Indonesian Journal of Global Health Research
Volume 8 Number 2, April 2026
e-ISSN 2715-1972; p-ISSN 2714-9749
http://jurnal.globalhealthsciencegroup.com/index.php/IJGHR

THE IMPACT OF ONLINE REGISTRATION SYSTEMS ON PATIENT SATISFACTION AND OUTPATIENT SERVICE DELIVERY: A SCOPING REVIEW

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ABSTRACT
Online registration systems have emerged as digital innovations to improve the efficiency of outpatient services, which often experience long queues and extended waiting times that negatively affect patient satisfaction. By enabling remote appointment scheduling, these systems aim to streamline administrative processes and enhance healthcare delivery. This scoping review followed the PRISMA 2020 guideline to identify studies published between 2015 and 2025 examining the implementation of online or electronic registration systems in hospital outpatient settings. Searches were conducted across PubMed, Google Scholar, and EbscoHost, including English and Indonesian articles. A total of 2,148 abstracts were screened, and data were extracted on study design, system type, outcomes, and key findings related to waiting time and patient satisfaction. Ultimately, six studies were included. Each study was independently reviewed by two reviewers, and in cases of disagreement, a third reviewer was consulted to reach a consensus. Six studies from Indonesia and India met inclusion criteria. Most used quantitative designs, while one employed a qualitative approach. All studies reported significant reductions in waiting time (up to 75%) and improvements in patient satisfaction, driven by ease of access, reduced congestion, and system responsiveness. Integration with hospital information systems enhanced adoption, although barriers such as low digital literacy and technical limitations persisted. Online outpatient registration systems effectively reduce waiting times and improve satisfaction, supporting their integration into hospital digital transformation strategies.

Keywords: digital health; online registration; outpatient services; patient satisfaction; waiting time

How to cite (in APA style)
Kusumawati, N. R. D., Widjanarko, B., & Jati, S. P. (2025). The Impact of Online Registration Systems on Patient Satisfaction and Outpatient Service Delivery: A Scoping Review. Indonesian Journal of Global Health Research, 8(2), 13–20. https://doi.org/10.37287/ijghr.v8i2.692.

INTRODUCTION

Outpatient services represent one of the most frequently accessed components of hospital care, often dealing with high patient volumes daily (Al-Harajin et. al. 2019).[1] Conventional registration methods, which usually require patients to queue at the registration counter, frequently result in long waiting times and overcrowding. This inefficiency not only contributes to patient dissatisfaction but also creates additional burdens for healthcare staff, potentially affecting the overall quality of care delivery (Xie & Or, 2017). The rise of digital health technologies has provided opportunities to streamline administrative processes in healthcare systems. Online registration—whether through web-based platforms, mobile applications, short message services (SMS), or integrated insurance applications such as Mobile JKN in Indonesia—offers an alternative to manual registration (Zhang et al., 2023). By allowing patients to schedule appointments remotely, these systems aim to reduce registration bottlenecks, optimize patient flow, and enhance service efficiency.

Globally, several healthcare facilities have reported positive outcomes following the adoption of online registration, including reductions in waiting times and improvements in patient satisfaction.

However, implementation is not without challenges (Lee et al., 2020). Issues such as digital literacy gaps, resistance to change among patients and staff, and technical barriers related to system integration remain common obstacles. These limitations highlight the importance of assessing the broader context of implementation, particularly in settings with varied resource availability (Pitrou et al., 2009). Despite increasing adoption worldwide, comprehensive mapping of the literature remains limited, especially in the Indonesian context. Studies from local hospitals have shown promising results, but systematic evaluations are still scarce. Therefore, a scoping review is necessary to synthesize available evidence, explore the impact of online outpatient registration on waiting times and patient satisfaction, and identify research gaps to inform future studies and policy development.

METHOD

Study Design

This study was conducted as a scoping review following the methodological framework reported in accordance with the PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses 2020) checklist (Page et al., 2021).[6]

Eligibility Criteria

The population of interest in this scoping review consisted of outpatient populations seeking healthcare services. The central concept explored was the implementation of online or electronic registration systems, while the context was limited to hospital-based outpatient services. Studies were considered eligible if they met specific inclusion criteria: (1) published between 2015 and 2025; (2) written in either English or Indonesian; and (3) focused on online registration systems used in outpatient settings, with reported outcomes on waiting time and/or patient satisfaction. Both peer-reviewed journal articles and grey literature were included to ensure comprehensive coverage of available evidence. Exclusion criteria were applied to filter out studies that did not align with the research scope. These included publications unrelated to outpatient services, studies that assessed interventions without an online registration component, and articles lacking empirical data, such as commentaries, editorials, or opinion papers. This rigorous selection ensured that only studies providing measurable outcomes and relevant insights into online registration implementation were analyzed.

