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Antecedent of patient satisfaction and its implication for improving health services in a public hospital in central Jakarta

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Abstract

Patient satisfaction is an important indicator of healthcare quality, reflecting patients' perceptions of service delivery, healthcare personnel, and the hospital environment. In Indonesia, particularly in public hospitals in Central Jakarta with high patient volumes, empirical evidence on factors influencing patient satisfaction remains limited. These hospitals often experience overcrowding, limited resources, and inconsistent service standards, which may affect patient experiences. This study aims to analyze the effects of laboratory services, waiting time, and care provider performance on patient satisfaction, as well as their implications for healthcare improvement. A cross-sectional design was employed using a five-point Likert-scale questionnaire administered to 450 patients at a public hospital in Central Jakarta. Data were analyzed using path analysis with SmartPLS 4.0. The results showed that laboratory services, care provider performance, and the healthcare environment had significant positive effects on patient satisfaction, while waiting time did not show a significant effect. Furthermore, patient satisfaction and the healthcare environment significantly influenced healthcare improvement. Patient satisfaction did not mediate the effects of laboratory services or waiting time on healthcare improvement, but it significantly mediated the effects of care provider performance and the healthcare environment. These findings highlight the critical role of care provider performance and a supportive healthcare environment in enhancing patient satisfaction and improving healthcare quality. Strengthening these aspects should be prioritized as key strategies for improving service quality in public hospitals.

Keywords: Care provider, Healthcare environment, Laboratory, Patient satisfaction, Waiting time.

Introduction

Patient satisfaction has become a cornerstone of healthcare quality evaluation and a key indicator of hospital performance in both developed and developing health systems. It reflects not only patients' perceptions of medical outcomes but also their experiences with service processes, interpersonal interactions, and facility environments. High levels of patient satisfaction have been associated with greater treatment adherence, reduced complaints, and improved hospital reputation, making it a central measure of patient-centered care and organizational effectiveness (Alibrandi et al., 2023).

In recent years, the healthcare sector has experienced profound transformations driven by increasing patient expectations, advances in medical technology, and increased competition within the service industry. While much of the focus has centered on clinical outcomes, growing evidence suggests that patient satisfaction constitutes a critical indicator of healthcare quality, which in turn influences organizational performance, loyalty, and reputation (Coutinho et al., 2021).

The existing literature identifies several antecedents of patient satisfaction, encompassing both technical and non-technical aspects of healthcare delivery. Systematic reviews have shown that satisfaction is shaped by dimensions of service quality such as reliability, responsiveness, empathy, assurance, and tangibles, as conceptualized in the ServQual and Donabedian quality models (Batbaatar et al., 2017). Among these, operational and environmental factors—including laboratory services, waiting time, care provider performance, and healthcare environment—emerge as critical determinants in the hospital context.

Timeliness and accuracy of laboratory services are directly linked to patients' trust and perceived efficiency of care (Alelign et al., 2019). Likewise, excessive waiting time remains one of the most frequently reported causes of dissatisfaction, influencing patients' overall evaluations of service quality regardless of clinical outcomes (Fitzpatrick et

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al., 2019; Gao et al., 2023). Moreover, the quality of interaction between care providers and patients—encompassing empathy, clarity of communication, and attentiveness—has been identified as a major contributor to satisfaction and improved health outcomes (Wong et al., 2023). Finally, the healthcare environment, including cleanliness, comfort, privacy, and facility adequacy, plays an essential role in shaping patients' emotional responses and perceptions of quality (Batbaatar et al., 2017).

Despite extensive international evidence, context-specific studies in Indonesia remain limited, particularly in large urban public hospitals, where patient loads are high and service expectations continue to rise. In metropolitan areas such as Central Jakarta, public hospitals face unique challenges related to overcrowding, resource constraints, and variability in service delivery standards. These conditions may impact patient experiences and perceptions of care, yet empirical studies examining the determinants of satisfaction in this context are scarce.

Therefore, understanding the antecedents of patient satisfaction within Indonesian public hospitals is crucial for improving the quality and responsiveness of healthcare services. Addressing these factors can provide actionable insights for hospital managers and policymakers seeking to strengthen patient-centered care and optimize resource utilization in the future.

Accordingly, this study aims to analyze the antecedents of patient satisfaction and their implications for healthcare improvement at a major public referral hospital in Central Jakarta, Indonesia. Specifically, this study investigates how laboratory services, waiting time, and care provider performance influence patient satisfaction. The findings are expected to contribute to the theoretical development of patient satisfaction models in the Southeast Asian context and provide practical guidance for enhancing the quality of healthcare in urban public hospitals.

Method

Study design

This study was a hospital-based cross-sectional design. A structured questionnaire was used to collect data on patient satisfaction and its antecedents, including laboratory services, waiting time, care providers, and the healthcare environment. Items were rated on a 5-point Likert scale and adapted from established patient satisfaction frameworks. The required sample size was determined using Cochran's formula for estimating a population proportion and subsequently adjusted using the finite population correction and a non-response allowance. Data collection was conducted among 450 patients in a public hospital in Central Jakarta using a probability sampling approach. Informed consent was obtained prior to data collection.

Measurement instruments

All variables were measured using validated and contextually adapted instruments:

1. Care Provider (CP) was assessed using the dimensions of quality service quoted by Natasia (2022), which consists of seven dimensions: effective, efficient, fair, precise time, patient-oriented, safe, and integrated.
2. Healthcare Environment (HE) was measured using perceived hospital environment quality indicators (PHEQIs),which consist of dimensions of the environment in the room, spatial environment, and environmental sanitation (Manca et al., 2022). PHEQIs are measuring instruments that assess the perceptions of patients, visitors, and staff regarding the quality of the hospital environment. Tools measure humanization spatial-physical, which includes various aspects of comfort, both directly and indirectly.
3. Healthcare Improvement (HI) was evaluated using the instruments developed by Cui et al. (2025) to determine how patient satisfaction with improvement can influence improvements in health facilities.
4. Patient satisfaction (PS) was assessed based on a modified patient satisfaction questionnaire short form (PSQ-18). The modifications made were through test validity and reliability so that the instrument

was worthy of use for research (Imaninda and Azwar, 2016).

