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ORIGINAL

Patient Safety and Nursing Information Systems: Exploratory Study on Health Informatics-Based Multidisciplinary Reporting, Education, and Collaboration

Seguridad del paciente y sistemas de información de enfermería: estudio exploratorio sobre informes, educación y colaboración multidisciplinarios basados en informática sanitaria

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ABSTRACT

Introduction: patient safety is a vital aspect of quality healthcare, with nursing practice playing a strategic role. However, its implementation still faces obstacles, especially in incident reporting, education, and cross-professional collaboration. The development of health informatics encourages the use of nursing information systems to improve efficiency, accuracy, and data integration. Health information technology, such as electronic reporting and digital education platforms, provides an opportunity to strengthen the culture of safety in the clinical environment.
Objective: explores patient safety practices in nursing through analysis of incident reporting, educational efforts, and multidisciplinary collaboration, with a focus on the integration of health information technology into nursing information systems.
Method: qualitative research with an interpretive descriptive approach and literature review. Analysis was conducted thematically. Sampling using the method purposive sampling is a type of criterian sampling. The number of participants was 15 participants who were included in the source triangulation category consisting of implementing nurses and room heads. Semi-structured interview guidelines with in-depth interviews, FGDs and observations using field notes.
Results: there are 6 main themes obtained, namely: effectiveness of incident reporting systems, proactive nurse strategies, the role of education, multidisciplinary collaboration, operational challenges, and positive impacts on service quality and public trust. Digital systems such as e-IRS and EHR accelerate response and strengthen communication, although digital literacy and system support are still constrained. Preventive efforts by nurses and family involvement reduce the risk of incidents. Cultural transformation and team learning support continuous safety improvement.
Conclusions: nurses are central actors in supporting patient safety. Digital integration supported by training, leadership, and interdisciplinary collaboration can improve safety outcomes and public trust in hospital services.

Keywords: Role of Nurses; Patient Safety; Nursing Information Systems; Health Information Technology; Safety Culture; Qualitative Study.

RESUMEN

Introducción: la seguridad del paciente es un aspecto vital de la atención médica de calidad, y la práctica de enfermería desempeña un papel estratégico. Sin embargo, su implementación aún enfrenta obstáculos, especialmente en la notificación de incidentes, la formación y la colaboración interprofesional. El desarrollo de la informática sanitaria fomenta el uso de sistemas de información de enfermería para mejorar la eficiencia, la precisión y la integración de datos. Las tecnologías de la información sanitaria, como los informes electrónicos y las plataformas de educación digital, brindan la oportunidad de fortalecer la cultura de seguridad en el entorno clínico.
Objetivo: explorar las prácticas de seguridad del paciente en enfermería mediante el análisis de la notificación de incidentes, las iniciativas educativas y la colaboración multidisciplinaria, con un enfoque en la integración de las tecnologías de la información sanitaria en los sistemas de información de enfermería.
Método: investigación cualitativa con un enfoque descriptivo interpretativo y revisión bibliográfica. El análisis se realizó temáticamente. El muestreo intencional es un tipo de muestreo por criterios. El número de participantes fue de 15, incluidos en la categoría de triangulación de fuentes, compuesta por enfermeras implementadoras y jefes de sala. Se utilizaron directrices para entrevistas semiestructuradas con entrevistas en profundidad, debates de grupos focales y observaciones mediante notas de campo.
Resultados: se obtuvieron seis temas principales: eficacia de los sistemas de notificación de incidentes, estrategias proactivas de enfermería, el papel de la formación, la colaboración multidisciplinaria, los retos operativos y el impacto positivo en la calidad del servicio y la confianza pública. Los sistemas digitales, como el e-IRS y la HCE, aceleran la respuesta y fortalecen la comunicación, aunque la alfabetización digital y el soporte del sistema aún presentan limitaciones. Las iniciativas preventivas de enfermería y la participación familiar reducen el riesgo de incidentes. La transformación cultural y el aprendizaje en equipo impulsan la mejora continua de la seguridad.
Conclusiones: el personal de enfermería es fundamental para la seguridad del paciente. La integración digital, respaldada por la formación, el liderazgo y la colaboración interdisciplinaria, puede mejorar los resultados de seguridad y la confianza pública en los servicios hospitalarios.

Palabras clave: Rol del Personal de Enfermería; Seguridad del Paciente; Sistemas de Información de Enfermería; Tecnología de la Información Sanitaria; Cultura de Seguridad; Estudio Cualitativo.

INTRODUCTION

Patient safety is a fundamental component in the provision of quality health services. According to the World Health Organization (WHO), patient safety is an organized effort to prevent and reduce risks, errors, and adverse effects on patients during the provision of health services.[1] WHO Report[2] states that in low- and middle-income countries, approximately 134 million adverse events occur each year, resulting in approximately 2,6 million deaths, most of which are preventable. These data illustrate the systematic urgency of strengthening patient safety, particularly through effective incident reporting and management.

In Indonesia, the Hospital Patient Safety Committee (KKPRS) reported 7465 patient safety incidents in 2019, consisting of unexpected events (KTD), near misses (KNC), and non-injury incidents (KTC).[3] Although the reporting system has been available since 2006, the reporting rate from hospitals is still relatively low, which hinders the learning process and continuous improvement in the patient safety system.[4]

Nurses play an important role in supporting the implementation of patient safety because they are the health workers who interact with patients most frequently and the longest. They have direct responsibility for identifying risks, reporting incidents, implementing safety procedures, and providing education to patients and families.[5,6] However, several systemic challenges such as high workload, limited number of personnel, lack of training, and low managerial support are still the main obstacles to the optimal implementation of patient safety programs.[7,8,9]

Nurses play a strategic role in detecting and reporting patient safety incidents, making incident reporting systems one of the main tools in supporting safe and evidence-based nursing practice. Electronic incident reporting systems (e-IRS) facilitate faster, more accurate, and better documented reporting, facilitating analysis and follow-up of system improvements. In the nursing context, e-IRS not only increases the volume of reporting but also strengthens the role of nurses as agents of change in patient safety.[10,11] This system allows nurses to report incidents anonymously, at any time, and without fear of personal consequences, thus encouraging a positive reporting culture and collective learning in the clinical environment.

