



Evaluation of critical value report of laboratory results based on national quality indicators at Bima general hospital

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Abstract

Background: To improve service quality and patient safety, Bima Regional General Hospital has set quality targets according to the national indicator. One such indicator is the national quality indicator for laboratory services, which aims to achieve a critical laboratory value report of 100%. **Objectives:** This research aims to evaluate the reporting of laboratory critical values by considering the achievement of predetermined quality indicator targets. **Material and Methods:** This research was carried out by collecting secondary data using the cross sectional design at Bima Hospital from January 2023 to March 2023 with a total sampling of critical value reports to the clinician or room nurses from all treatment rooms. Achievement of reporting time is calculated based on the percentage of timeliness of reporting critical value results compared to the total of all critical value reporting and is expressed as 'achieved' and 'not achieved'. **Results:** This research identifies the achievements of reporting that do not meet the target, and several obstacles and challenges that affect the efficiency and effectiveness of reporting. These findings indicate needs for improving coordination, communication and reporting procedures to support better achievement of quality indicator targets. **Conclusions:** The proposed improvement recommendations can help hospitals optimize the laboratory reporting process, thereby improving the quality of service and overall patient safety.

Keywords

Critical value, Hospital, Laboratory, Quality indicator.



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1. Introduction

Patient safety is a major issue in health services. Indonesia has 12 national quality indicators that are mandatory for hospitals and one of them is reporting laboratory critical values. Meanwhile, accreditation institutions, such Joint Commission International (JCI) and Indonesian hospital accreditation standards established the mandatory requirement for laboratory critical values management, including the identification, notification, handling, documentation, auditing, and quality indicators monitoring of laboratory critical

values. Selection and collection of quality indicator data is one of the focuses on standards for improving quality and patient safety in hospital accreditation. In implementing quality in hospitals, it is said that the committee/team supports the process of selecting indicators and carries out coordination and integration of data measurement activities for quality indicators and patient safety in hospitals. Several indicators that need to be prepared are National Quality Indicators, Hospital Priority Quality Indicators, and Priority Quality Indicators in Units. National quality indicators are national quality indicators that must be measured and used as national quality information. One indicator is the reporting of critical laboratory results (Keputusan menteri kesehatan republik indonesia Nomor HK.01.07/Menkes/1128/2022, 2022; Peraturan Menteri Kesehatan Republik Indonesia, 2022).

The JCI implies that critical values are test results that are significantly outside the normal range and represent a life-threatening condition. Hospital policy states that reporting critical laboratory values must be received by the clinician within 30 minutes with the achievement target being 100%. The laboratory as a diagnostic support is also part of patient service management in hospitals (Desai & Chaudhari, 2017). One of the critical aspects in patient care management in hospitals is reporting critical values, namely reporting test results or diagnostic measurements that have significant clinical consequences, and are objective measurements that can endanger the patient's life. Delays in reporting critical values can have a serious impact on the medical decision-making process and ultimately affect the patient's length of stay (LOS) (Febrianto et al., 2021).

The importance of timely information, especially regarding critical values, cannot be ignored because it can influence a number of aspects of health care, such as treatment, medical treatment decisions, and patient outcomes. Therefore, this research will focus on evaluating critical value reporting based on national quality indicator targets at the Bima general hospital.

Bima general hospital is located in Bima city, West Nusa Tenggara province in Indonesia, which is the most visited hospital in the region. In January to March 2023, around 11.418 patients utilized outpatient services, 5.162 patients underwent inpatient treatment and no less than 9.948 laboratory tests were carried out. With various issues in management, laboratory examinations at this hospital are one that needs attention and follow-up. From

the initial data review carried out by researchers, the issue of delays in reporting critical laboratory examination data was discovered which could pose a risk to patient safety.

This research involves critical aspects of patient care management that can influence the quality of care and medical decisions. By understanding the impact of delays in reporting critical values based on unit quality indicator targets from the Laboratory department, ways can be found to increase the efficiency and effectiveness of patient services in hospitals. In addition, this research can provide a basis for improving the health information system in the laboratory department to make it more responsive and support better decision making.

2. Materials and Methods

This observational and cross-sectional study aims to prescriptively analyze the critical value report in laboratorium. The population of this study was 717 data obtained from laboratory critical value reporting documentation in Bima Regional General Hospital from January - March 2023. The method of sampling in this study was purposive total sampling.

The data amount of laboratory results during 2023 was obtained from the laboratory register. The total laboratory test during the observation was 9.948 tests.

The timeliness of laboratory critical value reporting is reporting laboratory test result that are included in the critical criteria (according to Hospital regulation) to responsible clinician whether verbal or written until received within ≤ 30 minutes and proven by therapy advice or SBAR (situation, background, assessment, and recommendation) documentation on medical record. Regardless of the amount and type of critical laboratory result reported, it only counted as 1 report if it is the same patient and reported at the same time. The result of reporting was classified as 'On time' or 'Late'. The data processing is working on spreadsheet-based application. It was occupied to show the distribution of laboratory critical values.

