

# Analysis of the Implementation of Reporting Critical Laboratory Results and Its Impact on Quality Improvement and Service Benefits in the Inpatient Unit at Amanda Hospital in North Cikarang (A Case Study)

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| Keywords:                                                                          | Abstract                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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| Laboratory critical values; service quality; lean management; value stream mapping | Timely reporting of critical laboratory values is essential for patient safety, service quality, and clinical decision-making. However, Amanda Hospital in North Cikarang recorded 684 critical laboratory results in 2024, of which 79 were reported beyond the established 30-minute standard. This study aimed to evaluate the reporting of critical laboratory values, examine its implications for service quality, identify process waste, and develop an improved reporting model. A qualitative phenomenological design was employed. Data were collected through interviews with five informants, direct observation, and reviews of standard operating procedures, medical records, patient progress notes, and quality reports. Three experts participated in validating the proposed model. Data were analyzed thematically using NVivo 12 Plus, while lean management principles and the DMAIC framework were applied to evaluate process efficiency. The findings revealed inconsistent compliance resulting from reporting delays, incomplete documentation, difficulties in contacting attending physicians, high service workloads, and nonstandardized communication practices. Lean analysis streamlined the laboratory examination process from 12 to 9 stages, reduced the critical-value reporting process from 5 to 4 stages, and shortened the mean examination time from 21.2 to 17.35 minutes. The proposed model incorporated automated notifications, structured documentation, clearly defined responsibilities, and systematic evaluation. In conclusion, integrated communication systems and lean process redesign can improve reporting timeliness, service quality, operational efficiency, and patient safety. |

## INTRODUCTION

A hospital is a healthcare institution that provides comprehensive individual health services, including inpatient, outpatient, and emergency care (KMK Number HK.01.07/Menkes/1596 of 2024). Every healthcare activity provided by health professionals to patients aims to improve and maintain health, prevent and treat disease, and restore health. The healthcare services provided are patient-centered, tailored to patients' needs, and take into account the hospital's capacity to deliver appropriate services. Hospitals are required to provide healthcare services in accordance with hospital service standards through standard operating procedures that provide clear and appropriate guidance, based on mutual agreement, for carrying out healthcare activities and functions in accordance with professional standards (Care., 2021).

Article 1 paragraph (1) of Minister of Health Regulation Number 11 of 2017 defines patient safety as a system for making patient care safer, consisting of risk assessment, risk identification and management, incident reporting and analysis, learning from incidents and their follow-up, and the implementation of solutions to minimize and prevent risks. In addition,

one of the standards and goals of patient safety in healthcare facilities is to improve effective communication. The same principle is stated in KMK No. HK.01.07/Menkes/1596 of 2024 concerning Hospital Accreditation Standards (Basarah JC Tahjoo A., 2022). Under Patient Safety Goal (Sasaran Keselamatan Pasien [SKP]) 2, hospitals are required to implement processes that improve the effectiveness of communication (Basaran N Yıldırım S., 2019), whether verbal and/or by telephone, in reporting critical-value results, including communication during handovers. The purpose of SKP 2 is to ensure effective communication that is timely (Clavijo A Coule P Singh G., 2020), accurate, complete, clear, and understood by the recipient, thereby reducing the potential for errors. Furthermore, Article 3 paragraph (4) of Permenkes No. 30 of 2022 states that, among the 13 national hospital quality indicators, one is the reporting of critical laboratory results, with a standard reporting time of less than 30 minutes (Pathologists., 2019).

Critical laboratory values are laboratory test results that indicate abnormal pathophysiological conditions and may be life-threatening if immediate action is not taken (Lunberg, 1972). According to Tate & Gardner (1993), critical-value reporting is an essential function of hospital laboratories because successful reporting depends on laboratory personnel identifying critical values and communicating them effectively to physicians, who can then interpret the results and provide appropriate patient care.

Data on critical-value reporting from several hospitals in Indonesia indicate varying levels of timeliness. A delay rate of 4.7% was reported at Bireun Hospital in 2019 and was attributed to an inadequate understanding of the correct interpretation of critical laboratory examination results (Sumadi et al., 2022). At Mayjend HM Ryacudu Hospital, the reporting of critical laboratory results was considered satisfactory, with an average reporting time of 14.6 minutes and a response time by the Dokter Penanggung Jawab Pelayanan (DPJP; attending physician) of less than 15 minutes, with an average response time of 5 minutes (Hidayat et al., 2024). Hospital accreditation has also been associated with improved timeliness in critical laboratory result reporting. At Hospital X in 2019, timely reporting increased from 84.34% before accreditation to 98.48% after accreditation (al., 2021). In addition, innovation through an electronic critical-value reporting system produced positive results at Prof. Dr. Margono Soekarjo Hospital, Purwokerto, in 2022, with compliance increasing from 72% to 88% and reaching 100% at the year-end evaluation, with reporting completed within 30 minutes (Utami, 2024)

