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The Effectivity of Outpatient Waiting Time in Hospital through Online or Web-based Reservation (Literature Review)

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ABSTRACT
The issue of long waiting times for outpatients remains a prevalent problem in healthcare services, particularly in hospitals. This can be mitigated through the implementation of an effective patient scheduling system, such as an online or web-based scheduling system. However, such systems are not widely utilized and have not received significant attention in Indonesian healthcare services, especially in public healthcare services. This study aims to identify the advantages of an online reservation system and determine the influential factors for developing an effective outpatient scheduling system for patients. A literature review was conducted using a systematic approach, searching through databases such as PubMed, ProQuest, and Scopus for publications from the past 5 years. The initial search using keywords "online reservation" OR "web-based reservation" OR "appointment system" AND "outpatient" AND "waiting time" AND "hospital" yielded 85 relevant literature sources. The PRISMA framework was then applied to narrow down the selection to 9 relevant literature sources, which were reviewed in-depth. The findings revealed numerous advantages of implementing an online scheduling system, including increased patient satisfaction, enhanced patient-centeredness, reduced patient absences, decreased workload for doctors and medical staff, among others. This review suggests that there are numerous advantages to implementing online or web-based reservation systems, as well as various types of online scheduling systems that can be applied and implemented in healthcare services. Practical implications and suggestions for further research are also discussed in this study.
Keywords: Complications, Elderly Patients, Knee Arthroplasty.

INTRODUCTION

Hospitals, as institutions in the healthcare sector, are fundamentally designed to ensure consumer or patient satisfaction and comfort in every service they provide. Patient waiting time is one of the crucial factors that can influence patient satisfaction and comfort. Numerous studies

have indicated that extended patient waiting times have a negative impact on patient satisfaction within a healthcare setting (Cao et al., 2011; Peter Idowu et al., 2014). These findings are supported by other studies, highlighting that waiting time also affect overall quality of a healthcare service. Addressing this issue remains a prominent concern in hospital management (Cao et al., 2011; Kwadwo Tenagyei et al., 2021; McMullen & Netland, 2015; Yeon et al., 2010). Particularly in this era, where society demands efficient services and places emphasis on patient centered care, time management and patient satisfaction play vital roles in delivering healthcare services (Peng Zhao, 2017; Peter Idowu et al., 2014). Consequently, the duration of waiting time in patient flow management within a healthcare service assumes paramount significance, requiring careful attention from the hospital.

Patient waiting time, especially the consultation waiting time (between registration and waiting for consultation/treatment), is greatly influenced by patient scheduling system. Samadbeik, et al. (Samadbeik et al., 2018) concluded in their journal that traditional scheduling methods, such as telephone appointments and walk-in registrations, result in several negative impacts, including long patient waiting times, long queues, and patient congestion at specific times. These conditions also affect the quality of service provided by doctors and hospital staff, as it increases stress and pressure due to limited time availability amidst long queues (Peter Idowu et al., 2014).

An effective scheduling system is a needed solution for a service to reduce patient waiting time, and it also enhances the utilization of resources such as staff and other resources (Kwadwo Tenagyei et al., 2021; Mardiah, 2013). Therefore, the rapid development of science and technology, particularly in the field of information technology, plays a vital role in various sectors, including companies, educational institutions, and hospitals. The application of technology in hospitals includes the use of applications or websites for online patient scheduling. This scheduling encompasses the date, time, and location of the patient's visit to the healthcare facility (Samadbeik et al., 2018). Furthermore, by utilizing the internet as a medium, patients are given the freedom to choose according to their preferences for the needed visit, including the doctor and the preferred time (Kwadwo Tenagyei et al., 2021; Peng Zhao, 2017).

