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Implementation of Patient Safety Incident Reporting Using Web-Based Quality Management Information System in Hospital X Tangerang

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Abstract. Patient safety incident reporting is a critical component of hospital quality systems. This study evaluated the implementation of a Quality Management Information System (QMIS) for incident reporting at Hospital X using the Structure–Process–Outcome (SPO) framework integrated with the HOT-Fit model. A mixed-methods case study was conducted, combining analysis of 774 incident reports submitted between March 2023 and December 2024 with in-depth interviews involving clinical staff, unit heads, and the Quality and Risk (QR) Manager. Findings revealed that while structural elements such as computing infrastructure and leadership support were in place, gaps remained in staff training, procedural awareness, and system usability. QMIS was actively used for reporting, but advanced features like root cause analysis (RCA) and dashboards were underutilized. Reporting performance was moderate, with 62.8% of reports submitted within 24 hours and a reporting rate of 22.03 per 1,000 patient days, below international benchmarks. Although some process improvements were implemented, feedback loops to frontline staff were limited. To enhance system effectiveness, technical improvements are recommended, including interface simplification, mobile access, data validation, and integration with hospital systems. Strengthening local support and fostering a learning-oriented safety culture is also essential to sustain engagement and improve patient safety outcomes.

Keywords: Patient Safety; Incident Reporting; Quality Management Information System

Abstrak. *Pelaporan insiden keselamatan pasien merupakan komponen penting dalam sistem mutu rumah sakit. Studi ini mengevaluasi implementasi Sistem Informasi Manajemen Mutu (SIMM) untuk pelaporan insiden di Rumah Sakit X menggunakan kerangka kerja Struktur–Proses–Hasil (SPO) yang diintegrasikan dengan model HOT-Fit. Penelitian studi kasus dengan metode campuran dilakukan dengan menganalisis 774 laporan insiden yang dikirimkan antara Maret 2023 hingga Desember 2024, serta wawancara mendalam dengan staf klinis, kepala unit, dan Quality and Risk (QR) Manager. Hasil menunjukkan bahwa meskipun elemen struktural seperti infrastruktur komputer dan dukungan pimpinan telah tersedia, masih terdapat kesenjangan dalam pelatihan staf, pemahaman prosedur, dan kemudahan penggunaan sistem. SIMM digunakan secara aktif untuk pelaporan, namun fitur lanjutan seperti analisis akar masalah (RCA) dan dasbor belum dimanfaatkan secara optimal. Kinerja pelaporan tergolong sedang, dengan 62,8% laporan dikirimkan dalam 24 jam dan tingkat pelaporan sebesar 22,03 per 1.000 hari pasien di bawah tolok ukur internasional. Meskipun beberapa perbaikan proses telah dilakukan, umpan balik kepada staf lini depan masih terbatas. Untuk meningkatkan efektivitas sistem, disarankan adanya perbaikan teknis, termasuk penyederhanaan antarmuka, akses seluler, validasi data, dan integrasi dengan sistem rumah sakit. Penguatan dukungan lokal dan pengembangan budaya keselamatan yang berorientasi pada pembelajaran juga penting untuk mempertahankan keterlibatan dan meningkatkan hasil keselamatan pasien.*

Kata kunci: *Keselamatan Pasien; Pelaporan Insiden; Sistem Informasi Manajemen Mutu*

INTRODUCTION

Incident reporting systems are a cornerstone of patient safety strategies worldwide, serving as essential tools for identifying risks, analyzing root causes, and implementing preventive actions. The World Health Organization (2021) recognizes incident reporting as a key component of the Global Patient Safety Action Plan 2021−2030, emphasizing its role in reducing avoidable harm in healthcare. In Indonesia, the Regulation of the Minister of Health Number 11 of 2017 on Patient Safetymandates the establishment of such systems in healthcare facilities, emphasizing their role in fostering a culture of safety and continuous learning. This mandate is further reinforced by Law Number 17 of 2023 concerning Health, which requires all healthcare facilities to implement patient safety standards, including incident analysis and reporting, as part of broader quality improvement efforts.

As healthcare systems become increasingly complex, digital transformation offers new opportunities to enhance the effectiveness of incident reporting, making it timelier and more accessible. In early 2023, Hospital X adopted a web-based Quality Management Information System (QMIS) to support incident reporting and learning, transitioning from a previous version used since the hospital's official opening. However, this implementation has not been comprehensively evaluated.

While digital health research has expanded, much of it focuses on electronic medical records (EMRs), especially following Indonesia's Regulation of the Minister of Health Number 24 of 2022 on Medical Record mandating EMR adoption. Studies on digital incident reporting systems remain limited despite their direct relevance to patient safety outcomes. The importance of evaluating health IT beyond usability–considering its alignment with human, organizational, and technological factors–was introduced by Yusof et al. (2008) through the HOT-fit framework, which remains widely referenced in contemporary studies.

Although numerous studies have examined the adoption of digital health technologies in hospitals, most have focused on EMRs and clinical decision support systems. Research specifically addressing digital incident reporting systems–particularly those integrated into quality management platforms–remains limited. Existing literature tends to emphasize technical performance and user interface design, with less attention given to how these systems interact with organizational culture and human factors to influence patient safety outcomes.

