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Research article

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Development of the LAPOR PAK System for Pre-Anesthesia and Patient Condition Information to Enhance Anesthesia Service Quality

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Abstract

Information technology systems play a crucial role in enhancing efficiency within nursing services, particularly in minimizing administrative tasks related to patient care. Anesthesia services hold a paramount position in hospital operations, focusing significantly on patient safety through the management of preoperative conditions. This study aims to develop a computer-based information technology system, named LAPOR PAK, for reporting preoperative patient conditions. The system is designed to improve anesthesia practices, thereby reducing adverse events and promoting patient safety. The research utilized the Research and Development (R&D) methodology, implementing the Systems Development Life Cycle (SDLC) to construct the LAPOR PAK system. The development process involved iterative testing and refinement to ensure functionality and usability. The outcome of the study is the LAPOR PAK system, which successfully facilitates the reporting of pre-anesthesia patient conditions. Testing revealed no data processing errors, with 20% of respondents rating the interface as good and 80% as very good. These findings underscore the system's effectiveness and utility in enhancing anesthesia services. The computer-based LAPOR PAK system represents a significant advancement in leveraging information technology to achieve patient safety goals in anesthesia. By streamlining preoperative reporting, the system not only minimizes adverse events but also supports routine monitoring and evaluation activities within healthcare settings.

INTRODUCTION

The information system is one of the attributes needed in hospital service administration activities.[1] Information technology systems in nursing management have a positive impact on the development and improvement of the quality of nursing services.[1] Reporting of the patient's pre-anesthesia condition helps carry out pre-anesthesia and sedation assessments. Pre-anesthesia assessment is an important procedure that aims to ensure the surgery to be performed.[4] This procedure is the doctor's responsibility, but in practice it involves a lot of nurses, especially in documentation. Surgery is a high-risk action, therefore everything needs to be prepared properly and carefully. Pre-anesthesia patient data is very decisive in

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the preparation of anesthesia, such as gender, age, weight, surgical diagnosis, co-morbidities, history of previous operations, respiratory status conditions, physical condition (physical, mental disorders), immunity, results of investigations, presence of intubation complications, fitness status (ASA), administration of prophylaxis, preparation of blood products, as well as conditions that must be met by the patient prior to anesthesia. Plans for surgical procedures and postoperative care are prepared based on assessment or preoperative patient data.[5]

The hospital's quality program is oriented towards patient safety. Kirlan's study 2022 reports peri-operative mortality due to surgery is estimated at 0.4-0.8% and the main complication rate is estimated to be around 3-17%, including complications of wrong procedures, wrong patient operations, problems with anesthetic equipment, equipment availability inadequate supplies, unexpected blood loss, equipment sterility is not met, and surgical items left in the patient's body.[6]

The preliminary study was conducted on 5 anesthesiologists at RSD K.R.M.T Wongsonegoro Semarang City using the interview method. Data obtained that the need for anesthesia services at the preparation stage requires more complete patient data. The data reported from the patient registry so far is only the patient's identity, medical diagnosis, surgery and the doctor in charge of surgery and anesthesia. Other data have not been included so that nurse anesthetists experience difficulties in preparing various anesthetic needs. Competent nurse anesthetists play a very important role in the pre-anesthesia preparation stage by preparing the anesthesia machine and its equipment, medicines and preparations in anticipating emergencies and minimizing complications that may occur. This pre-anesthesia preparation is of course very dependent on the condition of the pre-anesthesia patient. Pre-anesthesia patient data determines all equipment and medicines that must be prepared.

The information technology system which is designed as a system for reporting the condition of pre-anesthesia patients (LAPOR PAK) is expected to be able to overcome the obstacles that have been experienced by nurses in preparing anesthetic supplies. Reporting of pre-anesthesia patient data is carried out by the registrar, usually from the inpatient room, special unit, or from the anesthesia polyclinic. The users (surgical and anesthetic nurses) are expected to be able to manage the informed data so as to assist the implementation of the nurse's duties in preparing for anesthesia.