In Indonesia, the use of websites or applications in both private and government hospitals has started to develop. However, it is sometimes not well optimized due to the absence of standardized scheduling practices, and this issue has not yet been prioritized. This is in line with Alfiansyah's research (Alfiansyah et al., 2021) on patient registration in an Indonesian hospital, which still relies on a manual system. As a result, patients have to queue at the registration counter, leading to inefficiency and time consumption. Other studies conducted by Susanti (Susanti et al., 2015) and Laeliyah (Laeliyah & Subekti, n.d.) also indicate that waiting times in Bandung Islamic Hospital and Indramayu General Regional Hospital exceed 60 minutes from registration to examination. These conditions do not align with the recommendations set by the

Indonesian government through Decree of the Minister of Health No. 129/Menkes/SK/II/2008 on the Minimum Service Standards for Hospitals, which states that the maximum waiting time for outpatient services should be ≤ 60 minutes(MENTERI KESEHATAN REPUBLIK INDONESIA NOMOR : 129/Menkes/SK/II/2008 TENTANG, n.d.)

In accordance with the transformation of the Indonesian healthcare system in 2024, the utilization of digital information needs to be optimized to support an integrated health data system. This literature review aims to explore the use of online scheduling, the advantages of implementing an online scheduling system that encourages hospitals in Indonesia to address this issue, and the factors that contribute to the efficiency of online scheduling.

RESEARCH METHODS

The study was conducted using the Literature Review with systematic approach to examine the efficiency of patient waiting time through online reservations using the PRISMA (Preferred Reporting Items for Systemic Reviews and Meta-Analysis) method. The databases used for research sources were PubMed, ProQuest, and Scopus.

In this study, research questions were formulated to facilitate the achievement of research objectives related to the selected topic. The research questions focused on examining the effectivity of patient waiting time in hospitals/clinics with the implementation of online reservations. The search process involved using keywords such as "online reservation" OR "web-based reservation" OR "appointment system" AND "outpatient" AND "waiting time" AND "hospital." The inclusion criteria for selecting relevant literature were studies that were published within the past 5 years (2018-2023), full-text availability, and English language journals. The exclusion criteria included journals that are focuses on scheduling systems in general, rather than specifically on web-based or online-based appointments.

After the search process, the retrieved results based on Boolean logic were imported into the Mendeley Reference Manager to check for duplicates using the software. Two authors independently selected the literature based on its relevance to the research needs of the literature review. Following the initial selection based on abstracts and titles, a further screening was conducted based on the full text of the studies to ensure the eligibility of literature selection. The process of literature selection and screening will be documented and summarized using the PRISMA flowchart.