3. Results and Discussion

3.1. Routine Laboratory Test

In January 2023 there were 5,918 outpatients and inpatients, with 3,199 patients or 54.05% of the total number of patients who performed laboratory tests. In February 2023

there were 5,698 patients with 3,177 patients or 55.75% of the total patients who had laboratory tests. In March 2023 there were 6,118 patients with 3,262 patients or 53.31% of the total patients who had laboratory tests (table 1).

Table 1. Routine laboratory tests

| Month | Amount of Total patients (person) | Amount of Laboratory test | Percentage of laboratory test (%) |
|----------|-----------------------------------|---------------------------|-----------------------------------|
| January | 5.918 | 3.199 | 54.05 |
| February | 5.698 | 3.177 | 55.75 |
| March | 6.118 | 3.262 | 53.31 |
| Total | 17.738 | 9.638 | 54.33 |

*Total patients who performed laboratory tests

**Percentage of patients who performed laboratory test

3.2. Laboratory Critical Value Report

We found 717 data about laboratory critical value reporting to responsible clinicians consisting of 11 test variations (Table 1) among it. Platelet test was the most tested on Januari, Februari dan March with critical result as many as 78 (29%); 61 (31%) and 57 (23%) respectively. On the contrary, leukocyte and total bilirubin were the fewest tests with critical results.

Table 2. Percentage of Laboratory critical result by type of test

| Test | January (%) | Februari (%) | March (%) |
|--------------------------------|-------------|--------------|-----------|
| Haemoglobin (Hb) | 74 (27) | 51 (26) | 45 (18) |
| Leukocyte (WBC) | 4 (1) | 6 (3) | 5 (2) |
| Platelets (PLT) | 78 (29) | 61 (31) | 57 (23) |
| Blood Glucose | 19 (7) | 15 (8) | 23 (9) |
| Blood Urea Nitrogen (BUN) | 18 (7) | 12 (6) | 20 (8) |
| Serum Creatinin | 18 (7) | 12 (6) | 20 (8) |
| Albumin | 12 (4) | 8 (4) | 16 (7) |
| Total Bilirubin | 3 (1) | 1 (1) | 4 (2) |
| Aspartate Trasaminase (AST) | 15 (6) | 5 (3) | 14 (6) |
| Alanine Aminotransferase (ALT) | 16 (6) | 5 (3) | 16 (7) |
| Electrolyte | 15 (6) | 24 (12) | 25 (10) |
| Total | 272 | 200 | 245 |

We obtained 9.948 laboratory test results from January to March 2023 that were delivered

to outpatient and inpatient wards. The laboratory critical value reporting was 717 (7%) out of 9.948 laboratory test results with critical values. The difference between the number and the documented critical laboratory results happened because we only count as 1 report if it is the same patient and reported at the same time regardless of the amount and type of critical laboratory result reported. For example, we found many test results from the same patient at the same time of reporting such as critical platelet count accompanied by critical blood glucose result accompanied by critical haemoglobin result.

Table 3. Laboratory critical result by patient room

| Room | January (%) | February (%) | March (%) |
|------------------------------|------------------|------------------|------------------|
| Outpatient Ward | 2 (1) | 1 (1) | 3 (2) |
| Emergency Room | 142 (66) | 93 (55) | 94 (52) |
| Intensive Care Unit | 9 (4) | 13 (8) | 29 (16) |
| Neonatal Intensive Care Unit | 12 (6) | 10 (6) | 11 (6) |
| <i>Verlos Kamer (VK)</i> | 10 (5) | 14 (8) | 16 (9) |
| IW1 | 10 (5) | 5 (3) | 7 (4) |
| IW2 | 8 (4) | 4 (2) | 1 (1) |
| IW3 | 5 (2.5) | 7 (4) | 9 (5) |
| IW4 | 8 (4) | 4 (2) | 5 (3) |
| IW5 | 3 (1) | 3 (2) | 1 (1) |
| IW6 | 1 (0.5) | 5 (3) | 0 (0) |
| IW7 | 2 (1) | 5 (3) | 2 (1) |
| IW8 | 2 (1) | 0 (0) | 2 (1) |
| IW9 | 2 (1) | 5 (3) | 0 (0) |
| Total | 216 (100) | 169 (100) | 180 (100) |

Note : IW (Inpatient ward)

The data of laboratory critical value reporting to responsible clinicians was obtained from outpatient ward, inpatient ward, emergency room, ICU and VK. IW6 and IW9 were the room with the fewest amount of reporting with 0 - 3% laboratory critical value reports compared to other rooms. Emergency room was the room with the most reporting with 52 - 66% laboratory critical value reports.

The percentage of critical value reporting's trend from January until March 2023 could be seen in figure 1. The timeliness of laboratory critical value reporting is time needed for reporting laboratory test results that are included in critical criteria (according to Bima Hospital regulation) from validated test result to clinician until received within 30 minutes and proven by SBAR documentation. The national Quality Indicator of Laboratory critical

value report target was 100%. In three months observation, the highest achievement to target happened in January 2023 was 98%. While, the lowest achievement happened in February 2023 was 96%.