METHOD

This study uses a research and development approach, specifically Research and Development (R&D), which aims to generate new findings and test their effectiveness.[7] The information development method employed is the Systems Development Life Cycle (SDLC). SDLC is a comprehensive methodology used in developing information systems, comprising phases from planning, analysis, design, implementation, to system maintenance. Among the SDLC models, the waterfall method stands out for its systematic and sequential approach. Its stages include requirements gathering, design, implementation, verification, and maintenance. The waterfall method's advantage lies in ensuring high system quality due to its phased implementation, albeit at the cost of a longer development period and higher expenses. This method suits projects involving new system creation and large-scale software development.[8]

The variable studied here pertains to reporting the patient's pre-anesthesia condition. The study population consists of all nurse anesthesiologists utilizing LAPOR PAK data. Total sampling was employed to

select 20 nurse respondents. The research was conducted at the anesthesia unit of RSD K.R.M.T Wongsonegoro, Semarang City. The instrument used was a test questionnaire interface designed by researchers to evaluate and identify system errors arising from interface mistakes or invalid assumptions about the interface. Data collection involved distributing the interface test form to respondents, who filled it out as per instructions provided. Data processing utilized Excel, focusing on frequency distribution tables to analyze interface test results. Researchers ensured respondents' voluntary participation and maintained confidentiality of data and identities solely for research purposes. Throughout the study, all respondents received consistent information, communication channels, and opportunities to provide feedback or opinions.[9]

RESULTS

Information technology management systems have become an effective medium in daily activities, including in the provision of health services and particularly in nursing services.[1] The information technology system developed by researchers, known as LAPOR PAK, aims to enhance nurses' efficiency and improve the quality of patient care by minimizing Unexpected Events (KTD). This is achieved through reducing the time required for patient administration and other core activities, shifting from manual systems to computerized ones. Information technology systems in nursing also prioritize maintaining the security and confidentiality of patient data, facilitating the exchange of valuable information among healthcare professionals involved in patient care, and supporting the nursing process.

At RSD K.R.M.T Wongsonegoro, the applied SIMRS takes the form of the Medifirst application called Siwongso, which serves the needs of various units within the hospital. The researchers designed a reporting framework for pre-anesthesia conditions based on user requirements, which was subsequently integrated into Siwongso by the SIMRS team. An overview of the program design results can be seen in Figure 1 below:

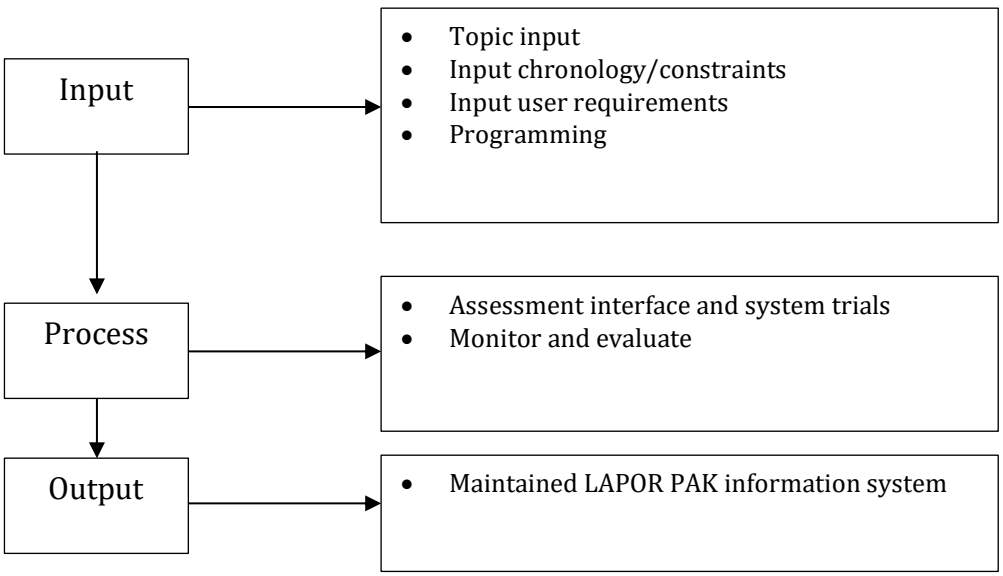

Figure 1
LAPOR PAK Information System Design

Figure 2
Pre-Anesthesia Patient Condition Reporting Plan (LAPOR PAK)

