# Leveraging Lean Management to Improve Patient Flow in the JKN Outpatient Department: A Case Study in Cancer Healthcare Santosa Hospital Bandung Kopo (SHBK)

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## Abstrak

Studi ini secara sistematis menyelidiki aliran pasien rawat jalan JKN dan masalah waktu tunggu di instalasi rawat jalan pada fasilitas layanan kesehatan Kanker di Santosa Hospital Bandung Kopo menggunakan perspektif suara proses. Alat lean seperti pemetaan proses, lembar pemecahan masalah A3, dan analisis akar penyebab digunakan untuk mengidentifikasi pemborosan proses tersembunyi dan waktu tunggu yang lama di instalasi rawat jalan JKN. Hasil menunjukkan bahwa proses pendaftaran pasien rawat jalan di tempat, kecukupan jumlah dokter onkolog, dan jadwal praktek dokter onkolog yang tepat waktu menjadikan pelayanan lebih cepat dan akurat. Implementasi lean dapat meningkatkan aliran pasien dan kinerja instalasi rawat jalan JKN. Studi ini mengidentifikasi masalah kualitas instalasi rawat jalan dari perspektif suara proses dan menyarankan alat lean untuk meningkatkan pelayanan medis. Implementasi ini dapat membantu meningkatkan produktivitas dan kinerja fasilitas layanan kesehatan.

## Abstract

*This study systematically examines the issues of patient flow and waiting times in the Cancer healthcare Santosa Hospital Bandung Kopo (SHBK) JKN outpatient department from a process perspective. Lean tools such as process mapping, A3 problem-solving sheets, and root cause analysis were employed to identify hidden process wastes and prolonged waiting times in the JKN outpatient department. The findings reveal that efficient registration of outpatient patients on-site, an adequate number of oncologists, and the punctuality of the oncologists' practice schedules are critical for providing fast and accurate medical services. Implementing a lean framework can enhance the flow of JKN outpatients and the performance of the outpatient department. This study identifies quality issues in the outpatient department from a process perspective and recommends appropriate lean tools to further improve medical services. Implementing these strategies can boost the productivity and performance of healthcare institutions.*

***Keywords:*** *Patient flow; Process mapping; Root causes analysis; Lean strategy; Performance improvement*

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# 1. Introduction

Cancer patients demand specialized attention and intensive care. A significant challenge in delivering quality healthcare services to such patients is expediting service time and reducing waiting time. Sluggish service time can worsen the patient's condition, heighten risks, and result in patient discontentment (Alkaabi et al., 2020). Therefore, enhancing the efficiency and quality of services for cancer patients is essential to enhance treatment outcomes and hasten patient recovery.

Currently, there are three therapeutic modalities for cancer that are commonly applied: surgery, radiotherapy, and chemotherapy. The management of cancer patients is usually multimodal, involving a combination of all three or a combination of two therapeutic modalities, depending on the patient's condition (Satria, 2019).

Healthcare organizations are responsible for providing appropriate and standardized healthcare services, including timely service in outpatient departments. It is essential to ensure that patients receive proper diagnoses and treatment plans. According to the Regulation of the Minister of Health of the Republic of Indonesia Number 30 of 2022 on National Health Service Quality Indicators, the standard waiting time for outpatient care in Indonesia should be ≤60 minutes. However, Ahmed et al. (2018) noted that poorly designed healthcare service processes can result in unnecessary duplication of services and extended patient waiting times (Ahmed, 2018).

Healthcare quality is a critical concern worldwide, and various methodologies have been employed to improve service delivery in hospitals. One such methodology is Lean Six Sigma, which combines lean manufacturing principles with Six Sigma tools to enhance efficiency and reduce errors (Jones, 2016).

Several studies have demonstrated the effectiveness of Lean Six Sigma in different healthcare settings. For example, Thompson et al. (2017) reported significant improvements in patient wait times and service delivery efficiency in U.S. hospitals (Thompson, 2017). Similarly, Nguyen and Parker (2018) found positive outcomes in reducing operational costs and increasing patient satisfaction in Canadian healthcare facilities (Nguyen, 2018).

Despite these promising results, there is a notable gap in the literature regarding the impact of Lean Six Sigma on healthcare quality in Malaysian hospitals. While a few studies have touched upon general quality improvement initiatives in Malaysia (Lee, 2017), none have specifically focused on Lean Six Sigma implementation and its outcomes (Rahman, 2018). This gap is significant given Malaysia's unique healthcare system and demographic challenges, which may influence the effectiveness of Lean Six Sigma differently compared to Western contexts.

