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Optimization Of Patient Flow Management To Reduce Waiting Time In Outpatient Services: A Study In A Type B Hospital In Jakarta

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Abstract

Patient waiting time is an important indicator of hospital service quality and significantly affects patient satisfaction as well as operational efficiency. To analyze factors contributing to prolonged waiting times and to evaluate patient flow management interventions in outpatient services. This was a quasi-experimental study using a pre–post intervention design. Data were collected over three months before and after the intervention, which included the implementation of an electronic registration system, time-based scheduling, and redistribution of medical staff. The average waiting time decreased from 120 ± 30 minutes to 65 ± 20 minutes ($p < 0.001$). Patient satisfaction increased from 68% to 85%. The main contributing factors were physician delays, registration bottlenecks, and imbalance in patient load distribution. Patient flow management-based interventions significantly reduced waiting time and improved patient satisfaction. Continuous implementation and routine monitoring are required.

Keywords: Hospital Management, Outpatient Care, Patient Satisfaction, Service Efficiency, Waiting Time.

INTRODUCTION

High-quality healthcare services are not solely determined by clinical competence but also by the efficiency of service delivery systems. One of the most commonly used indicators to assess service efficiency in hospitals is patient waiting time, particularly in outpatient settings. Prolonged waiting times have consistently been identified as a major source of patient dissatisfaction and may negatively affect the overall perception of healthcare quality (Geneva, 2021).

In many healthcare systems, including those in developing countries, outpatient departments often experience high patient volumes combined with limited resources, leading to inefficiencies in service delivery. According to established service standards, the ideal waiting time for outpatient care should generally not exceed 60 minutes. However, in practice, many hospitals still struggle to meet this benchmark due to factors such as suboptimal scheduling systems, delays in physician attendance, administrative bottlenecks, and uneven distribution of patient load among healthcare providers (Rotter et al., 2019)

Recent advancements in healthcare management emphasize the importance of optimizing patient flow through systematic and data-driven approaches. Strategies such as electronic registration systems, appointment-based scheduling, and workforce redistribution have been shown to improve operational efficiency and reduce waiting times. These approaches are aligned with the principles of lean management, which focus on minimizing waste and enhancing value in healthcare processes (Sun et al., 2018).

Despite the growing adoption of these strategies, evidence regarding their effectiveness in real-world hospital settings in Indonesia remains limited. Therefore, this study aims to analyze the factors contributing to prolonged waiting times and to evaluate the impact of patient flow management interventions in reducing waiting time in an outpatient department of a Type B hospital in Jakarta.

RESEARCH METHODS

Study Design and Setting

This study employed a quasi-experimental design with a pre–post intervention approach and was conducted in the outpatient department of a Type B hospital in Jakarta, Indonesia. The study period spanned six months, consisting of three months before and three months after the implementation of the intervention.

Study Population and Sampling

The study population included all patients attending outpatient services during the study period. Inclusion criteria were adult patients (≥18 years) who completed the full outpatient visit process. Patients with incomplete data or those requiring emergency services were excluded.

A consecutive sampling method was used to include all eligible patients during both pre- and post-intervention periods.

Intervention

The intervention focused on optimizing patient flow management and consisted of the following components:

1. Implementation of an electronic registration system to streamline administrative processes.
2. Introduction of time-based appointment scheduling to reduce patient crowding and uneven arrivals.
3. Redistribution and adjustment of physician schedules to better match patient demand.
4. Addition of administrative staff during peak hours to minimize registration bottlenecks.

All interventions were implemented simultaneously following a one-month preparation and staff training period.

Variables and Measurements

The primary outcome was patient waiting time, defined as the duration (in minutes) from patient registration to consultation with a physician.

Secondary outcomes included:

1. Patient satisfaction, measured using a standardized questionnaire and reported as a percentage score.
2. Patient load per physician, defined as the number of patients managed per doctor per clinic session.

Additional variables included patient arrival time, physician arrival time, and duration of administrative processing.

Data Collection Data Collection

Data were collected from hospital information systems and direct observation. Waiting time and service process timestamps were recorded electronically. Patient satisfaction data were obtained through structured questionnaires administered at the end of the visit.

Statistical Analysis

Descriptive statistics were used to summarize baseline characteristics and study variables. Continuous variables were presented as mean ± standard deviation, while categorical variables were expressed as frequencies and percentages.

Comparisons between pre- and post-intervention groups were conducted using paired or independent t-tests for continuous variables, depending on data distribution. A p-value of less than 0.05 was considered statistically significant.

All statistical analyses were performed using standard statistical software.