Pre-anesthesia patient data will be received by users, namely surgical and anesthetic nurses who can be accessed via Siwongso. The design of this program can be explained in Figure 3 below:

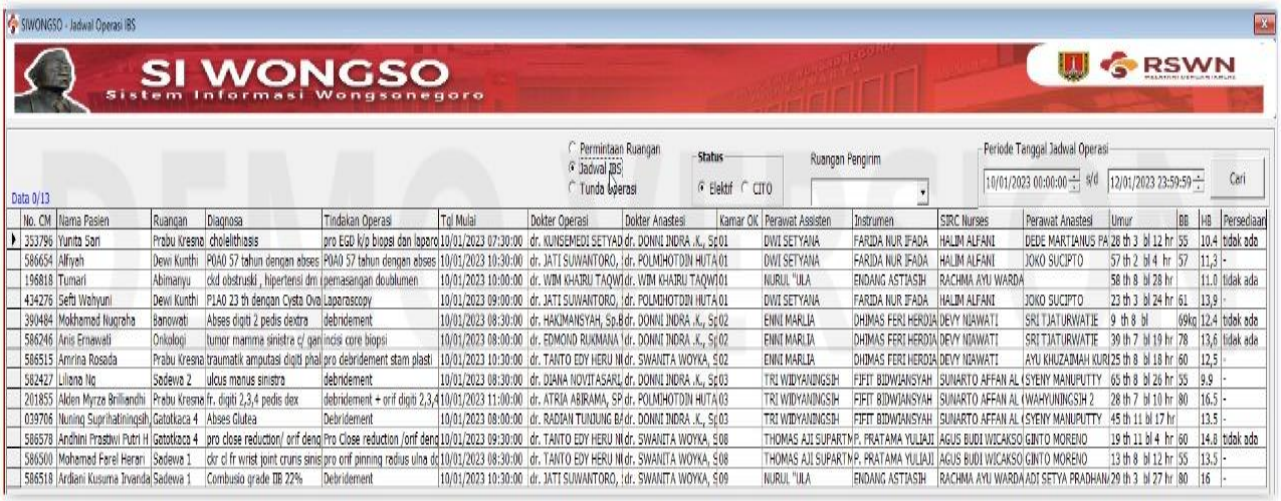

Figure 3
LAPOR PAK Data Received By Users

Test results from the form*interface* which was tested on 20 respondents (*user*) reported that 20% of respondents said the system was good, and 80% of respondents said it was very good. Test form*interface*to evaluate and detect programming errors that are distributed to be filled in by respondents can be seen as shown below:

score 5 : very good; score 4 : good; score 3 is enough
score 2 ; not enough; score 1: very less

NO	QUESTION	SCORE
	USABILITY ASPECTS	
1	Is the appearance of the application easy to recognize?	
2	Is the application easy to operate?	
3	Is the application menu as needed?	
	USER ASPECTS	
1	Is the application display easy to read and understand?	
2	Is the application menu as needed?	
3	Is the application easy to operate?	
	INTERACTION ASPECT	
1	Is it easy to access the information provided?	
2	Is the information provided as required?	