Outside Indonesia, data from January 2015 to June 2019 at Beijing Tsinghua Changgung Hospital identified 38,020 (0.49%) critical-value results among a total of 7,706,962 laboratory examination results, with inpatients accounting for 24,050 (63%) of all critical values (Li et al., 2019). According to Thota & Bitla (2023), 1,963 (0.5%) critical results were identified among 390,000 examination results over a 6-month period from December 2021 to May 2022 at the Department of Biochemistry, Sri Venkateswara Institute of Medical Sciences, with 86.8% of critical results successfully reported within 1 hour. At the Department of Clinical Pathology, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, 253,537 laboratory test results were recorded from October 2018 to May 2020, including 2,722 (1.1%) critical results, with strict monitoring requiring glucose and potassium critical results to be reported within 30 minutes (Wongkrajang P Nuanin S & Laiwejpithaya S., 2025).

Quality refers to fitness for use, meaning that a product or service should conform to the

needs of its users (De Feo & Barnard, 2004). The dimensions of healthcare quality in Indonesia refer to those established by the World Health Organization and other international institutions and include effectiveness (Gosselin RC Dorgalaleh A Favalaro EJ Lippi G Pego JM Regan I Siguret V., 2020), safety, people-centeredness, timeliness, efficiency, equity, and integration. Quality plays an important role in healthcare and serves as a framework for evaluating the various elements of healthcare delivery and the interactions among them (Donabedian, 1988) Quality indicators are benchmarks used to assess the achievement of healthcare quality targets (Hilmy Putranto R. D. Mahadewi E. P. Setiawan I. & Shameela A., 2026). According to (Kuan K, 2024), timely reporting of critical results is used as one of the quality indicators related to national patient safety goals.

The benefits of healthcare services refer to the appropriate use of services to meet the health needs of individuals and communities. Healthcare services include promotive, preventive, curative, rehabilitative, and palliative activities ((Hilmy Putranto R. D. Mahadewi E. P. Setiawan I. & Shameela A., 2026). In the context of this study, the benefits of reporting critical laboratory values are associated with the timely communication of examination results that may pose an immediate threat to patient safety, enabling healthcare professionals to take appropriate action promptly. Critical results are findings outside the expected range that indicate a high-risk or potentially life-threatening condition requiring immediate medical attention (KMK No. HK.01.07/Menkes/1596 of 2024). Therefore, critical-value reporting is an important component of patient safety because delays in communicating such information may hinder clinical decision-making and increase the risk of complications (Amanda et al., 2021; Hilmy Christin & Nofiarni., 2026; Hilmy Putranto R. D. Mahadewi E. P. Setiawan I. & Shameela A., 2026; Hilmy Shameela A. & Mahadewi E. P., 2026; Hilmy Simanjuntak I. R. & Wahid K. R., 2026).

Critical-value reporting is a mechanism for communicating laboratory results that may indicate a potentially life-threatening condition to responsible healthcare providers (Wagar et al., 2007). Successful reporting depends on laboratory personnel's ability to identify critical results and communicate them effectively to clinicians so that appropriate clinical action can be taken (Tate & Gardner, 1993). At Amanda Hospital in North Cikarang, the reporting process refers to Director's Policy Number 335/PER/DIR/RS AMANDA/VIII/2025 and the Standar Prosedur Operasional (SPO) for Reporting Critical Laboratory Results Number/SPO/029. The procedure includes patient identification, examination and verification of critical results, documentation, communication of the results to nurses or physicians, documentation in the electronic medical record through the Catatan Perkembangan Pasien Terintegrasi (CPPT) using the SOAP method, and communication of the information to the DPJP within 30 minutes.

Based on the 2024 report of the Laboratory Unit at Amanda Hospital in North Cikarang, 684 critical-value results were recorded, of which 605 were reported within 30 minutes and 79 were reported after more than 30 minutes. Delays were associated with incomplete documentation, failure to forward results to the DPJP, reporting by telephone or WhatsApp without adequate documentation, and delayed communication of results. During the same year, the 100% quality target was not achieved in seven months. Time analysis showed that the interval from initial reporting until the results were received and responded to by the DPJP ranged from 38 to 169 minutes. This condition may contribute to delays in therapy, deterioration of the patient's condition, prolonged hospitalization, and increased healthcare

costs. Therefore, this study focuses on the processes of examining and reporting critical laboratory values, their implications for service quality and benefits, the barriers encountered during implementation, the application of lean management to identify process waste, and the development of a more effective and efficient reporting model and standard operating procedure (Alzahrani, 2021).

