Analysis of Outpatient Length of Stay Time of Obstetrics & Gynecology Department in XYZ Hospital

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Abstract. In response to increasing competition in the healthcare services sector and rising patient expectations regarding service quality, hospitals are placing greater emphasis on enhancing their quality of care. This improvement spans both clinical and management aspects. One area of focus is the reduction of Length of Stay (LOS) in outpatient departments, as this can enhance operational efficiency and, consequently, elevate patient satisfaction levels. The primary objective of this study is to conduct an analysis of the current performance of LOS times, benchmarking them against the standards set by hospital management. Additionally, the study aims to comprehensively scrutinize each subprocess associated with LOS and subsequently formulate recommendations to reduce LOS durations within the Obstetrics & Gynecology Department of XYZ Hospital in Bandung. To achieve these objectives, this study will analyze the existing LOS database spanning from August 2020 to May 2023. The analysis employs Control Charts and Process Capability methodologies to evaluate the performance of LOS. Furthermore, Business Process Model and Notation (BPMN) will be utilized to visually map the current business process and identify non-value-added activities within the process. Subsequently, an improved BPMN will be developed to represent the proposed strategy for process optimization. The recommended enhancements encompass several measures, including the refinement of the hospital's website system. This refinement will involve functionalities for verifying patients' insurance databases, collecting data for new patients, and offering time slot suggestions for appointment scheduling. Additionally, self-service kiosks will be introduced to facilitate the recording of patient data. This will be achieved by scanning a QR code generated through the website upon a patient's arrival, thereby eliminating the need for a traditional registration counter. These initiatives collectively aim to streamline the patient journey, ensuring that patients arrive at the hospital according to their designated time slots and proceed directly to the polyclinic. Ultimately, this process optimization is anticipated to significantly reduce patient waiting times and enhance overall operational efficiency.

Keywords: healthcare quality improvement, length of stay, outpatient department.

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1 Introduction

In recent decades, the imperative of establishing effective healthcare systems has grown significantly. This phenomenon has been primarily spurred by the substantial escalation in healthcare expenditures, coupled with a concurrent surge in the demand for healthcare services and the rising expectations of patients concerning service quality[1]. Simultaneously, hospitals are grappling with heightened competition in their efforts to attract patients. This competitive landscape compels hospital administrators to place greater emphasis on both clinical outcomes and patient satisfaction, as these factors are pivotal in sustaining or expanding revenues and market share[2].

Among the initial services that patients encounter upon their entry into a hospital, the outpatient department takes precedence[3]. The outpatient departments assume a position of paramount importance within the healthcare ecosystem as they constitute the primary source of patient inflow into the hospital's inpatient departments[4]. This significance is underscored by the fact that patients often gauge the overall quality of hospital services based on their experiences in the outpatient departments. Furthermore, there is a notable trend in the burgeoning growth of outpatient care centers, to the extent that it is projected that the revenue generated by these centers may soon equal or even surpass that of inpatient services[5]. Consequently, the outpatient department assumes a pivotal role in determining the hospital's profitability and financial viability.

The Outpatient Length of Stay (OLOS) time is a critical factor in determining patient satisfaction with a hospital's services and has persistently posed challenges for outpatient clinics[6]. Average OLOS, in this context, signifies the mean duration a patient spends during their visits to a healthcare facility. Research has substantiated that the average OLOS can serve as a comprehensive metric of overall performance[7]. It is intricately linked with aspects such as cost-effectiveness, operational efficiency, care quality, and the speed of service delivery. In general, lower values of average OLOS are perceived as indicative of enhanced operational performance[8]. A specific study has even asserted that prolonged hospital stays elevate the patient's susceptibility to acquiring infections[9]. Consequently, it becomes a strategic imperative for hospitals to reduce the average OLOS as part of their operational goals.

The present study is set to be carried out at XYZ Hospital, situated in Bandung, Indonesia. XYZ Hospital has been progressively expanding its network of branches throughout the country. However, despite its years of operation, the hospital continues to grapple with suboptimal performance in terms of outpatient length of stay time. In order to ensure economic viability and long-term sustainability, healthcare service providers and hospitals must prioritize value creation. This necessitates a focus on delivering high-quality services, enhancing operational efficiency, all while maintaining cost-effectiveness[10]. Consequently, it is of paramount importance for XYZ Hospital to undertake measures aimed at ameliorating its service quality and operational efficiency, principally by reducing its average length of stay.

