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EFFECT OF CHEST X-RAY WAITING TIME ON PATIENT SATISFACTION IN A REGIONAL HOSPITAL RADIOLOGY DEPARTMENT

Santa Mareta[1 *] , Ridho Hidayah Tulloh[2], Oktavia Puspita Sari[3], Yori Rahmadianti[4]
Vocational Faculty, Baiturrahmah University, Padang

Abstract

Waiting time is a critical factor influencing patient satisfaction. This study analyzes the effect of chest X-ray waiting time on patient satisfaction at Prof. H. Muhammad Yamin, SH Regional General Hospital, where preliminary findings indicated delays of 1 week to 10 days far exceeding the 3-hour standard. A quantitative cross-sectional design was employed, involving 93 respondents selected through accidental sampling. Data were collected using questionnaires assessing waiting time (≤3 hours: good; >3 hours: not good) and patient satisfaction (satisfied ≥80%; dissatisfied <80%) across five dimensions: responsiveness, reliability, assurance, empathy, and tangibles. Simple linear regression was used for analysis. All respondents (100%) experienced waiting times exceeding 3 hours and reported dissatisfaction. Regression analysis revealed a significant correlation between waiting time and satisfaction ($p = 0.001$; $p < 0.05$), confirming that prolonged waiting negatively affects patient satisfaction. The study concludes that non-compliant waiting times significantly reduce patient satisfaction. Hospitals are urged to improve service management by increasing radiologist staffing and implementing PACS to reduce delays and enhance patient experience.

Keywords : *chest X-ray; waiting time; patient satisfaction*

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Coresponding Author:
Santa Mareta*
Email*: santamareta@fv.unbrah.ac.id

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1. Introduction

Quality healthcare services are a determining factor in improving patient satisfaction in healthcare facilities such as hospitals. One indicator of service quality is timeliness, including waiting times for diagnostic support services. The Radiology Department, as a medical support unit, plays a strategic role in supporting diagnosis, particularly through chest X-rays, which are a routine procedure for detecting various thoracic abnormalities (Yusri, 2015; Lampignano & Kendrick, 2018).

The waiting time for services, especially for chest X-ray results, is defined as the time period from when the patient arrives until they receive the results that have been read by a specialist (expert). Long waiting times are one factor that can potentially cause patient dissatisfaction (Laeliyah & Subekti, 2017; David Anugrah et al., 2024). Patient satisfaction is the patient's subjective evaluation of the performance of the services received compared to their expectations (Karunia et al., 2022; Fajriani et al., 2023).

Several previous studies have examined similar issues. Research by Setyo (2017) at Santa Clara Hospital in Madiun showed a significant effect of waiting time on outpatient dissatisfaction (p=0.001). A study by Dewi Percunda et al. (2024) at the internal medicine clinic at Muhammadiyah Ahmad Dahlan Hospital in Kediri also confirmed the significant effect of waiting time on patient satisfaction (p=0.005). Although relevant, these two studies focused more on outpatient services in general and clinics, and did not specifically examine services in the radiology unit, particularly chest X-Rays.

The research gap lies in the lack of studies that specifically analyze the effect of chest X-ray waiting times on patient satisfaction in radiology departments, especially in regional hospitals with resource challenges such as a shortage of radiologists. The Hospital Minimum Service Standards (SPM) stipulate a maximum waiting time of 3 hours for chest X-ray results (Kementerian Kesehatan RI, 2020). However, a preliminary study at Prof. H. Muhammad Yamin, SH Regional General Hospital found that the waiting time for chest X-ray results reached 1 week to 10 days due to the absence of on-call doctors. This condition is strongly suspected to affect patients' perceptions and satisfaction with the quality of radiology services.

Based on this background and gap, this study aims to analyze the effect of waiting time for chest X-ray services on patient satisfaction at the Radiology Department of Prof. H. Muhammad Yamin, SH Regional General Hospital. The hypothesis of this study is that there is a significant effect between waiting time for chest X-ray services and patient satisfaction.

2. Method

This quantitative research with a cross-sectional design was conducted at the Radiology Department of Prof. H. Muhammad Yamin, SH Regional General Hospital from October 2024 to June 2025. The study population consisted of all 1,373 patients who underwent chest X-ray examinations. The sample was calculated using the Slovin formula with a 10% margin of error, resulting in 93 respondents selected by accidental sampling according to the inclusion criteria: aged 21–60 years, able to communicate, and willing to be respondents. The research instruments consisted of a waiting time questionnaire using the Guttman scale (good ≤3 hours, not good >3 hours) and a patient satisfaction questionnaire using a 5-point Likert scale based on five dimensions of service quality (25 items). The questionnaire has been tested for validity (calculated r > table r 0.361) and reliability (Cronbach's Alpha 0.901) on 30 respondents.

