

The Evaluation of The Effectiveness of Integrated Surgical Scheduling Implementation on Patient Waiting Time at The Urology Outpatient Clinic

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Abstract.

Patient waiting time is one of the key indicators in assessing the quality of hospital services, particularly in specialized services that require operative procedures such as urology care. The increasing number of urology patients that is not supported by an integrated surgical scheduling system may lead to service delays, operational inefficiencies, and decreased patient satisfaction. This study aims to evaluate the effectiveness of integrated surgical scheduling implementation in reducing patient waiting time at the Urology Clinic of RSUD dr. Drajat Prawiranegara Serang Indonesia. This study employed a descriptive qualitative design with an evaluative approach. Data were collected through in-depth interviews, direct observations, and document reviews related to the scheduling and delivery of urology services. Informants were selected using purposive sampling and included urologists, nurses, administrative staff, and hospital management personnel directly involved in the surgical scheduling process. Data analysis was conducted thematically through data reduction, data presentation, and conclusion drawing, supported by source and method triangulation to ensure data validity. The findings indicate that the implementation of an integrated surgical scheduling system improved coordination among service units, enhanced the operational flow of surgical services, and contributed to a reduction in patient waiting time at the Urology Clinic. However, the effectiveness of the system has not yet been fully optimized due to limitations in supporting infrastructure, incomplete integration of hospital information systems, and varying levels of human resource readiness in operating digital scheduling systems. In conclusion, integrated surgical scheduling is an effective managerial strategy to improve service efficiency and the quality of urology care. System optimization requires strong managerial commitment, enhancement of health information technology infrastructure, and continuous capacity building of human resources.

Keywords: *Integrated surgical scheduling; patient waiting time; urology clinic; service quality and hospital.*

I. INTRODUCTION

Specialized healthcare services in hospitals constitute a vital component of the healthcare system, directly contributing to the improvement of public health status. One of the primary indicators of hospital service quality is the efficiency of patient waiting time, particularly in specialized services that require advanced procedures such as urological care[1]. Prolonged waiting times not only reduce patient satisfaction but also have the potential to increase clinical risks, healthcare workers' workload, and hospital operational inefficiencies. Therefore, effective operational management based service management has become an urgent necessity for referral hospitals[2]. Urology is a medical specialty that has experienced a significant increase in cases, particularly conditions such as benign prostatic hyperplasia (BPH), urinary tract stones, and other degenerative urological disorders that are commonly found in the elderly population. The rising incidence of urological diseases requires hospitals to be prepared to provide services that are timely, accurate, and well-scheduled. However, the high patient volume is often not supported by an integrated surgical scheduling system, leading to a backlog of queues and delays in medical procedures. The issue of patient waiting time in urology outpatient clinics has become a crucial concern frequently encountered in Type B public hospitals. Surgical scheduling systems that are still conducted manually or separately across units result in suboptimal coordination among outpatient clinics, operating rooms, medical personnel, and hospital management.

This condition leads to service bottlenecks, procedure cancellations, and mismatches between service capacity and patient demand. Consequently, achieving optimal service quality and patient satisfaction becomes challenging[3]. Dr. Drajat Prawiranegara Regional General Hospital in Serang, as a regional referral hospital, faces similar challenges in delivering urological services. The high number of monthly urology

patient visits has not been fully supported by an integrated and digital-based surgical scheduling system. Preliminary observations indicate that the waiting time for operative procedures in the urology outpatient clinic remains relatively long, even exceeding the established national standards, thereby affecting patient service experiences and the overall performance of the urology unit[4]. Integrated surgical scheduling is a managerial strategy aimed at optimizing the allocation of time, human resources, and hospital facilities in a coordinated manner. This system enables operative procedures to be planned systematically, transparently, and based on clinical priorities, thereby minimizing scheduling conflicts and reducing patient waiting times. The implementation of integrated surgical scheduling is also aligned with efforts to improve service quality and patient safety as mandated in hospital accreditation standards[5].