## **METHOD**

This study employed a qualitative approach with a phenomenological design to obtain an in-depth understanding of the implementation of critical laboratory value reporting at Amanda Hospital in North Cikarang. The study explored the reporting process, identified problems and barriers, examined their implications for service quality and benefits, and assessed waste in the examination and reporting processes using a lean management approach. The findings were subsequently used as the basis for developing a more effective reporting model or standard operating procedure (SOP) aligned with applicable standards and actual conditions in the hospital.

The study involved five primary informants, consisting of four medical or healthcare personnel and one hospital management representative, as well as three experts with experience and expertise in critical laboratory value reporting. Data were collected through in-depth interviews, direct observation, and document review. The reviewed documents included integrated patient progress notes (CPPT), electronic medical records, quality reports, and SOPs for critical laboratory value reporting. Qualitative data were analyzed using NVivo 12 Plus to identify relevant codes, themes, and patterns. The study was conducted at Amanda Hospital in North Cikarang, Bekasi Regency, West Java, from January 2025 to April 2026.

### **Research Data and Sources**

The research was conducted on the inpatient installation of Amanda Cikarang Utara Hospital, including inpatient children, adults, infants, ICU, PICU, NICU, and obstetrics who use laboratory examination services and apply critical value report reporting. The research data consisted of primary data and secondary data used to obtain a comprehensive picture of the implementation of laboratory critical value reporting.

1. **Primary Data:** Primary data was obtained through in-depth interviews with doctors/DPJPs, nurses, laboratory analysts, and Heads of Medical Services involved in reporting laboratory critical value results. Informants were selected by purposive sampling based on experience, direct involvement, and willingness to provide information.
2. **Secondary Data:** Secondary data is obtained through the study of hospital documents, such as SOPs, laboratory service guidelines, medical records, CPPT, critical value reporting reports, and quality reports. This data is used to reinforce the results of interviews and observations and to see the fit between procedures and implementation in the field.

### **Data Collection Techniques and Procedures**

#### **1. Observations**

Observations were made directly on the process of reporting laboratory critical value results in inpatient installations. Observations are carried out starting from the results of the exit examination until the results are submitted to the officer who requests the examination and forwarded to the DPJP. The researcher observed communication patterns, media used, reporting time, documentation, and obstacles that occurred during the reporting process.

Observation is carried out in stages through the description stage to obtain an overview, the reduction stage to focus observations on the critical value reporting process, and the selection stage to identify more specific patterns, relationships, and categories.

## 2. Interview

The interview was conducted to obtain information about experiences, perceptions, obstacles, and input from medical personnel, health workers, and hospital management related to the implementation of laboratory critical value reporting. The interview uses a semi-structured approach with a pre-prepared question guideline, but the researcher can still develop the questions according to the informant's answers to obtain more in-depth information. Interviews are conducted in person or online according to conditions and recorded with the consent of the informant, then transcribed for analysis.

## 3. Document Review

Document analysis was carried out to obtain secondary data and strengthen the results of interviews and observations. The documents examined included SOPs for communication and reporting, patient medical records, laboratory internal quality reports, and documentation evidence for reporting critical value results. Document review is used to determine the compatibility between the established procedures and the implementation of reporting in the field.

### **Data Analysis Procedure**

Data analysis was carried out using a descriptive qualitative approach with thematic analysis. The first stage is carried out by preparing data through collection, transcription, organization, and anonymization of data from interviews, observations, and document reviews. Next, *\*coding\** is carried out by providing code on data that is relevant to the focus of the research. The codes that have similarities are then grouped into themes and subthemes.

The themes that have been formed are further reviewed to ensure their compatibility with the overall research data. After the theme is considered appropriate, the naming and definition of the theme are clearly carried out. The final stage is carried out by compiling a report on the results of the research through the presentation of themes, subthemes, informant quotes, and interpretations associated with theories and previous research. The data analysis process is assisted using NVivo 12 Plus.

## **RESULTS AND DISCUSSION**

### **SUBFOCUS 1**

#### 1. Research Findings

"The examination process carried out by analysts starts from receiving orders and taking samples in the room, examining them in the lab, entering data into the system, to reporting quickly (to the room and specialist doctors) if critical examination results are found".

#### 2. Discussion

According to WHO (2011) in the Laboratory Quality Standards and Their Implementation for Managing Laboratory Specimens, the laboratory inspection process consists of three stages. Lieseke & Zeibig (2012) also mentioned that there are three phases in sample examination in the laboratory. Different from the previous one, (Lundberg, 2023) stated that there are 11 steps carried out in the implementation of laboratory tests or known as brain to brain loop. Of all the theories that exist, every process that is carried out is very important,

if there is an error/deficiency in one of the processes alone, it will have an impact on the results of the examination and something unexpected happens. The causes of errors during the laboratory examination process, according to (Schmidt et al., 2019) are mostly found in the pre-analytical phase of 46-68% such as improper examination requests, patient/sample identification errors, hemolysis, insufficient sample volume, samples taken from incorrect access, and improper sample storage.

