Short Communication

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How to decrease the rejection rates: reasons of sample rejection and solutions

Laboratuarda numune reddedilme nedenleri ve red oranlarının azaltılması

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Abstract

Objective: Sample rejection is an important step in the laboratory related with the patient safety. Periodical analysis of rejected samples is necessary to define the causes of rejection and follow-up the requirements for staff training. In this study, we aimed to put forth the efficiency of trainings by analyzing the amount of rejected samples in Yozgat State Hospital.

Materials and methods: Taken from laboratory information system (LIS), rejected sample statistics related to 8 month-data before training was compared with 8-month data after training between 07.2015 and 10.2016 are examined. These datas were compared in itself and to each other. All statistical analyses were performed using the SPSS (V15).

Results: Before training, the average number of patients for the analysis included months was 34,733 [standard deviation (SD) ± 4031], the number of rejected samples was 397.7 (SD ± 85.3) and the average rejection percentage was 1.13 (min-max: 1–1.29). The average number of patients for the after training months was 39,426 (SD ± 4779), the number of rejected samples was 343.2 (SD ± 57.7) and the average rejection percentage was 0.87 (min-max: 0.62–0.98), Rejected sample rates were significantly lower interms of statistics in the after-training group (p = 0.0001).

Conclusion: Staff training takes a very important place preventing these mistakes. As it can be seen in our study, training helps decreasing rejection rates. It is suggested to schedule more trainings in order to decrease the rates to lower degrees.

Keywords: Sample rejection rate; Clinical laboratory; Pre-analytical phase.

Özet

Amaç: Numune reddi, laboratuarda hasta güvenliği ile ilgili önemli bir önlemdir. Reddedilen örneklerin periyodik olarak analizi, personelin eğitimin ihtiyaçlarını belirlenmesi ve personele gerekli eğitimlerin verilerek numune güvenliğinin sağlanmasına hizmet eder. Bu çalışmada, Yozgat Devlet Hastanesinde reddedilen numunelerin analiz ederek eğitimlerin etkinliğini ortaya koymayı amaçladık.

Materyal-Metod: Numune reddi ile ilgili bilgiler 07,2015 ve 10,2016 tarihleri arasını kapsayacak şekilde Laboratuvar bilgi sisteminden (LIS) alındı. Eğitimden önceki 8 aylık verilerle ile eğitimden sonraki 8 aylık veriler kendi içlerinde ve birbirleriyle karşılaştırıldı. Tüm istatistiksel analizler SPSS (V15) kullanılarak yapıldı.

Sonuçlar: Eğitimden önceki sekiz aylık dönem de ortalama hasta sayısı 34.733 (SD ± 4031), reddedilen numune sayısı 397,7 (SD ± 85,3) ve ortalama reddedilme yüzdesi 1,13 (min-max: 1–1,29) olarak bulunmuştur. Egzersiz sonrası aylardaki ortalama hasta sayısı 39.426 (SD ± 4779), reddedilen numune sayısı 343,2 (SD ± 57,7) ve ortalama reddedilme yüzdesi 0,87 (min-max: 0,62–0,98) bulunmuştur. Reddedilen numune oranları, eğitim sonrası grupta istatistiksel olarak anlamlı ölçüde düşük bulundu (p = 0,0001).

Tartışma: Personel eğitimi, laboratuvar hataları önlemede çok önemli bir yer tutmaktadır. Çalışmamızda

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görülebileceği gibi, eğitim numune reddedilme oranlarının düşürülmesine yardımcı olmaktadır. Numune red oranları düşürmek için daha fazla ve iyi planlanmış eğitimlerin yapılması önerilmektedir.

Anahtar Kelimeler: Numune red oranı; Klinik laboratuar; Preanalizik faz.