Data collection was conducted by distributing questionnaires directly to respondents. Data were processed through editing, scoring, and coding stages, then analyzed using SPSS. Univariate analysis described the characteristics of respondents, waiting times, and patient satisfaction. Bivariate analysis used simple linear regression tests after the data was declared normal through the Kolmogorov–Smirnov test ($p > 0.05$). The effect was declared significant if $p < 0.05$

This study has received official permission from the hospital director. (No. 000.9.2/44/Sdm-2025). All respondents were given an explanation and signed an informed

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consent form as proof of voluntary participation, and the confidentiality of their personal data was guaranteed.

3. Results and Discussion

This study involved 93 respondents who were patients undergoing chest X-rays at the Radiology Department of Prof. H. Muhammad Yamin, SH Regional General Hospital. All respondents (100%) were adults aged 21–60 years. Based on gender, most respondents were male, numbering 56 people (60.2%), while females numbered 37 people (39.8%).

Table 1. Frequency distribution of respondent characteristics

Characteristic	Category	Frequency (n)	Percentage (%)
Age	21–60 years	93	100.0
Gender	Male	56	60.2
	Female	37	39.8

Source: primary data, 2025

Based on the Ministry of Health's minimum service standards (Kementerian Kesehatan RI, 2020), the waiting time for chest X-ray results is categorized as good if it is ≤ 3 hours and not good if it is > 3 hours. The analysis results show that all respondents (100%) experienced a waiting time of > 3 hours.

Table 2. Frequency distribution of waiting time for chest X-ray services

Waiting time	Frequency (n)	Percentage (%)
≤ 3 hours	0	0.0
> 3 hours	93	100.0
Total	93	100.0

Source: primary data, 2025

Patient satisfaction was measured based on the total score of 25 questions using a 1–5 Likert scale. According to Ministry of Health standards, patients were categorized as satisfied if their satisfaction score was ≥ 80% and dissatisfied if it was < 80%. The results of the analysis showed that all respondents (100%) were in the dissatisfied category, with an overall satisfaction score of 68%.

Table 3. Frequency distribution of patient satisfaction

Patient satisfaction	Frequency (n)	Percentage (%)
Satisfied (≥ 80%)	0	0.0
Dissatisfied (< 80%)	93	100.0
Total	93	100.0

Source: primary data, 2025

Before conducting hypothesis testing, a normality test was performed on the data using the Kolmogorov–Smirnov test because the sample size was > 50. The test results showed that the waiting time data ($p = 0.053$) and patient satisfaction data ($p = 0.171$) were normally distributed ($p > 0.05$).

Table 4. Normality test results

Variable	p-value (Kolmogorov–Smirnov)	Description
Waiting time	0.053	Normal
Patient satisfaction	0.171	Normal

Source: primary data, 2025

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A simple linear regression test was used to analyze the effect of waiting time on patient satisfaction. The analysis results showed a calculated F value of 10.935 with a p value of 0.001. Since the p value was < 0.05, the null hypothesis (H_0) was rejected and the alternative hypothesis (H_a) was accepted.

Table 5. Simple linear regression test results

Model	Sum of Squares	df	Mean Square	F	Sig. (p)
Regression	61.788	1	61.788	10.935	0.001
Residual	514.212	91	5.651		
Total	576.000	92			

Source: primary data, 2025

The coefficient of determination (R Square) value is 0.107, which means that the waiting time variable affects patient satisfaction by 10.7%, while the remaining 89.3% is influenced by other factors that were not examined. The regression coefficient shows a negative value (B = -0.015), indicating that the longer the waiting time, the lower the patient satisfaction, and vice versa.

This study aims to analyze the effect of waiting time for chest X-ray services on patient satisfaction at the Radiology Department of Prof. H. Muhammad Yamin, SH Regional General Hospital. The results of the bivariate analysis prove that there is a significant effect with a p-value of 0.001 ($p < 0.05$), which means that waiting time is a determining factor in patient satisfaction levels. These findings confirm that the longer the waiting time experienced by patients, the lower their satisfaction level, and vice versa.

Healthcare waiting time is defined as the time period experienced by patients from the moment they arrive until they receive treatment or treatment results (Laeliyah & Subekti, 2017). In the context of radiology, the waiting time for chest X-ray results includes the duration from the time the patient completes the examination until they receive the results that have been read by a specialist doctor (David Anugrah et al., 2024). The Minimum Service Standards of the Indonesian Ministry of Health (Kementerian Kesehatan RI, 2020) stipulate a maximum waiting time of 3 hours for chest X-ray results. However, this study found that all respondents (100%) experienced a waiting time of > 3 hours, even reaching 1 week to 10 days.