## **SUBFOCUS 2**

### **1. Research Findings**

"The critical value reporting procedure is carried out with great care. The laboratory does not directly issue numbers, but conducts a retest (duplo) first, then consults with a SpPK doctor, then matches the patient's clinical symptoms through a nurse. After the results were confirmed to be accurate, the nurse immediately called the doctor in charge (DPJP) to get instructions on patient handling".

### **2. Discussion**

Current reporting procedures are still ineffective and compliant with standards. Although the procedure has not fully met the standards, it has run like the existing procedure. The role of socialization about reporting procedures must continue to be carried out, because it is still found that the implementation of reporting has not been standardized comprehensively. This is reinforced by the findings that nurses forgot to do documentation, were not all exposed to the definition and list of critical and abnormal values, did not report to the DPJP, reporting was done >30 minutes, the reporting media varied from direct phones & applications, and the response of the old DPJP. According to WHO (2014), if critical laboratory results are obtained, in certain examinations can be consulted with the doctor in charge of the laboratory. And if the results are critical, they can be reported directly to the applicant before the final results are sent. The WHO's statement is in accordance with the reporting procedures that have been carried out so far. Utami (2018) stated that the lack of socialization and poor knowledge of officers are obstacles in the implementation of reporting critical value results. Lundberg (1969) argued that due to the officer's ignorance of the critical value and the delay in reporting the results, it was fatal for the patient. According to Rodríguez et.al. (2019) In the implementation of reporting laboratory critical value results, it can affect clinical decision-making or corrective actions observed in the patient's medical records from the emergency room such as initiation or change of treatment therapy in 51 cases, consultations between doctors in 6 cases, re-sample examination, and transfer of patients from outpatient to emergency unit in 17 cases. Therefore, many guidelines are made by health institutions or institutions from WHO, CAP, JCI, ICSH and others with themes that can complement each other, in an effort to prevent morbidity or mortality of patients to critical outcomes.

## **SUBFOCUS 3**

### **1. Research Findings**

"The implementation of critical value reporting at Amanda Hospital has gone well with a combination of direct telephone and electronic medical records. When reporting to the DPJP, the nurse not only provides critical figures from the lab, but also information about the patient's physical condition and medical history so that the doctor can provide proper treatment instructions."

## 2. Discussion

Lundberg (1990) stated that there is a need for good communication in conveying information on the results of examinations carried out by laboratory officers to avoid failures in communicating both to patients and health workers. The results of the research found that the reporting of critical value results was reported directly by telephone from the laboratory officer to the nurse, then continued from the nurse to the DPJP to get direct instructions. Reporting documentation is in the form of SOAP but it is still found that nurses forget to do SOAP, and reporting is not verified. In Article 1 paragraph (1) of Permenkes Number 11 of 2017, part of the standards and goals of patient safety in health care facilities is to improve effective communication. JCI Edition 8 (2024) IPSG 02.00 if the critical value reporting process implements effective communication that emphasizes that reporting must be delivered quickly, accurately, completely, and documented. ACSQHC (2021) emphasizes effective communication in the delivery of critical value outcome information aimed at safety in patient care and information recording. According to CAP (2019), it is necessary to re-read the results carried out over the phone and record. Li et.al. (2020) The application of a close-loop laboratory system combined with HIS, short messages (SMS), and phone calls is an effective intervention to increase critical value reporting notifications compared to just phone and read-back. Sweaters et.al. (2024) Although the communication method for reporting critical value results is still preferred via direct telephone, reporting with digital media is another alternative that can improve the critical result reporting process such as secure messaging applications, computerized notification systems, electronic ALERTS systems, text messaging systems, and secure texting applications. (Astinawati LB Ruswanti E., 2019) EFFECTIVE COMMUNICATION THAT FOCUSES ON REPORTING LABORATORY CRITICAL VALUES HAS NO EFFECT ON HOSPITAL SERVICE QUALITY AND PATIENT SAFETY. Meanwhile, Hidayat et.al. (2024) The reporting method is still carried out manually with a mobile phone or officers delivering the results directly to the room.

### **SUBFOCUS 4**

#### 1. Quality Influence

##### a. Research Findings

"Critical value reporting is very crucial for hospital and national quality indicators. The biggest problem at the moment that makes the quality target not achieved is not because the officer does not report, but the factor of negligence in documentation (forgetting to fill out the SOAP) since the hospital switched to using electronic medical records".