5. Laboratory (LAB) measured with quoted instruments, as described by Raj et al. (2024). Laboratory instruments were designed by the senior pathologist in charge, specially trained in NABL assessment, along with input and advice from hospital administration faculty, senior residents, technical personnel, and obtained from previous studies in archives.
6. Waiting Time (WT) was measured using objective and subjective factors, including Actual Waiting Time (AWT), estimated waiting time (EWT), perceived waiting time (PWT), reasonable waiting time (RWT), and tolerable waiting time (Zhang et al., 2023).

All responses were recorded on a six-point Likert scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). This scale was used to catch level agreement respondents to each statement in the questionnaire, allowing researchers to measure perception in a more detailed, measurable, and structured manner.

Data collection procedures

Data collection using instrument questionnaire. The questionnaire was distributed via Google Forms. Respondents filledin self-administered questionnaires in accordance with the instructions provided on the page beginning form. To ensure clarity, each item was equipped with short instructions so that respondents could understand the question without direct mentoring from researchers. Google forms were used for data collection because of their convenience in reachingrespondents widely and efficiently (Pujianto & Kadarsih, 2019; Jam et al., 2025).

Data analysis

Data analysis was conducted using SmartPLS 4.0 (SmartPLS GmbH, Germany) employing partial least squares structural equation modeling (PLS-SEM), chosen for its efficacy in managing confident latent constructs and moderate sample sizes. The analysis was conducted in two phases. Initially, the measurement model was assessed to determine reliability and validity through composite reliability, Cronbach's alpha, Average Variance Extracted (AVE), and discriminant validity. All constructs exhibited AVE values of 0.50, indicating sufficient convergent validity. Second, the structural model was evaluated by analyzing the e square, path coefficient, Latent Variable (lv) performance, and importance–performance map analysis (IPMA). The goal is to assess the strength and quality of the relationship between variables in the model, measure the ability of predictive models, and identify the most influential variables that need to be improved in the context of the study.

Results

Participant characteristics

A total of 450 outpatients participated in this study at a public hospital in Central Jakarta. The participants had a mean age of 43.15 ± 11.35 years, with women comprising 64.6% of the sample population. Most have at least a secondary education and live with their spouses or family members. Detailed baseline characteristics are presented in Table 1

Table 1. Participant characteristics

Characteristics	Description	Total participants (*n* = 221)
Gender (*n*)	Male Female	159 (35.3%) 291 (64.6%)
Ages (years), mean (SD)		43.15 ± 11.35
Education level (n)	No formal education	16 (3.5%)
	Elementary school graduate	31 (6.8%)
	Junior high school graduate	142 (31.5%)
	Senior high school graduate	90 (20%)
	Associate graduate	45 (10%)
	Bachelor's degree	60 (13.4%)
	Master's degree	43 (9.6%)
	Doctoral degree	23 (5.2%)

Reside with (n)	Spouse	161 (35.8%)
	Sibling(s)	59 (13.1%)
	Child(s)	79 (17.6%)
	Grandchild(s)	15 (3.3%)
	Relative(s)	20 (4.4%)
	Caregiver	31 (6.9%)
	Living alone	67 (14.9%)
	Others	18 (4%)
Occupation (*n*)	Housewife	51 (11.3%)
	Privately employed	75 (16.7%)
	Civil servant	47 (10.4%)
	Individual service provider	131 (29.1%)
	Online driver	110 (24.4%)
	Others	36 (8.1%)

Measurement model evaluation

The outer model was assessed to ensure validity and reliability of the latent constructs, including care provider, healthcare environment, laboratory, patient satisfaction, and waiting time. All indicator loadings exceeded 0.70, confirming the item reliability. Composite Reliability (Cr) and Cronbach's alpha values were above 0.70, and Average Variance Extracted (AVE) values were greater than 0.50, indicating adequate convergent validity. Discriminant validity was demonstrated using the Heterotrait–Monotrait Ratio (HTMT), with all values below 0.90. Cross loading with indicator loading value on the measured construct is more tall than cross loading value on other constructs. The Fornell–Lacker criterion with the root mean square from the average of the extracted variances by a construct must be larger than the correlation between the construct and other constructs. Overall, the measurement model met all statistical criteria, confirming internal consistency and conceptual distinctiveness of the constructs.

Table 2. Results of measurement model evaluation

Composites	Outer Loadings	AVE	CR	Cronbach's Alpha
Care Provider		0.910	0.984	0.984
CP1	0.946			
CP2	0.945			
CP3	0.962			
CP4	0.954			
CP5	0.953			
CP6	0.959			
CP7	0.957			
Healthcare Environment		0.729	0.980	0.977
HE1	0.893			
HE2	0.891			
HE3	0.897			
HE4	0.898			
HE5	0.905			
HE6	0.801			
HE7	0.758			
HE8	0.795			
HE9	0.786			
HE10	0.763			
HE15	0.886			
HE16	0.865			
HE17	0.877			

HE18	0.897			
HE19	0.892			
HE20	0.834			
Laboratory		0.881	0.957	0.955
LAB1	0.897			
LAB2	0.961			
LAB3	0.938			
LAB4	0.957			
Patient Satisfaction		0. 950	0.947	0.947
PS1	0.974			
PS2	0.975			
Waiting Time		0.901	0.973	0.973
WT1	0.937			
WT2	0.955			
WT3	0.956			
WT4	0.957			
WT5	0.942			

Structural model analysis

R-squared indicates how much an exogenous variable can explain an endogenous variable. Its value ranged from 0 to 1. The higher the value, the better the model explains the variable.