Several studies have shown that digital systems can improve reporting rates and data processing efficiency (Gong *et al.*, 2015; Dawson *et al.*, 2022; Soularto, Arini and Listiowati, 2022; Saefulmilah *et al.*, 2024). However, few studies have comprehensively evaluated how these systems function in real-world hospital settings using integrated frameworks that consider both health information system performance and patient safety culture.

Therefore, this study aims to fill that gap by analyzing the implementation of a digital patient safety incident reporting system through a web-based QMIS in Hospital X, given its potential to streamline patient safety incident management workflows. It evaluates how structural, human, organizational, and technological factors influence the effectiveness of incident reporting and learning. Initial observations indicate that while QMIS facilitates incident submission, its use in subsequent processes–such as root cause analysis and incident closure–remains limited. The study applies Donabedian (2003) model to assess healthcare quality across structure, process, and outcomes, and integrates the HOT-fit framework Yusof et al. (2008) to examine the alignment between system use and contextual factors. This research contributes to the growing body of literature by offering a holistic evaluation of a digital reporting system and its interaction with safety culture in a hospital setting.

METHOD

This study employed a mixed-methods approach, combining both quantitative and qualitative data to comprehensively evaluate the implementation of a digital incident reporting system for patient safety. The integration of methods aimed to provide both breadth and depth in understanding the system's effectiveness and the contextual factors influencing its use. This study was conducted at Hospital X, a type C general hospital located in Tangerang Regency, Banten Province, Indonesia.

The quantitative analysis was based on secondary data obtained from the QMIS at Hospital X. All patient safety incident reports submitted between 1 March 2023 and 31 December 2024 were included. Descriptive statistics were used to examine reporting trends, frequency, timeliness, completeness, and the use of system features such as root cause analysis (RCA).

The qualitative component was conducted to explore user experiences, perceptions, and organizational factors influencing the implementation of the QMIS. Data collection involved in-depth interviews with ten informants working in clinical settings, including frontline staff, individuals in managerial or supervisory roles, and the Quality and Risk Manager. In addition, direct observations of the QMIS interface were carried out to understand the process flow of incident reporting, including the sequence of steps involved. This observation also served as part of the triangulation strategy to validate findings from interviews and document analysis. Furthermore, a review of internal documents, such as guidelines and standard operating procedures related to incident reporting and patient safety, was conducted to assess the alignment between policy and practice.

Interview participants were selected purposefully to ensure representation across professional roles and departments. Interviews were conducted using a semi-structured guide and were audio-recorded with participant consent. Thematic analysis was applied to identify patterns and insights related to system usability, safety culture, and barriers to reporting.

This study applied both methodological and source triangulation to enhance the credibility of the findings. Methodological triangulation was achieved by combining data from incident report records, document reviews, direct observations, and in-depth interviews. Source triangulation was conducted by interviewing informants from various clinical professions and roles, including frontline staff, unit supervisors, and the Quality and Risk administrator, to capture diverse perspectives on the incident reporting process.

RESULT

Between 1 March 2023 and 31 December 2024, Hospital X received 775 incident reports through its QMIS. One duplicate report was identified and removed. As the result, 774 unique reports were analyzed, representing all safety-related incidents recorded during the study period.

Human: User Characteristics

Professional Background

Among the 774 validated incident reports submitted to Hospital X's QMIS, the majority were reported by nursing staff (nurses and midwives), accounting for 39.8% of all submissions. Reports submitted anonymously–via the system's identity protection feature–comprised 25.5% of the total. Other contributors included medical doctors (12.0%), allied health staff (10.3%), administrative staff (8.8%), and non-clinical support staff (3.6%) (Figure 1).

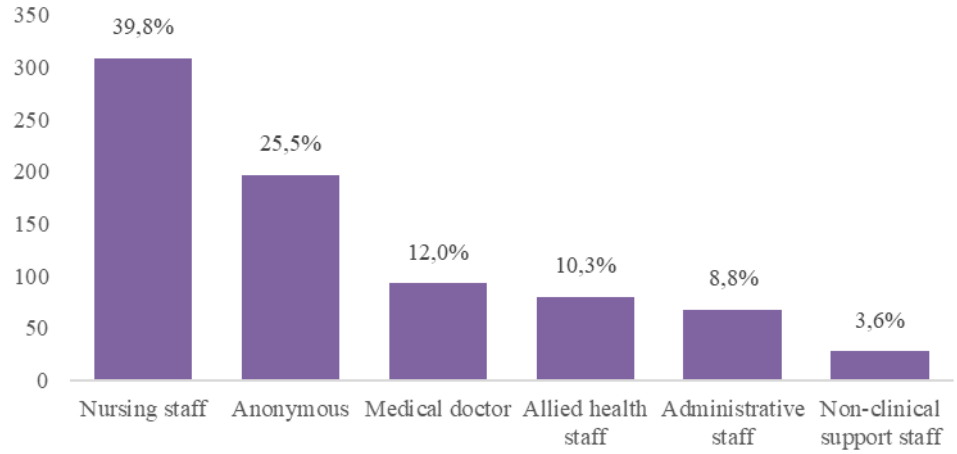

Figure 1. Number of Incident Reports by Professional Group

This high volume of reports from nursing staff is also reflected in the number of individual users involved in reporting, with nearly half of all identified reporters coming from the same professional group. Among the 577 incident reports submitted with identifiable user information, a total of 118 unique users were involved in reporting. Most of these users were nursing staff (49.2%), followed by allied health staff (21.2%), medical doctors (13.6%), administrative staff (11.0%), and non-clinical support staff (5.1%) (Figure 2).