Figure 4
Interface Test Form LAPOR PAK

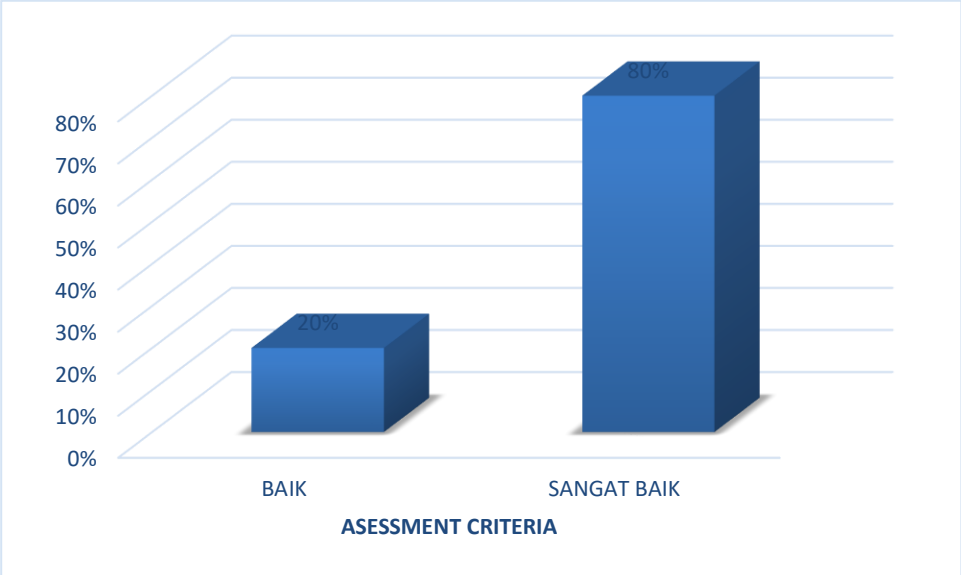

Figure 5
Graph of Test Asessment Result Interface LAPOR PAK

DISCUSSION

The use of Hospital Information Management System Technology needs to be increased to enhance the success of the Hospital Service Quality process through an integrated coordination network, reporting, and administrative procedures that provide accurate and precise information, crucial for decision-making.[1] The pre-anesthesia patient reporting system, LAPOR PAK, has proven effective and beneficial for all nurses working in surgical and anesthesia units. Previous research supports that computer-based documentation systems enable quick and comprehensive data collection. Liaw (1993) argues that stored data is not only more effective but also serves as a valuable resource for research, patient education continuity, disease epidemiology, and health service cost calculations. Computer-based management information systems

also support decision-making processes for nursing policy makers through Decision Support Systems and Executive Information Systems.[2] Machdalena's study (2022) affirms that the developed information system, SIPENJA, effectively enhances geriatric nursing services.[3]

The LAPOR PAK information technology system provides essential data for nurse anesthetists in preparing anesthesia supplies for patients. Equipment sizes, such as the anesthesia machine's breathing circuit, anesthetic cuffs, bagging breathing components, endotracheal tubes, Laryngeal Mask Airway (LMA), Oropharyngeal Airway (OPA), Nasopharyngeal Airway (NPA), and even head positioning pillows, are determined by the patient's age and weight. Drug dosages are also calculated based on patient specifics like age, weight, fitness status (ASA), allergies history, comorbidities, and contraindications. Effective pre-anesthesia patient preparation significantly contributes to the success of anesthesia and subsequent surgical procedures, prioritizing patient safety as the primary goal.

During interface testing, 80% of respondents (users) indicated that the LAPOR PAK information system was highly beneficial. This system allows immediate identification of patient data upon surgical registration, automatically integrating data into the Siwongso system accessible within surgery/anesthesia rooms. Recorded data serves multiple purposes, including generating monthly, quarterly, and annual reports. Data on patient visits categorized by age, gender, weight, ASA status, surgical cases, anesthesia types, and attending physician/anesthesiologist can be efficiently tracked. Nurses utilize this data to maintain daily logbooks, referencing patient medical records and surgical/anesthetic procedures from system summaries.

Challenges currently faced include limited accessibility of computer-based information systems, particularly among nurses lacking computer proficiency. Insufficient computer equipment and infrastructure further hinder system utilization. The hospital's existing information system, Siwongso, serves nearly all unit needs, necessitating high-capacity devices with substantial procurement and maintenance costs. Management concerns include meeting these infrastructure needs to ensure effective implementation of information systems.

CONCLUSION

Hospital Information Management System Technology, particularly LAPOR PAK, significantly enhances Hospital Service Quality through streamlined coordination, precise reporting, and efficient administrative procedures. This system supports nurses in surgical and anesthesia units by improving data collection efficiency and ensuring tailored patient preparations, crucial for anesthesia and surgical success. Research emphasizes the benefits of computer-based systems in enhancing patient care continuity, disease management, and cost-effectiveness. Challenges such as limited system accessibility and inadequate infrastructure remain, underscoring the need for enhanced support to fully leverage technological advancements in healthcare settings.

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hospital administration system, particularly within the anesthesia unit.

CONFLICTS OF INTEREST

The authors declare no conflict of interest regarding the publication of this research. The development and evaluation of the pre-anesthesia condition reporting information system (LAPOR PAK) were conducted solely for academic and healthcare improvement purposes, without any financial or personal relationships that could influence the objectivity of the study.

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