patient visits can lead to increased staff workload, resulting in easy fatigue, stress and poor quality of service. Work stress is strongly related to the performance of nurses in carrying out nursing services (Fajirillah & Nurfitriani, 2016).

In addition to stress levels, the adequacy of human resources in the emergency room also affects response time, from the time the patient arrives until the patient is treated by health workers/doctors. One shift in the emergency room of a private hospital involved 1 doctor on duty, four nurses, and 1 staff member/laborer. According to a study by Manik (2020), response time can be decreased by expanding human resources in the emergency room. The response time decreased from 8.61 minutes to 4.14 minutes with the addition of 3 doctors and 6 nurses per shift (Manik & Simorangkir, 2020).

Based on the diagnostic results, a doctor’s assistance pathway procedure was formulated and recommended as an SOP to facilitate the performance and flow of services in the emergency room. The SOP (Standard Operating Procedure) is a tool/device containing instructions that must be carried out to complete certain routine work processes or the correct and best steps based on consensus/mutual agreement in carrying out various activities and service functions made by health care facilities based on professional standards (Permenkes, 2010).

The purpose of formulating SOPs is to provide assurance to patients to obtain medical services based on scientific values in accordance with the patient’s medical needs and to maintain and improve the quality of medical services provided by doctors. According to the Regulation of the Minister of Health of the Republic of Indonesia Number 1438/MENKES/PER/IX/2010 concerning Medical Service Standards, SOPs that have been prepared by medical staff at health care facilities must be approved by the head of the health care facility (Permenkes, 2010). This flow of physician assistance has been applied and has shown good results but has not been officially piloted as a hospital SOP. To recommend the doctor’s assistance pathway to be a hospital SOP, a trial will be carried out, and after examining the ability and benefits of the trial results of the doctor’s assistance pathway, the SOP will be resubmitted by attaching the results of the trial.

An SOP is a guide used to ensure that the operational activities of an organization or company run smoothly. The use of SOPs in organizations aims to ensure that the organization operates consistently, effectively, efficiently, systematically, and well managed to produce products that have consistent quality in accordance with predetermined standards (Soemohadiwidjo, 2014). Wahongan’s research (2021) suggested that SOP has a positive influence on employee performance. The SOP is an internal institutional performance assessment tool, especially in terms of clarifying the work processes within the organization, including the responsible work unit. The achievement of smooth operational activities and the realization of coordination, facilities and control minimize overlapping activity processes within the organization’s subsections (Taufiq, 2019).

The doctor’s assistance flow pathway, which is recommended to be an SOP (Standard Operating Procedure), can be used as an internal hospital performance assessment that is procedural in nature. The formulation of SOPs that are tested through the flow of physician assistants can be used as a benchmark for assessing the effectiveness and efficiency of hospitals in implementing service programs. Conceptual SOP is a step toward the desired processes. The desired processes are in the form of a system; service processes, in the form of activities; data flows; and work processes. An SOP is a standardized process of steps to carry out a work activity. SOP serves to create a work system flow that is organized, systematic, and accountable. SOPs can be used as policies and regulations that apply in general to explain the procedures for carrying out ongoing activities. An SOP is essentially a description or procedure for carrying out the work steps required to achieve hospital goals while increasing revenue (profit). The SOP can act as a document that contains the processes and procedures for an effective and efficient activity based on a standardized standard (Taufiq, 2019).

The results of this study showed that the doctor’s response time in the emergency room of a private hospital was sometimes more than five minutes during high patient visits. The average number of patient visits to the emergency room of Private Hospital is 73 patients per day, and several cases of false emergencies increase the number of cases/visitations. The response time of the emergency room doctor before the implementation of the doctor’s assistance pathway ranged from 5 to 30 minutes.

Some of the obstacles associated with response time in the emergency room of private hospitals include a lack of personnel (HR) and infrastructure. This finding is in line with that of Hania’s study (2020), which revealed two factors that influence response time: internal factors and external factors. External factors affect response time more strongly when
supported by internal factors. The external factors included the availability of tools and drugs, infrastructure, facilities, stretchers, the attendance of officers and workload. The internal factors include emergency conditions, emergency training, tenure and education (Hania, 2020).