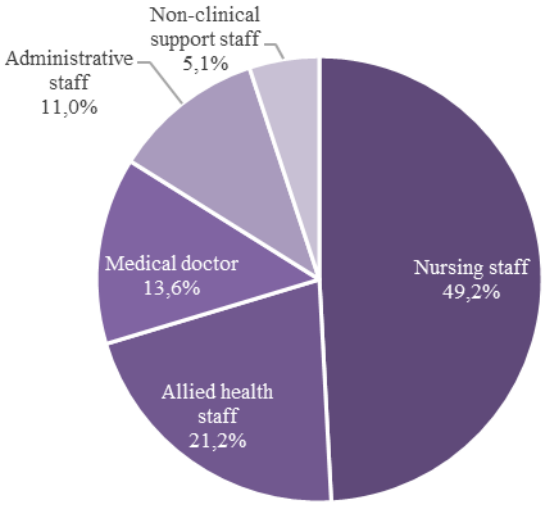

Figure 2. Number of Incident Reporters by Professional Group

Ten informants with clinical roles at Hospital X participated in the qualitative component, including five incident reporters, four analysts, and one Quality and Risk administrator. Their backgrounds spanned nursing, pharmacy, laboratory technology, and medicine. Most had 5–7 years of length of service, and two held master's degree in Hospital Administration. The Quality and Risk (QR) Department is managed by a single administrator with a medical background and over six years of experience in quality and risk roles, including three years at Hospital X. This diverse group provided a well-rounded clinical perspective on QMIS implementation.

Knowledge and Training

Most informants demonstrated a clear understanding of patient safety incidents, citing examples such as medication errors, missing identification, patient falls, and equipment issues. The QR Manager confirmed this general awareness but noted occasional confusion in distinguishing between near-miss, no-harm, and adverse events. Familiarity with internal guidelines or Standard Operating Procedure (SOP) was limited; only one informant had read the relevant procedure. Informal learning–via supervisor briefings, unit meetings, or peer discussions–was the primary source of procedural knowledge. Training experiences varied. Informants mentioned e-learning modules, orientation programs, and departmental briefings, but none had received dedicated instruction on using QMIS or conducting RCA. The QR Manager confirmed that such training was typically embedded within broader sessions.

Organization

Policies and Procedures

A content analysis was conducted on three internal documents related to patient safety incident reporting at Hospital X, which are the Guideline of Quality Improvement, Patient Safety, and Risk Management (QPS-MR); SOP for Incident Management; and Standard Operating Procedure (SOP) for Incident Registration. The QPS-MR outlines a comprehensive framework for incident classification, reporting procedures, and RCA. In contrast, the SOPs contain inconsistencies with the current QMIS platform. Several outdated terms and workflow steps–such as “incident owner” and “incident investigator”–remain from the previous system, which may cause confusion and indicate the need for procedural updates.

Culture of Safety

Hospital X has established a generally positive culture of safety, particularly within internal units. Informants perceived that hospital management prioritizes patient safety through leadership walk rounds, implementing safety procedures, and the application of root cause analysis (RCA). Supervisors and managers actively reinforce patient safety goals, conduct audits, and ensure infrastructure support.

A just culture was evident in most internal units. Informants understood that incident reporting serves as a tool for learning and improvement rather than punishment. However, subtle signs of blame were noted in interdepartmental contexts, particularly when incidents involved multiple units. One

informant emphasized that feeling blamed is a personal perception, suggesting that such feelings may not necessarily reflect the organization's culture but rather individual sensitivities or interpersonal dynamics. Open communication was commonly observed within units. Supervisors and managers encouraged direct reporting of issues directly, favoring early internal resolution to prevent escalation. This approach reflected a proactive attitude toward safety management.

Management Support for Using QMIS

Management strongly supports the use of QMIS for incident reporting at Hospital X, particularly through the role of the QR Department. Incident reporting is formally conducted through QMIS, and the system is widely recognized among staff by its platform name, Medblaze. This is reflected in common expressions such as "put into Medblaze" (register into the QMIS) or "make the Medblaze" (make the report), which are used interchangeably with the act of reporting an incident. The QR Manager reinforces its use by setting monthly reporting targets and encouraging staff to document safety-related concerns directly in the system, emphasizing its role as a formal and proactive tool for patient safety.