This study aims to address this gap by investigating the effects of Lean Six Sigma on quality performance in Malaysian hospitals. By focusing on this specific context, the research seeks to provide insights that can guide policymakers and healthcare administrators in optimizing Lean Six Sigma strategies to improve service quality and patient outcomes in Malaysia.

In 2021, the Ministry of Health of the Republic of Indonesia recorded approximately 2,810 hospitals and clinics serving National Health Insurance (JKN) participants, with 235 million participants (The Ministry of Health of the Republic of Indonesia, 2022). The

Social Health Insurance Administration Body (BPJS Kesehatan) reported that around 73 million JKN patients visited hospitals and clinics in 2021 (BPJS Kesehatan, 2022), contributing to the primary issue of long waiting times. The Ministry of Health of the Republic of Indonesia, 2022 reports that several factors, including the limited number of doctors, inadequate facilities and infrastructure, and management issues, contribute to an average waiting time for outpatient care of approximately 134.9 minutes or approximately 2 hours and 15 minutes in several general hospitals in Indonesia.

Al Hroub et al. (2019) noted that healthcare organizations still need to improve their service systems, resulting in the wastage of resources, patient movements, and time. Unnecessary or repetitive patient movements between areas contribute to patient movement waste, while extended wait times for healthcare services and excessive time spent on administrative tasks contribute to time waste. These wastes not only lead to inefficiencies in healthcare delivery but also have a detrimental effect on the quality of services and increase the risk of medical errors (Al Hroub et al., 2019).

Ahmed et al. (2018), Al Hroub et al. (2019), and Akmal et al. (2020) promote adopting a system-wide improvement approach by healthcare organizations. One of the most promising approaches is the implementation of lean methodology and its principles (Al Hroub et al., 2019; Akmal et al., 2020). Bhat et al. (2020) suggest that healthcare organizations can utilize business process management and lean concepts to identify and eliminate non-value-added activities, enhance workflow, and improve operational effectiveness. Implementing lean concepts in the context of healthcare organizations, which includes process mapping, can aid in identifying inefficiencies and areas for improvement, such as reducing wait times in outpatient services. Bhat et al. (2020) noted that process mapping could identify bottlenecks and queues in patient flow. It can help capture critical process data required for process improvement methods. Additionally, process mapping can evaluate process efficiency, resource utilization, and patient experience and provide input for other process improvement methods. Finally, process mapping can be utilized to create a conceptual framework that describes the functional interaction between the service system, workflow processes, and patient safety practices (Bhat et al., 2020). Consequently, the following research questions arise: How can patient flow problems in the JKN outpatient department be identified from the voice of process perspective, and how can the efficiency of patient flow in the JKN outpatient department be enhanced?

The present study outlines the following specific research objectives to address the research questions: (1) to analyze the current JKN outpatient flow by developing a flow/process map, (2) to identify existing issues and problems in the JKN patient flow and determine their root causes from a process perspective through root cause analysis, and (3) to assess the perceptions of the internal environment, systems, and procedures of the JKN outpatient department, as well as the support services provided by the department, from the perspective of the staff.

Drawing from the background mentioned above, the Cancer Center, located in Bandung, West Java, was selected as the focal point of this study to enhance patient flow in the JKN outpatient department. To achieve this objective, process mapping techniques were employed to chart the existing process, identify waste sources, and elicit the perspectives of outpatient department personnel on the key problem areas by utilizing A3 problem sheets. This research concentrates explicitly on the voice of process via process mapping, waste identification employing A3 sheets, and root cause analysis. The findings of this

study have significant potential to mitigate JKN outpatient department congestion and facilitate improvements in patient flow.

## 2. Method

This study employed a case study approach to investigate the JKN outpatient department, enabling an in-depth examination of the phenomenon within its real-world context. Case studies are an appropriate method for exploring new phenomena and addressing research problems, particularly when the research involves "how" or "why" questions (Yin, 2014).

This study employed various data collection methods, including taking personal notes during the natural process, participant observation, and unstructured interviews with outpatient department staff. Figure 1 illustrates the research methodology adopted in this study, which integrates lean methodology to identify the root causes of JKN outpatient flow problems. Qualitative data collection approaches, such as observation and unstructured interviews, were used within a case study research design. To gather data from the outpatient department staff at the Santosa Hospital Bandung Kopo Cancer Center, process mapping and A3 problem-solving methods were applied to identify the main issues in patient flow. The subsequent step involved developing cause-and-effect diagrams to pinpoint the root causes of process bottlenecks and conducting a comprehensive waste analysis.