Databases

The literature search was conducted across international databases (Google Scholar, PubMed, EbscoHost). Grey literature, such as theses, reports, and conference proceedings, was also included to capture additional relevant evidence.

Search Strategy

A systematic search strategy was developed using a combination of controlled vocabulary and free-text keywords, including: *"online registration"*, *"e-registration"*, *"pendaftaran online"*, *"outpatient"*, *"waiting time"*, and *"patient satisfaction"*. Boolean operators ("AND", "OR") and truncation were applied as appropriate for each database. The search was limited to articles published from January 2015 to January 2025.

Study Selection

All retrieved citations were exported into a reference management software, and duplicates were removed. Two independent reviewers conducted a two-stage screening process: (1) title and abstract screening, followed by (2) full-text review of potentially eligible studies. Discrepancies were resolved through discussion or by consulting a third reviewer. The selection process was documented using a PRISMA 2020 flow diagram. From a total of 2,148 articles screened, six studies were ultimately included in this scoping review.

Data Extraction

Data were extracted independently by two reviewers using a standardized extraction form. Extracted information included: first author, year of publication, country, study design, study population, type of online registration system, reported outcomes (waiting time, patient satisfaction), and key findings.

RESULT

A total of six studies published between 2020 and 2025 met the inclusion criteria for this scoping review. The studies were conducted across Indonesia and India, focusing on the implementation and impact of online hospital registration systems within outpatient departments. Research designs included quantitative cross-sectional, experimental, and qualitative phenomenological approaches. All studies evaluated at least one of the following primary outcomes: waiting time, patient satisfaction, and service quality. Overall, these studies consistently demonstrated that online registration systems improve healthcare service efficiency and enhance patient experience.