Computing Facilities

All informants reported that incident reporting through QMIS was conducted using desktop or laptop computers available in their respective work units, which were also used to access other hospital systems such as the Hospital Information System (HIS) and EMR. However, QMIS is a stand-alone application and not integrated with these systems. Although QMIS is technically accessible via mobile devices, several informants noted difficulties using smartphones due to screen size and limited Wi-Fi compatibility. Internet connectivity was generally sufficient, though occasional access issues were reported. Overall, computing facilities and network access were considered adequate to support QMIS use.

Technology: Information System

System Quality

In terms of system quality, most users reported that the platform was generally usable after an initial adjustment period. However, some informants experienced confusion during early use, particularly when navigating complex forms or selecting appropriate categories and severity levels. Occasional system errors and slow loading times were also noted, especially during peak usage. The anonymous reporting feature was frequently activated unintentionally, suggesting a need for a clearer interface design.

Information Quality

Users appreciated the structured format of the reporting forms, though some found the volume of required fields overwhelming. Several informants highlighted inconsistencies in the Indonesian translation of system terms, which sometimes led to confusion. The accuracy and completeness of information were most relevant to the system administrator, who relied on the data for monitoring and follow-up. Issues such as duplicate entries, inconsistent numbering, and invalid timestamps were identified during the data review.

Service Quality

The QR Manager, as an administrator, was consistently described as responsive and helpful. While most technical issues were addressed promptly, some required escalation to the corporate office, which could delay resolution. Despite these limitations, the support provided at the hospital level was generally viewed as effective in assisting users with system-related challenges.

System Use

Incident Reporting

As shown in Figure 3, monthly data from QMIS between March 2023 and December 2024 shows notable variation in both the number of incident reports submitted and the number of active reporters. The highest reporting activity occurred in August 2023, with 74 incident reports submitted by 33 individual reporters. In contrast, the lowest activity was recorded in May 2024, with only 10 reports from 6 reporters. On average, the system recorded approximately 35 reports per month, submitted by around 17 unique users.

Root Cause Analysis

Out of 770 incident reports submitted over the two-year period, 76% (n = 585) were completed with RCA documentation in the QMIS at Hospital X. Among the RCA entries, the vast majority (n = 584) utilized the "General" method, which involves a free-text narrative format. Only one report applied the "Five-Why" technique, and none used the "Fishbone" diagram approach.

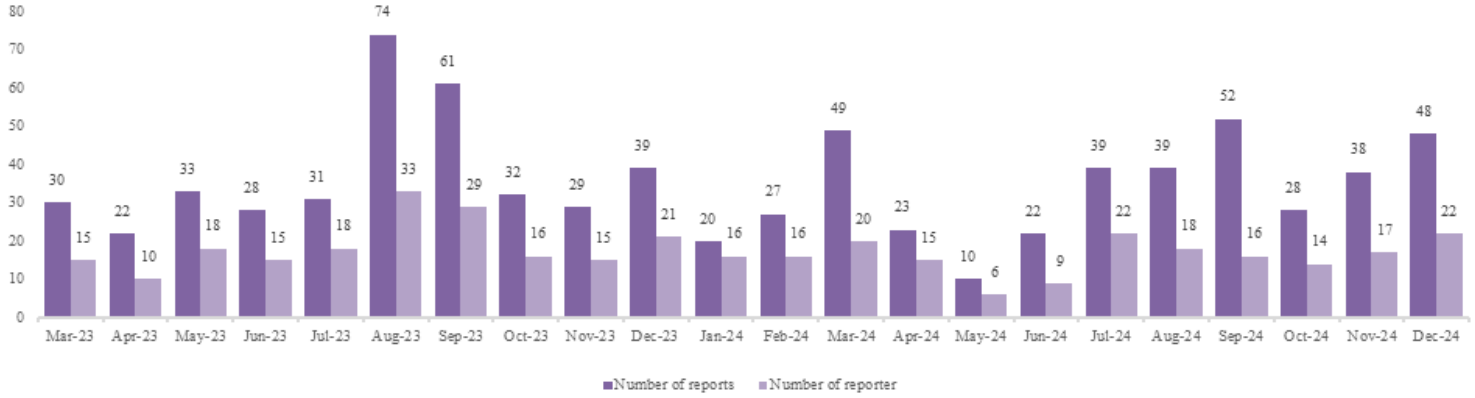

Figure 3. Monthly Trends in Incident Reports and Reporters (March 2023 – December 2024)

Incident Dashboard

The dashboard feature within the QMIS incident module at Hospital X was primarily utilized by the QR Department for rapid data visualization during coordination meetings or internal reviews. The dashboard was used to monitor the status of incident reports, including identifying those that had not yet been completed with RCA. For more comprehensive reporting needs, the QR Manager preferred to extract raw data from QMIS and conduct independent analysis.

System Acceptance

In general, staff at Hospital X expressed a positive reception toward the use of the QMIS for incident reporting, highlighting its practicality, confidentiality, and improved documentation. However, one informant noted the potential benefit of maintaining a parallel record using spreadsheet software (e.g., Microsoft Excel) could be beneficial. This was proposed to support internal data tracking purposes.