Table 3. R Square test

	R-square
Healthcare improvement	0.090
Patient satisfaction	0.743

The R-squared (r^2) value for the healthcare improvement (y) variable was 0.09 or 9%. This shows that 9% of the variation or change in variable y can be explained by exogenous variables in the model, namely laboratory, waiting time, care provider, and healthcare environment. The remaining 91% is explained by other variables outside this research model. For patient satisfaction variable (z), the R-squared value was 0.743. Or 74.3%. This means that variations in variable z can be explained by exogenous variables in the model, namely laboratory, waiting time, care provider, and healthcare environment, and the remaining 25.7% is influenced by other factors outside the model study.

Path coefficients and hypothesis testing

All hypothesized relationships were evaluated using a bootstrapping procedure with 5,000 subsample. The results revealed that the laboratory had a significant positive effect on patient satisfaction (β=0.169, p<0.030), waiting time did not have an effect on patient satisfaction (β=0.087, p=0.277), care providers had a significant positive effect on patient satisfaction (β=0.386, p<0.000), the healthcare environment had a significant positive effect on patient satisfaction (β=0.267, p<0.001), patient satisfaction had a significant positive effect on healthcare improvement (β=0.170, p<0.008), the laboratory did not have an effect on healthcare improvement (β=0.001, p=0.991), waiting time did not have an effect on healthcare improvement (β=0.068, p=0.734), care providers did not have an effect on healthcare improvement (β=-0.159, p=0.099), and the healthcare environment had a significant positive effect on healthcare improvement (β=0.229, p<0.009).

The results of this study show that the laboratory, care provider, and healthcare environment have a significant effect on patient satisfaction, while waiting time does not.

Patient satisfaction is proven has a significant positive effect on healthcare improvement. However, only the healthcare environment has a direct effect on healthcare improvement, while the laboratory, care provider, and waiting time do not show a direct influence.

Table 4. Path coefficient with t-values and p-values for the structural model

Relationship	Path coefficient (β)	T values	P values	Result
H1: laboratory -> patient satisfaction	0.169	2,176	<0.030*	Supported
H2: waiting time -> patient satisfaction	0.087	1,088	0.277	Unsupported
H3: care provider -> patient satisfaction	0.386	3,803	<0.000*	Supported
H4: healthcare environment -> patient satisfaction	0.267	3,295	<0.001*	Supported
H5: patient satisfaction -> healthcare improvement	0.170	2,647	<0.008*	Supported
H6 : laboratory -> healthcare improvement	0.001	0.011	0.991	Unsupported
H7: waiting time -> healthcare improvement	0.068	0.734	0.463	Unsupported
H8: care provider -> healthcare improvement	-0.159	1,652	0.099	Unsupported
H9: healthcare environment -> healthcare improvement	0.229	2,611	<0.009*	Supported

*: significant (p< 0.05)

Mediation effects

Mediation analysis confirmed that patient satisfaction did not mediate the relationship between laboratory and healthcare improvement (β=0.029, p=0.100), patient satisfaction did not mediate the relationship between waiting time and healthcare improvement (β=0.015, p=0.361), patient satisfaction was able to mediate the relationship between care providers and healthcare improvement (β=0.066, p<0.043), and patient satisfaction was able to mediate healthcare relationships environment on healthcare improvement (β=0.045, p<0.044).