These findings are consistent with research by Herniati et al. (2017) at Santa Elisabet Hospital in Batam, which shows that the waiting time for radiology services exceeds the SPM standard of 3 hours. Research by Yusri (2015) at Dr. Mohammad Hoesin General Hospital in Palembang also identified that the waiting time for outpatient chest X-rays did not meet standards due to various operational constraints. The main factor causing long waiting times at the research site was the limited number of radiologists, with only one available and not on standby every day, resulting in delays in the examination of chest X-ray results until the doctor was present.

Patient satisfaction is a subjective evaluation of the performance of the services received compared to their expectations (Karunia et al., 2022; Fajriani et al., 2023). In this study, all respondents (100%) expressed dissatisfaction, with an overall satisfaction rating of only 68%, far below the customer satisfaction standard set by the Ministry of Health, which is ≥ 80% (Kementerian Kesehatan RI, 2020). The total dissatisfaction rate (100%) found in this study is a serious signal for hospital management. This finding is far below the average satisfaction reported in international studies. A systematic review and meta-analysis in Saudi Arabia by AlShammari et al. (2025) shows that patient satisfaction with primary health care services is generally above 70%, and can even reach 95.8% for telemedicine services. Although the service context is different, this figure shows that high patient satisfaction standards (above 70-80%) are an achievable target. The low satisfaction at the research site confirms that there are fundamental problems with service quality, particularly in terms of timeliness. Similarly, research in Ghana by Asah et al. (2024) on the quality of medical imaging services also

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reported low quality in the dimension of timeliness, with a score of 2.8 out of 5, and only 38.2% of clients feeling satisfied overall. This confirms that timeliness is a critical factor that consistently affects patient satisfaction in various countries.

Findings regarding waiting times at Prof. H. Muhammad Yamin, SH Regional General Hospital are consistent with global challenges faced by radiology services in various countries. A study in Lagos, Nigeria, conducted by Adeniran et al. (2024) at a diagnostic center with a public-private partnership scheme also found a wide variation in waiting times, with an average waiting time for laboratory results reaching 1,835 minutes (approximately 30 hours). This indicates that the problem of long waiting times for diagnostic services is not only occurring in Indonesia, but also in other developing countries with similar resource challenges.

Analysis of service quality dimensions revealed several interesting findings. In terms of tangible dimensions (physical evidence), the majority of respondents expressed satisfaction with the appearance of staff (54.8% very satisfied) and environmental cleanliness (30.1% very satisfied). This is in line with the findings of Mulyani (2017), which state that physical facilities and the appearance of staff contribute positively to patient perception. However, in terms of responsiveness, most respondents expressed dissatisfaction with notifications of delays (8.6% dissatisfied) and the appropriateness of waiting times (5.4% dissatisfied). These findings indicate that staff communication during delays is still weak, consistent with Chandra and Chandra (2020), who emphasize the importance of response speed in service.

In terms of assurance, respondents' dissatisfaction with the assurance of reading results delays (5.4% dissatisfied) reflects that patients want certainty regarding timing. This is supported by research by Suciati and Zaman (2023), which states that guaranteed service certainty increases patient trust and satisfaction. Meanwhile, in terms of empathy, respondents were quite satisfied with the explanation of procedures (35.5% were very satisfied), but were less satisfied with communication regarding waiting times. Research by Handayany (2020) emphasizes that the empathy of staff, including the ability to understand patient anxiety, greatly influences perceptions of service quality.

The finding that the *assurance* dimension is a concern for patients, particularly regarding certainty about when reading results will be available, is supported by research in India using the SERVQUAL framework. Choudhury and Singh (2018) found in private hospitals in India that patients highly value the *assurance* that they can rely on doctors and nurses, as well as honest communication from staff.

The results of the simple linear regression test show a p-value of 0.001 with a negative regression coefficient (B = -0.015), which means that an increase in waiting time is followed by a significant decrease in patient satisfaction. These findings are consistent with various previous studies. Setyo (2017) at Santa Clara Hospital in Madiun reported a significant effect of waiting time on outpatient dissatisfaction (p = 0.001). Dewi Percunda et al. (2024) at Muhammadiyah Ahmad Dahlan Hospital in Kediri also found a significant effect (p = 0.005). Research by Rahmadini and Rahman (2024) at the Hikun Community Health Center in Tabalong Regency confirmed that waiting time is closely related to patient satisfaction.