The paper-based incident reporting system that is still used in many hospitals is considered inefficient, prone to data loss, and difficult to follow up. Therefore, the electronic incident reporting system (e -IRS) has begun to be adopted as an effort to increase transparency and effectiveness of reporting. Gong et al.[10] emphasized

that features such as ease of use, reporter anonymity, and real-time feedback in e-IRS can increase the volume and quality of incident reporting. Koskiniemi et al.[12] also added that training, system integration with clinical workflows, and management support greatly influence the effectiveness of the electronic reporting system.

Digital transformation in healthcare, including the implementation of Electronic Health Records (EHR), further strengthens the importance of technology integration in patient safety. Palojoki et al.[13] stated that the integration of incident reporting modules into EHR creates an efficient workflow and enables early detection of incidents. In fact, the analysis of Li et al.[14] shows that EHR also plays a role in strengthening the effectiveness of multidisciplinary team collaboration in clinical decision-making. In the era of digital transformation, electronic incident reporting systems (ERI) have emerged as an important tool to support risk management and organizational learning. The study by Gqaleni et al.[15] also showed that the implementation of electronic reporting systems in special care units can improve incident detection and strengthen learning from adverse events. In addition, digital platforms such as Electronic Health Records (EHR) also encourage cross-professional collaboration in clinical decision-making

Furthermore, the integration of health information technology also supports cross-professional collaboration in efforts to improve patient safety. Electronic Health Records (EHR), Clinical Decision Support Systems (CDSS), and interprofessional dashboards enable real-time information exchange and improve communication between healthcare professionals. These technologies have been shown to accelerate clinical decision-making, reduce medical errors, and improve coordination between teams.[16,17] A recent study showed that digital platforms designed to support interprofessional interactions contributed to increased service efficiency, patient satisfaction, and reduced clinical risk.

However, the success of technology implementation is not only determined by technical factors, but also socio-technical aspects. Livesay et al.[18] remind that the mismatch between digital systems and clinical workflows can cause user resistance, disrupt services, and even create new risks. Therefore, nurse participation in the development and evaluation of health technology systems is very important to ensure alignment between digital innovation and clinical practice.

Furthermore, the literature shows that structural approaches alone, such as policies and regulations, are not effective enough in promoting a culture of patient safety. A more contextual and behavioral-based approach is needed, including increasing health literacy and technology readiness among health workers. Information technology-based innovations, such as the use of virtual reality (VR) training media, have been shown to improve nurses' communication skills, team readiness, and clinical awareness in dealing with critical situations.[19,20]

Based on matter said, research this aiming for explore role nurse in implementation safety patient through system reporting electronics, education, and collaboration multidisciplinary based on digital nursing information systems. This study expected can give base empirical in development of intervention models based on relevant and applicable technology in context House sick, especially in build culture sustainable safety.

Theoretical Framework

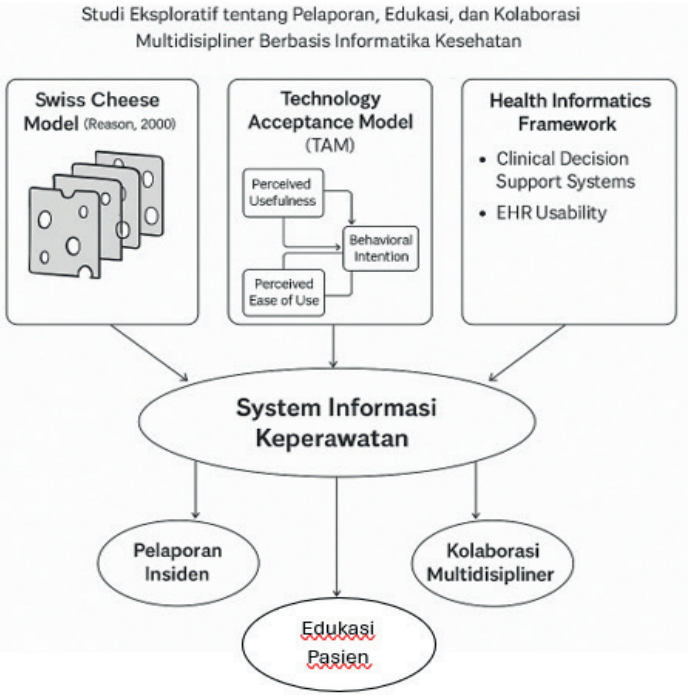

Figure 1. A Health Informatics-Based Framework for Patient Safety

The Swiss Cheese Model[21] illustrates that patient safety incidents occur due to layered failures in organizational systems, where each layer has "holes" or weaknesses that allow errors to slip through when the gaps align.[21,22] In nursing information systems, this model is relevant to explain how suboptimal incident reporting, documentation delays, and interdisciplinary miscommunication can occur due to poorly integrated systems. Well-designed technologies such as Clinical Decision Support Systems (CDSS) and Electronic Health Records (EHR) play an important role as additional defenses that help close these "holes" through automated reminders, drug interaction detection, and real-time data access. Meanwhile, the Technology Acceptance Model (TAM) developed by Davis[23] emphasizes that the level of technology adoption is influenced by perceptions of usefulness and ease of use. In the context of nursing, TAM is used to assess the extent to which healthcare workers accept information systems such as incident reporting, CDSS, and digital patient education features.[24,25]

High levels of technology acceptance are positively correlated with increased patient safety and team efficiency. Furthermore, the Health Informatics Framework includes three essential components in the application of information technology in health services, namely CDSS that supports data-based decision making, EHR usability that ensures user-friendly interfaces and effective workflows, and Health Information Exchange (HIE) that enables secure and real-time data exchange between facilities. The integration of these three approaches shows that nursing information systems are not just documentation tools, but strategic instruments in preventing errors, empowering health workers, and improving communication and education in a multidisciplinary environment.

METHOD

This study uses a qualitative approach with an interpretive descriptive method and literature review. This approach was chosen to explore in depth the nurses' perceptions of patient safety issues.

Data collection was conducted in April 2025 at Ibnu Sina Hospital, which was selected based on considerations of patient safety cases. The sampling technique used purposive sampling of the criterion sampling type, with 15 participants, consisting of 7 implementing nurses and 8 room heads.