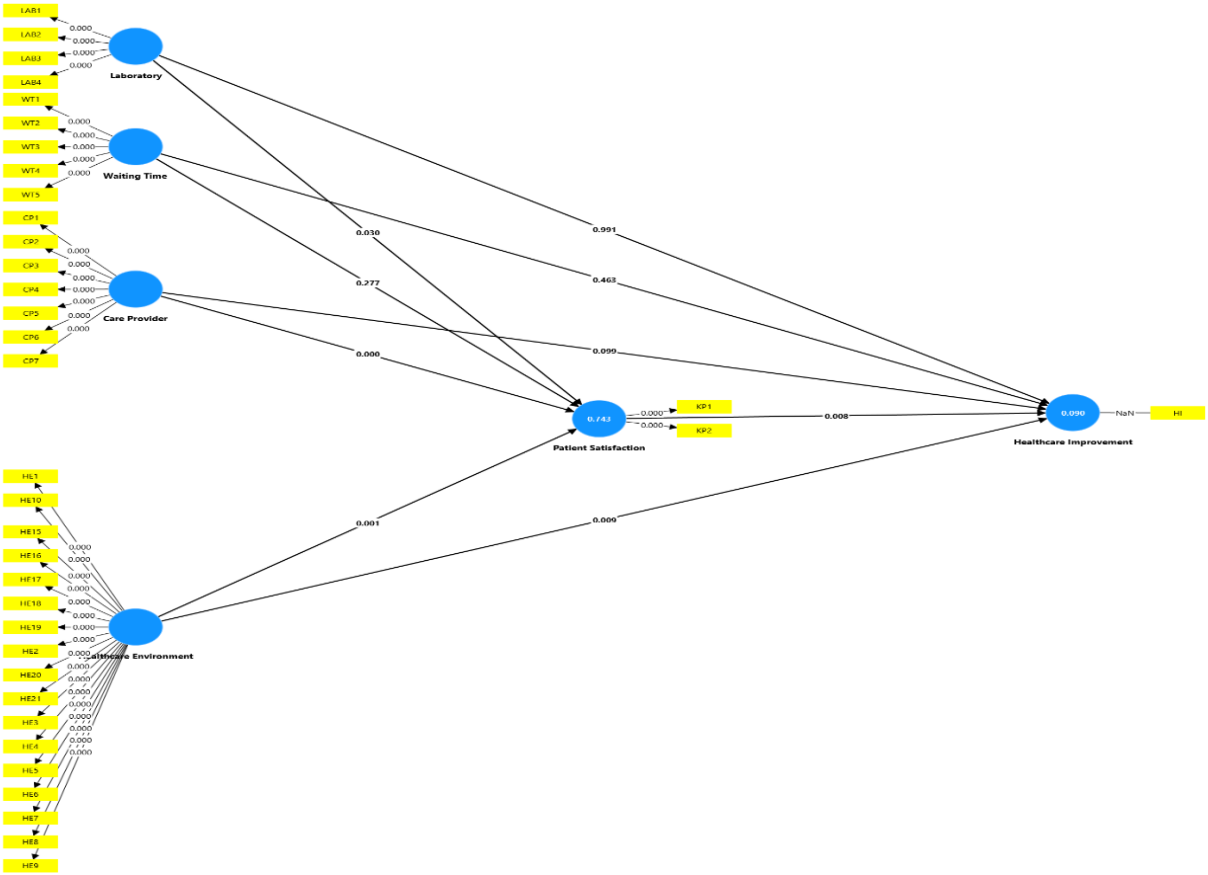

Figure 1. Inner model

Table 5. Path coefficient with T-Values and P-Values for the mediation effect

Relationship	Path coefficient (β)	T values	P values	Result
H10: laboratory -> patient satisfaction -> healthcare improvement	0.029	1,647	0.100	Unsupported
H11: waiting time -> patient satisfaction -> healthcare improvement	0.015	0.914	0.361	Unsupported
H12: care provider -> patient satisfaction -> healthcare improvement	0.066	2,022	<0.043*	Supported
H13: healthcare environment -> patient satisfaction -> healthcare improvement	0.045	2,010	<0.044*	Supported

*: significant (p< 0.05)

Latent Variable (LV) performance: *Latent variable performance* analysis aims to determine the level of performance of each latent variable in the research model. Patient satisfaction has mark performance highest namely 88,284, which shows that level satisfaction patient response to service health classified as very good. This is signified that patient in general feel satisfied with the service received, both from aspect power health, facilities and systems services provided. Furthermore, the variables care provider (87,633), healthcare environment (87,154), and laboratory (87,062) also show high and relatively balanced, indicating that third aspect the has walk with good and get positive assessment from respondents. Meanwhile, waiting time obtained performance amounting to 86,382, which is still classified as good however relatively lower compared to variables others. This is show that efficiency waiting time still can have improved so that it can strengthen overall positive patient experience. Different with variables other than that, healthcare improvement has mark performance lowest namely 19,943, which indicates that improvement quality service overall health still not yet maximum. Value this become indication that although a number of aspect service has own high performance, its impact on increasing quality service health still limited and requires attention more carry on.

Importance–Performance Map (IPMA) Analysis on Variables

The Importance–Performance Map Analysis (IPMA) was used to identify which variables have high importance for the objective variable (healthcare improvement) and to assess their performance levels based on respondents' perceptions. The healthcare environment (importance = 0.275; performance = 87.154) and patient satisfaction (importance = 0.170; performance = 88.284) fall into this category. These two variables must be maintained and consistently improved, as they contribute significantly to enhancing the quality of healthcare services. Care provider (importance = –0.094; performance = 87.633) and laboratory services (importance = 0.030; performance = 87.062) are positioned in Quadrant II.

This indicates that the organization should continue to maintain high performance in these areas without requiring substantial additional resources, thereby supporting operational efficiency. Waiting time (importance = 0.083; performance = 86.382) is categorized in Quadrant IV. This suggests that improvements in queue management and more efficient service times can be strategic steps to enhance patients' perceptions of their overall service experience.

Table 6. Latent Variable (LV) performance

Variables	LV Performance
Care Provider	87,633
Healthcare Environment	87,154
Healthcare Improvement	19,943
Laboratory	87,062
Patient Satisfaction	88,284
Waiting Time	86,382

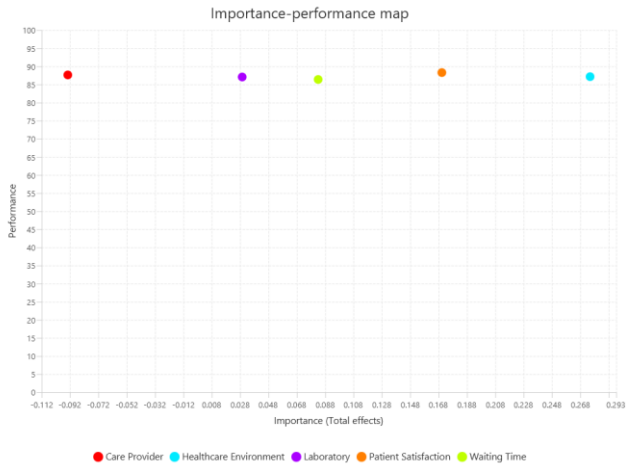

Figure 2. IPMA variables

Importance–Performance Map (IPMA) analysis on indicators

Overall, the indicators in this study demonstrate relatively high performance levels, with values ranging between 85 and 90, indicating respondents' positive perceptions of the measured dimensions. Meanwhile, the importance values vary, reflecting differences in the relative influence of each indicator on improving healthcare service quality.