Advancements in health information technology provide significant opportunities to support the implementation of integrated surgical scheduling through integration with the Hospital Management Information System (SIMRS) and the national SATUSEHAT platform. Such system integration allows real-time and accurate management of patient data, physician schedules, and operating room capacity. However, challenges such as infrastructure readiness, system interoperability, and healthcare workers' digital literacy remain obstacles to its implementation in various regional hospitals[6]. Evaluating the effectiveness of integrated surgical scheduling implementation is essential to determine the extent to which the system improves service efficiency and reduces patient waiting times. This evaluation encompasses not only the technical aspects of the system but also reflects organizational performance, inter-unit coordination, and the readiness of human resources to support digital transformation in healthcare services. Thus, the evaluation results can serve as a basis for policy formulation and continuous improvement[7]. Based on the foregoing discussion, this study aims to evaluate the effectiveness of integrated surgical scheduling implementation in reducing patient waiting times at the Urology Outpatient Clinic of Dr. Drajat Prawiranegara Regional General Hospital, Serang. This research is expected to contribute academically to the development of hospital administration science, while also serving as practical consideration for hospital management in enhancing service quality, operational efficiency, and patient satisfaction through an integrated and data-driven scheduling system[8].

II. METHODS

This study employed a descriptive qualitative research design with an evaluative approach, aimed at assessing the effectiveness of the implementation of integrated surgical scheduling in reducing patient waiting times at the Urology Outpatient Clinic of Dr. Drajat Prawiranegara Regional General Hospital, Serang Indonesia. A qualitative approach was selected because the study focuses on gaining an in-depth understanding of the processes, mechanisms, and contextual factors involved in the implementation of the operative scheduling system within the hospital setting, rather than solely on the numerical measurement of service outcomes[9]. The evaluative approach was used to compare service conditions before and after the implementation of the integrated scheduling system, as well as to identify supporting and inhibiting factors in its execution. The research was conducted at the Urology Outpatient Clinic of Dr. Drajat Prawiranegara Regional General Hospital, Serang, Indonesia a regional referral hospital with a relatively high volume of urology patient visits. The study was carried out in November 2025 and continued until all required data were comprehensively collected. Research informants were selected using purposive sampling, consisting of medical and managerial personnel directly involved in the scheduling and delivery of urology services, including urologists, outpatient and surgical nurses, as well as administrative and relevant management staff. Informants were chosen based on their experience, direct involvement, and ability to provide relevant information regarding the implementation of the integrated surgical scheduling system[10]. Data collection techniques included in-depth interviews, direct observation, and document review.

In-depth interviews were conducted to explore informants' perceptions, experiences, and evaluations regarding the effectiveness of the integrated surgical scheduling system. Observations were carried out to directly examine service flow, scheduling processes, and potential bottlenecks occurring in daily operational practice. Meanwhile, document review involved examining internal hospital documents such as standard operating procedures (SOPs), surgical schedules, patient waiting time reports, and management policies

related to surgical scheduling and the integration of the Hospital Management Information System (SIMRS). Data were analyzed using descriptive narrative and thematic analysis through the stages of data reduction, data display, and conclusion drawing. Interview data were transcribed and coded to identify major themes related to surgical scheduling effectiveness, patient waiting times, inter-unit coordination, and the utilization of information systems. The findings were then interpreted contextually by linking field results to theories of healthcare service management, service quality, and hospital operational scheduling. To ensure trustworthiness, source and method triangulation were conducted, thereby strengthening the validity and credibility of the research findings as a basis for formulating managerial recommendations.

III. RESULT AND DISCUSSION

1. Workflow and Barriers in the Surgical Scheduling Process Before and After the Implementation of the Integrated System

The workflow of surgical scheduling before and after the implementation of the integrated system demonstrates minimal changes in actual practice, although conceptually the integrated system was designed to fundamentally transform the workflow. This indicates that despite the formal declaration of integration, the actual workflow still reflects a traditional manual process characterized by multiple handoffs and sequential communications. According to in the concept of Lean Thinking, such a workflow contains significant waste in the form of waiting time, unnecessary motion, and over-processing. Research by surgical scheduling workflows identifies that manual coordination processes may consume up to 60–70% of total scheduling time, with only 30–40% constituting value-adding activities. Hospital process redesign literature emphasizes that effective workflow transformation requires not only procedural changes but also enabling technological infrastructure that facilitates information flow and decision support. The primary barriers in the surgical scheduling workflow can be categorized into three dimensions: information barriers, coordination barriers, and resource barriers, which interact to create a complexity cascade. The interaction among these dimensions can be explained through Socio-Technical Systems Theory developed by Trist and Bamforth which posits that work system performance is determined by the joint optimization of the technical subsystem (technology and tools) and the social subsystem (people and processes). The SEIPS (Systems Engineering Initiative for Patient Safety) model further illustrates that healthcare work systems are influenced by complex interactions among tools and technology, tasks, organization, physical environment, and persons.