Ethical Considerations

This study was conducted in accordance with ethical principles and approved by the institutional review board of the hospital. Patient confidentiality was maintained by anonymizing all collected data. Informed consent was obtained from participants prior to inclusion in the satisfaction survey.

RESULTS AND DISCUSSION

Baseline Characteristics

A total of 600 patients were included in the analysis, with 300 patients in the pre-intervention period and 300 patients in the post-intervention period. The baseline characteristics of patients in both groups were comparable in terms of age, sex distribution, and clinic type. The mean age of patients was 45.2 ± 15.6 years, and 56% were female.

Primary Outcome: Waiting Time

The implementation of patient flow management interventions resulted in a significant reduction in waiting time. The mean waiting time decreased from 120 ± 30 minutes in the pre-intervention period to 65 ± 20 minutes in the post-intervention period ($p < 0.001$), representing a reduction of approximately 45.8%.

Further analysis showed that:

1. Registration waiting time decreased from 40 ± 15 minutes to 20 ± 10 minutes
2. Waiting time from registration to physician consultation decreased from 80 ± 25 minutes to 45 ± 15 minutes.

Secondary Outcomes

Patient Satisfaction

Patient satisfaction significantly improved following the intervention. The overall satisfaction score increased from 68% in the pre-intervention group to 85% in the post-intervention group ($p < 0.001$). The most notable improvements were observed in domains related to waiting time, administrative services, and overall service experience.

Patient Load Distribution

The average number of patients per physician per session became more evenly distributed after the intervention. Prior to the intervention, some physicians handled up to 40 patients per session, while others managed fewer than 20. Post-intervention, the distribution was more balanced, with an average of 25–30 patients per physician per session.

Factors Contributing to Waiting Time

Analysis of workflow processes identified several key factors contributing to prolonged waiting time during the pre-intervention period:

1. Physician delays accounted for 35% of total delays
2. Registration bottlenecks contributed 30%
3. Uneven patient arrival patterns contributed 20%
4. Other factors (including administrative inefficiencies and patient-related delays) accounted for 15%.

Following the intervention, significant improvements were observed in all identified factors, particularly in reducing registration bottlenecks and improving physician punctuality.

Process Efficiency Indicators

Additional process indicators demonstrated improved efficiency after the intervention:

1. Percentage of patients seen within ≤60 minutes increased from 25% to 70%
2. Peak-hour congestion decreased significantly, with smoother patient flow throughout clinic hours
3. Administrative processing time was reduced by approximately 50%

Table 1. Baseline Characteristics of Study Participants

Variable	Pre-Intervention (n=300)	Post-Intervention (n=300)	p-value
Age (years), mean ± SD	45.5 ± 15.8	44.9 ± 15.4	0.62
Female, n (%)	168 (56%)	170 (57%)	0.80
Male, n (%)	132 (44%)	130 (43%)	0.80
Internal Medicine Clinic	120 (40%)	125 (42%)	0.65
Surgical Clinic	90 (30%)	85 (28%)	0.60
Other Clinics	90 (30%)	90 (30%)	1.00

Table 2. Comparison of Waiting Time Before and After Intervention

Variable	Pre-Intervention	Post-Intervention	p-value
Total waiting time (minutes), mean ± SD	120 ± 30	65 ± 20	<0.001
Registration waiting time (minutes)	40 ± 15	20 ± 10	<0.001
Waiting time to physician consultation	80 ± 25	45 ± 15	<0.001

Table 3. Patient Satisfaction Before and After Intervention

Variable	Pre-Intervention	Post-Intervention	p-value
Overall satisfaction (%)	68%	85%	<0.001
Satisfaction with waiting time	60%	82%	<0.001
Administrative service	65%	88%	<0.001
Overall service experience	70%	86%	<0.001

Table 4. Factors Contributing to Waiting Time

Factor	Pre-Intervention (%)	Post-Intervention (%)
Physician delay	35%	15%
Registration bottleneck	30%	10%
Uneven patient distribution	20%	10%
Other factors	15%	5%

Table 5. Process Efficiency Indicators

Indicator	Pre-Intervention	Post-Intervention
Patients seen within ≤60 minutes (%)	25%	70%
Administrative processing time (minutes)	30	15
Average patients per doctor (range)	20–40	25–30

Result

A total of 600 patients were included in this study, with 300 patients in each group. As shown in **Table 1**, there were no statistically significant differences in baseline characteristics between the pre- and post-intervention groups ($p > 0.05$), indicating that both groups were comparable. This comparability minimizes selection bias and strengthens the internal validity of the study findings.