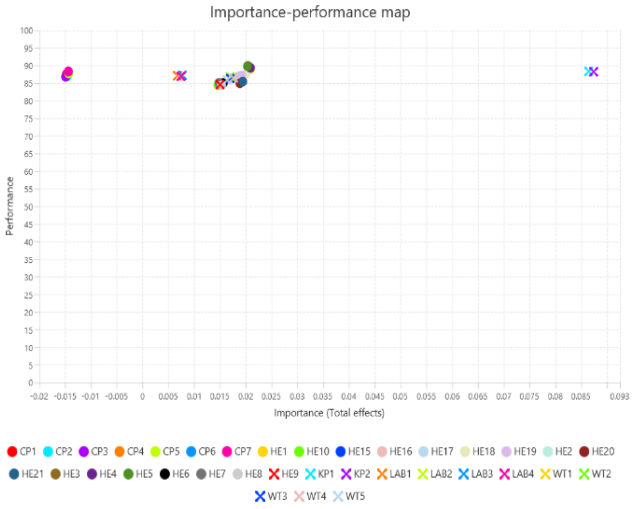

Figure 3. IPMA indicators

The mapping results show that indicators from the Care Provider (CP) and Patient Satisfaction (PS) variables occupy positions with both high importance and strong performance. In contrast, the Healthcare Environment (HE) variable demonstrates excellent performance, but its level of importance is categorized as moderate. The laboratory (LAB) and Waiting Time (WT) variables exhibit lower relative importance, despite having high performance levels.

Discussion

Laboratory on patient satisfaction

The results of the study show that the laboratory variable has a significant positive effect on patient satisfaction ($\beta = 0.169$, $p < 0.030$), indicating that Hypothesis 1 is accepted. This means that improvements in laboratory facilities lead to higher levels of patient satisfaction. Enhancing the quality of laboratory services in healthcare facilities is therefore an important factor that contributes to patient satisfaction. As explained by Radito (2021), the quality of services and healthcare facilities has a positive and significant influence on patient satisfaction.

A well-functioning laboratory service—such as optimal equipment performance, adequate infrastructure, and a comfortable environment—tends to improve patient satisfaction. This aligns with the ServQual theory, which states that the tangibles dimension (physical evidence) strongly influences patients' perceptions of service quality (Radito, 2021). With more modern and reliable laboratory facilities, patients perceive shorter waiting times, more accurate examinations, and a more comfortable laboratory environment. All of these aspects contribute directly to increased patient satisfaction.

Sebera et al. (2024) also emphasize that laboratory facilities must operate effectively by providing results as quickly as possible with accurate time estimates. Patients often feel dissatisfied when laboratory results take a long time, especially when timely treatment is urgently needed. This highlights how the quality of laboratory services—particularly reliability and responsiveness—contributes to patient satisfaction. Research by Loekito and Hukama (2017) further supports this, showing that in clinical laboratories, the responsiveness dimension is the most dominant factor influencing customer satisfaction. Thus, improving laboratory facilities—both in terms of infrastructure and staff service—will

enhance patient satisfaction, as laboratory quality is not only determined by equipment but also by the responsiveness and competence of personnel in delivering fast and accurate services.

Waiting time on patient satisfaction

The results of this study indicate that waiting time does not have a significant effect on patient satisfaction ($\beta = 0.087$, $p = 0.277$). This suggests that variations in waiting duration—whether long or short—do not substantially shape patients' satisfaction levels. A plausible explanation is that patients in public hospitals have become accustomed to extended service processes, starting from registration to treatment and medication collection. This condition is often exacerbated in facilities that accept government insurance, where high patient volume commonly leads to overcrowding and longer service flows.

This finding aligns with Zhang et al. (2023), who reported that waiting time does not fully determine patient satisfaction due to subjective differences in how patients perceive waiting. Some patients may consider a one-hour wait excessively long, whereas others find it acceptable. Therefore, hospitals mainly need to ensure that waiting times remain rational and appropriate to the clinical needs of patients.

The insignificant effect may also indicate that patients prioritize other components of healthcare quality—such as physician competence, diagnostic accuracy, and staff professionalism—over waiting duration. Consistent with Wiranata and Keni (2025), although waiting time shows a negative association with satisfaction, its effect remains nonsignificant because patients tend to tolerate queuing as long as the care they receive is adequate and reliable.

Care provider on patient satisfaction

The results of this study demonstrate that care providers have a significant positive effect on patient satisfaction ($\beta = 0.386$, $p < 0.000$). This finding confirms that improvements in care provider performance directly enhance patient satisfaction. Similar results were reported by Gao et al. (2022), who identified provider-related factors—such as consultation duration, the quality of the consultation process, and the provider's willingness to deliver information proactively—as key determinants of patient satisfaction.

Aljarallah et al. (2023) further emphasize that provider behavior, communication skills, and responsiveness play a central role in shaping patients' perceptions of healthcare services. When interactions with doctors or nurses are empathetic, informative, and respectful, patients are more likely to feel understood and supported, which strengthens their overall satisfaction. This aligns with Azizam et al. (2015), who found that effective communication from care providers is a major contributor to patient satisfaction.

Overall, these findings highlight that competent, communicative, and responsive care providers significantly influence the patient experience. Strengthening provider competence and interpersonal skills is therefore essential, as it has a direct and meaningful impact on improving patient satisfaction.

Healthcare environment on patient satisfaction

The results of this study show that the healthcare environment has a significant positive effect on patient satisfaction ($\beta = 0.267$, $p < 0.001$). This indicates that better environmental conditions lead to higher patient satisfaction. This finding aligns with Al-Munaini et al. (2024), who highlight that factors such as air quality, ventilation, cleanliness, lighting, and noise control directly influence patient comfort and overall experience. A well-maintained environment enhances both safety and patients' positive perceptions of care.

Similarly, Al-Munaini et al. (2024) and Rakhman et al. (2022) emphasize that a clean, quiet, and orderly hospital environment creates a positive care experience and improves patients' psychological comfort, sense of security, and confidence in the services provided. Thus, improvements in the healthcare environment contribute meaningfully to increased patient satisfaction.