### 2.1. Research setting

This research focuses on the flow of patients who participate in JKN (Indonesia's national health insurance program) in the outpatient department at the Bandung Cancers Center, which has Ten of oncologists on staff and serves approximately 135,000 patients annually. The JKN outpatient department represents more than 85% of the services. The study aims to investigate the patient flow process, specifically from arrival to discharge, and identify any inefficiencies in the system.
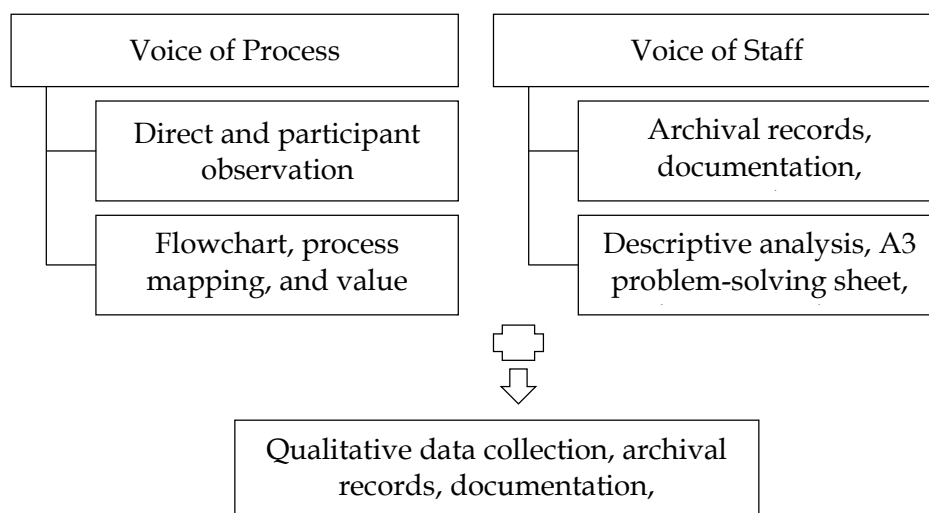


Figure 1. Research Methodolog

## 2.2. Analysis of JKN outpatient department process flow

This study utilized process mapping to capture a process perspective, while A3 problem-solving sheets were employed to gather staff insights on issues within the JKN outpatient department. The main objective was to redesign the process with a new map/model to minimize or eliminate waste. The following steps were undertaken to investigate the current patient flow in the JKN outpatient department:

### Step 1

Lean thinking was introduced to the outpatient department staff through individual meetings with the Cancer center director and outpatient department staff, including nursing managers, doctors, nurses, and administrators. During these meetings, the Cancer center director provided a brief overview of the outpatient department, introduced the concept of quality to the staff, and highlighted the significance of the proposed study for improving the JKN outpatient department.

### Step 2

Process observation was conducted by examining the current system, focusing on patient flow from admission to discharge. The processes in the JKN outpatient department were sketched and documented. Multiple patients were followed to observe the hospital environment, with each observation lasting 2-5 hours, depending on the patient's length of stay. The current layout of the outpatient department was carefully analyzed during these observations to assess its effectiveness in facilitating smooth patient flow.

### Step 3

Data collection was undertaken using time study sheets to monitor the duration of patients' journeys from admission to discharge, documenting the time spent at various stages. The stages in the observation procedure were as follows: 1) Step 3.a.: A3 problem-solving sheets were provided to all staff members involved, who were requested to fill them out and submit them. The observation commenced with an initial tour led by the nursing manager to gain an understanding of the JKN outpatient department environment. Subsequently, the current system was scrutinized, with paper and pen used to outline the entire process within the JKN outpatient department and make notes, particularly regarding the movement of patients from admission to discharge; 2) Step 3.b.: A3 problem-solving sheets were distributed to three doctors, nurses, and administrators, who offered input on the current system by responding to questions on the A3 troubleshooting sheet. This method of indirect observation is employed to examine JKN outpatient department processes, drawing from staff expertise in utilizing lean tools. The A3 problem-solving sheet comprises investigation and improvement plan sections.

### Step 4

Root cause analysis was carried out by identifying the underlying causes of delays, drawing from observations, staff discussions, A3 problem sheets, and analysis of data from the JKN outpatient department database. These root causes were then illustrated and presented using a fishbone diagram.