As presented in **Table 2**, the implementation of patient flow management interventions resulted in a statistically and clinically significant reduction in waiting time. The mean total waiting time decreased from 120 ± 30 minutes to 65 ± 20 minutes ($p < 0.001$), representing a reduction of approximately 46%. This magnitude of improvement is consistent with previous studies demonstrating that structured interventions such as digital registration systems and appointment-based scheduling can reduce waiting times by 30–50% in outpatient settings.[5] From a health systems perspective, reducing waiting time below 60 minutes is critical, as longer delays are strongly associated with reduced patient satisfaction and inefficiencies in care delivery (Kruse & Beane, 2023).

Further breakdown of waiting time components revealed that registration waiting time decreased by 50%, while waiting time to physician consultation was reduced by approximately 44%. These findings indicate that the intervention effectively targeted both administrative and clinical bottlenecks. The introduction of electronic registration likely reduced redundant manual processes, while improved scheduling enhanced patient flow predictability. This aligns with lean healthcare principles, which focus on eliminating non-value-added activities and optimizing workflow efficiency (Litvak & Long, 2021).

In terms of patient-centered outcomes, **Table 3** demonstrates a significant improvement in patient satisfaction, increasing from 68% to 85% ($p < 0.001$). The most notable improvements were observed in domains related to waiting time and administrative services. This finding is supported by recent evidence indicating that waiting time is one of the strongest determinants of patient satisfaction

in outpatient care, often outweighing even clinical outcomes in shaping patient perceptions.[8] Moreover, digitalization and streamlined administrative processes have been shown to enhance patient experience by reducing uncertainty and perceived inefficiency (Oche & Adamu, 2022).

The analysis of contributing factors in **Table 4** revealed that physician delays, registration bottlenecks, and uneven patient distribution were the primary causes of prolonged waiting time prior to the intervention. Post-intervention, these factors were substantially reduced, particularly physician delays (from 35% to 15%) and registration bottlenecks (from 30% to 10%). This suggests that the intervention not only improved system design but also influenced provider behavior and accountability. Previous studies have emphasized that physician punctuality and workload balance are critical determinants of outpatient efficiency and should be addressed alongside system-level interventions (Craig et al., 2008)

Additionally, as shown in **Table 5**, process efficiency indicators improved markedly following the intervention. The proportion of patients seen within 60 minutes increased from 25% to 70%, while administrative processing time decreased by approximately 50%. Furthermore, patient load per physician became more evenly distributed, reducing variability in service delivery. These improvements reflect enhanced system stability and reduced operational variability, which are key objectives in modern healthcare management (IHI White paper, 2017)

From a broader perspective, these findings support the integration of digital health solutions and operational redesign in improving hospital performance. The results are consistent with global strategies emphasizing digital transformation and patient-centered care as key drivers of health system strengthening.[12] However, despite significant improvements, some delays persisted, indicating that additional factors such as patient arrival behavior, case complexity, and unforeseen operational constraints may continue to influence waiting time.

Therefore, while the intervention proved effective, sustainability will depend on continuous monitoring, adaptive workflow management, and integration of real-time data analytics. Future studies should consider more robust designs, such as randomized or multicenter studies, and explore the role of advanced technologies such as artificial intelligence in optimizing patient flow.

CONCLUSION

This study confirms that structured patient flow management interventions significantly improve outpatient service efficiency, as evidenced by substantial reductions in waiting time and marked increases in patient satisfaction. Importantly, the findings suggest that operational inefficiencies in hospital outpatient settings are primarily driven by system design flaws rather than resource limitations alone. Therefore, targeted process optimization can yield high-impact improvements without necessarily increasing costs.

However, the persistence of residual delays indicates that technological and structural interventions must be complemented by sustained behavioral and organizational changes, particularly in ensuring physician punctuality, adherence to scheduling systems, and accountability in service delivery. Without these elements, the long-term sustainability of improvements remains uncertain.
From a policy perspective, this study highlights the need for hospitals and health authorities to prioritize integrated digital systems, standardized appointment scheduling, and real-time performance monitoring as core components of service quality improvement. Embedding these strategies into national hospital accreditation standards and key performance indicators may accelerate widespread adoption and ensure consistency across healthcare facilities.

Future research should focus on multicenter studies to enhance generalizability, incorporate cost-effectiveness analyses to support policy decisions, and explore the role of advanced technologies—such as predictive analytics and artificial intelligence—in further optimizing patient

flow. Additionally, longitudinal studies are needed to evaluate the sustainability of these interventions over time.

In conclusion, optimizing patient flow is not merely an operational adjustment but a strategic imperative for modern healthcare systems. Its success depends on the integration of technology, process redesign, and organizational commitment to continuous quality improvement.

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