Patient satisfaction on healthcare improvement

The results of this study show that patient satisfaction has a significant positive effect on healthcare improvement ($\beta = 0.170$, $p < 0.008$). This

indicates that higher patient satisfaction supports overall service improvement, as satisfied patients provide a positive signal that current services meet their expectations—forming a foundation for further quality enhancement.

This finding is consistent with Bianchim et al. (2023), who noted that when patients are satisfied with responsive and reliable services, healthcare organizations can use this feedback to refine processes, practices, and clinical outcomes. Similarly, Ferreira et al. (2023) highlighted that patient satisfaction is a key outcome within the healthcare quality framework and provides valuable insights for resource allocation and service adjustment to better meet patient needs.

Understanding the factors that influence satisfaction—such as clinical interactions, communication, and service attributes—enables healthcare facilities to identify critical improvement areas, supporting ongoing, patient-centered service enhancement.

Laboratory on healthcare improvement

The results show that the laboratory variable does not affect healthcare improvement (β = 0.001, p = 0.991), indicating that laboratory quality does not directly drive service enhancement. This aligns with Adekoya et al. (2025) and Strain et al. (2019), who explain that although laboratories are theoretically important for diagnostic accuracy and clinical decision-making, their real impact depends on infrastructure quality, system integration, and the effective use of laboratory results. In many developing-country settings, including Indonesia, limited resources, weak integration with clinical services, and suboptimal utilization of diagnostic findings reduce the laboratory's contribution to overall service improvement. Thus, laboratory quality alone does not automatically improve healthcare; its impact depends on how well laboratory outputs are integrated and applied within the healthcare system.

Waiting time on healthcare improvement

The results of this study show that waiting time does not have an effect on healthcare improvement (β = 0.068, p = 0.734), indicating that shorter or longer waiting durations are not considered key drivers in efforts to enhance healthcare services. This may be because other factors—such as provider–patient interaction quality, facility conditions, and clinical outcomes—play a more dominant role in influencing improvement efforts. These findings contrast with Cima and Almeida (2024), who identified waiting time as a strategic component in hospital service improvement initiatives. However, they are supported by Wildan et al. (2024), who found that waiting time does not significantly influence patient satisfaction, suggesting that patients in certain contexts may view waiting duration as secondary compared with clinical quality or provider competence. Consequently, waiting time may not function as a major catalyst for strategic change within healthcare facilities.

Care provider on healthcare improvement

The results of this study show that care providers do not have an effect on healthcare improvement (β = –0.159, p = 0.099). This indicates that the services delivered by healthcare personnel are not direct predictors of system-level quality improvement efforts. This finding aligns with Ahmed et al. (2024), who emphasize that improvements in healthcare services are not driven solely by individual provider behavior, but by factors such as clinical leadership, organizational structure, quality culture, and quality management systems. Although care providers play an important role in clinical interactions, their performance does not automatically translate into system-wide improvements without strong organizational support.

This result is further supported by De Kok et al. (2023), who highlight that organizational factors—such as culture, structure, and managerial commitment—are far more influential in determining an institution's capacity for quality improvement than the performance of individual providers. Elements such as leadership commitment, an open culture, and opportunities for team development are critical for enabling organizations to learn and improve. Therefore, this study suggests that provider performance alone, when not supported by effective organizational mechanisms, is insufficient to drive healthcare quality improvement.

Healthcare environment on healthcare improvement

The study results show that the healthcare environment has a significant positive effect on healthcare improvement ($\beta = 0.229$, $p < 0.009$). This indicates that better healthcare environmental conditions lead to greater improvements in healthcare outcomes. These findings are consistent with Sun et al. (2023), who reported that environmental factors such as temperature, ventilation, humidity, cleanliness, and air quality directly influence the comfort, health, and productivity of both patients and healthcare staff. Their study also emphasizes that effective physical environment management—from air quality control to room arrangement—creates supportive recovery conditions and reduces user stress, ultimately contributing to improved health outcomes and service performance.

Similarly, Shetty et al. (2024) found that hospital environmental design—including ventilation, lighting, layout, and cleanliness—significantly influences patient outcomes, staff well-being, work efficiency, and care quality. Anåker (2023) further highlights that physical environment improvements are essential for enhancing service quality, as building renovations and room design contribute to better clinical care and operational performance. Therefore, a well-designed healthcare environment not only enhances patient experience but also forms a structural foundation for comprehensive quality improvement.

Role of patient satisfaction as a mediator

The study shows that patient satisfaction does not mediate the relationship between laboratory services and healthcare improvement ($\beta = 0.029$, $p = 0.100$), nor between waiting time and healthcare improvement ($\beta = 0.015$, $p = 0.361$). In contrast, patient satisfaction significantly mediates the relationship between care providers and healthcare improvement ($\beta = 0.066$, $p < 0.043$), as well as the relationship between the healthcare environment and healthcare improvement ($\beta = 0.045$, $p < 0.044$).

These results indicate that patient satisfaction only acts as a mediator for variables directly linked to patients' emotional and perceptual experiences, rather than technical or operational factors. The lack of mediation in laboratory and waiting time suggests that although these aspects are essential to service delivery, improvements in these areas are not sufficiently perceived by patients to elevate satisfaction, and therefore do not translate into broader organizational improvement. This is consistent with Ridwan et al. (2024), who note that technical accuracy—such as laboratory results—does not always shape patient perceptions, and with Hutabarat et al. (2025), who emphasize that only certain service quality dimensions lead to managerial or policy-level improvements.