Other relevant studies include Bachrun (2018) at Santa Clara Hospital confirms that waiting time is the main predictor of patient satisfaction. Elvina (2018) at Putri Hijau Hospital found that factors such as speed of service and communication with staff correlated with patient satisfaction in radiology. Ramadhani and Hermana (2023) also highlight that timely healthcare services increase patient loyalty.

An R Square value of 0.107 indicates that waiting time only explains 10.7% of the variation in patient satisfaction, while 89.3% is influenced by other factors such as the quality of staff interaction, facilities, administrative procedures, and individual patient characteristics (age, education, economic status). This is in line with the opinion of Handayany (2020), which states that patient perception is influenced by multiple factors, including previous experiences and environmental conditions.

The findings of this study have important implications for hospital management, particularly the Radiology Department. First, there is a need to increase the number of radiology specialists or implement a rotating work system to ensure the availability of expert

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services every day. Second, the procurement of a *Picture Archiving and Communication System (PACS)* enables remote reading of results (tele-radiology) so that doctors can read chest X-ray results even when they are not on site. This is in line with the recommendations of David Anugrah et al. (2024), which emphasize the importance of information technology in accelerating radiology services.

Recommendations for adopting technologies such as PACS and tele-radiology to overcome the limitations of specialist doctors are increasingly relevant when viewed from international experience. In the United Kingdom, pressure on radiology services and delays in reporting have become national issues. A study at Chelsea and Westminster Hospital found that although 87.2% of scan reports met the 28-day target, the median scan reporting time was 9 days, which is considered inadequate for oncology patients with strict treatment schedules. In fact, the UK Ombudsman's Office reported in 2025 that failures to read and report scans in a timely manner had led to delayed cancer diagnoses, unnecessary surgeries, and deaths that could have been avoided (Hilsenrath, 2025). A quasi-experimental study in Ethiopia by Nigatu et al. (2025) showed that the implementation of a web-based teleradiology system significantly reduced the median waiting time for imaging results from 43.5 hours to only 4.62 hours ($p < 0.01$), accompanied by a significant increase in patient satisfaction scores.

Third, improving communication between staff and patients regarding estimated waiting times and proactive notification in the event of delays can improve patient perceptions of responsiveness and assurance. Effective communication training for radiographers needs to be intensified, as recommended by Chandra and Chandra (2020).

This study has several limitations. First, the cross-sectional design only measures relationships at a single point in time, so it cannot assess changes in satisfaction over time. Second, waiting time measurements are based on patient perceptions (questionnaires) without objective validation using medical records or hospital information systems. Third, the variables studied are limited to waiting time and patient satisfaction, while other factors such as the technical quality of the examination, cost, and accessibility are not examined.

Despite its limitations, this study makes an important contribution to the literature on the quality of radiology services in Indonesia. The novelty of this study lies in its specific focus on chest X-ray services in regional hospital radiology departments, which face the challenge of a shortage of specialists. This study also integrates satisfaction measurements based on the five dimensions of service quality (SERVQUAL), which are rarely applied comprehensively in radiology studies. Thus, this study enriches the understanding of the determinants of patient satisfaction in diagnostic support units and provides practical recommendations for improving service quality.

4. **Conclusions and Suggestions**

This study concluded that all respondents (100%) experienced a waiting time for chest X-ray services of > 3 hours, which means that it did not meet the 2020 Indonesian Ministry of Health Minimum Service Standards (≤ 3 hours). All respondents (100%) also expressed dissatisfaction with the services received, with an overall satisfaction score of 68%, below the established customer satisfaction standard of ≥ 80%. Statistical tests proved that there was a significant effect between the waiting time for chest X-ray services and patient satisfaction at the Radiology Department of Prof. H. Muhammad Yamin, SH Regional General Hospital ($p = 0.001$; $p < 0.05$). The longer the waiting time experienced by patients, the lower their satisfaction level. The main factor causing the long waiting time is the limited number of radiology specialists, with only one available and not on standby every day, resulting in delays in the expert review of chest X-ray results.

Based on these findings, it is recommended that the management of Prof. H. Muhammad Yamin, SH Regional General Hospital, particularly the Radiology Department, immediately add more radiology specialists or implement a rotating work system to ensure the availability of expert services every working day. Additionally, the implementation of a Picture Archiving and Communication System (PACS) is highly recommended to enable remote reading of chest X-ray results (tele-radiology), thereby reducing waiting times. Improving communication between

staff and patients, especially in providing estimated waiting time information and proactive notifications in case of delays, also needs to be addressed through effective communication training for radiographers. With the implementation of these recommendations, it is hoped that waiting times for services can be minimized and patient satisfaction significantly improved.

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