CRITICAL VALUE OF GLUCOSE USING APPLICATION IN BALI MANDARA EYE HOSPITAL

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ABSTRACT

Critical value is very critical result in laboratory examination that can indication several emergency conditions. Reporting critical values are controversial between hospital management, clinicians, and laboratory. Reporting critical value required effective communication. Information technology has become one of the solution effective communication in reporting critical values. Critical values can occur in clinical chemistry, hematology, and other laboratory examination. Glucose is one of the clinical chemistry parameters which is often foound critical value and therapy must be given immediately. Aim of this research is to evaluated time reporting using Critiva 1.0 application in cellular phone of clinical pathologist Bali Mandara Eye Hospital. Samples were 50 times reporting the glucose critical value simulation using the Critiva 1.0 application and 50 times reporting the Standard Operating Operations (SPO) simulation at the Bali Mandara Eye Hospital. Simulation carried by laboratory techonology in charge. We used means to analyze time reporting and SPSS version 16. Mean reporting glucose critical value using Critiva 1.0 application was 12 seconds. Mean reporting glucose critical value using SPO Bali Mandara Eye Hospital was 720 seconds.

***Keyword**: Critical Value, Glucose, Critiva 1.0, Standard Operating Procedure*

ABSTRAK

Nilai kritis adalah nilai hasil laboratorium yang sangat ekstrim yang dapat menggambarkan suatu keadaan gawat darurat Pelaporan nilai kritis sering menjadi perdebatan antara manajemen rumah sakit, klinisi, dan laboratorium Pelaporan nilai kritis adalah salah satu mutu yang dilaporkan ketika akreditasi rumah sakit di Indonesia. Pelaporan nilai kritis ini membutuhkan komunikasi yang efektif. Teknologi informasi menjadi salah satu solusi komunikasi yang efektif dalam pelaporan nilai kritis. Nilai kritis dapat terjadi di bidang kimia klinik, hematologi, dan lainnya. Glukosa merupakan salah satu parameter kimia klinik yang sering ditemukan nilai kritis dan harus segera diberikan terapi.Penlitian ini bertujuan untuk mengukur waktu pelaporan nilai kritis glukosa menggunakan aplikasi Critiva 1.0 pada telepon seluler dokter penanggung jawab laboratoriumdi Rumah Sakit Mata Bali Mandara.Penelitian ini

menggunakan sampel 50 kali percobaan simulasi nilai kritis glukosa menggunakan aplikasi Critiva 1.0 dan 50 kali percobaan simulasi pelaporan secara Standar Prosedur Operasional (SPO) di Rumah Sakit Mata Bali Mandara. Percobaan simulasi dilakukan oleh analis yang berjaga. Analisis stastisik berupa rerata waktu percobaan simulasi dengan menggunakan SPSS versi 16. Rerata waktu keluarnya nilai kritis glukosa sampai ke dokter penaanggung jawab laboratorium melalui aplikasi Critiva 1.0 adalah 12 detik. Rerata melalui SPO Rumah Sakit Mata Bali Mandara 720 detik.

Kata Kunci : Nilai kritis,Glukosa,Critiva 1.0, Standar Prosedur Operasional

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INTRODUCTION

Laboratory result is one of the determinants of the diagnose and the treatment that will be given to the patient. The result will be released after passing 3 phase, which are pre-analytic, analytic, and post-analytic. One thing that becomes the consideration when releasing the laboratory test is the critical value[1].Critical value is an ultimate value of laboratory test which describes a life threatening situation that needs an immediate action[2]. Critical value needs to be reported to the patient's doctor immediately since it affects the next treatment that will be given[1].The report of critical value has become a controversy between hospital management, laboratory, and clinician for decades. The concept of critical value report is revised continuously until the most effective and the most efficient way to do one treatment is found[1,3,4]. Critical value report is one of the qualities that is reported during hospital accreditation in Indonesia. Hospital accreditation in Indonesia is done to assess the hospital's obedience to the accreditation standard. The accreditation which was enforced in January 2018 was entitled National Accreditation Standards for Hospitals Edition 1. This standard stated that the report of critical diagnostic value is included in patient safety goals which one of it is the report of laboratory checking[5]. The purpose and the objective of patient safety goals is to encourage the hospitals to do specific maintenance in patient safety. This target is highlighting the problematic parts in the hospital service and is explaining the proof and solution from the experts consensus of this problem. A good system will affect the quality improvement of the hospital service and the patient safety[5]. The

report of this critical value needs effective communication. Communication is considered effective if it is on time, accurate, complete, not ambiguous, and well accepted by the recipient which aimed to minimize errors and maximize patient safety. Communication can be in verbal, electronic, and written form. The disadvantage of verbal communication is it needs time so it may lead to problems, especially if it is done on the phone. The cause of this problem may come from the difference of accent. Pronunciation can complicate recipient in understanding the command, meanwhile the report of critical value needs to be done immediately and there can be no mistakes[5,6] .Information technology has improved rapidly and it can be one of the solution for effective communication in reporting the critical value. Information technology can be in the form of a notification on the doctor in charge's phone so it is expected that the doctor can be fast and responsive to the critical value of the patient and the patient can be treated quickly and minimize the time of reporting[1,3,5,6]. The limitation of information technology system is it is not affordable so not all laboratories can buy a software to notify the hospital ward and emergency room for the critical value[1,3,5,6]. Information system in big laboratory has applied the notification quickly but in small laboratory it can not be applied yet due to the lack of budget and technology.