Data were collected through focus group discussions (FGD) for implementing nurses and in-depth interviews for ward heads. Semi-structured interview guidelines were developed by the researcher. The FGD and interview processes were conducted after participants signed informed consent, with a duration of approximately 40–60 minutes. The tools used were voice and video recorders.

This study also explored the use of information systems by nurses, both for reporting and patient education. Some units still use manual systems, while others have begun using digital systems, such as electronic documentation through the hospital information system. Nurses also access educational materials through nursing e-learning provided by the hospital. In addition, some rooms have used communication dashboards to support coordination between medical teams in improving patient safety.

What variables will be analyzed in the study? What statistical techniques will be used to analyze them?

RESULTS

This study involved nurses with a number of participants that corresponded to the data saturation obtained from the results of the analysis of participant answers. The table below characteristics participants as following:

Table 1. Characteristics Student FGD participants (n=15 people)

Participant	Gender	Age (Year)	Education	Position	Length of working (Year)	Employment Status
PP1	Man	33	Nurse	Nurse Executor	6	CPT
PP2	Woman	21	Nurse	Nurse Executor	5	CPT
PP3	Woman	30	Nurse	Nurse Executor	6	CPT
PP4	Woman	36	S1	Nurse Executor	19	Permanent employee
PP5	Woman	27	Nurse	Nurse Executor	1	Honorary
PP6	Woman	37	S1	Nurse Executor	13	Permanent employee
PP7	Woman	27	Nurse	Nurse Executor	1	Contract
KR1	Woman	40	Nurse	Head Room	18	Permanent employee
KR2	Man	40	Nurse	Head Room	19	Permanent employee
KR3	Woman	46	Nurse	Head Room	28	Permanent employee
KR4	Woman	43	Nurse	Head Room	19	Permanent employee
KR5	Woman	39	Nurse	Head Room	19	Permanent employee
KR6	Woman	41	Nurse	Head Room	19	Permanent employee
KR7	Woman	40	Nurse	Head Room	17	Permanent employee
KR8	Woman	36	Nurse	Head Room	16	Permanent employee

Based on table 1, it shows that this FGD involved 15 participants consisting of 7 implementing nurses (46,7 %) and 8 heads of rooms (53,3 %). Most of the participants were female, 13 people (86,7 %), while only 2 were male (13,3 %). In terms of education, the majority, 13 people (86,7 %) were graduates of professional education in Nursing, and only 2 people (13,3 %) were graduates of S1 Nursing without a profession.

Participants' ages ranged from 21 to 46 years, with an age distribution that showed a mix of young and experienced nursing staff, with ward heads tending to be more senior than nurses. Participants' length of service showed that 6 (40 %) had less than 10 years of service, while 9 (60 %) had more than 10 years of service, including 2 (13,3 %) with more than 20 years of service.

In terms of employment status, 9 people (60 %) are permanent employees, while the rest consist of 3 prospective permanent employees (CPT) (20 %), 1 honorary employee (6,7 %), and 1 contract employee (6,7 %). In general, the characteristics of the respondents reflect diversity in terms of work experience and employment status, with a predominance of women with nursing education who provide rich perspectives in discussions based on differences in roles and career levels.

The research theme was formulated based on the analysis of participants' answers to interview questions and field notes during the data collection process. There were 6 themes that described nurses' experiences of patient safety issues. The resulting themes are as follows:

Theme 1: Effectiveness of incident reporting and evaluation systems in improving patient safety in hospitals

Table 2. Theme Analysis Process 1

Theme	Sub-Theme	Coding
Effectiveness of incident reporting and evaluation system in improving patient safety in hospitals	Incident reporting within 1x24 hours	Reporting within 1x24 hours
		Reporting immediately after an incident occurs
	Follow-up from the patient safety quality unit	Reporting to Quality section
		Involvement of Quality Unit from ranks board of directors
		Duties and responsibilities quality unit responsibility
	Evaluation and learning from incident events	Direct follow-up in the field
		Meeting evaluation incident
		Learning from incidents

Based on table 2 above, the incident reporting and evaluation system in hospitals plays an important role in efforts to improve patient safety. The findings show that incident reporting within 1 x 24 hours and reporting immediately after the incident are still the main focus in the effectiveness of this system.

Reporting of incidents in the hospital has been carried out according to procedure, which is a maximum of 1x24 hours. The reporting process is carried out in stages from the implementing nurse to the head of the room, then forwarded to the quality department. Several participants even stated that reporting was carried out immediately after the incident, demonstrating a commitment to a rapid response in handling incidents.

- KR4: "As the first room head, for example, if a friend experiences an incident, then the incident must be reported to me within 1x24 hours. Then I will forward it to the quality section. Later, quality will also follow up to the room."
- KR8: "The program reports immediately, so the report is 1x24 hours we report to the head of the room, the head of the room reports to the quality team." (ST)

The patient safety quality unit has an active role in following up on incident reports. This follow-up includes coaching for related staff, analysis of the chronology of events, and collaboration with the board of directors to respond to incidents comprehensively. This reflects a collaborative teamwork system in maintaining service quality.

- KR4: "Quality still involves the board of directors as well as how to respond to the incident."
- KR7: "After that, we will discuss it with the quality department and also help to find out the chronology."

Evaluation and learning from incidents are carried out directly through field visits, evaluation meetings, and reflective efforts to prevent similar incidents in the future. This process is an important part of improving the quality of service and a culture of continuous patient safety.

- KR 8: "If there is an incident of a patient falling, we immediately evaluate it with the quality department. Usually, we go straight to the field to see if there are any procedural errors or non-compliance with the SOP."
- PP6: "Usually there is a meeting to evaluate the incident so that it does not happen again."
- PP2: "We can learn from this incident, be more careful, more caring, more concerned so that it doesn't happen again."

Theme 2: Proactive Nurse Strategies in Preventing Patient Safety Incident Risks

Table 3. Theme 2 Analysis Process

Theme	Sub-Theme	Coding
Proactive Nurse Strategies in Preventing Patient Safety Incident Risks	Fall Risk Labeling	Installation sign special for patient at risk fall
		Identification patient through symbol risk
		Preventive measures based on patient fall history
	Security Bed	Locking of patient beds is done routinely
		Installation of handrails as a safety aid
		Education to patients regarding bed safety
	Infusion examination to prevent phlebitis	Routine checks on infusion conditions
		Observe for signs of redness and swelling.
		Periodic evaluation of patient infusion installation
		Phlebitis prevention through staff training

Based on table 3, it can be seen that Nurses implement various risk prevention strategies actively and systematically. Identification of patients at risk of falling is done by giving special labels, while securing the bed is a routine step to prevent falls. In addition, regular IV checks are implemented to prevent complications such as phlebitis. All of these actions reflect preventive efforts integrated into the daily practice of nurses to support patient safety.