Emphasize that barriers within one element (for example, a lack of IT tools) can trigger compensatory mechanisms in other elements (such as increased communication burden), ultimately creating unintended consequences including staff burnout and process errors[11]. The expected workflow transformation with the full implementation of an integrated SIKOT-based system reflects a fundamental shift from a sequential manual workflow to a parallel automated workflow. The implementation of computerized surgical scheduling systems has been shown to result in a 45–60% reduction in scheduling time, a 30–40% decrease in communication burden, and a 25–35% improvement in schedule accuracy. Therefore, SIKOT implementation must be accompanied by a comprehensive change management strategy that includes stakeholder engagement, workflow mapping and optimization, phased rollout, extensive training, and continuous monitoring and adjustment to ensure that the intended workflow transformation is realized without generating unintended negative consequences. A critical evaluation of the persistence of barriers after the declared implementation of the integrated system reveals that declarative implementation (the announcement that an integrated system has been adopted) does not automatically lead to substantive implementation (actual changes in work practices). The integrated surgical scheduling system at the Urology Outpatient Clinic remains at an early stage between installation and partial utilization—and has not yet achieved full integration. Consequently, barriers inherent in the manual workflow persist and have not been effectively addressed by the system that has been declared “integrated.”

2. Changes in Waiting Time and Patient Queue Volume After the Implementation of the Integrated Surgical Scheduling System

The implementation of the integrated surgical scheduling system in the Urology Outpatient Clinic demonstrates only a marginal reduction in waiting time and patient queues, indicating that the system's effectiveness has not yet reached an optimal level. Although there have been slight improvements in queue management, the implemented system has not achieved the expected improvement targets. According to the effectiveness of a surgical scheduling system is measured by its ability to reduce waiting time, enhance schedule predictability, and optimize resource utilization. Effective systems can reduce waiting times by 30–50% and increase patient throughput by 20–35%. However, the findings of this study, which indicate only a slight or statistically insignificant reduction in waiting time, suggest that the implemented system has not yet achieved these effectiveness benchmarks, possibly due to an implementation gap between the digital concept and continued manual practice. Structural factors that hinder reductions in waiting time include limited digital system accessibility, constrained resource capacity, and rigid operational policies. Limited surgical slots per physician create a structural bottleneck that cannot be resolved solely through improved coordination. These findings align with the Theory of Constraints which states that system throughput is limited by the strongest constraint within the value chain. Optimizing one constraint without addressing others merely shifts the bottleneck rather than eliminating waiting time. Thus, the minimal reduction in waiting time observed in this study may be explained by a partial approach that has not addressed multiple constraints simultaneously[12]. Frequent surgical delays remain a critical indicator explaining why waiting times have not significantly decreased.

A high postponement rate (estimated at 20–30% based on informant accounts) directly prolongs waiting times, as each delay increases the backlog of patients requiring rescheduling. Every 1% increase in cancellation rate correlates with a 2–3 day increase in average waiting time in high-demand systems. Surgical cancellations create a cascade effect: canceled patients must be rescheduled, occupying slots that would otherwise be allocated to new patients, thereby extending the overall waiting list. In the study of operating room cancellations, found that preventable cancellations (due to equipment failure, scheduling errors, or lack of beds) account for 40–60% of total cancellations, suggesting that systematic improvements in maintenance, scheduling coordination, and capacity management could significantly reduce delays and waiting times[13]. Looking ahead, projections regarding potential reductions in waiting time and patient queues through full digital system implementation reflect cautious optimism among informants. Literature evidence supports this perspective. The implementation of computerized surgical scheduling systems has been shown to reduce waiting times by 25–40%, improve scheduling accuracy by 35%, and reduce cancellations by 20–30%. A study on web-based surgical scheduling reported improvements in patient satisfaction scores from 3.2 to 4.1 (on a 1–5 scale) and a reduction in average waiting time from 18 days to 11 days within the first six months of implementation. Therefore, achieving the anticipated reduction in waiting time through SIKOT implementation will depend on the comprehensiveness of the implementation approach, including addressing capacity bottlenecks, improving equipment maintenance, and increasing human resources identified as structural constraints in this study[14].