##### b. Discussion

The timeliness of reporting (less than 30 minutes) in reporting laboratory critical value results is one of the national quality indicators of hospitals with a target of 100% in accordance with the Minister of Health Regulation No. 30 of 2022 Article 3 Paragraph (4). Kuan & Forest (2024) timely reporting of critical results is used as one of the quality indicators for the national patient safety goal. Field findings show that delays in reporting critical value results have a direct impact on the decline in quality indicators. This is reflected in the 2024 quality report as many as seven cases of reporting not reaching the 100% target, namely in February-July and November. Meanwhile, the quality report on reporting critical values in 2025 found a decrease from the previous year which did not reach the target of 3 cases, namely October-December. WHO (2018) explained that the quality of reporting critical value results can be carried out

effectively, safely, and on time. Febrianto et.al. (2021) mentioned that one of the ways in an effort to improve the quality of critical value reporting is the important role of hospital re-accreditation. 84.34% of the percentage of punctuality in reporting critical value results before accreditation was obtained, to 94.43% after accreditation. Piva & Plebani (2009) reporting of critical value results is an important phase in the laboratory examination process and reporting results exceeding the deadline indicates the ineffectiveness of the process. Li et. AL (2020) One of the strategies in an effort to improve effective quality in reporting critical value results is to create new quality indicators, such as reporting ratio, reporting timeliness ratio, acceptance ratio, report acceptance timeliness ratio, and doctor response ratio. Meanwhile, another study by Astinawati et. Al (2019) 9.6% of critical value data reported late, has no effect on the quality of service in hospitals because it is still considered good.

## 2. Effect of Benefits

### a. Research Findings

"All informants agreed that rapid reporting of laboratory critical values provides enormous service benefits, especially in terms of speed of medical treatment (fast response) and safety assurance for patients and medical personnel."

### b. Discussion

The basis for the reporting of laboratory critical value results is based on patient safety, advanced management of patients who require immediate clinical decisions to prevent complications resulting from such delays. The findings of the informant stated that if it is late, it will prolong the LOS, complications for the patient, and delay in the administration of therapy. The emergence of the critical value theory by Lundberg (1969) began with the officer's ignorance of the critical results obtained and delays in handling that caused the patient to die. Hjort (1978) stated that accuracy in treatment, medical procedures, diagnosis, and treatment can prevent and ease the burden of both cost and duration of treatment. The et.al base. (2019) Reporting of laboratory critical value results provides benefits for diagnosis enforcement by 71.0%, therapy administration by 83.0%, and accelerates the effect of treatment therapy by 76.0%. Therefore, inaccurate reporting can have a negative impact on patients on their morbidity or mortality rates.

## **SUBFOCUS 5**

### 1. Research Findings

"Overall, the reporting system has been running well. However, the main obstacles that still often occur are mainly communication factors with doctors (DPJP), negligence due to hectic work situations, and documentation problems."

### 2. Discussion

Hawkins (2011) mentioned several causes of delay in reporting laboratory results including critical results in the post-analytical phase, namely misinterpretation of results, inappropriate follow-up plans, failure in consultation, data validation errors, improper data input, and long turnaround times. In this study, it was found that the causes of late reporting of critical values were forgetting to report because conditions were crowded, there was no reporting to the DPJP, and reporting was carried out via whatsapp. Similar findings were also found in a study by Sumaidi et.al. (2022) 4.7% of delays occurred because reporting was not done by officers to the DPJP because nurses and laboratory officers did not understand the definition of critical values correctly. Marsetyo et.al. (2023) FACTORS THAT CAUSE

LABORATORY CRITICAL VALUE REPORTING TARGETS TO NOT BE ACHIEVED, NAMELY MOTIVATION, LEARNING, LEADERSHIP, AND WORK DESIGN. Practical et.al. (2024) several obstacles faced in reporting critical value results such as the response to reporting critical value results by the treatment room, the reporting method written in the CPPT in the form of SBAR methods, read back, and telephone methods. Jafari et.al. (2021) REPETITION OF CRITICAL LABORATORY RESULTS WITHOUT INFORMING THE RESULTS OF THE INITIAL CRITICAL VALUE IS ONE OF THE DELAYS IN REPORTING. In addition, Mostafa et.al. (2022) mentions three obstacles in reporting, namely nurses' perceptions of errors, fears, and obstacles related to the reporting system that delay the reporting process.