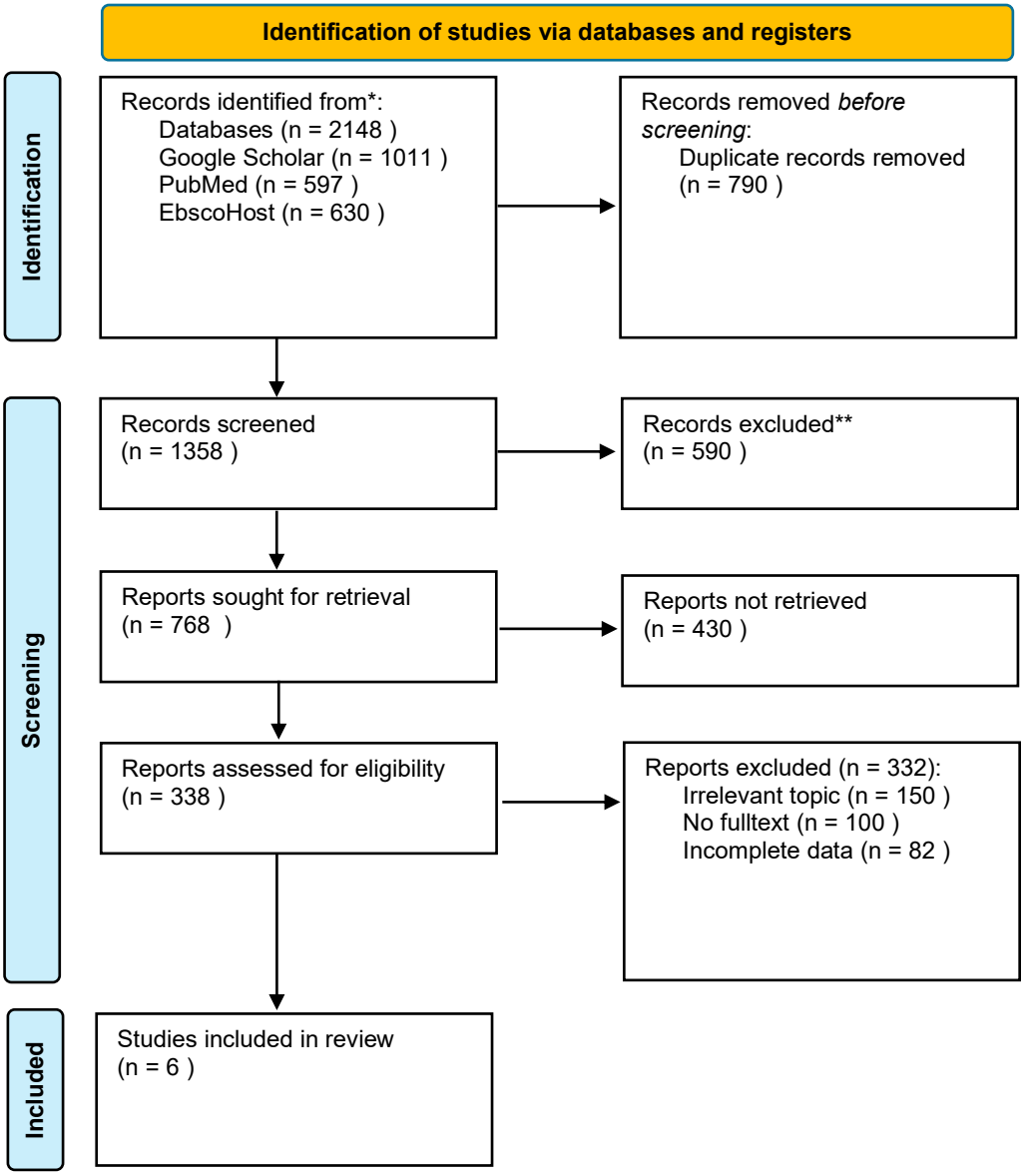

Figure 1. PRISMA 2020 Flowchart

Reduction in Waiting Time

Five out of six included studies reported a significant reduction in outpatient waiting time following the implementation of online registration systems. In India, Sharma et al. (2022) found that the introduction of the Computerized Online Registration System (CORS) at a tertiary hospital reduced the median waiting time by 75% from 60 minutes for walk-in patients to only 15 minutes for those registered online ($p < 0.001$). Similarly, in Indonesia, Wulandari and Dewi (2025) demonstrated a statistically significant improvement in outpatient waiting times at Al Ittihad Hospital, with a t-value of 5.281 and $p < 0.05$, confirming the system's effectiveness in expediting patient flow.

Consistent findings were reported by Hastuti et al. (2023), who observed that shorter waiting times were strongly correlated with higher patient satisfaction ($p = 0.003$) among outpatients at RS Bhayangkara Makassar.[10] Santhosa et al. (2024) also supported these results, revealing that 55.7% of patients rated the SIDOLI (Sistem Pendaftaran Online) system as "good," with a positive correlation between perceived system quality and satisfaction ($\rho = 0.279$, $p = 0.05$). Furthermore, Masrulloh et al. (2020) confirmed that the speed, readiness, and accuracy of online registration services were significant predictors of satisfaction ($p < 0.05$), reinforcing the relationship between operational efficiency and perceived service quality. Collectively, these findings underscore that online registration systems effectively reduce patient waiting times, minimize congestion at outpatient counters, and enhance the overall service delivery process.

Improvement in Patient Satisfaction

All six studies reported a notable improvement in patient satisfaction following the adoption of online registration systems. Sharma et al. (2022) found that online-registered patients were ten times more likely to express satisfaction compared to walk-in patients (AOR 9.8, 95% CI: 2.2–43.5).[8] Similarly, Hastuti et al. (2023) identified that 85.3% of respondents who used online registration reported satisfaction, compared with only 54.2% in the conventional system.

Table 1.
Included studies

Author (Year)	Location	Method / Design	Sample Size	Main Results	Conclusion
Azizah & Susanti (2024).	Muhammadiyah Hospital, Bandung	Qualitative phenomenology (interviews surveys)	10 participants	Identified 5 themes—ease of access, reduced queues, initial difficulties with app use, anjungan pendaftaran mandiri (APM) benefits, and suggestions for improvement	Online registration enhances access and reduces waiting time; continuous system improvement is required.
Sharma et al. (2022).	PGIMER, Chandigarh (India)	Cross-sectional comparative study	120 patients (50 online, 70 walk-in)	Waiting time 15 min vs 60 min (p<0.001); online users 10× more satisfied (AOR 9.8, 95% CI 2.2–43.5)	Online registration (CORS) significantly reduces waiting time and increases satisfaction.
Wulandari & Dewi (2025).	Al Ittihad Hospital, Blitar	Experimental, post-test only with two groups	133 outpatients	t = 5.281, p<0.05; online registration significantly reduced waiting time	Online system effectively shortens waiting times in outpatient registration.
Hastuti et al. (2023).	RS Bhayangkara Makassar	Cross-sectional quantitative (multiple regression)	225 respondents	Online registration (p = 0.000) and waiting time (p = 0.003) both significantly affected satisfaction	Online registration and shorter waiting times improve patient satisfaction; system updates recommended.
Santhosa et al. (2024)	Bangli General Hospital, Bali	Cross-sectional quantitative (Spearman correlation)	70 respondents	55.7% rated system good; satisfaction 55.7%; correlation r = 0.279, p = 0.05	There is a significant but weak relationship between system quality and patient satisfaction.
Masrulloh et al. (2020).	Jombang General Hospital	Analytical observational quantitative	125 respondents	Service speed, accuracy, and readiness all significantly affect satisfaction (p<0.05)	Quality dimensions of online registration services strongly predict patient satisfaction and

Author (Year)	Location	Method / Design	Sample Size	Main Results	Conclusion
					service efficiency.