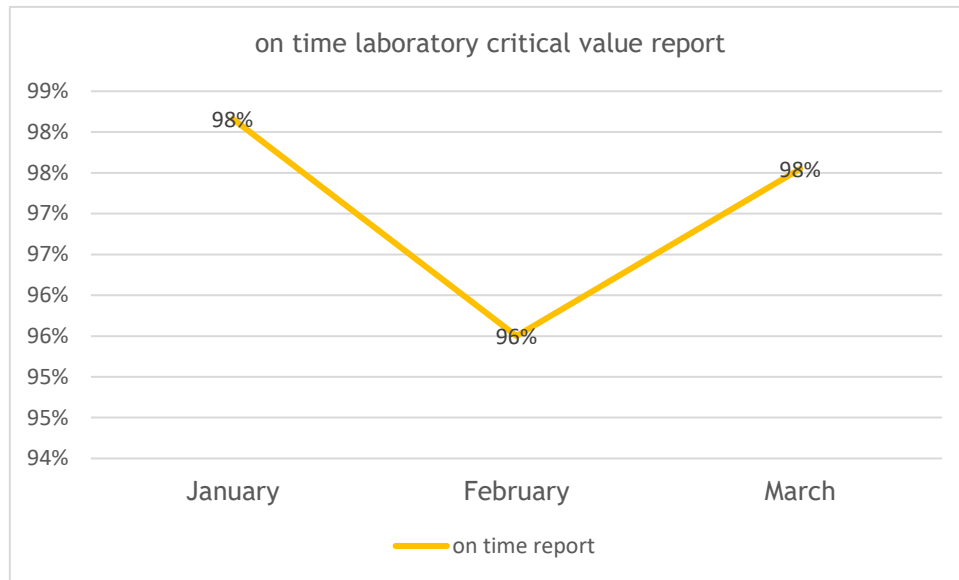


Figure 1. The Percentage (%) of Laboratory Critical Values Reporting

We identified 11 laboratory test variations that have critical value and reported them to the responsible clinician. The most laboratory test result with critical value was platelet followed by hemoglobin as mentioned in Table 1. A study from Desai and Chaudhari in 2017 found laboratory test results with the most critical value that informed to responsible caregiver was haematologi that include platelet and hemoglobin (Desai & Chaudhari, 2017). Similar with data from Febrianto et al., in 2021 which shows platelet as the highest percentage in laboratory critical value report (Febrianto et al., 2021). Wallace K., et al (2020) found that in all patients combined of critical value of platelet including thrombocytosis or thrombocytopenia and hemoglobin show anemia were associated with significantly higher risks of death (Wallace et al., 2020).

The critical laboratory results constituted 6-8%, compared to 2.69% that was found by Shubha H.V (2022). Maximum critical values were recorded from the emergency department 55-66%. Similar with this study, Shubha HV also found that a maximum of critical values was recorded from the emergency department as many 55.7% ((Shubha H.V,

2022).

The critical laboratory test result percentage in our result is relatively high 98% as seen in figure 1. On the other study, Chuang F (2023) also found that inpatient critical value report percentage was 94.1%, which increased to 96.6% after reducing unnecessary work ((Chuang, 2023).

In this study, the method used for reporting the laboratory critical values was often made by telephone or read-back. A study from Li et al., (2019) found that this method was more time consuming and easy to have missing reports or even false reports. They also found that the ratio of errors made by telephone contacts for critical values was 3.5% to 5.0% (Li et al., 2020).

Our study also found that the majority of the laboratory critical value report was received by nurses in the inpatient wards. Febrianto et al, (2021) found that 55.6% of laboratory critical results have been reported to other health workers than straight to responsible clinicians. Piva et al (2014) found that failure to adequately communicate a laboratory critical value is a potential cause of adverse events. They also found that automated notification of laboratory critical value report supports effective clinical decision making (Piva et al., 2014).

Our study shows that the total percentage of timeliness of laboratory critical value reporting to responsible clinicians was under the target of the national quality indicator, or below 100%. Similar to that found by Marsetyo (2023), the reporting of laboratory critical value at laboratory department for January - Juli 2020 period had not reached 100%. He found that factors that caused target of laboratory critical value report has not been reached are motivation, learning, leadership and job design (Marsetyo, 2023).

Based on the problems we found, some suggestions that could improve the critical value reporting target: (1) re-educate laboratory staff regarding the urgency of critical values reporting and how to deliver them and write the report forms, (2) there needs to be a routine meeting to present critical value reports condition in laboratory units and evaluate the challenges that occurred during report critical values within time of less than 30 minutes, and (3) design an alarm system to effectively report the laboratory critical value result directly to the clinician.

4. Conclusions

Our study found the achievement of laboratory critical result report was more than 90% but less than 100%. Target from the national quality indicator should achieve 100%. Several challenges could influence the compliance of laboratory critical value reporting, including the response from the room, SBAR procedure and read-back or telephone methods. Need of flowchart notification and alarm system also required to meet the target of National Quality Indicator. It is very crucial to report the laboratory critical value result as soon as possible because it is inseparable with patient safety.

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