## **SUBFOCUS 6**

### **1. Research Findings**

- a. Define: "Although the examination flow at Amanda Hospital is already running according to the rules, the process is still inefficient due to too much manual recording and typing activities, especially after the lab results come out (post analytics stage). In addition, the absence of automated facilities such as pneumatic tubes and LISs, makes officers waste their time on foot to take samples. Hospitals need digitization and system integration so that the results from the machine can be directly entered into electronic medical records without the need to be copied manually."
- b. Measure: "The current flow of laboratory examinations at Amanda Hospital is still inefficient because it is burdened by repetitive manual administration processes, limited automated sample transportation facilities, and long critical value report flows".
- c. Analyse: "To make the laboratory process faster and more effective, hospitals need to make improvements such as the integration of computer systems so that the examination results go directly to the ERM complete with critical value notifications, and the procurement of automatic introductory facilities/pneumatic tubes, so that analysts no longer need to deliver directly to the room and are free from manual writing routines".
- d. Improve: "The improvement plan in this improve phase focuses on the process of digitizing the total integration of computers and automatic barcodes), the transfer of analyst tasks to runner/pneumatic tubes, and the rearrangement of the lab workspace. The combination of these solutions will make the examination flow much faster, more efficient, and safer from the risk of patient data input errors."
- e. Control: "In order for the improvement of laboratory flow and critical value reporting to be successful in the long term, the main recommendation lies in thorough socialization to minimize staff rejection, manual/backup preparedness of procedures in the event of a technological system disruption, and transparent two-way communication between leaders and staff".

### **2. Discussion**

Identification of waste against laboratory inspection flows provides efficient time savings and eliminates unnecessary or repetitive activities. The findings of the laboratory examination process were simplified from 12 stages to 9 stages with the discovery of waste starting from the pre-analytical, analytical, and post-analytical stages. In addition, the simplification of critical value reporting from 5 stages to 4 stages. The average time of examination of 20

samples from 5 different examinations was 21.2 minutes to 17.35 minutes. This result is supported by research by Ardanti & Widjaja (2025) the lean concept has been proven to be effective with waste of 71.43% to 7.6%, lead time of 23 minutes, and process time of 11.6 minutes in AGD examination in the ICU. In addition, Alifa et.al. (2025) mentions simplifying the critical value reporting system through LIS with the lean management method, shortening 7 steps to 4 steps, and cutting the time from 110 minutes to 42 minutes. Jha et.al. (2022) The application of tools in improving the quality of reporting critical value results with the define, measure, analyze, improve, control (DMAIC) method can reduce the completion time (TAT) of the audit by 30% (Grabau, 2018). The waste found in this study is in the form of extra processing with recording activities that are carried out repeatedly, both written and electronic. In addition, waiting is one of the wastes that makes reporting critical values long because you have to wait to verify with the doctor in charge.

## SUBFOCUS 7

### 1. Research Findings

"The current critical value reporting system is running well and digitally integrated. Officer discipline is the main key to maintaining a fast and appropriate communication process for patient safety. The critical value reporting model development plan focuses on making it easier for staff to work through a computer system with checklist and automatic notification features, tightening reporting oversight (quarterly to monthly/daily), and ensuring communication between professions can run even better."

### 2. Discussion

The procedures for reporting critical value results still need to be refined to be more in line with various guidelines, such as WHO (2014), JCI Edition 8 (2024), ISO 15189 (2022), and Hospital Accreditation Standards (2024). The guidelines emphasize the importance of reporting deadlines, documentation, effective communication, responsible parties, and alternative procedures if the doctor or recipient of the results cannot be contacted. Singh and Vij (2010) also explain the need for a multi-level communication flow starting from the applicant's doctor, DPJP, nurse, to other responsible parties if the main recipient is difficult to contact. Based on the findings of the study, the existing procedures have not fully explained the parties responsible for reporting and receiving critical results, the steps taken if the applicant cannot be contacted, as well as the definition and list of critical and abnormal values. Several studies also show that the implementation of critical value reporting is still influenced by policy limitations, the absence of clear deadlines, as well as factors of knowledge, attitudes, perceptions, and motivation of officers. Therefore, the development of SOPs is needed so that the reporting process is clearer, faster, integrated, and can support patient safety.

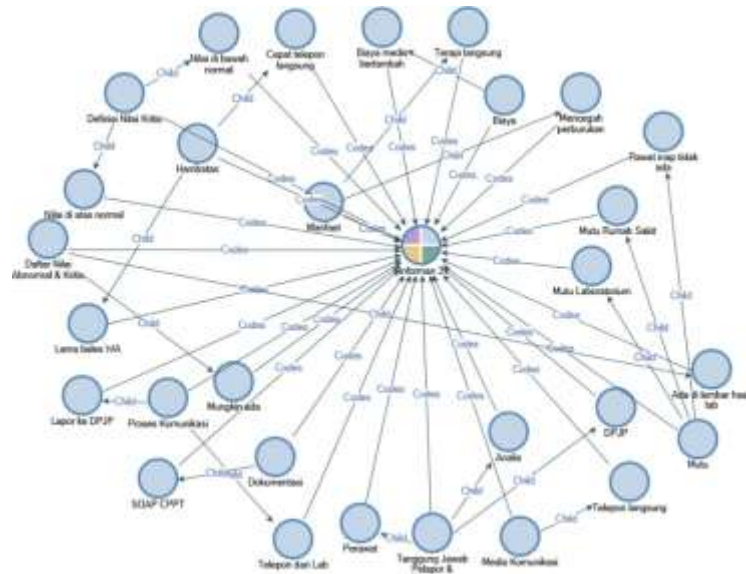
**Table 1 Comparison of Procedures for Reporting Critical Value Results of Old and New Model Laboratories**