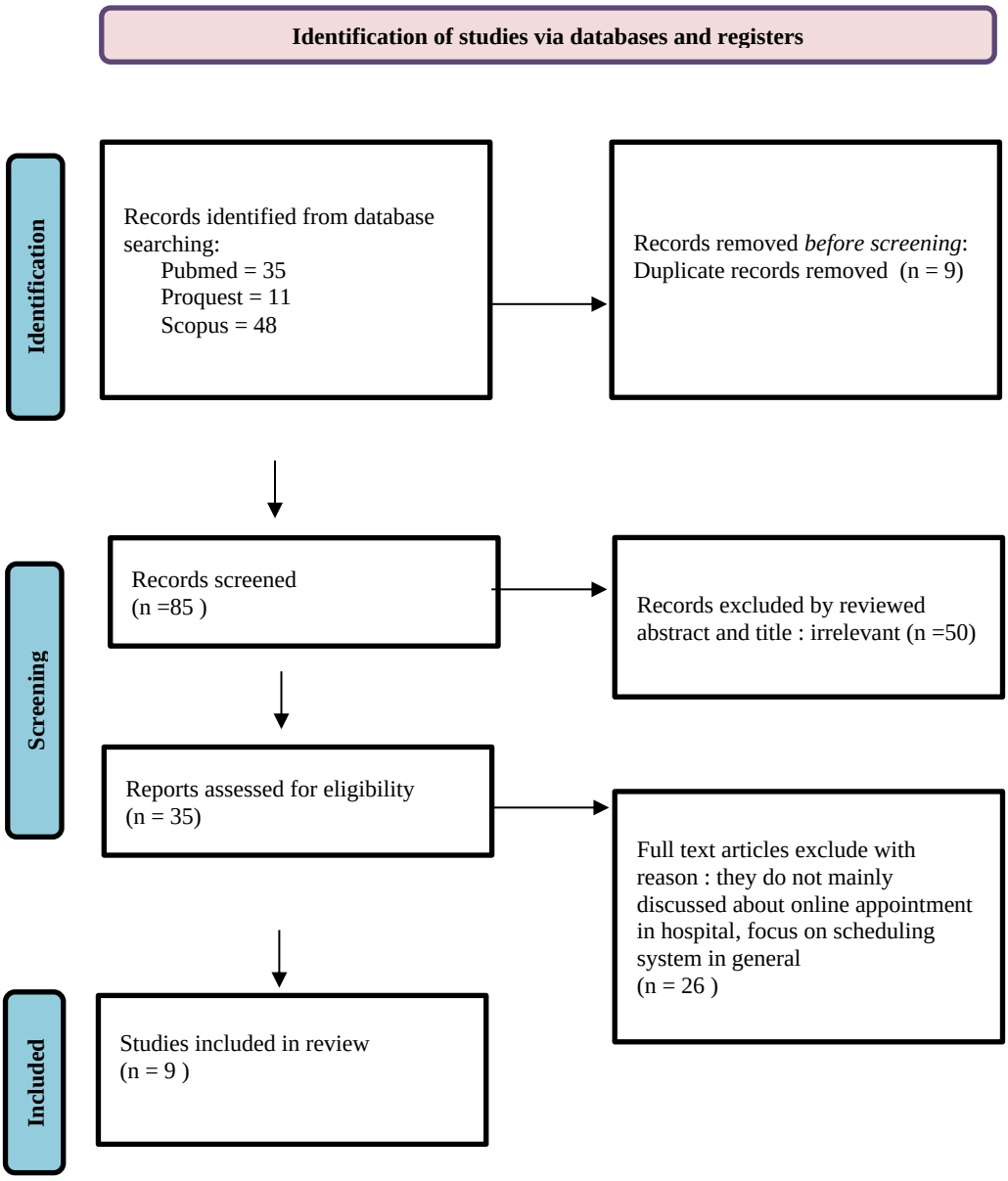

Figure 1. Inclusion with PRISMA guideline (*Preferred Reporting Items for Systematic Review and Meta-Analysis*).

RESULTS AND DISCUSSION

Table 1. Result

No	Author, years	Title	Origin	Objectives	Registration system utilized	Advantages

						Minimize the concentration of patients in the morning at the outpatient clinic and decrease the queue length
1	Jin, Ha- Jun, et. Al., 2021(Jin et al., 2021)	Effect and satisfaction of outpatient services by precision valuation reservation registration	China	Developing patient registration processes to reduce waiting times, thereby enhancing patient satisfaction and medical staff performance.	Precision reservation registration by following the patterns observed in the outpatient department, several visit intervals of 3, 4, 5, 6, 7, 8, 9, or 10 minutes are obtained.	Decrease patient's waiting time, thus can enhance patient's satisfaction, alleviating feelings of irritability and anxiety caused by prolonged waiting Improve satisfaction of medical staffs, creating peaceful and efficient treatment environment Ensure orderly treatment processes, including precise diagnosis and suitable treatment
2	Ye, Qing dan Hong Wu, 2022(Ye et al., n.d.)	Patient's decision and experience in the multi-channel appointment context: An empirical study	China	Investigate the factors influencing patients' choices in selecting their registration method	Online and offline registration system	Facilitates doctors in effectively managing service capacity, reduce the additional burden on the healthcare system

				and how this selection affects patient waiting time.		Balance the demands between online and offline channels can avoid overload situations, improve efficiency of healthcare service by optimizing online and offline processes) Patients can get more information *via* the online appointment channel and chances to choose a satisfied doctor (internet can provide certain results) The reduction of patient waiting time, improve satisfaction, reduce the aggravation of patient's conditions caused by uncesessary waiting time
3	Akintomide, Akintunde O, et. Al., 2019(Akintomide et al., 2019)	An audit of the appointment booking system and patient waiting time in an ultrasound unit in	Nigeria	Assess the appointment scheduling system and other factors contributing to queues in the	Online registration system with 30 minutes interval for each patient	Decrease patient congestion (by an efficient allocation into blocks and time slots interval) Shorter waiting times