Nurses use special signs or labels as a form of initial identification of patients who are at risk of falling, so that they can be given more attention.

- PP1: "When we are in care, the patient is reviewed from the patient, for example, this is a cardio patient, this is a patient with a history of falling risk, so there is a sign that is put up, so when we enter the room we know oh this patient has a history of falling risk. So, there are efforts."
- PP7: "Usually there are patients who fall, so we have signs for patients who are too high risk."

In addition, securing the bed with a lock or handrail is a routine practice for nurses to prevent patients from falling out of bed.

- PP5: "For example, if there is a phenomenon such as the bed must always be locked, we tell the patient to always install or lock the bed safety so that unwanted things do not happen."
- PP3: "In the past, we often held training, but recently we rarely hold training, for example, maybe we as implementing nurses don't read enough, maybe we miss out on information like that."

Routine checks on the patient's infusion condition are also carried out as a form of preventing complications such as phlebitis.

- PP6: "The program holds meetings on how to avoid incidents, usually the infusion must be checked every few hours, first see if there is any redness, swelling, so as to avoid phlebitis."
- KR5: "Yes, minimizing the occurrence of patient safety, if phlebitis occurs, providing nutrition is indeed high risk because the osmolarity of the fluid causes a high risk of phlebitis. "

Theme 3: The Role of Education in Increasing Patient Safety Awareness for Patients and Families

Based on table 4, it can be seen that education is an important component in strengthening patient safety awareness. Nurses not only provide education to patients but also involve families in the use of assistive devices and prevention of fall risks. Families participate in daily monitoring, such as accompanying patients to the bathroom and understanding safety protocols. This educational process builds active family participation and increases awareness of potential incidents.

Table 4. Theme 3 Analysis Process

Theme	Sub-Theme	Coding
The Role of Education in Increasing Patient Safety Awareness for Patients and Families	Family education regarding the use of assistive devices	Providing information to families regarding patient assistive devices
		Families are given a role in fall prevention
		Education regarding the use of handrails and safety equipment
	Education risk falls and their prevention	Explanation to patient about risk fall
		Education to increase patient awareness
		Delivery of preventive measures through direct communication
	Involvement family in monitoring	Family accompanies patient in the bathroom
		Families are asked to be active in-patient supervision
		Educate families about their role in maintaining patient safety.

Education is provided to families about the use of assistive devices so that they can participate in maintaining patient safety.

- PP1: “We provide education….”
- PP5: “ We educate, both to patients and families about patient safety. Such as locking the bed safety or stickers for fall risks like that.”
- KR7: “Yes, to improve patient safety... patient education and family education, for example, the risk of falling, this encourages the patient’s family to install a safety device near the bed...”

In addition, education about the risk of falls and their prevention is provided to patients and their families as a preventive measure.

- PP1: “ Patients at risk of falling are given education, usually we tell them to be careful, then we also put up labels so that the staff knows.
- KR6: “The information is provided so that it does not happen again, the quality department will help with follow-up.”

Families are also involved in monitoring patient conditions to increase alertness and safety.

- KR7: “ Family accompaniment in the bathroom is also important because patients often fall in the bathroom, so we ask their families to accompany them.”
- PP5: “Yes, it’s normal for a patient’s family to be negligent... so we always ask and remind the patient’s family.”
- PP2: “We can learn from this incident, be more careful, more caring, more concerned so that it doesn’t happen again.”

Theme 4: Multidisciplinary Collaboration as a Key Pillar in Patient Safety Programs

Table 5. Theme Analysis Process 4

Theme	Sub-Theme	Coding
Multidisciplinary Collaboration as a Key Pillar in Patient Safety Programs	Collaboration between nurses, doctors, technicians and families	Coordination between power health and family
		Family involvement in meeting patient needs
		Collaboration of technicians in physical security of the environment
	Synergy between nurses and quality department	Reporting incidents to the quality department in a hierarchical manner
		Follow-up and evaluation with the quality team
		Active communication between nursing and quality

	Involvement of all units in system development	Cross-unit involvement in patient safety efforts
		Collaboration with hospital management
		Collaboration between medical and non-medical units (technicians, security)
	Internal policies to ensure collaboration	Reporting SOP incident available
		Coordination inter-unit in accordance procedure
		Safety forum patient involved
		System reporting walk structured
		Policy supports involvement of all parties

Based on table 5, it can be seen that multidisciplinary collaboration has proven to be a major pillar in implementing patient safety programs. Harmonious cooperation between nurses, doctors, technicians, and patient families plays an important role in meeting needs and creating a safe care environment. Family involvement not only improves understanding of patient conditions but also strengthens the support system during the care process. In addition, synergy between nurses and the quality team through tiered incident reporting, joint evaluation, and active communication is the foundation for continuous improvement efforts.

Cross-unit involvement, both medical and non-medical, including hospital management, further strengthens the comprehensive patient safety system. Internal policy support through clear SOPs, coordination according to procedures, patient safety forums, and structured reporting systems are the foundation for ensuring effective collaboration between units. With this collaborative approach, patient safety efforts are not only the responsibility of individuals or one profession but are a collective commitment of all elements of the hospital.

Patient safety is the result of collaboration between various parties, including nurses, doctors, technicians, and patient families. This collaboration allows for quick and integrated action on potential risks.

- KR7: "Here we have cooperation between nurses including those who have problems with medication... the general section can also have problems, such as installing handrails."
- KR4: "Coordination is carried out with the board of directors and quality team."
- KR8: "We help each other between the implementing nurse and the doctor in the room."

Synergy between nurses and quality units is essential in detecting, handling, and evaluating patient safety events. Active communication and joint action are key in risk management.