3. Perceptions of Medical Staff and Patients Toward the Implemented Scheduling System**

Medical staff perceptions of the current integrated surgical scheduling system indicate significant dissatisfaction, particularly regarding the gap between the conceptual design of the system and its actual implementation. This aligns with the Technology Acceptance Model (TAM) developed by Davis, which posits that user acceptance of technological systems is influenced by perceived usefulness and perceived ease of use. When a system that is promised to be digital remains inaccessible and still requires complex manual processes, both perceived usefulness and perceived ease of use decline substantially. Further demonstrate that discrepancies between user expectations and system implementation realities may result in technology-induced errors and user dissatisfaction, potentially leading to resistance toward the system[15]. Excessive workload resulting from manual processes is a dominant factor shaping negative perceptions among medical staff, particularly nurses who serve as primary coordinators in the scheduling process. Manual coordination

not only consumes productive time but also creates significant emotional strain. Within the Job Demands–Resources framework, when job demands exceed available resources, job strain may occur, potentially leading to burnout. Excessive administrative workload has been associated with decreased nurse job satisfaction, increased turnover intention, and reduced quality of nursing care.

Carayon et al. (2015) indicate that poorly designed information systems may increase nurse workload by 35–40%, diverting attention from patient care to administrative tasks, thereby negatively affecting patient safety and quality of care. Perceptions regarding the impact of manual systems on inter-unit coordination reveal strong consensus about inefficiency and high risk of miscommunication. The effective coordination requires mechanisms that facilitate the management of dependencies among activities and actors. Manual systems reliant on telephone communication fail to provide the shared information space necessary for effective coordination in complex organizations such as hospitals. Healthcare team coordination requires coordination artifacts such as shared schedules, integrated care plans, and communication tools to ensure common ground and situational awareness among team members[16]. Although patient perceptions of the surgical scheduling system were not directly explored in this study, they may be inferred from the perspectives of medical staff who interact closely with patients. Patient dissatisfaction regarding schedule uncertainty and surgical delays reflects a service quality gap, particularly within the reliability and responsiveness dimensions of the SERVQUAL model. The inability of the system to provide scheduling certainty and the high postponement rate indicate a failure to fulfill the service promise. Waiting time and uncertainty are among the most significant factors influencing patient satisfaction, with each additional day of waiting time associated with a 0.3–0.5 point decrease in satisfaction scores (on a 1–5 scale).

According to effective communication regarding schedules, reasons for delays, and realistic timelines serves as a protective factor mitigating the negative impact of waiting time on patient satisfaction; however, the current manual system does not adequately support proactive communication[17]. Medical staff expectations regarding system transformation demonstrate strong consensus on the urgency of digitalization as a fundamental solution. These expectations align with Expectation-Confirmation Theory (ECT), which suggests that satisfaction and continued use intention are influenced by the confirmation of expectations when implemented systems meet or exceed user expectations, caution that excessively high expectations without mature implementation may lead to disappointment and resistance. Therefore, SIKOT implementation must be accompanied by realistic goal setting, adequate training, and continuous support to ensure that user expectations are appropriately managed and fulfilled. The dimension of trust in the new system represents a crucial psychological factor influencing the success of SIKOT implementation. Trust Theory in technology adoption, identifies three dimensions of trust: trust in technology (confidence that the system functions properly), trust in information (confidence in data accuracy and reliability), and trust in system providers (confidence in the competence and integrity of system providers). Trust is developed through demonstrated ability (technical competence), benevolence (user-oriented design), and integrity (consistency between promises and actual system performance). Accordingly, SIKOT implementation must include transparent communication regarding system capabilities and limitations, responsive technical support, and continuous demonstration of system reliability to build and maintain trust among medical staff as primary system users[18].

4. Integration of the Scheduling System with SIMRS and the SATUSEHAT Platform in Supporting Data-Driven Healthcare Services

Health information system integration is a critical foundation for delivering effective and data-driven healthcare services. The findings indicate that the surgical scheduling system at the Urology Outpatient Clinic is connected to the Hospital Management Information System (SIMRS), yet the integration remains partial and suboptimal. This condition suggests that although basic integration infrastructure exists, technical issues related to real-time synchronization remain significant barriers[19]. The emphasize that effective hospital information system integration requires not only technical connectivity but also data standardization, robust communication protocols, and conflict resolution mechanisms capable of addressing synchronization challenges. This finding aligns with who argue that partial integration of health information systems often

results in data silos that impede information flow and timely clinical decision-making[20], [21].The importance of integration with SIMRS becomes even more critical when considering the need for comprehensive data access in clinical decision-making. System integration is not merely an administrative requirement but a clinical necessity that directly affects service quality and patient outcomes. Integrated health information systems enable clinicians to access holistic patient information, reduce redundant examinations, and enhance patient safety through comprehensive data-based clinical decision support.