		Nigeria: A need to eliminate congestion in our public hospitals		ultrasound department and their impact on patient waiting times.		Improving patient satisfaction Patient allow to choose a convenient day and time for their examination, allow them to manage their booking, which will reduce the rate of "no-show" and cancellation
4	Bagheri, Fatemeh, et. Al., 2022(Bagheri et al., 2022)	The use of various appointment systems among patients visiting academic outpatient centers in Kerman and the evaluation of patients' perspective and satisfaction	Iran	Determine the use of the appointment systems by patients visiting the outpatient centers and to examine the perspective and the satisfaction of the users of these systems.	Web- based appointment system, Interactive Voice Record (IVR), and Unstructured Supplementary Service Data (USSD) appointment systems	Allows individuals to conveniently and securely book their appointments and reservations online through any Web-connected device. Positive effect on patient's satisfaction Reducing no-shows Reducing waiting time Reducing staff workload 24-hour access to the systems
5	Garavand, Ali, et al., 2021(Garavand et al., 2021)	E-booking Websites in Iranian Public Clinics: A Step Toward	Iran	Analyse the situation of e-booking websites in Iranian	Internet-based e-booking system in the hospitals (e-health)	Prevent congestion of healthcare centers, and thus, they could be a barrier to the spreading of

		Health Equity	public clinics			communicable diseases, especially in the COVID-19 pandemic Reduction of patients' waiting time Decrease in waste of resources Increase in patients' satisfaction
6	Leung, Winnie, et al., 2019 (Leung & Nøhr, 2019)	Improving Access to Healthcare with On-line Medical Appointment system	Australia	Design patient scheduling methods to ensure that sufficient space is reserved for walk-in patients, while at the same time, seeing as many patients as possible.	Improve the process of making medical appointments for small or medium size medical clinics or centers – a critical aspect to increase healthcare quality, efficiency, flexibility and decrease cost	Improves flexibility for the patient as they can make an appointment online without restricting to business hours Reduction of waiting times, improved patient satisfaction. Improved hospital performance, better quality of service. Reduce throughput time and better use of capacity. Activities can be executed faster, increase communication speed, increase information availability, reduce duplicated data

						entry, reduce human error and offer a more predictable result
7	Su, Wei., at al., 2020(W. Su et al., 2020)	Who Misses Appointment Made Online? Restrospective Analysis of the Outpatient Department of a General Hospital in Jinan, Shandong Province, China	China	The key factors related to missed appointments made on the Internet appointment system of a general hospital in Jinan, Shandong Province.	Outpatient Online Appointment system	Improves the efficiency of hospital services Reduces patient congestion, shortens wait times, enhances patient experiences Reduces the rate of no-shows
8	Kwak, Jin Kyung, 2023(Kwak, 2023)	Analysis of the Waiting Time in Clinic Registration of Patients with Appointments and Random Walk-Ins	Korea	Investigating whether the clinic registration system can be improved by separating the queues and resources for scheduling patient and walk-in patient	Outpatient scheduling system and offline appointment (walk-in appointment)	Can possibly save time of walk-in patients while minimizing the time lost for patients with appointment

9	Su, Huiqiao, et al., 2019(H. Su et al., 2019)	Online scheduling for outpatient services with heterogeneous patients and physicians	China	Design a scheduling policy for the outpatient scheduling (both online and walk-in), while considering the heterogeneity of both patient and healthcare providers	Online scheduling system with Markov decision process (MDP)	Reduce the average waiting time per served patient, without increasing the number of deferred patients, thus it has lower total cost Reduce physicians overtime working

The search results using Pubmed, Proquest and Scopus yielded a total of 85 articles relevant to the keywords. The next step involved removing duplicates using Mendeley Reference Manager, resulting in the exclusion of 9 articles. The evaluation was then conducted based on the titles and abstracts for research relevance, leading to the identification of 50 irrelevant articles. From the remaining 35 articles, a comprehensive assessment and review of their content were performed. The evaluation and review revealed that 26 articles mostly explained about appointment system in general, rather than specifically about online or web-based appointment. Literature on this topic was gathered with inclusion criteria for the last 5 years, and the PRISMA results identified three relevant articles. These 9 articles were published within the past 3 years, indicating the ongoing and emerging relevance of online reservations. Four articles were conducted in China, two of them were from Iran, and the others were conducted in Nigeria, Australia, Korea.