| Aspects                                           | Old Models   | New Models                                                |
|---------------------------------------------------|--------------|-----------------------------------------------------------|
| Definition & list of critical and abnormal values | None         | Attach definitions, lists of critical and abnormal values |
| Communication process                             | Direct phone | Direct phone                                              |
| Reporting media                                   | Phone        | Automatic notifications, phone                            |
| Reporting documentation                           | SOAP         | SOAP ERM, TBaK, SBAR, read back                           |





c. Informant 3

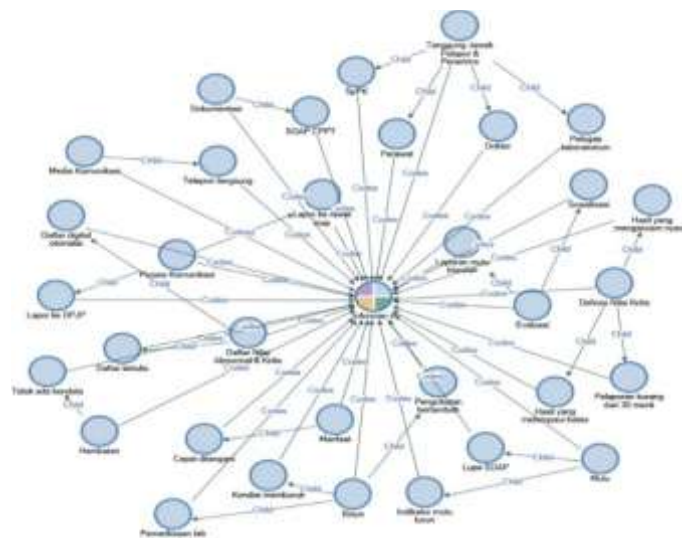


### Figure 3. Critical Value Reporting Analysis on Informant 3

## Interpretation

In the figure above, it is explained that informant 3 explains that the definition of critical value is a value that is below or above normal. A list of abnormal and critical values may be available in the laboratory, but can also be viewed when the lab results are complete. Inappropriate critical value reporting procedures will have an impact on the quality aspect because it is included in hospital quality and laboratory quality, and the benefit aspect can be direct therapeutic instructions to prevent worsening. The obstacles faced if the reporting via WA is answered, the faster it is to call directly. The reporting process was carried out after the analyst found critical results and then called the nurse directly, then the nurse immediately informed the DPJP. The preferred reporting media is by direct phone and documented in the form of SOAP at CPPT. Responsibilities for receiving and reporting critical values include nurses, analysts, and DPJPs.

d. Informant 4



### Figure 4 Critical Value Reporting Analysis on Informant 4

## Interpretation

In the image above, it is explained that informant 4 mentions that the definition of critical value is laboratory results that exceed the limit, which can be life-threatening, which are reported in less than 30 minutes. For a list of abnormal and critical values available in the laboratory, both in writing and digitally automatically upon input of results. An inappropriate critical value reporting procedure will have an impact on the quality aspect to decrease, one of which is forgetting SOAP, from the aspect of patient benefits being handled faster. There are no significant obstacles faced at the moment. The reporting process is carried out after the analyst finds critical results and inputs to HMS, then calls directly to the nurse, then the nurse immediately informs the DPJP. The reporting media is faster with direct calls and is documented in the form of SOAP at CPPT. Responsibilities in receiving and reporting critical values include analysts, SpPK, nurses, and DPJP. Evaluation and socialization are carried out during the quality report every 3 months.