- KR8: "Usually it is appropriate, for example there is an incident of a patient falling, we report the incident like this, then it is handled by the patient safety quality commitment, later they will follow up and evaluate together."
- KR6: "Patient safety quality will follow up on incidents reported by the room."

The development of a patient safety system also involves all units in the hospital, including management, technicians, and non-medical departments, to ensure the effectiveness of program implementation.

- KR1: "All teams are involved including technicians."
- KR7: "The general department is also involved, for example in installing handrails... We are trying to find a way out so that the system continues to run."

Several participants also mentioned that internal hospital policies such as reporting procedures, team coordination, and systems for involving all units have been set up to strengthen collaboration between teams in handling patient safety incidents.

- KR8: "If it is usually appropriate, the incident is immediately handled with a commitment to patient safety quality."
- KR3: "The reporting system is running well so we just have to follow the procedure."
- KR7: "There is already a system, who handles it first and what is the follow-up."

Theme 5: Operational Challenges in Implementing Patient Safety Programs

Based on table 6, it can be seen that the implementation of patient safety faces complex operational challenges, including limited human resources, technical barriers, and lack of communication and training. Multidisciplinary involvement and education of patients and families have been shown to strengthen the safety program. However, various structural and technical obstacles hinder the optimization of this program. Synergy between all parties and ongoing training are the keys to the successful implementation of the patient safety program.

Table 6. Theme Analysis Process 5

Theme	Sub-Theme	Coding
Operational Challenges in Implementing Patient Safety Programs	Limitations power nurse	Shortage of nurses in a particular shift
		Imbalance between workload and number of staff
		Supervision becomes less than optimal during overload
	Technical problems such as running out of handrub or unlocked windows	Handrub and soap facilities run out when needed
		The physical security system is not optimal (example: windows are not locked)
		Technical solutions must be implemented immediately
	Differences in perception and beliefs between patients and nurses	Lack of communication between nurses and patients
		Communication barriers increase safety risks
		Patients do not get enough information
	Lack of training and socialization of safety programs	Training not routinely implemented
		Socialization policy Not yet evenly
		Lack of Exposure material safety
		Hope exists training periodic
		Nurse Not yet exposed information latest
	Lack of management support for the nursing team	Safety facilities are often not available
		Response slow to need tool
		Technical submissions not immediately followed up
		Complaint No fast overcome
		Lack of logistical support from management
	Administrative burdens that interfere with direct service	Documentation takes up patient observation time
		Form reduce focus service
		Administration hinder supervision
		More data input priority from maintenance
		Workload increases due to administrative tasks

Several participants stated that the limited number of nurses resulted in high workloads and less than optimal patient supervision, especially on certain shifts.

- PP6: “There is a shortage of nurses, especially when there are a lot of patients... Usually there are some who work alone or in pairs.”
- KR5: “Facilities and doctors are also still lacking.”
- KR3: “Security hasn’t come yet, family isn’t there either, so it’s not monitored.”

Technical issues that should be easy to address, such as handrub facilities or room security, are often overlooked and hinder patient safety procedures.

- KR1: “For the technical part, I suggest that the windows be locked immediately.”
- KR2: “Handrub, the soap dispenser sometimes runs out.”
- PP5: “Sometimes the bed is unlocked, it should always be locked.”

Lack of communication causes patients to not understand medical procedures, so that trust in nurses decreases and endangers safety, and the lack of regular training and socialization causes nurses not to understand the latest protocols, increasing the risk of errors.

- KR5: “We as implementing nurses are less exposed to the latest information.”
- PP1: “... seminar from K3, but the duration is long and not routine.”
- PP3: “Patients need to be explained more so that they do not misunderstand... there used to be frequent training, but now it is rare... I hope there is training so that they do not miss out on information.”

Lack of management response to facility and safety equipment needs slows medical care and increases the risk of incidents, and heavy administrative tasks divert nurses’ focus from patients, reducing the effectiveness of monitoring and responding to patient needs.

- KR1: “We proposed the security, but it was not installed immediately.”
- KR2: “Sometimes facilities like soap and handrub run out.”
- KR5: “Lack of infrastructure slows down action.”
- PP7: “There are too many forms, sometimes I get tired.”

Theme 6: Positive impact of patient safety programs on service quality and public trust

Table 7. Theme Analysis Process 6

Theme	Sub-Theme	Coding
Impact positive safety program patient to quality service and trust public	Reduce incidents and stress patient	Program to reduce the number of incidents
		Patients feel safe and not anxious
		Patient stress decreases due to optimal prevention
	Increasing trust in hospitals	Safety programs improve hospital image
		Trust patient to House Sick increase
		Response fast to incident strengthen reputation
	Improving the accuracy and caring attitude of nurses	Nurses are more careful in administering medication and taking action
		Nurses show more caring and careful attitudes
		Learning from incidents improves quality of care
	Improving safety culture in hospital environment	Nurses are more careful and caring
		Patient safety becomes a work culture
		Work culture becomes disciplined and alert
		SOP implemented in a way consistent
		The work environment becomes safer
	Changes in attitudes and collective awareness of the health team	Health workers more reflective and open
		Culture each other remind grow
		Discussion post-incident increase
		Collective awareness of risk is increasing
		A cautious attitude emerges in daily practice
	Strengthening team communication in responding to unwanted incidents	Joint evaluation is carried out across units
		Incident meetings are facilitated by the quality team
		Communication increase post incident
		Teams submit incident reports to each other
		Team discussions encourage prevention of recurrence

Based on table 7, it can be seen that the patient safety program has been proven to have a positive impact on the quality of service and public trust. The implementation of the patient safety program in hospitals has a significant impact on improving the quality of service and building public trust. This program has been able to significantly reduce the number of medical incidents, both mild and severe, and reduce the level of stress experienced by patients during treatment. When patients feel safer, their psychological condition becomes more stable, which also supports the healing process. In general, the patient safety program has been proven to be able to reduce the number of unwanted incidents and calm the psychological condition of patients through a preventive approach.

- PP2: “We can learn from this incident, be more careful, more caring, more concerned.”
- KR7: “Avoid incidents so that patients feel safe.”

In addition, public trust in hospitals increases along with the ability of health facilities to respond to incidents quickly and professionally. The quick response from health workers shows that patient safety is a top priority, not just an administrative obligation.