Performance

Figure 4 illustrates the sequential workflow of incident management at Hospital X, as implemented through the QMIS, covering the period from March 2023 to December 2024. The process begins with the occurrence or acknowledgment of an incident, followed by its submission into QMIS, delegation to an analyst, completion of RCA, and final verification and closure by the administrator. Each stage is associated with a specific turnaround time (TAT) metric, reflecting the duration taken to complete that phase.

The average TAT for incident reporting was 3.98 days, with 62.8% of reports submitted within the 24 hour standard. Delegation of incidents to analysts took an average of 7.30 days, although no formal standard was defined for this stage. RCA completion times varied by severity category: 92.71 days for SAC 1 and 2 (red and yellow), 73.21 days for SAC 3 (green), and 107.95 days for SAC 4 (blue), against respective standards of 45, 14, and 7 days. Overall, 60.0% of RCA submissions met the expected timeliness criteria. Verification and closure of incidents averaged 101.47 days, while the total end-to-end TAT–from submission to closure–was 175.16 days. Despite these extended durations, 97.1% were verified, and 73.8% of incidents were fully processed.

Organizational Benefit

The implementation of incident reporting through the QMIS at Hospital X has contributed to tangible improvements in patient safety practices, particularly through process improvements and organizational learning. Managers and supervisors described workflow revisions, such as changes to outpatient medication input. Meanwhile, frontline staff highlighted improvements like protocols to prevent needlestick injuries and the use of bed railing cushions to reduce falls. However, at the staff level, awareness of these improvements was less consistent. Some frontline staff reported limited knowledge of changes resulting from incident reports, indicating that the perceived impact of reporting may not be uniformly experienced across all levels of the organization.

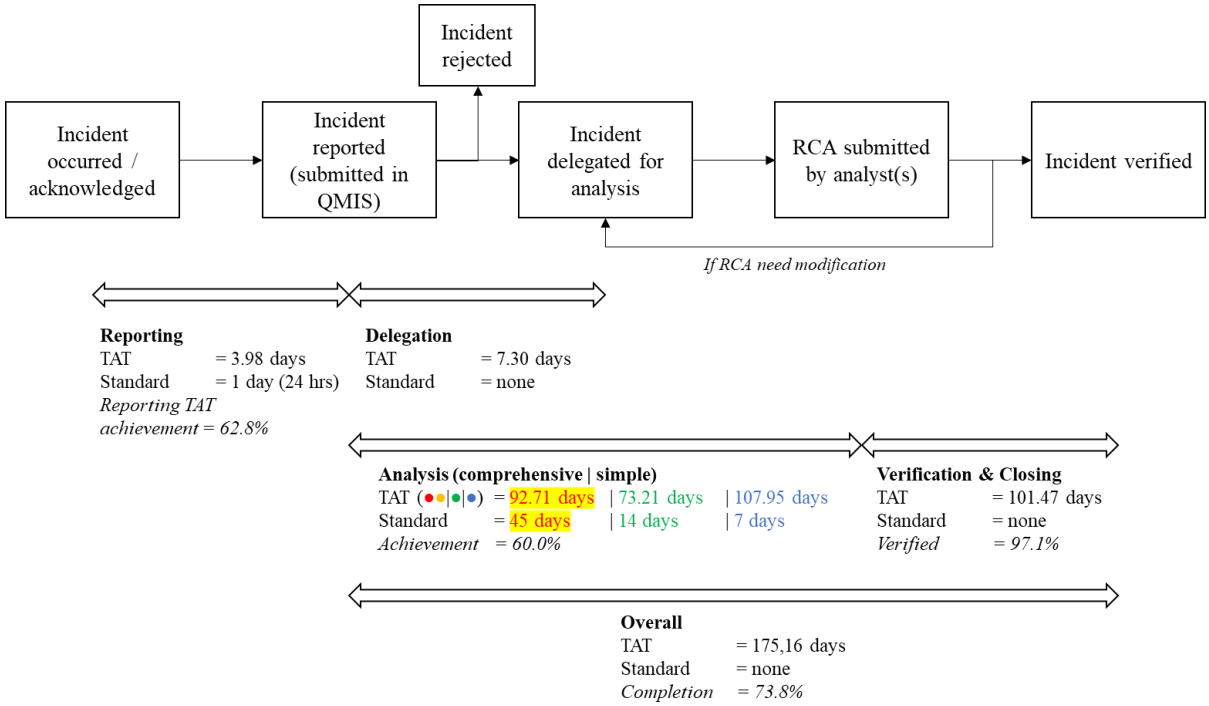

Figure 4. Workflow of Incident Management and Turnaround Time (TAT) Performance

The reporting rate of patient safety incidents at Hospital X, measured from March 2023 to December 2024, was 22.08 reports per 1,000 patient days. This figure serves as a relative indicator of reporting activity within the hospital. While there is no universally established standard for incident frequency in hospital settings, a large-scale analysis by Kepner and Jones (2025) reported a rate of 32.2 reports per 1,000 patient days based on data from the largest event reporting database in the United States. This external figure is presented here solely as a contextual reference.