After the trial using the recommended doctor assistance pathway in the SOP, there was a decrease in the doctor response time in the emergency room, with an average time of 1 minute 30 seconds 12 milliseconds (1:30:12). After going through this trial, the doctor’s assistance pathway can be recommended as an SOP. A good SOP can be used to create a good company, and SOP encourages and moves a group to achieve organizational goals. Employee noncompliance in implementing SOPs can hinder the implementation of the work process and have an impact on the quality of employee work. SOPs can help employees be careful in their work and know their respective work positions. The benefits of implementing SOP include encouraging and improving the quality of work, which includes timelines, neatness, and completeness (Agustina, 2021). Sugiharti’s research (2018) showed that doctors, as implementers and providers of medical services, state that the compiled SOP is very useful in the process of implementing clinical services. Among the 51 respondents, 37 stated that doctors’ compliance with the SOP was complete and that there was a positive relationship between the implementation of the compiled SOP and the quality of service felt by the patient. The SOPs that have been prepared at this time are constantly evaluating the implementation process for improvement and correction so that medical SOPs can be developed according to the needs of the clinic and that other medical and nonmedical service SOPs can be developed to support the improvement of the quality of clinical services (Sugiharti, 2018).

The results of the doctor’s assistance pathway trial showed that the tool can be used at private hospitals, provide good results and could be recommended as a hospital SOP. Support from management and hospital leaders is needed so that this SOP can be used consistently and evaluated for use continuously so that quality service can improve consistently.

Leadership plays an important role in the success of an organization. The importance of leadership and teamwork in the successful implementation of total quality management has a very significant relationship (Rahmawati & Supriyanto, 2020). Cahyadi’s research (2020) showed that top management support has a significant effect on the quality of accounting information systems (Cahyadi et al., 2020). Organizational support has a significant positive effect on employee performance, and organizational support also affects organizational commitment, which means that the stronger the organizational support is, the greater the employee’s organizational commitment (Metria & Riana, 2018).

4.6. Study strengths and limitations

The strength of this study is the involvement of various types of healthcare workers, including medical staff, nonmedical staff, and also patients and families, so that a comprehensive picture can be obtained from various points of view, experiences, and perspectives. Medical and nonmedical staff who became research informants had a variety of periods of work, and different experiences could be useful inputs for the formulation of the doctor’s assistance pathway (input as a reference for formulating SOP). The doctor assistance pathway was arranged by medical personnel who are currently working in the emergency room unit. Patient and family input or points of view are also taken into consideration when formulating a doctor’s assistance pathway so that the SOP draft can be created. Most of the time, management problems that occur in hospitals only focus on the point of view of hospital staff or management, while patients and families are rarely included or asked for their opinions. Another strength of this study is that in addition to involving staff and patients, this study also included an improvement trial in which the doctor’s assistance pathway was tested for implementation in emergency room services. Then, evaluation and improvement are carried out, and the trial is also carried out directly from health workers to patients so that the draft of the SOP from the doctor’s assistance pathway has proven quality.

In addition to providing advantages and benefits, this study has several limitations. This research is qualitative and limited by the context under study. This study is limited to the ER’s services at private religious-affiliated hospitals; therefore, the complexity of the problem and the ability of the doctor’s assistance pathway as a problem solution to be applied in emergency departments of other hospitals still need further study. A further shortcoming of this study is that it is still in the form of a doctor’s assistance pathway and an SOP draft; it does not yet have a decree from the hospital director as the leader of the hospital service facility studied.

5. Conclusions

Lean Management implementation is able to provide a visual picture of waste in the emergency room of a private religious-affiliated hospital. The results of the lean implementation analysis revealed that four types of waste should be eliminated: waiting, overprocessing, motion, and unnecessary. This study highlights the complex challenge of eliminating waste in the emergency room. The first step, as an immediate action that must be taken to expedite the service process in the emergency room, is to implement SOP. The commitment of health workers is considered to be health care providers, support from hospital management is needed to increase the potential for and commitment to improvement, and overcoming factors that hinder the smooth flow of services in the emergency room. Continuous evaluation is needed so that the flow of emergency room services improves.

https://www.malque.pub/ojs/index.php/msj
Acknowledgments

We thank the Universitas Muhammadiyah, the director and staff of Private Hospital, and the emergency room staff of Prospective Hospital for their assistance during this research.

Ethical considerations

Ethical approval was obtained from the Health Research Ethics Committee of the Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Yogyakarta (No. 228/EC-KEPK FKIK UMY/VII/2023). It has been declared ethically feasible according to 7 WHO standards (2011).

Conflict of interest

The authors declare no conflicts of interest.

Funding

This research has not received any external funding.

References


https://www.malque.pub/ojs/index.php/msj