- PP1: “Patient safety is a priority, so that patients trust.”
- KR4: “A quick response is important so as not to reduce the trust of the patient’s family.”
- KR8: “Prompt reporting increases trust.”

Through the safety program, nurses become more careful, reflective, and responsible in every medical action, which improves the overall quality of service. The safety program strengthens a work culture that is disciplined and prevention-oriented. Patient safety becomes a core value in health care practice. Nurses and health teams begin to implement SOPs consistently, maintain discipline, and make patient safety part of their daily work values.

- PP1: "The more careful attitude emerged after the incident." Patient safety is a priority, it is the culture here."
- PP5: "We implement our SOP consistently."
- KR3: "The work environment is safer because we remind each other."

Post-incident discussions, joint cross-professional evaluations, and meetings facilitated by the quality team strengthen team communication and increase collective awareness of patient safety risks. In this way, the safety program is not just a procedural activity, but develops into a collaborative approach that unites various professions with one goal: to protect and ensure patient safety on an ongoing basis. Thus, patient safety has become part of the hospital's work system and culture that is oriented towards quality, professionalism, and public trust.

- PP6: "Usually there is an evaluation meeting after an incident."
- KR4: "After an incident, a quality facilitation meeting is usually held."
- KR6: "Quality of patient safety follow-up and joint evaluation."
- KR8: "If something happens, we discuss it with the team… We immediately report it within 1x24 hours, then the team comes down."

State the limitations associated with the study given the qualitative methodology used and the way in which the results are presented.

It is recommended to:

- Use summary tables showing frequencies by theme and subtheme.
- Integrate the theoretical framework into the interpretation of the findings.
- Report observational evidence to reinforce self-reported narratives.
- Establish an explicit link between the results and practical or institutional implications.

DISCUSSION

Effectiveness of Incident Reporting and Evaluation System in Improving Patient Safety in Hospitals

Based on the results of the study on theme 1, data was found that the incident reporting system in the hospital had been running according to procedure, namely reporting was done a maximum of 1x24 hours after the incident. The reporting process was carried out in stages from the implementing nurse to the head of the room, then forwarded to the quality department. Several participants even stated that reporting was done immediately after the incident, indicating a commitment to a rapid response.

This is in line with a study in Saudi Arabia which found that rapid and systematic incident reporting improves early detection of risk and accelerates preventive interventions.[26] In addition, real-time and tiered incident reporting improves data accuracy and strengthens the culture of safety in hospitals,[27,28] with practice reporting incidents recommended by various guide international and national, including reporting in 24 hours' time as indicator effectiveness system reporting.[29] This is also reported in the report national that reporting incident in 24 hours' time becomes indicator main effectiveness system home reporting Indonesian Ministry of Health and in general external to National Safety Committee Patient.[3,30]

World Health Organization[31] also emphasized importance strengthening system reporting and learning incident safety patient for reach objective zero patient harm. Not only that, WHO also developed Minimal Information Model (MIM PS) which regulates minimum data elements that must be collected in reporting incidents, including information patient, time and location incident, factor causes and mitigation, types incidents, outcomes, actions taken, as well as role reporter.

research results also show that the Safety Quality Unit Patient own role active in follow up report incident, start from coaching staff, analysis chronology incident, until collaboration with management. This is in line with Kumah et al.[32], that act systematic and collaborative follow - up strengthen effort repair sustainable and ensure that every incident become base learning for prevent incident similar in the future.

Jacobson et al.[33] explain that involvement of quality and management units House Sick in act carry on very important incident for ensure repair sustainable and prevent incident similar. Cross-unit collaboration and top management support strengthen the reporting culture and accelerate the implementation of improvements.[34,35] In addition, the importance of coaching staff and analysis root problem as part from act carry on incident.[36]

Involvement active all over component House sick, start from executor until management, to become factor key success system reporting incidents. A sustainable safety culture is formed if every incident is used as a shared

learning experience. A strong safety culture is formed from the active involvement of all staff and management in reporting and evaluating incidents.[37,38] In addition, openness, communication, and collaboration across units strengthen the reporting culture and improve patient safety.[39,40]

Research result This also obtained related data evaluation and learning incident. This is in line with study[32,41] that evaluation done through visit field, regular meetings, and reflection together. This process No only for look for cause, but also as means learning collective for staff become more thorough and caring. Evaluation results usually used for improving SOP and increase quality service in a way comprehensive.

WHO[31], stated that learning from incident is key main for prevent recurrence incident similar. Reflection and learning from incidents form the basis for developing new SOPs and improving service quality.[42] Direct evaluation processes and regular meetings have been shown to enhance institutional learning and strengthen safety culture.[43]

Every incident evaluated become base SOP improvement, enhancement quality services, and prevention incident repeated. This process is a continuous improvement cycle in hospital risk management. An effective incident reporting system has been shown to contribute to improving patient safety culture. The continuous improvement cycle based on incident reporting is the main foundation in hospital risk and quality management.[44] A hospital that is consistent apply reporting and evaluation incident tend own level more incidents low and get confession more Good from institution accreditation.[32,45]

WHO data shows that about 10 % of patients take care stay in developing countries experience incident safety, and 50 % in between can prevented with system good reporting.[46] Systematic incident reporting and evaluation has been shown to improve service quality and reduce the incidence of recurrent incidents.[46]

Proactive Nurse Strategies in Preventing Patient Safety Incident Risks

Based on the research results in table 4, it is stated that patient safety is the main focus in today's health care system. Nurses, as the spearhead of hospital services, play an important role in detecting and preventing various risks that can endanger patients, such as falls and complications due to infusion.

One form of such effort is the identification of patients at risk of falling, which is carried out by giving special labels to patients who have been identified as having a history or potential for falling at Ibnu Sina Hospital Makassar. This strategy not only makes it easier for health workers to identify at-risk patients, but is also in line with recent studies that emphasize the importance of a visual identification system as a communication tool to increase alertness and rapid response.[47,48] In fact, Shao et al.[49] showed that the use of special colored wristbands can reduce the incidence of falls by up to 30 % in inpatient rooms.