DISCUSSION

This study evaluated the implementation of a QMIS for patient safety incident reporting at Hospital X using a mixed-methods approach. The analysis was initially guided by the Structure–Process–Outcome (SPO) framework and the Human–Organization–Technology Fit (HOT-Fit) model. However, to better reflect the key findings, the discussion is structured around four emergent themes: strengthening procedural understanding, improving system usability, bridging gaps in safety communication across units, and bringing safety lessons to the frontline. These themes reflect the interplay between human, organizational, and technological factors that influence QMIS and how it contributes to patient safety outcomes.

Strengthening Procedural Understanding

Although staff at Hospital X generally understood what types of incidents should be reported, many were unaware of key procedural expectations such as the required TAT for reporting and completing RCA. This gap suggests that while the concept of reporting is familiar, the operational standards are not fully internalized. According to the Regulation of the Minister of Health Number 11 of 2017 on Patient Safety, incidents should be reported within 2×24 hours of occurrence or detection.

Hospital X's internal guidelines are even more stringent, requiring reporting within 24 hours. Furthermore, the Decree of the Minister of Health Number HK.01.07/MENKES/1596/2024 on Hospital Accreditation Standards stipulates that a simple investigation should be completed within 14 days for green-grade incidents and within 7 days for blue-grade incidents. These national benchmarks are reflected in Hospital X's internal guidelines, yet awareness and compliance among staff remain inconsistent, indicating a need for clearer communication and reinforcement of procedural standards.

The hospital has three formal regulations related to incident reporting. However, one SOP of incident registration has not been updated to reflect the current QMIS platform. Staff rely heavily on informal learning such as peer guidance and trial-and-error rather than structured training. This informal approach, while adaptive, can lead to

inconsistent practices and confusion, especially in areas like incident grading and RCA documentation. Similar challenges have been reported in other studies, where limited training and unclear procedures hinder the effective use of digital reporting systems (Gong *et al.*, 2015; Chi and Hu, 2021).

A key factor contributing to this situation is the limited capacity of the hospital's QR Department, which is staffed by a single manager. Despite being experienced and responsive, the manager's ability to provide ongoing training, monitor system use, and support users is constrained by the absence of additional personnel. This structural limitation reduces the department's ability to proactively reinforce procedural compliance and provide hands-on coaching. As Martin et al. (2024) emphasize, the effectiveness of safety roles depends not only on individual expertise but also on adequate organizational support and resource allocation.

Improving System Usability

Compared to traditional paper-based reporting systems, Hospital X's QMIS platform (Medblaze) was seen as a more advanced solution. However, users still faced several usability challenges, especially during the transition from the previous digital system. Many staff found the reporting form complex, citing an excessive number of mandatory fields and unclear classification categories. These challenges align with findings by Koskiniemi et al. (2024), who reported that overly detailed forms and poorly structured options can hinder effective incident reporting. In addition to these design issues, some users at Hospital X also struggled with the English-language interface. Although a translation feature was available, it occasionally produced confusing results, highlighting the need for better localization.

The anonymous reporting feature also caused confusion. It was often activated by mistake, making it difficult for the QR team to follow up on reports. This reflects a mismatch between system design and user behavior, as highlighted by Tagne et al. (2023), who found that unclear features can reduce the quality of data collected. Access was another issue. Although the system is web-based, it is only accessible through the hospital's internal network to maintain a secure environment. While this restriction helps protect sensitive data, it also limits flexibility for users. Expectations for mobile phone accessibility were also noted in Song and Guo (2019) where nursing interns viewed it as a more practical and time-saving alternative to desktop-based reporting. However, the study did not explore potential limitations such as screen size or system compatibility.

At Hospital X, users noted that while QMIS support by the administrator was generally responsive, many issues remained unresolved due to escalation to external vendors or corporate offices. This gap between initial responsiveness and final resolution affected user satisfaction. Similar concerns were reported by Jebraeily et al. (2019), who found that responsiveness and reliability were the most significant service quality gaps in hospital information systems, largely due to delays in resolving issues beyond the local IT team's control. These findings align with the SERVQUAL model, which emphasizes five dimensions of service quality: tangibles, reliability, responsiveness, assurance, and empathy. In this context, while the administrator demonstrated responsiveness and empathy through active engagement and support, limitations in system reliability and the lack of local resolution capacity undermined overall service quality. Addressing these gaps–particularly by strengthening local technical capabilities and ensuring timely resolution–could enhance user trust and satisfaction with the system.

In terms of data utilization, the dashboard feature in QMIS was primarily used by the administrator for internal monitoring and coordination. However, it was not directly used for generating formal reports, which often required additional data processing. This practice remains necessary when reports must be tailored to meet specific regulatory requirements. For example, the Decree of the Minister of Health Number HK.01.07/MENKES/1596/2024 on Hospital Accreditation Standards requires hospitals to analyze specific incident trends, such as major discrepancies between preoperative and postoperative diagnoses. To fulfill such requirements, the administrator must conduct further analysis of individual report content, which goes beyond the dashboard's default visual summaries.