Two of the nine articles (Akintomide et al., 2019; Jin et al., 2021) discussed scheduling systems implemented with time intervals, ensuring that patients arrive according to predetermined schedules. Two articles (Garavand et al., 2021; Leung & Nøhr, 2019) focused on the improvement and implementation of online scheduling system. Three articles(Bagheri et al., 2022; Sousa et al., n.d.; W. Su et al., 2020) explained the factors influencing patients' choice of registration for outpatient services. The last two articles(Kwak, 2023; H. Su et al., 2019) were

discussed about the upgraded online appointment system to reduce waiting time for both booked and walk in patients. All nine articles concluded that the use of internet-based patient registration systems and scheduling with intervals can reduce patient waiting times and effectively enhance patient satisfaction with healthcare services.

Discussion

Many factors can affect patient waiting time, including a shortage of medical staff, a high patient volume, computer usage, and a lack of discipline among medical staff (Akintomide et al., 2019; Zhao et al., 2017). Based on these factors, one of the most crucial components is the existence of an effective patient scheduling system. Online scheduling and reservation systems are one of the patient scheduling systems that provide patients with the opportunity to choose and determine their own appointment schedules. When compared to traditional appointment systems where patients must physically come and wait in queues, the effectiveness of online reservation systems proves to be better for both patients and healthcare providers (Peng Zhao, 2017; Zhang et al., 2014). This journal will discuss the effectiveness of online reservations, including the advantages of implementing online reservation systems.

One of the advantages of using online reservations, as found in all articles (Akintomide et al., 2019; Bagheri et al., 2022; Garavand et al., 2021; Jin et al., 2021; Kwak, 2023; Leung & Nøhr, 2019; H. Su et al., 2019; W. Su et al., 2020; Ye et al., n.d.) is the **reduction in patient waiting time**. This condition is partly due to the fact that online reservations can distribute the patient load evenly throughout block time slots (reduce the patient overload) (Akintomide et al., 2019; Garavand et al., 2021; Jin et al., 2021), thereby reducing queues and patient waiting time. The use of specific time slots for registration also contributes to the reduction in waiting time. Patients can register at specific times, ensuring that they arrive at the designated time for their doctor's visit or treatment. This applies to both the registration waiting time and the doctor's visit waiting time (Jin et al., 2021). In addition to the use of online reservation systems, the system and workflow within it also play a significant role. It is important to ensure that the online reservation system can distribute patients effectively between online and walk-in patients, optimizing both the online and offline registration processes (Ye et al., n.d.). This condition is further elucidated in the journal by Kwak, Jin Kyung (Kwak, 2023) which provides solutions for managing the flow of online and offline patients, ensuring that neither registration system is disadvantaged.

Another advantage widely found in the 7 articles (Akintomide et al., 2019; Bagheri et al., 2022; Garavand et al., 2021; Jin et al., 2021; Leung & Nøhr, 2019; W. Su et al., 2020; Ye et al., n.d.) is that the use of online reservation systems will **enhance patient-centeredness**. Online reservation prioritizes patients, thereby increasing patient satisfaction. Studies conducted by Bagheri (Bagheri et al., 2022), Leung & Nohr (Leung & Nøhr, 2019), and Ye, Qing et al. (Ye et al., n.d.), explain that online reservation enable patients to make appointment with 24-hour access,

unrestricted by working hours/ business hours. This improves flexibility and accessibility for patients, facilitating the scheduling of healthcare appointments.