## 2.3. Conceptual model of JKN outpatient service quality

Based on the current JKN outpatient department process results, a conceptual framework was developed and illustrated, highlighting the relationship between the main themes (integrated lean strategy and JKN outpatient department service quality) related to the voice of process perspective. The model provides a comprehensive understanding of the factors affecting JKN outpatient service quality and the role of integrated lean methodology in improving patient flow and overall healthcare performance.
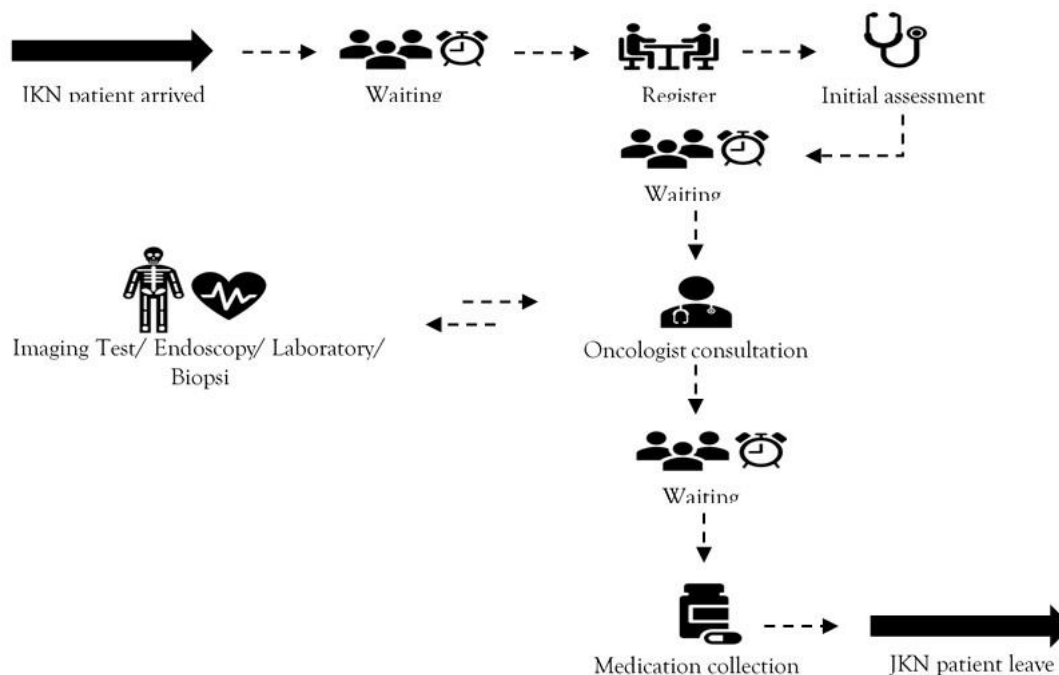


*Source: Standard Operational Procedure- Santosa Hospital Bandung Kopo (SHBK)*

Figure 2. Process Mapping for Outpatient Flow

## 3. Result

### 3.1. Analysis of JKN outpatient department overcrowding

JKN outpatient flow process maps were initially developed through direct observation and feedback from outpatient department staff, employing problem-solving A3 sheets. Based on these preliminary investigations and observations, a comprehensive process map was created for JKN patient flow, detailing each step from patient arrival to discharge, as depicted in Figure 2.

Figure 2 provides an extensive visualization of the JKN outpatient journey, highlighting essential process components such as patient arrival, decision-making points, and primary waiting areas. Upon entering the outpatient department, patients are guided to the primary waiting area, where they await registration with a receptionist. Once registered, patients advance to the initial examination area for a preliminary assessment by a qualified nurse. Following this, patients transition to a secondary waiting area in anticipation of a consultation with a Oncologist. After the Oncologist's evaluation,

patients are divided into two categories: those requiring further diagnostic procedures and those receiving medication prescriptions. The former group is directed to the appropriate diagnostic facilities, while the latter proceeds to the pharmacy. In the pharmacy area, patients wait for the pharmacist's notification indicating that their medications are ready for pick-up. After obtaining their medications, patients can exit the facility.

Utilizing direct observation and process mapping techniques, the researcher examined the average time JKN patients spent at each stage of their journey, from arrival to medication retrieval at the pharmacy (Table 1). This analysis aimed to gain a deeper insight into patient flow and identify potential bottlenecks contributing to prolonged waiting times.