One informant reported using Microsoft Excel to manually collect incident-related data for internal quality monitoring. This was particularly relevant for departments such as pharmacy and nursing, which track specific indicators like medication errors, pressure injuries, or phlebitis. Since access to QMIS data is limited to the administrator, this workaround reflects a need for more decentralized access or role-based data sharing to support unit-level quality improvement efforts.

While Medblaze is a widely adopted platform for incident reporting across hospitals, usability challenges at Hospital X may stem from local implementation practices or user adaptation rather

than inherent system flaws. The system was developed externally and was not evaluated in this study. Therefore, it remains unclear whether standard Software Development Life Cycle (SDLC) principles-such as configuration, testing, and user validation were followed. SDLC frameworks are commonly used in health IT to guide the development of reliable and user-centered systems (Adriani, Teguh Raharjo and Ni Wayan Trisnawaty, 2024). However, without access to vendor-side documentation, this aspect remains outside the scope of the current evaluation.

Despite these problems, many users said they have become more comfortable with the system over time. However, this learning was mostly informal, as formal training was limited. As Zhou et al. (2019) emphasize, sustained use of digital health tools depends heavily on good usability design, including ease of learning and user satisfaction–actors that can influence long-term engagement.

Recent evidence highlights the critical role of "champions"–experienced health personnel who actively promote and support technology adoption within their teams–in improving system usability and engagement. The study done by Pettersen, Eide and Berg (2024) found that champions, often referred to as superusers, facilitators, or implementation leaders, serve as both technical guides and cultural mediators during digital transformation. Their success depends on clear organizational anchoring, dedicated time, and appropriate training. Champions who are respected, enthusiastic, and embedded within clinical workflows can bridge gaps between management and frontline staff, foster peer learning, and mitigate resistance to change. Rather than relying solely on system design improvements, hospitals should consider empowering champions across departments to enhance usability and sustain engagement with digital reporting systems.

Bridging Gaps in Safety Communication Across Units

Hospital X exhibits a generally supportive safety culture, with leadership initiatives such as safety briefings and walk rounds indicating institutional prioritization of patient safety. These practices align with the “enabling” dimension of safety culture, where leadership fosters conditions conducive to safe care (Lee and Dahinten, 2020). However, inconsistencies persist in how safety values are communicated and enacted across units. While many staff report open communication within their immediate teams, interdepartmental or cross-functional communication is often hindered by perceived blame, hierarchical barriers, and a lack of psychological safety.

The study done by Hustoft et al. (2018) found that communication and relational ties were significantly stronger within similar professional groups than between contrasting ones, suggesting that interprofessional collaboration remains fragmented. This fragmentation is further exacerbated by unclear roles, limited shared understanding, and insufficient inter-professional education. The findings by Van Dongen et al. (2024) reinforce this by identifying relational and contextual barriers–such as hierarchical dynamics, fear of negative consequences, and unpredictable reactions from superiors–as key inhibitors to speaking up. Their systematic review highlights that speaking up is not merely an individual act but is shaped by a complex interplay of individual, relational, contextual, and organizational factors. These findings reflect a partial implementation of just culture principles, where the absence of a psychologically safe environment, especially across professional boundaries, can suppress reporting and hinder collective learning.

Supervisors play a pivotal role in reinforcing safety norms, yet their engagement varies significantly. Leadership approach and behavior are critical determinants of speaking-up behavior in healthcare settings. When supervisors and managers are perceived as open, supportive, and proactive, staff are more likely to voice safety concerns. Conversely, when leaders are seen as unresponsive, dismissive, or retaliatory, staff are more likely to withhold concerns, even in the face of clear safety risks. In Hospital X, variability in supervisory practices contributes to uneven reporting behaviors and underutilization of incident data for learning. These findings underscore the need for consistent leadership practices that foster psychological safety and model inclusive communication to support a robust safety culture (Van Dongen et al., 2024).

Bringing Safety Lessons to the Frontline

At Hospital X, nursing staff–including nurses and midwives–were the most frequent reporters of patient safety incidents over the two-year study period. This reflects not only their frontline position in patient care and their larger representation within the hospital workforce but also their engagement with QMIS as a reporting system. Their central role in reporting is further supported by a systematic review showing that nurses submitted 83.7% of all critical incident reports across hospital-based systems (Goekcimen *et al.*, 2022). However, this also suggests that incident data may underrepresent safety issues encountered by other professional

groups, highlighting the need for more inclusive and cross-disciplinary engagement in safety communication.

While the number of incident reports and active reporters reflects system use, it does not fully capture the depth of safety culture. To contextualize reporting behavior, this study examined the reporting rate, which was 22.08 reports per 1,000 patient days. This figure is below the benchmark of 32.2 per 1,000 patient days reported by Kepner and Jones (2025) in a large U.S. dataset. However, incident reporting systems are known to capture only a fraction of actual adverse events.