Conversely, the significant mediation effect in care providers underscores the importance of interpersonal quality—communication, empathy, and direct interaction—in driving patient satisfaction, which in turn supports improvement at the organizational level. This aligns with Novitasari (2022), who asserts that patient satisfaction often serves as a bridge between service quality and organizational outcomes. The mediation effect of the healthcare environment further highlights that physical aspects such as cleanliness, comfort, and facility adequacy strongly influence satisfaction, eventually contributing to systemic improvements. Inaray et al. (2024) similarly found that tangible facilities and empathy shape satisfaction and reinforce positive patient experiences, ultimately supporting service improvement.

Theoretical contributions

This study provides several key theoretical contributions to the literature on healthcare quality, patient satisfaction, and healthcare improvement mechanisms. The findings reinforce service quality theory by showing that interpersonal dimensions (care providers) and the physical healthcare environment have a significant impact on patient satisfaction, while technical aspects such as laboratory services and waiting time do not shape satisfaction perceptions in a meaningful way.

The mediation results further clarify that patient satisfaction is not a universal mediator; it operates effectively only for variables directly experienced and emotionally perceived by patients. This aligns with the view that satisfaction is a subjective construct

shaped by interpersonal interactions and perceived service quality, rather than technical performance.

Moreover, the study expands theoretical understanding of healthcare improvement by demonstrating that organizational improvement is more strongly driven by satisfaction signals derived from patient experiences with care providers and the physical environment. In contrast, laboratory accuracy and waiting time—although operationally important—do not translate into perceptual cues capable of driving broader systemic improvement.

Practical and managerial implications

This study offers several practical insights for hospital leaders and healthcare managers. First, healthcare organizations should prioritize strengthening the quality of interactions between healthcare workers and patients, as this factor plays a central role in shaping patient satisfaction and driving healthcare improvement. Second, managers should enhance the physical healthcare environment—particularly cleanliness, ventilation, lighting, layout, and overall comfort—given its proven direct influence on satisfaction and perceived service quality. In addition, hospitals may need to improve patient education regarding laboratory processes and waiting time management to ensure patients understand ongoing quality efforts and the technical performance of these services.

Limitations

This study has several limitations. Data collection relied on patient questionnaires, which may introduce perceptual and subjective bias. Additionally, the study was conducted in a single public healthcare facility in Central Jakarta, limiting the generalizability of findings to other hospital settings or different organizational contexts.

Future research direction

Future studies are encouraged to incorporate additional mediating or moderating variables—such as patient trust, service experience, organizational culture, or digital health readiness—to better explain the relationships between the predictors and healthcare improvement. Comparative studies across public vs. private hospitals, or across different regions, are also recommended to determine whether the findings vary based on organizational characteristics or healthcare system differences.

Conflicts of interest

The authors declare that there is no significant competing financial, professional, or personal interests that might have affected the performance.

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Conclusion

This study concludes that patient satisfaction is significantly influenced by the laboratory, care provider, and healthcare environment, while waiting time does not contribute meaningfully to patient satisfaction. Among the examined variables, only the healthcare environment directly affects healthcare improvement. However, patient satisfaction is shown to mediate the relationships between care provider and healthcare improvement, as well as between healthcare environment and healthcare improvement.

The importance–performance map analysis indicates that patient satisfaction and healthcare environment hold the highest priority, supported by strong performance, whereas waiting time—despite performing well—remains a low-priority factor. Overall, these findings highlight the need to strengthen care provider performance and enhance the physical healthcare environment while ensuring high patient satisfaction to effectively drive healthcare improvement in public hospitals.

References

Adekoya, A., et al. (2025). Medical laboratories in

healthcare delivery: A systematic review of their roles and impact. Laboratories, 2(8). https://doi.org/10.3390/laboratories2010008

Ahmed, Z., et al. (2024). Exploring the impact of compassion and leadership on patient safety and quality in healthcare systems: A narrative review. BMJ Open Quality, 13, e002651. https://doi.org/10.1136/bmjoq-2023-002651

Alelign, T., et al. (2019). Patient satisfaction with clinical laboratory services and associated factors. BMC Health Services Research, 19, 870.

Alibrandi, A., Gitto, L., Limosani, M., & Mustica, P. F. (2023). Patient satisfaction and quality of hospital care. Evaluation and Program Planning, 97, 102251. https://doi.org/10.1016/j.evalprogplan.2023.102251

Aljarallah, N. A. (2023). Satisfaction of patients with health care services in tertiary care facilities of Riyadh, Saudi Arabia: A cross-sectional approach. Frontiers in Public Health, 10, 1077147. https://doi.org/10.3389/fpubh.2022.1077147

Al-Munaimi, M. F. S., et al. (2024). The impact of environmental factors on patient safety in hospitals. Evolutionary Studies in Imaginative Culture, 8(S2).

Anåker, A. (2023). The physical environment is essential, but what does research really say? Scandinavian Journal of Caring Sciences.

Azizam, N. A., et al. (2015). A satisfaction study in the outpatient clinic at Hospital Kuala Lumpur: Patient–healthcare-provider communication and associated factors. Malaysian Journal of Public Health Medicine.

Batbaatar, E., Dorjdagva, J., Luvsannyam, A., Savino, M. M., & Amenta, P. (2017). Determinants of patient satisfaction: A systematic review. Perspectives in Public Health, 137(2), 89–101.

Coutinho, S. M., Prasad, C. V. V. S. N. V., & Prabhudesai, R. (2021). Antecedents and outcomes of patient satisfaction: A study of dialysis centers in India. Journal of Datta Meghe Institute of Medical Sciences University, 16(3), 540–547. https://doi.org/10.4103/jdmimsu.jdmimsu_377_20

Cui, J., et al. (2024). National patient satisfaction survey as a predictor for quality of care and quality improvement – Experience and practice. Patient Preference and Adherence, 19.