Table 1. Average Time Spent at JKN Outpatient Stages

| JKN Outpatient Process | Average Time |
|---|---|
| Waiting for registration | 00:05:36 |
| Registration and initial assessment | 00:05:31 |
| Waiting for Oncologist | 00:15:38 |
| Oncologist consultation | 00:15:49 |
| Waiting at the pharmacy | 00:10:36 |
| Pharmacy service | 00:02:30 |
| **Total** | **00:53:06** |

*Source: Hospital Santosa Bandung Kopo - Admin Information System*
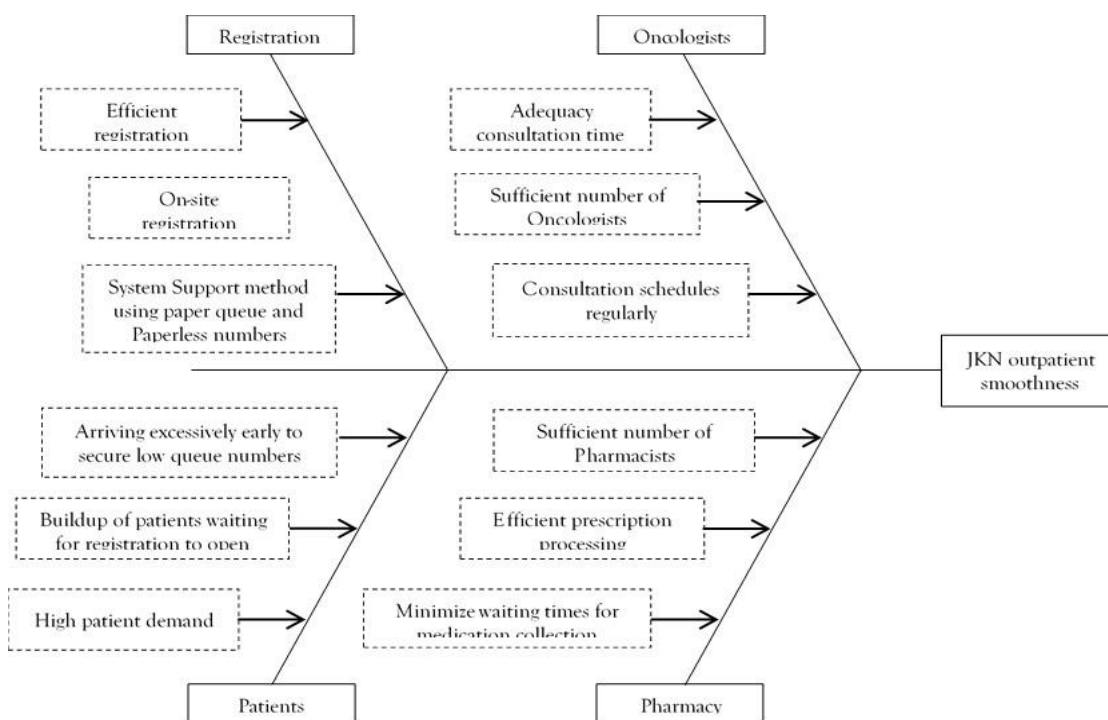


*Source: Santosa Hospital Bandung Kopo –Standard Operational Procedure*

Figure 3. Cause and Effect Diagram for Smoothness

The root-cause analysis comprised intensive brainstorming sessions with outpatient department staff, incorporating process observations and mapping and staff input via A3 problem-solving sheets. Crucial factors and areas contributing to outpatient department overcrowding, along with underlying causes, were identified and illustrated in Figure 3.

Upon evaluating direct observations and A3 sheets submitted by outpatient were discerned: registration, patients, Oncologists, and pharmacy (Figure 3).

Outpatient department staff number of Oncologists and regular consultation schedules are the primary factors smoothness in the outpatient department. The adequacy availability of Oncologist results in minimize patient waiting times and a backlog of cases. Additionally, organized consultation schedules create regularly and smoothness the Medical Services, causing patients to minimize waiting for their appointments.

The efficiency of medication dispensing systems has also been identified as a smoothness on Pharmacy Department, leading to quick patient discharge times from healthcare facilities. One significant factor contributing to this smoothness is the sufficiency number of pharmacists.

These factors can be traced back to three main areas: processes, staffing, and patient related. A thorough examination of each contributing factor and its associated variables is essential for understanding their impact on outpatient department smoothness, as most of these factors are connected to the procedures and personnel in the outpatient department.