A systematic review by Hibbert et al. (2023) found that, on average, only 7% of adverse events identified through the Global Trigger Tool (GTT) were also reported in incident systems. These findings suggest that reporting rates should be interpreted as indicators of engagement and learning behavior rather than as proxies for actual harm prevalence. Therefore, efforts to strengthen feedback loops and promote meaningful use of incident data are essential to bring safety lessons to the frontline.

Despite the availability of digital reporting, Hospital X has not fully leveraged incident data for organizational learning and quality improvement. While incident reports are collected and stored, their translation into actionable insights remains limited, particularly at the frontline level. Recent evidence supports the value of structured, team-based discussions in fostering a culture of learning and safety.

A study by Tsamasiotis et al. (2024) found that healthcare professionals who participated in Morbidity and Mortality Conferences (MMCs) or Experience Feedback Committees (EFCs) reported significantly higher scores in the "Organizational Learning" dimension of the Hospital Survey on Patient Safety Culture. These findings suggest that engaging staff in reflective, nonpunitive forums can strengthen shared learning and transparency. Hospitals might consider adapting these formats into more accessible presentations or open forums where leadership discusses real safety issues with staff, reinforcing a culture of openness and continuous improvement.

Informants noted that although incident data are occasionally discussed in management meetings and coordination forums, dissemination of staff is inconsistent and often filtered by perceived relevance. This selective communication limits opportunities for shared learning and weakens the feedback loop essential for a learning health system (Braithwaite *et al.*, 2017). Moreover, while some units reported implementing process changes based on incident trends, such as adjustments in medication workflows or fall prevention protocols, these improvements were not systematically tracked or evaluated. The absence of structured mechanisms to close the learning loop reflects a broader challenge in converting data into sustained improvement (Tartaglia, 2021).

The literature emphasizes that effective incident reporting systems must go beyond data collection to support real-time analysis, feedback, and system redesign. Without these components, reporting risks becomes a symbolic act rather than a driver of safety culture and performance. The study by Dawson et al. (2022) demonstrate that a well-designed Safety Event Management System (SEMS), when coupled with closed-loop communication and decentralized follow-up, can significantly improve reporting culture and organizational learning.

However, as Macrae (2016) argues, healthcare has often misapplied the principles of incident reporting borrowed from high-reliability industries like aviation. Instead of fostering a culture of inquiry and systemic improvement, many healthcare systems have focused on accumulating large volumes of reports without the necessary infrastructure for investigation and learning. Similarly, Mitchell et al. (2016) identify persistent challenges such as inadequate triaging and analysis of reports, lack of clinician engagement (especially among physicians), and insufficient visible action following reports. These limitations underscore the need for a shift from passive data collection to active, system-wide learning processes that translate incident reports into meaningful safety improvements.

CONCLUSION

This study examined the implementation of a QMIS for patient safety incident reporting at Hospital X using the SPO framework. The findings highlight that while the structural foundation–comprising user readiness, organizational support, and technological infrastructure–was generally in place, several gaps remain in system optimization and cultural internalization. The QMIS platform was accepted and actively used for reporting, but its more advanced features, such as root cause analysis and dashboard utilization, were underutilized. Reporting processes were often delayed due to workload and unclear responsibilities, and while some improvements were made based on incident data, the feedback loop to frontline staff was limited.

The overall reporting rate remained below international benchmarks, indicating persistent underreporting. To enhance the effectiveness of QMIS, Hospital X should focus on simplifying system workflows, strengthening staff training and procedural clarity. Integrating incident reporting into daily clinical routines is also important. More importantly, fostering a culture that values learning from incidents beyond compliance will be essential for sustaining improvements in patient safety.

RECOMMENDATION

To improve the technical effectiveness and cultural integration of QMIS at Hospital X, the hospital should simplify the user interface and integrate QMIS with existing hospital systems (e.g., EMR or HIS) to streamline workflows and reduce redundant data entry. A team of superusers should be established as unit champions to promote consistent usage, facilitate peer learning, and bridge gaps between management and frontline staff. Cultivating a culture of openness, psychological safety, and continuous learning–supported by leadership-led safety forums–will further reinforce engagement. These combined strategies will significantly enhance system usability and overall engagement.

ETHICAL CLEARANCE

This study received ethical approval from the Research and Community Engagement Ethics Committee of the Faculty of Public Health, Universitas Indonesia, on 24 April 2025, under approval letter number Ket-202/UN2.F10.D11 /PPM.00.02/2025. The research was conducted only after ethical clearance was granted and permission was obtained from Hospital X. All informants were provided with a clear explanation of the study objectives and procedures before giving their consent to participate. Written informed consent was obtained from each participant, and confidentiality was strictly maintained throughout the research process.

CONFLICT OF INTEREST

The author is currently employed at the corporate office of the hospital group that oversees Hospital X, the institution studied in this research. This affiliation did not influence the design, conduct, analysis, or reporting of the study.

AUTHORS' CONTRIBUTION

AJ: Conceptualization, Data Curation, Formal Analysis, Investigation, Methodology, Project Administration, Resources, Visualization, Writing Original Draft. MN: Supervision, Validation, Writing Review and Editing. All authors have read and approved the published article.

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