The Obstetrics & Gynecology Department at XYZ Hospital has emerged as the second-busiest department, garnering a substantial 18,938 visits during the period span-

ning August 2020 to May 2023. It is worth noting that female patients seeking services in gynecology and obstetrics polyclinics may be particularly vulnerable to the impact of extended waiting times. This is especially crucial given that pregnant women, among others, may be dealing with symptoms such as abdominal pain, early contractions, vaginal discharge, urinary discomfort, bleeding or spotting, and hypertension[11]. Given the significance and urgency of the Obstetrics and Gynecology Department within the XYZ Hospital, it is imperative to undertake research to address the observed issues.

In an effort to enhance its service quality, the hospital management at XYZ Hospital has established a standard of outpatient length of stay (OLOS) of ≤2 hours. However, the available data reveals that the average OLOS at the Obstetrics & Gynecology Department stands at 4.1 hours, signifying that the department has not met the set target defined by the hospital management. Consequently, this research endeavors to fulfill several objectives, including assessing the present OLOS performance in relation to the hospital management's prescribed standards. Additionally, the study aims to dissect the various elements or sub-processes within OLOS that contribute to prolonged waiting times. Ultimately, the research seeks to propose recommendations aimed at narrowing the gap between the actual outpatient length of stay in the Obstetrics & Gynecology Department and the standards stipulated by the hospital management.

2 METHOD

The following methods are used in Table 1. below.

Table 1. Method.

Stage	Data Collection Method	Data Analysis Method
Identifying problem	Observation, Interview, and Tracking Time Data	Excel, Power BI
Assessing the performance of OLOS and sub-processes of OLOS	Tracking Time Data	Control Chart, Process Capability Analysis, One-Way ANOVA, Tukey Pairwise Comparison
Illustrating hospital business process	Hospital's Standard Operating Procedure	BPMN
Assessing current BPMN	BPMN	Value Added Analysis
Illustrating improved business process	Value-Added Analysis	BPMN

3 RESULT AND DISCUSSION

3.1 OLOS (Outpatient Length of Stay)

The study conducts an in-depth analysis of the Outpatient Length of Stay (OLOS) data collected from August 2020 to May 2023. This analysis employs the I-MR Control Chart methodology to assess the stability of the hospital's current OLOS performance concerning the maximum standard established by the hospital management, which is set at 2 hours. The outcomes of the I-MR Control Chart analysis clearly indicate multiple instances where the OLOS data deviates from the norm and surpasses the defined control limits.

To gauge the process capability of OLOS, the study conducts Process Capability analysis, resulting in a Ppk value of 0.00. It's important to note that a Ppk value below 1.3 is deemed as poor, signifying that the process is not capable[12]. Furthermore, the analysis reveals a Defects Per Million Opportunities (DPMO) rate of 49.41%. Collectively, these findings lead to the conclusion that the OLOS process is not only out of control but also falls short of being deemed capable.

Additionally, the study undertakes a comparative analysis of OLOS times for three distinct patient categories: General, Insurance, and BPJS patients. This comparison is facilitated through One-Way Analysis of Variance (ANOVA) analysis, followed by Tukey Pairwise Comparison. The results of this test unveil significant disparities in the means of OLOS duration among General, Insurance, and BPJS patients. This analysis suggests that the wait time associated with insurance confirmation potentially contributes to the overall extended OLOS duration.

Subsequently, the study proceeds with a Value Added Analysis aimed at enhancing efficiency[13], in alignment with the activities identified in the Business Process Model and Notation (BPMN). In this context, Value Added activities are defined based on certain criteria[14]:

1. It physically transforms the work being processed.
2. It is specifically requested by the customer.
3. It is legally required or mandated by the customer.
4. It is something the customer is willing to pay for.

The concept of Business Value Added (BVA) encompasses any operation within a process that, while not directly creating value, is essential to enhance the overall value of the final products or services[13]. On the other hand, Non-Value Added (NVA) activities refer to those unnecessary steps within a process that do not have a significant impact on the quality of care or the patient experience[15]. In essence, as shown in Table 2, these activities represent tasks that can be minimized or eliminated to streamline the process and improve efficiency. Identifying and mitigating NVA activities is a critical step in optimizing processes and enhancing overall performance.