## 3.2. Model for improving patient flow in the JKN outpatient department

The outpatient department serves as an essential entry point to the healthcare system. Adequacy resources and rising demand for JKN outpatient services, it is confronted with increasing pressure to provide quality patient care. Consequently, healthcare providers are progressively focusing on streamlining processes and ensuring timely service delivery in pursuit of the most effective strategies to enhance patient flow. In this context, pinpointing potential improvements to patient flow becomes a critical area of investigation when tackling the research problem of optimizing patient flow.

Based on the observations made in this study, it is recommended to develop a reliable method or tool to monitor the time JKN patients spend at each stage, from their arrival at the outpatient department until their discharge. In implementing this, it is vital to establish well-defined, quantifiable objectives and corresponding metrics. Furthermore, it is crucial to consider the concept of balanced metrics to reduce the time spent and improve flow. By employing an integrated lean approach, patient flow improvement can be further refined by adopting appropriate methods, which are detailed in the subsequent sections.

## 3.3. Development of the Current Value Stream Mapping

This study identifies several obstacles in the JKN outpatient department process that need elimination or minimization to enhance patient flow. Achieving a "balanced flow" in the JKN outpatient department process requires employing value stream mapping with the average "cycle time" for each step. Implementing value stream mapping in JKN outpatient department is complex and challenging due to varying patient situations.

However, deriving the average cycle time from numerous observations can provide a reasonable estimate for comparison with best practices.

Based on observations, staff discussions, and available information, researchers have developed the current value stream mapping, as illustrated in Figure 4. This mapping identifies the main areas associated with patient flow, including registration and initial assessment time, Oncologist examination time, medication collection time, and waiting times at each stage. The cycle time analysis reveals significant time efficiency within the process, elimination inefficiency to improve patient flow. Future efforts should implement more effective timekeeping using the value stream mapping proposed in this study. If cycle times can be reasonably determined, practitioners can employ several widely used lean techniques, such as continuous flow, activity standardization, visual management, and others, to enhance patient flow and mitigate bottlenecks.

This study has qualitatively assessed bottlenecks using the current value stream mapping. For example, the transition from the registration area to the initial assessment area currently employs a push method. If numerous patients are waiting in the registration area, they are directed to the initial assessment area before the previous patient has finished.

This issue ultimately impacts the quality of care provided, as excessive demand arises at certain times.
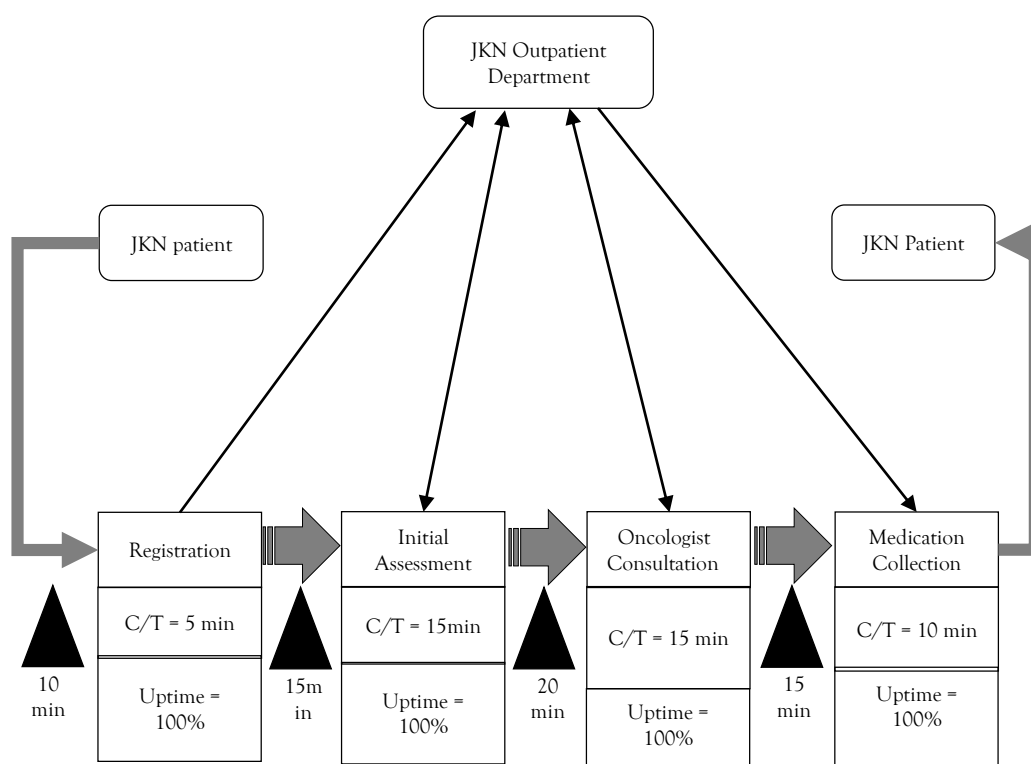


*Source: Santosa Hospital Bandung Kopo – Admin Information System*

Figure 4. Current State Value Stream Map in JKN Outpatient Flow

## 3.4. Future Value Stream Mapping

In order that enhance patient flow, value stream mapping should account for the movement between outpatient department areas and employ adequate information and communication systems.