De Kok, K., van der Scheer, W., Ketelaars, C., & Leistikow, I. (2023). Organizational attributes that contribute to the learning and improvement capabilities of healthcare organizations: A scoping review. BMC Health Services Research.

Ferreira, D. C., et al. (2023). Patient satisfaction with healthcare services and the techniques used for its assessment: A systematic literature review and bibliometric analysis. Healthcare, 11, 639. https://doi.org/10.3390/healthcare11050639

Fitzpatrick, R., et al. (2019). Waiting time and patient satisfaction in healthcare services. BMC Health Services Research.

Gao, X., et al. (2023). How to adjust the expected waiting time to improve patient satisfaction. BMC Health Services Research, 23, 34.

Gao, Q., & Liu, M. (2022). Patient satisfaction and its health provider-related determinants in primary health facilities in rural China. BMC Health Services Research.

Hutabarat, A., Manurung, K., Tarigan, F. L., & Sipayung, R. (2025). Evaluation of the relationship between health service quality and patient satisfaction in the outpatient department of Tarutung Regional Public Hospital in 2023. Journal of Pharmaceutical and Sciences, 8(1).

Imaninda, V., & Azwar, S. (2016). Modifikasi Patient Satisfaction Questionnaire Short Form (PSQ-18) ke dalam bahasa Indonesia. Gadjah Mada Journal of Psychology, 1(1).

Inaray, A. C., Soewignyo, F., Sumanti, E. R., & Mandagi, D. W. (2024). Examining the mediating role of patient satisfaction in service quality and recommendation intentions in faith-based hospital settings. MSEJ / Ekuitas (Jurnal Ekonomi & Keuangan).

Loekito, A. R., & Hukama, L. D. (2017). Pengaruh kualitas pelayanan terhadap kepuasan konsumen laboratorium klinik (Studi kasus

laboratorium klinik X Jakarta). International Journal of Social Science and Business, 1(4).

Manca, S., et al. (2022). Perceived hospital environment quality indicators: The case of healthcare places for terminal patients. Buildings, 13(1). https://doi.org/10.3390/buildings13010057

Jam, F. A., Ali, I., Albishri, N., Mammadov, A., & Mohapatra, A. K. (2025). How does the adoption of digital technologies in supply chain management enhance supply chain performance? A mediated and moderated model. Technological Forecasting and Social Change, 219, 124225.

Natasia, D. K. (2022). Dimensions of health service quality in patient satisfaction during Covid-19 pandemic in Sulamu Public Health Center Kupang Regency. Pancasakti Journal of Public Health Science and Research, 2(3).

Novitasari, D. (2022). Hospital quality service and patient satisfaction. JISMA (Journal of Integrated Service Management and Accounting).

Radito, T. (2021). Analisis pengaruh kualitas pelayanan dan fasilitas kesehatan terhadap kepuasan pasien puskesmas. Jurnal Ilmu Manajemen, 11(2). https://doi.org/10.21831/jim.v11i2.11753

Raj, S., et al. (2024). Patient satisfaction and service quality of clinical laboratory: A questionnaire-based analysis in accredited tertiary care government hospital. IP Journal of Diagnostic Pathology and Oncology, 9(1).

Rakhman, F., Fitriani, A. D., & Jamaluddin, J. (2022). Pengaruh lingkungan fisik ruang rawat inap kelas III terhadap kepuasan pasien di RSUD Tgk Chik Di Tiro Sigli. Jurnal Kesehatan Kusuma Husada.

Ridwan, M., Syarifah, U., Nasution, Y. A., & Purba, S. H. (2024). Analisis pengaruh kualitas pelayanan kesehatan terhadap kepuasan pasien pada rumah sakit rawat inap: Studi literatur. Indonesian Journal of Health Science, 4(4).

Sebera, E., et al. (2024). Patient satisfaction survey in a public hospital: Remera Rukoma District Hospital, Rwanda, 2023. BMC Health Services Research, 24, 1478.

Shetty, R. S., Kamath, G. B., Rodrigues, L. L. R., Nandineni, R. D., & Shetty, S. R. (2024). The impact of the physical environment on staff in healthcare facilities: A systematic literature review. Buildings, 14(9), 2773.

Silveira Bianchim, M., et al. (2023). The implementation, use and impact of patient-reported outcome measures in value-based healthcare programmes: A scoping review. PLOS ONE, 18(12), e0290976. https://doi.org/10.1371/journal.pone.0290976

Strain, A. K., & Sullivan, M. M. (2019). Strengthening laboratory partnerships, enhancing recruitment, and improving retention through training and outreach activities: The Minnesota experience. Public Health Reports, 134(2). https://doi.org/10.1177/0033354919874085

Sun, Y., et al. (2023). Analysis and evaluation of indoor environment, occupant satisfaction, and energy consumption in general hospital in China. Buildings, 13, 1675. https://doi.org/10.3390/buildings13071675

Wildan, M., et al. (2024). Pengaruh waktu tunggu terhadap kepuasan pasien di unit rawat jalan poli penyakit dalam di RSD Idaman Banjarbaru tahun 2024. Jurnal Manajemen Pelayanan Kesehatan, 27(3).

Wiranata, J. P., & Keni. (2025). Pengaruh kualitas layanan, word of mouth, dan waktu tunggu terhadap kepuasan pasien rawat jalan di rumah sakit swasta tipe B di Jakarta Selatan. Jurnal Manajemen Bisnis dan Kewirausahaan, 9(2).

Wong, S. T., et al. (2023). Quality communication can improve patient-centered health outcomes: A rapid review. BMC Health Services Research, 23, 110.

Zhang, H., et al. (2023). Effect of waiting time on patient satisfaction in outpatient: An empirical investigation. Medicine, 102(40), e35184. https://doi.org/10.1097/MD.0000000000035184