Critical value can happen in chemical clinic, hematology, and others. Glucose is one of the parameters in chemical clinic that the critical value is usually found and needs to be treated immediately. Glucose is one of the indications of many diseases, and one of it is diabetes mellitus[7]. If the glucose level is too high and too low, it may lead to acute and chronic disease on diabetes mellitus patient. The acute diseases that can happen on diabetes mellitus patient are hyperglycemia and hypoglycemia crisis, and for the chronic disease it can be diabetic retinopathy. Acute and chronic diseases needs to be treated immediately to prevent the patient goes into worse condition.

METHOD

This research is cross sectional analytic observational research with 50 times simulation on glucose critical value sample using Critiva 1.0 and 50 times reporting simulation using Standard Operating Procedures (SOP) in Bali Mandara Eye Hospital. This simulation was done by the analyst who were in charge.The simulation using the software was done with the analyst input the laboratory result of the patient to the prepared web interface then the data was processed by the system and the critical value was determined with the specified standard. If there is a critical value

in the result, the system will send a notification in short message service (SMS) to the doctor in charge of the laboratory's phone. The doctor then will follow up the result by contacting the in charge analyst. The simulation using SPO in Bali Mandara Eye Hospital was done with the analyst taking a note of glucose checking result and the result was reobserved to match the demand and the result. The analyst then delivered the critical result to the doctor in charge of the patient immediately. If the doctor can not be contacted, the result then delivered to the nurse co-doctor. The analyst took a note on the critical value report book and signed by the in charge doctor or the nurse. The critical value that is approved in Bali Mandara Eye Hospital can be seen on the table below.

Table 1 Bali Mandara Eye Hospital Glucose Checkup Critical Value

Checkup	Age	Critical Low	Critical High
Glucose	< 4 weeks ≥ 4 weeks	≤ 40 mg/dl ≤ 50 mg/dl	≥ 400 mg/dl ≥ 400 mg/dl

The statistic analysis described as the means of simulation time using Critiva 1.0 and the means of simulation time using SPO with SPSS version 16. This research approved by ethics in Bali Mandara Eye Hospital.

RESULT AND DISCUSSION

This research used 50 times glucose critical value report simulation using Critiva 1.0 compared to 50 times glucose critical value report simulation using SOP in Bali Mandara Eye Hospital.

Critiva 1.0 in this research was first examined and had the interface as can be seen on the picture below. Image 1 shown the Login Page laboratory analyst to open the Critiva 1.0. This page was used to input the username and password to get the authority and the specified interface.

Image 1 Check Up Input Form

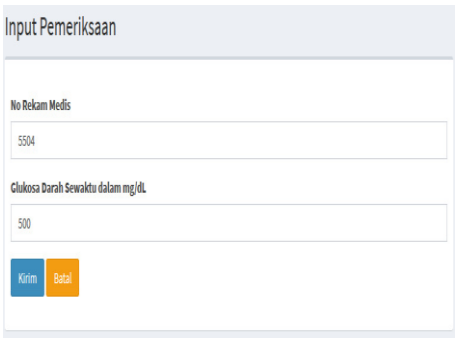

Image 2 shown the patient check up input form. The data that must be input are the medical record number and the glucose in mg/dL. All data that were input then

continued with clicking the send button. If the blood glucose got the critical value reached the specified standard, the system would send a notification in short message service (SMS) to the doctor in charge in laboratory's phone. The doctor then follow up the result by contacting the analyst.

Image 2 Warning Form if there is critical value

Image 3 shown the warning form if there is any critical value. If there is critical value, the system will notify the laboratory analist.Image 4 shown the SMS interview that received by the doctor in charge in the laboratory if there is a critical value. The form received is the medical record number of the patient and their critical value. Once the doctor received the SMS, the analyst is waiting for the confirmation from the doctor.

From the data analysis after 50 times critical value simulation using Critiva 1.0 and SOP report in Bali Mandara Eye Hospital was done, the result was found as can be seen on the table below.

Table 2 The means of time for critical value report

Simulation Type	Means
Critiva 1.0	12 seconds
SOP	720 seconds

The mean of time needed in releasing the glucose critical value to the doctor in charge in the laboratory through Critiva 1.0 is 12 seconds, while in SOP Bali Mandara Eye Hospital is 720 seconds.

Critical value is a value that needs to be reported immediately since it is related to patient's condition and the immediate treatment. The critical value report was usually done by phone. A research by Joan Barenfanger et al mentioned that there are 3,5% errors in critical value report by phone and the time means in reporting the critical value by phone is 57,6 seconds[8]. Another research by Megan et al in 2009 stated that the error of critical value repot was caused by the mention of the check up result value on the phone had the highest error after the error of mentioning patient's name. This research had the means of glucose critical value report time in Critiva 1.0 smaller than the SOP in Bali Mandara Eye Hospital, the place where this research was conducted. This research was similar to the research conducted by Piva et al who used Computerized Notification System: Alerting System and SMS compared to the by phone

reporting and it was found that Computerized Notification System: Alerting System and SMS shown the means of time 11 minutes and by phone was 30 minutes[9].The result of glucose critical value is delivered to the doctor in charge of the patient after reporting the doctor in charge of the laboratory verbally or by phone if the doctor was not on the location. This condition is susceptible to get error in mentioning the checkup result value while doing the report to the doctor in charge of the laboratory. Critiva 1.0 is expected to minimize the errors in mentioning the result and to shorten the time of reporting.

CONCLUSION AND SUGGESTION

The report of glucose critical value with Critiva 1.0 is faster than the SOP available in the hospital.The thing that can be done in developing Critiva 1.0 is having the access to Laboratorium Information System (LIS) so that the input is not done manually anymore.

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