Waiting for registration is significantly longer than the registration process itself. It is recommended to explore electronic patient registration using an online and mobile JKN queue application. Patients can register one to seven days before their planned arrival date. As a result, patients will not need to queue early in the morning for registration and can proceed directly to the initial assessment upon arrival. Outpatient department entrances should have self-registration kiosks or scanners, and patients should scan the queue number they obtained from home through the online and mobile JKN queue application. Educating patients that they only need to arrive at their estimated Oncologist examination time is also advisable. Encouraging them to arrive at most 30 minutes before the estimated examination time can help maintain disciplined patient arrival times according to the examination schedule, eliminating patient congestion in the outpatient department and shortening overall waiting times.

With the arrangement of patient arrivals, the buildup of patients in the Oncologist examination area is expected to decrease. However, it is recommended to calculate the number of practice hours for doctors compared to the number of patients needing examination. If the capacity limit is exceeded, increasing the number of oncologists based on patient volume should be considered. Additionally, ensuring doctors commit to their practice hours can guarantee that patients arrive on time for examinations.
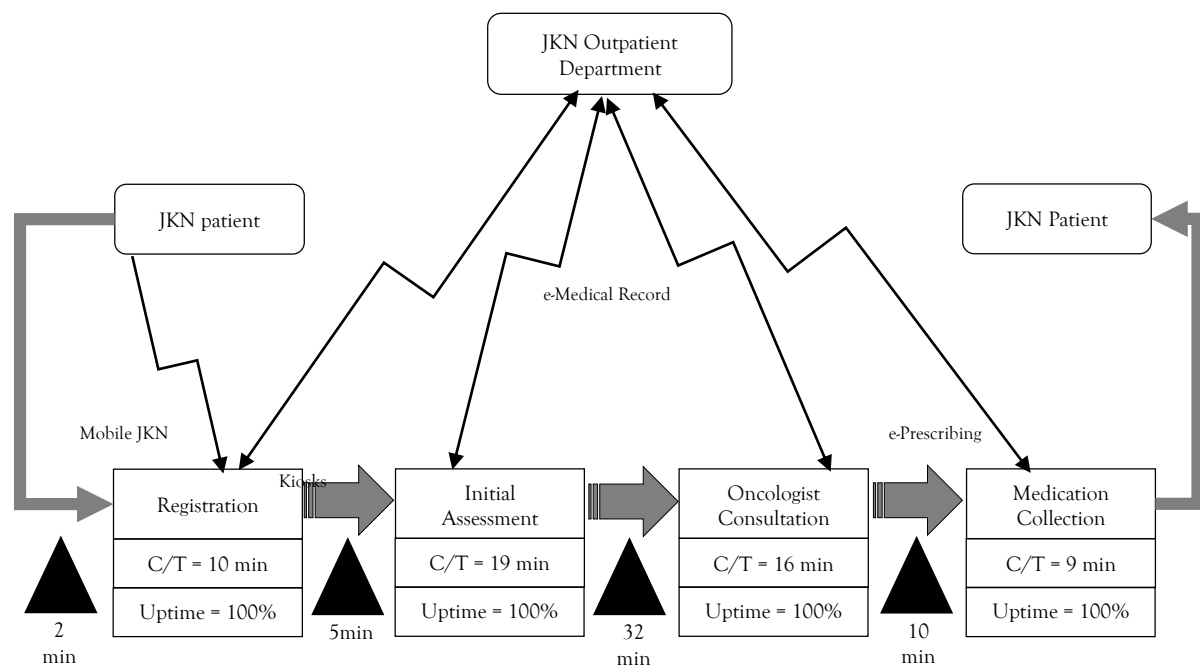


Figure 5. Proposed Future State Value Stream Map in JKN Outpatient Flow

As patient flow improves in registration and Oncologist examinations, congestion in the medication collection area may increase. Therefore, exploring the use of electronic prescriptions to enable real-time communication, allowing pharmacists to provide medications more quickly, is necessary. Transitioning to an electronic communication system in the medication prescription process through the digital transformation from paper-based procedures will significantly reduce medication collection wait times.