e. Informant 5

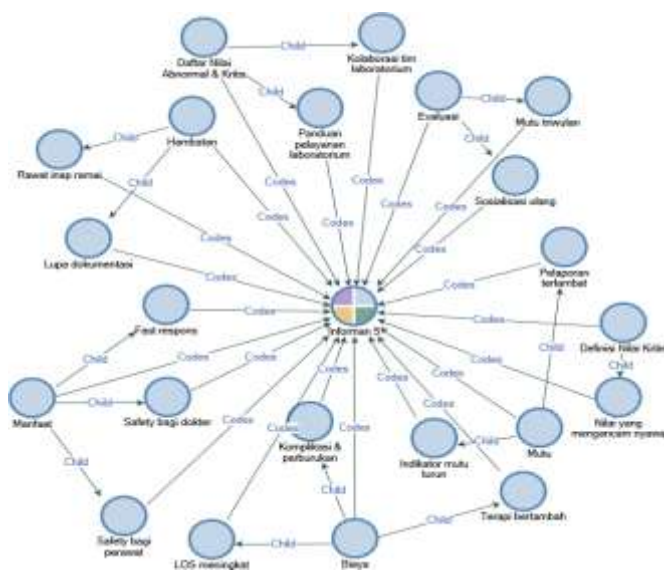


Figure 5. Critical Value Reporting Analysis on Informant 5

## Interpretation

In the image above, it is explained that informant 5 explained the definition of critical value is a value that can be life-threatening. The list of abnormal and critical values has been created by the team and is already in the laboratory guide. An inappropriate critical value reporting procedure will have an impact on the quality aspect to decrease if it is reported late, from the benefit aspect to fast response, doctors and nurses become safety. Obstacles that occur when reporting critical values when forgetting to do documentation and conditions in the hospital are crowded. Evaluation is carried out during the quality report every 3 months, in addition to that there is also a re-socialization of critical value reporting.

From the results of Nvivo's analysis on the five informants, several similar answers were obtained from the questions asked by the researcher. In IF2, IF3, and IF5, it is stated that the definition of critical value is a value that can be life-threatening. IF1 and IF3 stated that the quality of critical value reporting is included in the quality of hospitals and laboratory quality and can affect if there is a delay in reporting. Obstacles according to IF1 and IF3 both answered that if the report should be called directly to the DPJP, if the WA is long answered.

IF2, IF3, and IF4 explained that the communication process in reporting critical values can be carried out when analysts call nurses to inform the results of critical values, then nurses are hospitalized and then report to the DPJP for instructions. IF1, IF2, IF3, IF4 answered that direct telephone is a fast and effective medium of communication when reporting critical values. Reporting documentation in the form of SOAP in CPPT is the same answer according to IF2, IF3, and IF4. Evaluation of critical value reporting is carried out every three months during the quality report with the quality committee according to IF4, IF5.

### **Research Limitations**

Some of the limitations found in this study are:

1. The number of informants was limited in the study, the informants were only five people consisting of DPJP, 2 nurses, laboratory analysts, and the head of medical services. Although represented from each unit, it has not been able to reflect and dig deeply from different perspectives, such as from clinical pathologists, guard doctors, hospital management, senior nurses, and room heads.
2. The focus of the research was carried out in one hospital, namely Amanda Cikarang North Hospital, so that the procedure for reporting critical value results could not be generalized to other hospitals in terms of the type of hospital, service system, and resources owned.
3. The sampling time is short for 3 months, namely January – March 2026, starting from sampling of analysis process funds. In general, there is no absolute time duration for qualitative research, but ideally the research time lasts for 3-6 months.
4. The research data was limited to interviews and documents, did not include live recordings during the implementation of laboratory critical value reporting in inpatient facilities to visually and operationally confirm.

### **CONCLUSION**

Based on the study findings, the laboratory testing process at Amanda Hospital in North Cikarang followed the pre-analytical, analytical, and post-analytical phases; however, waste remained in both the testing process and critical-value reporting. The application of lean management using the DMAIC method streamlined the examination workflow from 12 to 9 stages and reduced the overall examination time. Critical-value reporting had referred to the hospital's standard operating procedure (SOP) and the established reporting standard of less than 30 minutes; however, implementation remained inconsistent because of reporting delays, incomplete documentation, difficulties in contacting the Dokter Penanggung Jawab Pelayanan (DPJP; attending physician), and high service workloads. These conditions could affect service quality and patient safety. Therefore, a critical-value reporting model was developed that included a standardized list of critical values, clearly defined responsibilities of the reporter and recipient, structured reporting procedures, and periodic evaluation to improve effectiveness, efficiency, and compliance with applicable standards.

This study indicated that effective communication and the application of lean management were important for improving the quality of critical laboratory value reporting. In practice, hospitals should strengthen SOP implementation, staff training and dissemination, monitoring, and the use of more effective communication channels and automated notification systems integrated into electronic medical records. Implementation of the proposed model is expected to accelerate the communication of critical results, improve documentation, reduce

reporting delays, and support patient safety. Future studies should investigate factors contributing to reporting delays, evaluate the effectiveness of automated notification systems, and compare critical-value reporting procedures across multiple hospitals to develop a more effective and broadly applicable reporting model.

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