In addition to visual identification, another preventive measure that plays an important role is bed security, such as the use of handrails and locks. This effort has proven effective in preventing falls from bed, as shown by a study by Mourão Nicoli et al.[50] which stated that consistent implementation of safety measures contributed significantly to reducing the incidence of falls in hospitals. In addition, educational interventions for patients and families regarding the importance of bed security are also proactive steps that have proven effective.[51,52]

Not only risk falls, nurses also play a role in prevent complications others, such as resulting phlebitis installation infusion. Routine infusion checks are an important strategy for early detection of this complication. Research by Guanche-Sicilia et al.[53] confirm that inspection infusion every 4 hours capable lower number incidence of phlebitis up to 25 %. Findings This reinforced by a study which states that training periodic about management infusion can increase compliance nurse to protocol inspection.[54,55]

Related matter said, training periodic for nurse become very crucial for ensure knowledge and skills they still up to date in carry out procedure safety patients. Unfortunately, decreasing the frequency of training can be a challenge in maintaining the quality of care.

Hospitals that implement ongoing training programs show lower rates of patient safety incidents than hospitals that rarely hold training. Ongoing training improves nurses' knowledge and attitudes towards patient safety, which has a positive impact on the implementation of safety protocols and reducing human error as a cause of patient safety incidents.[56]

Training programs combined with audiovisual media such as video reminders have also been shown to accelerate the improvement of nurses' knowledge and attitudes in a sustainable manner, thereby improving the quality of hospital services and public trust.[57] In addition, ongoing training is an important part of developing the competence of health workers to manage risks and implement safety procedures effectively.[58,59]

With Thus, all of the above strategies — from identification risk, security physical, routine check-ups, to training periodic — is part from effort integrated preventive in practice daily nurses to support safety patient. This is reinforced by research Ricciardi et al.[60] who emphasized that integration protocol safety in channel Work daily nurse capable increase culture safety and lowering incident adverse events at home Sick.

The Role of Education in Increasing Patient Safety Awareness for Patients and Families

The results of the study in table 4 show that education by nurses is not only aimed at patients, but also

actively involves families in the use of assistive devices and prevention of fall risks. Family involvement in daily monitoring and understanding of safety protocols has been shown to build active participation and increase awareness of potential incidents.

This finding is in line with research by Heng et al.[61] and Hill et al.[62] which shows that structured education to patients and families in a way significant capable lower number incident fall at home sick. Intervention education, such as training use tool help as well as socialization protocol safety, proven increase compliance in apply steps prevention.

Involvement family in activity monitoring patients, especially in situations at risk tall like moment to bathroom, able reduce incident fall up to 30 %. This is show that targeted education family No only strengthen role they as partner nurses, but also in a real contribute to effort safety patient.[63,64] In this context, a risk-based education approach is also very relevant. As stated by Adjunct et al.[65] and Pakpahan et al.[66] that providing specific information related to the patient's condition and potential risks faced, including the use of fall risk labels and stickers as visual reminders, has been shown to be effective in increasing the awareness of all parties involved.

Nurses not only act as educators but are also responsible for following up and evaluating family understanding. In addition, nurses act as facilitators of effective communication and reinforcers of safety culture in hospitals. Safety incidents that occur can be used as learning materials, where post-incident education to patients and families is a reflective strategy to prevent similar incidents and increase the awareness of health workers.[2,67]

Multidisciplinary Collaboration as a Key Pillar in Patient Safety Programs

Multidisciplinary collaboration has been shown to be a key foundation in efforts to improve patient safety in hospitals. Based on research, this collaboration involves nurses, doctors, technicians, management, and patient families, who together create a safe and risk-responsive care environment.

Findings from Sankaran et al.[68] study support this, showing that the involvement of multiple disciplines in a patient safety team allows for more comprehensive problem identification and speeds up incident response. This collaboration also improves transparent communication and distribution of responsibilities, thereby contributing to a reduced risk of adverse incidents.

Wulandari[69] emphasized that interprofessional collaboration is very important to improve patient safety. Effective collaboration, good communication, and internal policy support have a significant impact on reducing patient safety incidents and improving service quality. The World Health Organization (WHO) also emphasized that 70,80 % of health care errors are related to a lack of communication and understanding within the team, so coordination and collaboration are crucial.

As a form of real implementation, the use of the multidisciplinary team huddles approach has been shown to increase accountability in problem identification, problem solving, and strengthening teamwork. Lin et al.[70] show that huddles allow identification and resolution issue in a way fast, improve communication, and speed up response to problem safety patient. Findings This reinforced by Alkhorem et al.[71] that approach multidisciplinary lower mortality, complications, length of stay stay, and numbers readmission, and increase satisfaction patients and use service support like physiotherapy and nutrition

In line with this, a quantitative study by Nur et al.[72] showed a significant relationship between interprofessional collaboration and patient safety (p-value 0,000; r=0,492). Therefore, it is recommended that hospitals continuously improve these collaborative practices to ensure overall patient safety.

In terms of regulation, these efforts are also supported by national policies. Minister of Health Regulation Number 11 of 2017 concerning Patient Safety requires the formation of a patient safety team tasked with reporting, verifying, investigating, and analyzing incidents without blaming individuals. This team is also responsible for providing recommendations and solutions to the leaders of health facilities. In this case, the involvement of all elements of the organization—including patients and families—is very important, as also stated in other regulations such as the Hospital Law.[73]

Furthermore, forms of cross-disciplinary collaboration such as the formation of Infection Prevention Committees (IPCs) and the implementation of daily huddles have significantly contributed to the reduction in nosocomial infections and increased compliance with hygiene protocols. In this context, Alkhorem et al.[71] noted a decrease in the incidence of MRSA infections by 25 % and a decrease in hospital infections by 20 % after the implementation of multidisciplinary collaboration.

However, although the benefits of collaboration have been significantly proven, the effectiveness of its implementation still faces several challenges. Among them are communication barriers, unclear roles between professionals, and limited resources. Therefore, strong leadership support, ongoing interdisciplinary training, and integration of technology such as Electronic Health Records (EHR) and infection control applications are important factors in strengthening the success of cross-disciplinary collaboration in supporting patient safety.[71]

Operational Challenges in Implementing Patient Safety Programs in Hospitals

Based on the results in table 4, it is stated that one of the operational challenges in the patient safety program in hospitals is the limited medical personnel. These limitations include the number and competence of human resources, as well as the suboptimal performance of patient safety techniques.[74,75]

This matter in line with findings Aritonang[76] which shows that limitations power medical trained and adequate facilities are also obstacle main in the health center, where there is many power health Not yet get training emergency, so that SOP implementation not yet running optimally. The lack of equipment and medical personnel has an impact on delays in handling emergency cases.