Table 2. Value Added Analysis of OLOS

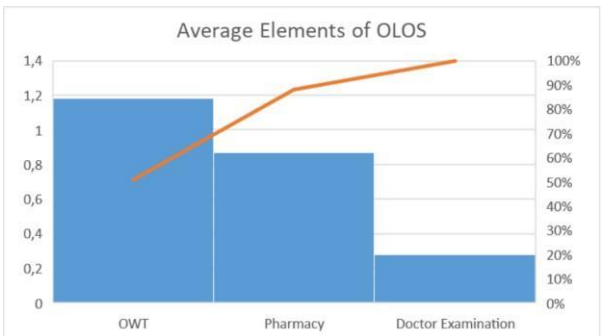
No	Activity	Customer Value Added	Business Value Added	Customer Non-Value Added
1	Come to the hospital		✓	
2	Register at the Online Check-In Counter			✓
3	Register at the Self-Service Counter			✓
4	Register at the Registration Counter			✓
5	Go to the polyclinic waiting room		✓	
6	Perform anamnesis	✓		
7	Direct patient to the doctor's examination room		✓	
8	Examine the patient	✓		
9	Complete payment	✓		
10	Make medicines according to the data from SIMRS	✓		
11	Hand over the medicine	✓		
12	Perform radiology examination	✓		
13	Perform laboratory examination	✓		

Kiosks are categorized as non-value added (NVA) activities since they only generate queue numbers without recording patients' arrival times. However, enhancing the functionality of these kiosk machines to also record patients' arrival times through the scanning of their QR or barcode registrations could transform them into Business Value Added (BVA) components. This enhancement would enable the collection of critical data necessary for achieving or tracking the ideal Length of Stay (LOS).

After a comprehensive assessment of the activities within the existing Business Process Model and Notation (BPMN), an improved BPMN is developed as a proposed suggestion. BPMN has demonstrated its effectiveness in identifying bottlenecks that impede the process and identifying activities lacking in added value for the enhancement of clinical processes[15][16]. In the context of healthcare, BPMN can contribute to streamlining the operations of healthcare organizations, ultimately leading to increased efficiency and effectiveness, which can positively impact patient satisfaction[17].

3.2 Sub-Process of OLOS

The sub-processes, as shown in Figure 1, that comprise the standard service include outpatient waiting time, doctor examination time, billing time, and pharmacy waiting



time.

Fig. 1. Based on the Pareto Chart above, it can be observed that OWT (Outpatient Waiting Time) contributes the most to the OLOS (Outpatient Length of Stay) with an average of 1.18 hours. This is followed by the pharmacy waiting time with 0.87 hours and the doctor examination time with 0.28 hours. Each of these sub-processes will be analyzed in more detail to identify appropriate recommendations for the hospital to minimize waiting time. Since OWT contributes to the longest waiting time, a solution is needed.

OWT (Outpatient Waiting Time). Outpatient waiting time refers to the duration between a patient's arrival at the hospital and the completion of their registration. The statistical summary analysis results indicate that in a stable outpatient waiting time process, the confidence interval for the mean falls between 0.44630 and 0.54063. This implies that the maximum or recommended outpatient waiting time should ideally range from 0.44630 (equivalent to 28 minutes) to 0.54063 (equivalent to 32 minutes). Outpatient waiting time involves two main processes: the kiosk process and the registration area process, both of which will be subjected to a Value Added Analysis. While the kiosk and registration process are primary contributors to patient waiting times, it's important to note that doctor lateness can also have a significant impact on extended waiting times. When doctors are delayed in their appointments, it can disrupt the schedules of other patients, leading to delays for those who were scheduled later in the day. Unfortunately, the current study lacks available data regarding doctor arrival times and individual doctor consultation schedules. The Value Added Analysis for the kiosk and registration area business processes is presented in Table 3 and Table 4.

Table 3. Value Added Analysis of Kiosk

No	Activity	Customer Value Added	Business Value Added	Customer Non-Value Added
1	Choose online registration option		✓	
2	Scan QR code or input registration code	✓		
3	Fill in name, date of birth, and polyclinic			✓
4	Choose type of coverage		✓	
5	Choose desired polyclinic and doctor		✓	
6	Print polyclinic queue number		✓	
7	Print registration queue number		✓	
8	Go to registration area			✓
9	Contact call center team			✓
10	Help patients solve the problem			✓

In the kiosk process, several activities have been identified as non-value added. Firstly, the activity of manually filling in the patient's name and date of birth is considered non-value added due to the potential risk of data discrepancies or errors. Secondly, the process of contacting the call center team and providing assistance to patients who encounter issues with the kiosk is also categorized as non-value added. These activities can prolong the patient registration process without providing any significant impact or benefit to the patient.