Based on the suggested improvements, the proposed future value stream mapping is depicted in Figure 5. The registration system operates electronically through an online and mobile JKN queue application, allowing patients to register one to seven days before their arrival date. The electronic prescription system will facilitate real-time information flow from the oncologist to the pharmacist (Figure 5). Consequently, pharmacists can use real-time prescription information through electronic communication to prepare medications more quickly, accelerating patient flow and discharge.

## 4. Discussion

To improve patient flow and optimize workflow in healthcare services, lean techniques and tools are increasingly adopted within healthcare organizations to enhance safety, efficiency, and quality (Bhat et al., 2020).

This study identified congestion in the JKN outpatient department as a critical issue. An integrated approach is needed to address the causes of patient flow problems and improve patient flow, especially considering that prolonged waiting times can negatively impact overall patient satisfaction. Given that waiting times were identified as a significant issue, they were pinpointed as potential areas for enhancing patient flow using value stream mapping (refer to Figures 4 and 5). By addressing these waiting time issues through the implementation of proposed changes to patient flow, the outpatient department can achieve better patient flow and increased capacity (e.g., by eliminating non-value-added activities and enhancing staff time utilization) without compromising service quality. These improvements can be realized by implementing suggested changes across various aspects of patient flow within the JKN outpatient department.

The findings of this study offer both theoretical insights and practical implications for practitioners. The evidence gathered from the perspectives of both the process and the staff underscores the significance of the link between lean strategies and the hospital-patient relationship, guided by factors such as quality, satisfaction with diverse outpatient services, and concerns within the outpatient department. These theoretical insights can be mapped onto existing theoretical frameworks that highlight the positive correlation between lean practices and healthcare quality, as well as the connection between healthcare service quality and patient satisfaction. Drawing upon these two interconnected theoretical frameworks of lean implementation, quality, and patient satisfaction, a unified theoretical model depicted in Figure 6 is proposed.

The findings of this study suggest that the comprehensive root cause analysis of congestion in the JKN outpatient department (as depicted in Figure 3), conducted through observational inquiry, process mapping, and the A3 problem-solving sheet, offers a holistic method for identifying the underlying causes of the issue from the perspectives of both the process and the staff. This study provides compelling evidence of the direct correlation between the three primary domains: process, staff, and patients. It illustrates that multiple factors contributing to patient flow issues, including congestion in the outpatient department, are closely linked to the perspectives of the process and the staff, exerting varying degrees of influence.

Drawing from the observations conducted in the JKN outpatient department, it is advisable to devise methods or tools to track patient flow durations from entry to exit within the department. These tools should specifically measure time intervals devoid of medical descriptions or diagnostic evaluations. Therefore, it is imperative to establish well-defined and quantifiable objectives accompanied by relevant metrics. These measurable goals can be derived from balanced metric principles that encompass various aspects of enhancement, including reducing process time, elevating quality standards, and attaining patient satisfaction. The recognition of the nature and extent of improvement, such as adjustments or modifications, can only occur when standard metrics are regularly updated.

Process mapping reveals that transitioning from a manual paper queue registration system to an online registration system could address patient backlog and lengthy waiting times during registration. This transition may also eliminate time wastage in the oncologist examination area and ensure synchronization between estimated examination durations and patient arrivals. Additionally, a proposed solution involves implementing electronic prescriptions at the pharmacy, facilitating prompt medication preparation by pharmacists through real-time communication between oncologists and pharmacists.

## 5. Conclusion

Numerous solutions have been proposed to address the increasing demand for high-quality healthcare services, including developing and redesigning clinical processes in outpatient settings. These solutions aim to tackle issues such as patient congestion and lengthy waiting times caused by non-value-added activities, as well as remove obstacles that impede patient access to outpatient services.

This study illustrates the advantages of applying lean principles and tools, such as process mapping, value stream mapping, and root cause analysis, to identify areas for improvement by eliminating waste, thereby enhancing the effectiveness of healthcare service operations.

A continuous improvement approach is underscored to eradicate unnecessary non-value-added activities through both current and future value stream mapping. Simultaneously, business process reengineering may be suitable for eliminating essential non-value-added waste.

The primary limitation of this study is the relatively small sample size derived from a single case study. It is recommended to test the proposed approach using more extensive datasets, including time intervals, patient categorization levels, patient volumes, and other pertinent data related to the outpatient department process, to identify priorities for continuous improvement.

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