Lack of understanding of patient safety SOPs by healthcare workers is also one of the most significant barriers, especially in low- and middle-income countries. Healthcare workers often do not understand the basic concepts and consistent use of safety checklists, which is exacerbated by minimal training, socialization, and high workloads.[77]

Other obstacles encountered in implementation of safety programs patient is weakness coordination between team medical and also between facility health, especially in the referral and handling process patient emergency emergency. Poor coordination causes delays in handling, so strengthening of internal and external communication systems is needed.[76,77]

Meanwhile, electronic patient safety incident reporting systems have shown potential for increased efficiency and transparency. However, their success is still constrained by a lack of adequate management support and training.[78,79]

Institutional support and ongoing training are key to creating a work environment that supports incident reporting. On the other hand, the manual recording system still used in many primary health facilities hinders the collection of accurate data for patient safety quality evaluation. The lack of interoperability of health information systems also makes it difficult to integrate and share electronic medical record data between facilities.[80]

High workload as well as priority other competing clinics participate led to a safety program patient not enough get attention. A study in Guatemala showed that staff health difficulty share focus between demands task daily and implementation of safety programs patients, exacerbated by low incentive as well as culture each other blame when happen error.[77] In addition, communication that is not effective between power health and between power health with patients also become reason main the occurrence incident No desired. In fact, patient involvement is very important in supporting safety, because they can provide direct input for system improvement.[80]

Impact Positive Safety Program Patient on Service Quality and Public Trust

Based on results research in table 4 states that the safety program patient has proven contribute in a way significant in increase quality service health and building trust community. The implementation of this program is effective in reducing the number of incidents and reducing stress levels in patients. In addition, this program also strengthens public trust in hospitals and encourages nursing staff to be more careful and attentive in providing services.

In line with this, the implementation of a comprehensive patient safety strategy has been proven to be able to reduce the number of unwanted events (adverse events) in hospitals. Systematic studies show that a strong patient safety culture is closely related to a decrease in medical incidents, so that patients avoid unnecessary injury or loss.[59] Furthermore, a safe and controlled hospital environment can significantly reduce patient stress and anxiety during treatment, because they feel more protected and trust the system in place.[81,82]

Consequently, high quality of service and consistent implementation of safety culture will increase patient and public trust in the hospital. Research shows that the quality of service provided by health workers, both doctors and nurses, has a direct impact on the level of patient trust and loyalty.[83] When patients experience safe, responsive, and professional service, they tend to be more trusting and willing to recommend the hospital to others. This is also recognized as an added value for hospitals to achieve national and international standards.[84]

Patient safety programs require health workers, especially nurses, to work more carefully and care about every action taken. Effective communication training, such as the SBAR (Situation, Background, Assessment, Recommendation) method, has been shown to improve nurses' attitudes, thoroughness, and concern in maintaining patient safety. An experimental study by Sembiring et al.[85] showed that SBAR training significantly improved nurses' attitudes, thoroughness, and concern in handling and reporting patient safety incidents.

Furthermore, a patient safety culture is the main foundation in creating a safe and quality work environment. Recent research confirms that hospitals with a strong safety culture are able to reduce incidents, improve performance, and encourage collaboration between staff. Leadership commitment, involvement of all staff, and an open incident reporting system are key in building this culture.

However, the reality on the ground shows that the implementation of patient safety culture still faces various challenges. Research Guspianto et al.[86] mention that in some House sick, such as Jambi Provincial

Hospital, obstacles main covering low commitment leadership, lack of training, as well as lack of awareness staff for report incidents. These findings indicate that safety culture has not been fully internalized in daily practice.

To overcome these obstacles, improving safety culture needs to be done through regular training for staff, strong management support, a non-punitive incident reporting system, solid teamwork, and the application of continuous learning principles. Research by Heriyati et al.[87] and Kesatria Pratama[88] support approach this, with show the effectiveness of these strategies in build awareness and increase practice safety patients. Management support and integration of safety culture with standard operating procedures are also determinants of successful implementation, as shown by Aeni et al.[89] in study at Indramayu Regional Hospital.

Besides that, role attitude and awareness collective from all over team health is very important for create safe environment for patients. Heriyati et al.[87] identify that commitment leadership, work the same team, communication effective, climate positive work, and culture without blame contribute significant to formation culture good safety. Change attitude staff can pushed through continuing education and training, communication open, and proactive leadership.[86]

So, effective communication between team health is very important success Handling incident No desired. Research use The Hospital Survey on Patient Safety Culture (HSOPSC) instrument emphasizes importance dimensions openness communication, feed come back about error, frequency reporting incidents, as well as handover and transition coordination between units.[90] By optimizing communication and collaboration across units, the patient safety system can be improved as a whole.

In general, the results of the data findings above include:

Table 8. Findings

Aspect Findings	Digital System	Digital Literacy of Nurses	Impact on Safety Patient
Reporting	e-IRS speeds up reporting & action carry on	Lack of training hampers electronic reporting	Fast & accurate incident handling when the system is optimal
Education	E-learning & digital media available limited	Nurses are not all accustomed to accessing or teaching	Digital education can reduce the risk of falls & increase awareness
Collaboration	EHR & dashboard supports team integration	Need for digital literacy & interprofessional training	Digital coordination speeds up intervention & reduces miscommunication

CONCLUSIONS

Nurses play a strategic role in patient safety through preventive measures, incident reporting, education, and cross-professional collaboration. The application of technology such as e-IRS and EHR accelerates reporting and coordination, but is still hampered by digital literacy, minimal training, and limited facilities. Management support and a collaborative work culture strengthen the patient safety system.

Strengthening the digital capacity of nurses needs to be done through regular training that is in accordance with clinical practice, as well as the integration of an electronic reporting system that is easily accessible and connected to daily services. Patient and family education must be facilitated digitally and interactively. Hospitals also need to establish interprofessional communication forums and ensure management support for logistics, training, and non-punitive policies to create a safe working environment and support a reporting culture.

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