Additionally, the process of physically going to the registration area is identified as non-value added. This step represents a redundant activity within the registration process that does not significantly contribute to the patient's care or treatment. To streamline and improve this process, it is recommended that the identification process within the kiosk be integrated using a QR code generated from the website system. This would not only expedite the registration process but also reduce the risk of errors associated with manual data entry.

Table 4. Value Added Analysis of Registration Area/Desk

No	Activity	Customer Value Added	Business Value Added	Customer Non-Value Added
1	Call patient's queue number		✓	
2	Submit registration queue ticket		✓	
3	Identify patient			✓
4	Enter medical record number			✓
5	Register patient			✓
6	Confirm insurance			✓
7	Print out insurance file			✓
8	Receive polyclinic queue number		✓	

In the registration area, several activities have been identified as non-value added, including patient identification, entering the medical record number, registering the patient in the system, confirming insurance, and printing insurance files. These redundant steps can be streamlined and eliminated by incorporating them into the online registration process, resulting in a reduction in patients' waiting time.

Meanwhile, in the improved BPMN, the registration area is eliminated altogether, as the entire patient registration process is fully automated and conducted through the kiosk or automated machine. This approach not only enhances efficiency but also minimizes the risk of errors associated with manual data entry and processing. Patients can complete the registration process seamlessly and without unnecessary delays.

Doctor Examination Time. The objective of conducting the One-Way ANOVA analysis for doctors is to assess the performance of different doctors within the Obstet-

rics & Gynecology Department. Ideally, the level of service provided by different doctors should exhibit consistent similarity without any significant variations. This analysis includes five distinct doctors, identified by the numbers 632, 542, 343, 8, and 7. The results of the One-Way ANOVA reveal that the p-value is 0.004 ($p<0.05$), signifying that the means of each doctor's performance are statistically significant and distinct from one another. In other words, there are significant differences in the service performance among these doctors.

Pharmacy Time. The final sub-process to consider in regular OLOS is the pharmacy waiting time, which encompasses the duration from when patients queue for pharmacy input until they receive the prescribed medicines. The results obtained from the Statistical Summary Analysis suggest that in a stable pharmacy waiting time process, the confidence interval for the mean duration falls within the range of 0.30424 to 0.37870. Consequently, the recommended duration for pharmacy waiting time should ideally range from 18 minutes to 23 minutes.

4 CONCLUSION

The study findings reveal that the Outpatient Length of Stay (OLOS) and various sub-processes' performance at XYZ Hospital currently do not align with the standards established by hospital management. Consequently, it is imperative to scrutinize and optimize the patient journey's business process at XYZ Hospital, eliminating activities that do not contribute value. Based on a comprehensive analysis conducted by the researcher, several recommended interventions can be implemented to enhance the hospital's operational efficiency and service quality.

Firstly, it is strongly recommended that the hospital management establish a unified Standard Operating Procedure (SOP) that encompasses all units within the outpatient department. This SOP should serve as a comprehensive guide to streamline processes and improve coordination across various departments. Additionally, the hospital should introduce a system allowing patients to upload their insurance cards during the online booking process. This pre-verification step will facilitate a smoother and more efficient experience for patients, reducing delays during their scheduled appointments. Furthermore, the hospital should implement a scheduling system within the online registration process to ensure patients arrive punctually for their reserved appointment slots.

As the improved registration process is implemented, the hospital must also focus on enhancing communication with patients. Clear and concise information should be provided to patients, and initial awareness campaigns should be conducted over the next three months to familiarize patients with the updated procedures. Additionally, the hospital should invest in enhancing the kiosk system to accurately track patient arrival times. The introduction of a barcode QR system for streamlined check-in will further expedite the process, ultimately eliminating the need for a dedicated registration area and reducing patient waiting times.

To address the observed significant variations in performance among doctors, it is recommended that the hospital actively encourage doctors within the same group to

standardize examination practices through open discussions and collaboration. Moreover, the hospital should establish a robust system for tracking and monitoring doctors' arrival times, thereby minimizing instances of doctor lateness and optimizing patient scheduling.

Lastly, the hospital's IT team should prioritize the improvement of the data recording system. This enhancement should address issues such as "no data" entries, ensuring the collected data is accurate, valid, and well-suited for further research and analysis. Organizing a comprehensive meeting involving all hospital staff and doctors will be instrumental in instilling discipline and improving data recording practices across the organization.

These proposed recommendations, when thoughtfully implemented, have the potential to significantly enhance XYZ Hospital's operational efficiency, service quality, and patient satisfaction. By aligning its practices with these suggestions, the hospital can strive towards meeting and exceeding the standards set by hospital management.

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