Introduction

The main goal of the biochemistry laboratories is to give the most accurate result as soon as possible. For this purpose, collecting and analysing data consistently are necessary tasks for assessing quality, monitoring standardized key processes, improving performance and patient safety in clinical laboratories. These factors influence 70% of medical diagnoses [1, 2]. Another thing that needs to be done for this purpose is to decrease sample rejection rates in laboratory. In biochemistry laboratories, a sample that cannot meet the necessary requirements is not accepted. The types of laboratory errors are classified as preanalytical, analytical and postanalytical. It has been demonstrated that 65–70% of errors occur in preanalytical phase. Preanalytical phase involves the steps of sample preparation for analysis such as centrifugation, aliquoting and sorting [3, 4]. Most errors occur by healthcare staff who are not under the control of the laboratory (especially service nurses and other staff who play a role in sampling). The most reliable approach to prevent the preanalytical errors is to construct preanalytical standardization [5]. Preanalytical phase starts with the entry of laboratory test requests by clinicians. Rejection reasons of test requests generally include wrong requests, missing input of tests, order of a medically unnecessary test, over-ordering, erroneous coding or unintelligible requests [6]. Personnel impact on specimen collection is an important factor and preanalytical error rate is 2–4 times higher for non-laboratory phlebotomists than laboratory staff [3]. This situation shows us how important the training of staff is in reducing laboratory errors. Rejected samples are reported to the related units by specifying the rejection cause. Frequently faced problems while accepting the samples are; faulty test entry (or request), improperly received sample, lack of preparation that is necessary for the test/lack of preliminary of the test (hunger, smoking etc.), occurrence of hemolysis, lipemia, insufficient sample, incorrect identification, clot, use of wrong sample vessel, taking the sample in the wrong amount (more or less = inappropriate level), mislabeling or sample without barcode, faulty collection of 24 h urine or transferring samples under inappropriate circumstances. Poor communications among physicians, nurses and phlebotomists involved in the total testing process or poorly designed processes are also counted as laboratory errors [7]. Detection of the amount of monthly rejected samples, statistical distribution, training the related staff is necessary in order to remove these causes and prevent the victimization of patients. In this study, we aimed to explain the rates and reasons of rejected samples, to put forth the efficiency of trainings by analyzing the amount of rejected samples and of course to decrease rejection rates in Yozgat State Hospital.

Methods

Taken from hospital information system, rejected sample statistics related to 8 month-data before training was compared with 8-month data after training between 07.2015 and 10.2016 are examined. These datas were compared in itself and to each other so that we could see if there is a difference between before and after training. After that, we visited all services starting with intensive care service which is the most problematic part, and we have identified problems and errors related to sampling. We have separated the staff in two groups and we have trained them for half a day in the training hall. All statistical analyses were performed using the SPSS (V15) (SPSS Inc, USA).

Results

Before training, the number of patients included in the analysis was 34,733 [standard deviation (SD) ± 4031], the number of rejected samples was 398 (SD ± 85.3) and rejection rate was 1.13 (min-max: 1.0–1.29), respectively. After training the number of patients included in the analysis was 39,426 (SD ± 4779), the number of rejected samples was 343 (SD ± 57.7) and rejection rate was 0.87 (min-max: 0.62–0.98, respectively) Table 1. Most common reasons for rejection were as follows: 1. Hemolysis (28.3%), 2. Clotted sample (27.6%), 3. Insufficient sample (19.6%), 4. Faulty test request (7.3%), 5. Incorrect identification (5.7%), 6. Improperly taken sample, (2%) 7. Faulty sample

Table 1: Before training and after training rejected samples ratios.

	Analyzed samples	Rejected samples (%)	p-Values
Before training	34,733 + 4031	397.7 + 85.3 (1.13)	0.0001
After training	39,426 + 4779	343 + 57.7 (0.87)	

record (2%), 8. Inappropriate level (1.4%), 9. Others (empty sample vessel, sample not delivered to the laboratory, lipemic sample, fibrinous sample, improper transfer) (6.1%). There was not a statistically significant difference between patient numbers before and after training. However, rejected sample rates were significantly lower in terms of statistics in the after-training group ($p = 0.0001$).

Discussion

In our study, we detected hemolysis as the major cause of rejection. We saw that the causes of hemolysis were sprayed into the tube with the injector. Another major cause of hemolysis is; arrangements are made while the tourniquet is already connected during depletion process. This situation causes trauma and hemolysis in the cells that are in the tourniquet area. Solution to this serious problem is the use of vacutainer and making of arrangements before connecting the tourniquet just like the depletion parts. We particularly paid attention to these issues in our training. One way of increasing the laboratory quality is to follow latest improvements and changes then pick and use ones that are suitable for the laboratory. Another important way is identification and certification of the problems and their resolution in terms of preventive actions. Regarding the control and improvement of the preanalytical universe is the duty of all health workers. The process should be monitored with continuous communication and good cooperation. For the purpose of effective and reliable management of laboratory and non-laboratory processes in biochemistry services, relevant health workers should be informed. Rules regarding the transfer of samples, the acceptance of laboratories and pre-analysis processes related to biochemical laboratory tests should be under control [8, 9].

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