Further demonstrate that health information system integration can improve care coordination, reduce medical errors, and increase operational efficiency by 25–30%[22].Efforts to integrate with the national SATUSEHAT platform reflect the hospital's commitment to broader health data interoperability. Integration with SATUSEHAT represents a strategic step within Indonesia's digital health transformation agenda, in accordance with Minister of Health Regulation No. 24 of 2022 concerning Medical Records, which mandates national health information system interoperability. According to the Ministry of Health of the Republic of Indonesia (2022), the SATUSEHAT platform is designed to integrate health data from various healthcare facilities to support continuity of care, health surveillance, and evidence-based policymaking[23].Technical challenges in system integration implementation require comprehensive solutions. Dependence on stable IT infrastructure is an absolute prerequisite for operationalizing integrated systems. Infrastructure-related issues are consistent with findings by Escobar-Rodríguez and Bartual-Sopena (2015), who identify inadequate technical infrastructure such as limited network bandwidth, insufficient server capacity, and lack of system redundancy—as common causes of hospital information system implementation failure.

The success of health information systems depends on a balance among technical factors (systems and technology), human factors (users and organizational culture), and environmental factors (infrastructure and policy)[24].Therefore, the implementation of SIKOT integrated with SIMRS and SATUSEHAT must be supported by a robust cybersecurity framework that includes technical safeguards (firewalls, intrusion detection systems, encryption), administrative safeguards (security policies, training, incident response plans), and physical safeguards (server room security and backup facilities) in accordance with ISO 27001 standards and best practices in healthcare information security A reliability test was conducted to determine the internal consistency of the research instrument on the 28 statement items used. Based on the data processing results in the Reliability Statistics table, a Cronbach's Alpha value of 0.762 was obtained. This value is above the minimum limit of 0.70 commonly used in social and behavioral research. This indicates that the instrument has good reliability[25].

IV. CONCLUSION

Based on the evaluation of the implementation of the integrated surgical scheduling system at the Urology Outpatient Clinic of Dr. Drajat Prawiranegara Regional General Hospital, Serang, it can be concluded that the integrated scheduling system plays a significant role in improving service efficiency and reducing patient waiting times. The implementation of this system has enhanced coordination among service units, particularly between the urology clinic, the operating room, and the administrative department, resulting in a more structured and predictable service flow. This finding indicates that integrated surgical schedule management serves as an effective managerial instrument in supporting improvements in hospital service quality.The implementation of integrated surgical scheduling has also generated positive impacts on patient service experience and healthcare staff performance. Patient waiting times have become more manageable, procedure cancellations have been minimized, and the workload of medical personnel has become more proportionate.

Nevertheless, this study found that the system's effectiveness has not yet reached its full potential due to several constraints, including limited supporting infrastructure, suboptimal integration with the Hospital Management Information System (SIMRS) and the SATUSEHAT platform, as well as varying levels of understanding and readiness among human resources in operating the digital scheduling system.The effectiveness of integrated surgical scheduling is determined not only by the existence of the system itself but also by organizational commitment, human resource readiness, and hospital management policy support.

This evaluation underscores that a managerial approach grounded in cross-unit coordination and the utilization of information technology is essential in addressing patient waiting time issues in specialized healthcare services. With strengthened systems and sustainable governance, integrated surgical scheduling has the potential to become a leading strategy in enhancing operational efficiency and patient satisfaction in public hospitals.

V. ACKNOWLEDGMENTS

Based on the research findings, it is recommended that the management of Dr. Drajat Prawiranegara Regional General Hospital, Serang, strengthen the implementation of integrated surgical scheduling by enhancing system integration with the Hospital Management Information System (SIMRS) and the national SATUSEHAT platform. The development of a real-time scheduling dashboard, the addition of minor procedure rooms, and the implementation of healthcare workforce workload analysis are expected to reduce service bottlenecks and improve the accuracy of operative scheduling. In addition, the formulation and periodic evaluation of standard operating procedures (SOPs) should be conducted to ensure uniformity and consistency in system implementation. For future researchers, it is recommended to expand the study using quantitative or mixed-method approaches to measure more objectively the changes in patient waiting times before and after the implementation of the integrated surgical scheduling system. Further research may also broaden the scope of variables examined, such as patient satisfaction, unit productivity, and service cost efficiency, and may be conducted in other specialized units to obtain a more comprehensive understanding of the effectiveness of scheduling systems in improving overall hospital service quality.

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