Furthermore, according to Ye, Qing, et al. (Ye et al., n.d.), patient-centeredness also aims to facilitate patients in obtaining sufficient information about healthcare services. In comparison to traditional scheduling methods, online scheduling allows patients to access abundant information, such as through websites or online applications, and choose their preferred doctors (Ye et al., n.d.). This aspect is also highlighted by Bagheri, et al.(Bagheri et al., 2022), stating that online reservations serve as a source of information for patients, which can enhance their knowledge and so that patient can be more interested in utilizing the online reservation system. This aspect is also related to health-related and cost-related risks (Ye et al., n.d.). Health-related risks refer to patients' inclination to seek transparent information regarding doctors, procedures, and costs when their condition becomes more severe, reducing uncertainty and doubt in healthcare services.

According to the research conducted by Jin, et al. (Jin et al., 2021), Ye, Qing & Hong Wu (Ye et al., n.d.), Bagheri, et al. (Bagheri et al., 2022), Leung, et al. (Leung & Nøhr, 2019), and Su, et al. (H. Su et al., 2019), another benefits of online reservation systems include **enhancing the effectiveness of doctors and medical staff**. This aspect is closely related to the previous point, as the utilization of online scheduling mechanisms provides doctors with the opportunity to manage service capacity and balance the demand between online and offline registrations, thereby reducing patient congestion (Ye et al., n.d.). This, in turn, alleviates the workload of medical staff. Jin H, et al. (Jin et al., 2021) further supports this idea by highlighting the need for precise evaluations of the capacity and habits of doctors and medical staff. Through precise evaluations that consider the patterns of doctors and patients, different registration intervals can be established, leading to improved efficiency and effective treatment from doctors and medical staff. The effectiveness of doctors and medical staff also impacts the overall efficiency and effectiveness of healthcare services, ranging from diagnosis to disease management and treatment (Jin et al., 2021; Leung & Nøhr, 2019; W. Su et al., 2020; Ye et al., n.d.).

Another factor that influenced by the use of online reservations is the **reduction in patient no-show incidents during scheduling**. This condition is described in studies by Akintomide, et al. (Akintomide et al., 2019) , Bagheri, et al. (Bagheri et al., 2022) , and Su, et al. (W. Su et al., 2020). According to Akintomide, et al. (Akintomide et al., 2019), a high rate of no-show occurrences partly due to the lack of patient input in determining their scheduled appointments. Patients should be able to choose their own preferred day and time for their examinations or consultations. It is concluded that the use of online reservations can decrease the percentage of patient arrivals compared to traditional registration method (W. Su et al., 2020). This finding is also consistent with Zhao's study (Zhao et al., 2017) which suggests that patients are more likely to take responsibility for their scheduled appointments when they are involved in the selection

and scheduling process, patients less likely to miss their appointments.

In the research by Su, et al., (W. Su et al., 2020), it is explained that no-show incidents are higher for appointments scheduled too far in advance. Therefore, one proposed solution is to limit patient scheduling to within 7 days, as it reduces the risk of patient no-shows. Additionally, another solution is to implement appointment confirmation to minimize the chance of patients forgetting their scheduled visits to the doctor. These measures instill confidence in patients that they have made appropriate appointments, thereby reducing uncertainty and potential barriers when attending their appointment (Bagheri et al., 2022).

CONCLUSION

Healthcare institutions should develop and optimize the implementation of online registration systems, considering the numerous benefits they offer. The effective utilization of online reservations is expected to optimize patient waiting times, reduce staff workload, and enhance the overall effectiveness and efficiency of hospital services. Specific advantages include increased patient satisfaction, reduced no-show rates, and improved management of patient flow. To successfully adopt this system, hospitals can establish regulations by introducing web-based patient registration mechanisms, which not only regulate patient demand but also empower patients to conveniently make appointment reservations. Practical steps include investing in user-friendly technology, training staff, and ensuring data security. By doing so, hospitals can provide patients with a multitude of advantages, significantly enhancing their overall healthcare experience. Further research is needed to identify best practices, overcome potential barriers to implementation, and optimize the use of online-based reservation systems to ensure their effectiveness and sustainability.

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