At Bangli General Hospital, Santhosa et al. (2024) demonstrated that improvements in system quality (SIDOLI) were associated with increased satisfaction, although the correlation was relatively weak (r = 0.279). Masrulloh et al. (2020) further elaborated that multiple dimensions of service quality—particularly responsiveness, accuracy, and reliability had a significant positive influence on patient satisfaction. Overall, these quantitative findings suggest that digital registration systems not only streamline administrative workflows but also enhance the patient experience by reducing frustration and improving perceived fairness and convenience in accessing healthcare services.

User Experience and System Barriers

Qualitative evidence provided by Azizah and Susanti (2024) offered insight into patients' lived experiences with online registration systems at Muhammadiyah Hospital Bandung. Participants generally described the system as convenient and flexible, allowing them to register without long queues and to schedule visits more efficiently. However, several technical and usability barriers were identified, including difficulties navigating mobile applications, outdated doctor schedules, and occasional system errors. Despite these challenges, most users acknowledged that online registration significantly reduced waiting times and improved service accessibility. The study emphasized the need for continuous improvement in the technical interface, user training, and responsiveness of online systems to enhance patient engagement and satisfaction.

Integration and Technical Readiness

Across all studies, successful implementation of online registration was linked to integration with hospital information systems and national health insurance platforms. Hospitals that connected their online registration tools with SIMRS (Sistem Informasi Manajemen Rumah Sakit) or JKN Mobile applications demonstrated smoother patient flow and data synchronization. Additionally, maintaining up-to-date doctor schedules, ensuring system reliability, and providing staff support for first-time users were essential to sustaining system adoption. The collective evidence highlights that the effectiveness of online registration systems depends not only on technological infrastructure but also on organizational readiness, user literacy, and system maintenance.

DISCUSSION

This scoping review provides an overview of the implementation of online outpatient registration systems and their reported effects on waiting times and patient satisfaction. The majority of included studies demonstrated that online registration consistently reduced waiting times and improved patient satisfaction compared with conventional manual registration (AlSubaie et al., 2021). These findings suggest that digital transformation in hospital administration can directly enhance service efficiency and patient experience, particularly in outpatient departments where overcrowding and long queues remain a major challenge. The observed reduction in waiting time aligns with prior research on digital health interventions, which emphasizes the role of information technology in optimizing patient flow and reducing bottlenecks in service delivery. Studies from high-income countries highlight the efficiency of web- and app-based registration, while findings from middle-income countries, including Indonesia, indicate similar benefits despite infrastructure limitations (Santos- Jaén et al., 2022). Improvements in patient satisfaction were primarily related to convenience, reduced queuing, and flexibility in scheduling, which have also been reported in earlier systematic reviews on digital appointment systems.

Despite the positive outcomes, several implementation challenges were consistently noted. Low digital literacy, particularly among elderly patients, limited the uptake of online systems. Technical barriers—such as lack of interoperability with existing hospital information systems—also hindered

smooth adoption (Xuan et al., 2022). Resistance to change among patients and hospital staff further constrained effectiveness in some contexts. These findings underscore the importance of not only technological readiness but also social and organizational preparedness when implementing digital health solutions (Hammoudeh et al, 2021).

The results suggest that online outpatient registration can serve as a practical strategy to enhance the quality and efficiency of healthcare services. Hospitals considering implementation should address equity concerns by providing alternative registration options for patients with limited digital access (Sarwat et el., 2021). Training programs for patients and staff may also improve digital literacy and acceptance. From a policy perspective, integration of online registration into national health insurance systems, such as the Mobile JKN application in Indonesia, may facilitate broader adoption and sustainability (Akhtar et al., 2023).

This review also highlights important gaps in the existing literature. Few studies assessed the cost-effectiveness of online registration, limiting the evidence base for resource allocation decisions. Similarly, studies rarely incorporated usability and user experience evaluations, which are essential for long-term adoption. Finally, there is a lack of longitudinal studies evaluating sustainability and long-term impacts, particularly in low- and middle-income country contexts. Addressing these gaps will be critical to guide evidence-based implementation and scale-up of online registration systems (Argyriadis et al., 2022; Shen et al., 2021). A key strength of this scoping review lies in its comprehensive search across both international and national databases, capturing literature from diverse healthcare settings. However, the review is limited by potential publication bias, as grey literature and non-indexed studies may have been missed. Additionally, heterogeneity in study designs and outcome measures precluded meta-analysis, and the findings are therefore descriptive rather than quantitative.

CONCLUSION

Online outpatient registration has the potential to significantly reduce waiting times and enhance patient satisfaction, making it a valuable innovation in improving the efficiency and quality of hospital services. While implementation challenges such as digital literacy, system integration, and user resistance remain, the overall evidence supports its role in streamlining outpatient care.

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