J Bras Patol Med Lab. 2021; 57: 1-5.

10.5935/1676-2444.20210023

Impact of pre-analytical errors on costs of clinical analysis laboratory

Impacto nos custos por erros pré-analíticos em laboratório de análises clínicas

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ABSTRACT

Introduction: Currently, it is well known that quality assurance systems in healthcare organizations are constantly evolving. Quality improvements can reduce costs by avoiding repetition of exams, which results in a waste of time and money for the company, as well as customer and physician dissatisfaction. **Objective:** To quantify the cost that errors in the pre-analytical phase generate for the laboratory using the collection indicators, direct material cost, and operating cost. **Materials and methods:** The database of a large laboratory in the city of Porto Alegre, Rio Grande do Sul, was analyzed between January 2013 and July 2014. **Results:** A total cost of R$ 23,330.71 spent on recollections was obtained. **Discussion:** Management cost is committed to efficiency in reducing expenses, through studies and analyzes aimed at changing management and conduct processes. **Conclusion:** Cost management is necessary in any company because in the case where it fails to be carried out, besides the being able to bring the institution down to bankrupt, it brings negative costs, as well as impacts customers and physician's satisfaction.

Key words: costs and cost analysis; laboratories; methods.

RESUMO

Introdução: *Atualmente, é notório que os sistemas de garantia da qualidade em organizações de assistência à saúde estão em constante evolução. As melhorias na qualidade podem reduzir os custos, evitando a repetição de exames, que gera desperdício de tempo e dinheiro para a empresa, bem como insatisfação do cliente e médico.* ***Objetivo:*** *Quantificar o custo que os erros na fase pré-analítica geram para o laboratório, utilizando os indicadores de recoleta, o custo com material direto e o custo de operação.* ***Materiais e métodos:*** *O banco de dados de um laboratório de grande porte da cidade de Porto Alegre, Rio Grande do Sul, foi analisado entre janeiro de 2013 e julho de 2014.* ***Resultados:*** *Obtivemos um total de R$ 23.330,71 gastos com as recoletas.* ***Discussão:*** *O custo gerencial compromete-se com a eficiência para redução dos gastos, por meio de estudos e análises voltados para mudanças de processos de administração e conduta.* ***Conclusão:*** *O gerenciamento de custo é necessário em qualquer empresa, pois, caso não seja realizado, além de poder levar a instituição à falência, traz custos negativos, assim como impactos na satisfação de clientes e médicos.*

Unitermos: *custos e análise de custos; laboratórios; métodos.*

First submission on 03/19/20; last submission on 03/26/20; accepted for publication on 05/27/20; published on 05/20/21

RESUMEN

Introducción: *Actualmente, llama atención que los sistemas de garantía de calidad en organizaciones sanitarias están en constante evolución. Las mejoras en la calidad pueden reducir los costos, evitando la repetición de pruebas, que genera una pérdida de tiempo y dinero para la empresa, así como la insatisfacción de clientes y médicos.* ***Objetivo:*** *Cuantificar el costo que los errores en la fase preanalítica generan para el laboratorio, utilizando los indicadores de nueva extracción, el costo con material directo y el costo de operación.* ***Materiales y métodos:*** *Se analizó la base de datos de un gran laboratorio en la ciudad de Porto Alegre, Rio Grande do Sul, entre enero de 2013 y julio de 2014.* ***Resultados:*** *Obtuvimos un costo total de R$ 23.330,71 gastados en tomas repetidas.* ***Discusión:*** *El costo de gestión se compromete con la eficiencia en la reducción de gastos, mediante estudios y análisis orientados a cambiar los procesos de gestión y conducción.* ***Conclusión:*** *La gestión de costos es necesaria en cualquier empresa, porque si no se hace, además de poder llevar a la institución a la quiebra, trae costos negativos, así como impactos en la satisfacción de clientes y médicos.*

Palabras clave: *costes y análisis de costes; laboratorios; métodos.*

INTRODUCTION

Clinical analysis laboratories continually undergo technological and scientific transformations due to the progress of clinical diagnostic methods. Therefore, healthcare companies establish new ways to win and retain clients, improving quality and adapting to the recent accreditation requirements in clinical analysis laboratories[1-3].

When referring to the quality of tests, the costs involved in performing them must be included. Quality costs include the costs of compliance (materials, protective equipment, and staff, among others) and non-compliance (cost generated by errors in the analytical phases). Currently, it is known that quality assurance systems in healthcare organizations are constantly evolving. There are pressures from private and public order to improve quality, but, on the other hand, cost containment must be achieved[4]. As examples of costs we can mention repetition of exams (internal failure) and repeated order of exams (external failure). Quality improvements can reduce costs by avoiding repeat exams, which results in waste of time and money. By reducing costs, there will be an improvement in competitiveness, allowing the company to remain active in the market with its activities and services[4].

The analytical process in clinical analysis laboratories consists of different successive stages: pre-analytical, analytical and post-analytical phases. The pre-analytical phase gathers since the receipt of customer at the service unit to the transport of material and the sample processing area. This phase must have a carefully defined and constantly monitored standardization due to the significant impact on the quality of the laboratory tests results[5].

This work aimed to quantify the cost that errors in the pre-analytical phase generate for the laboratory, using the indicators of recollection, cost with direct material, and cost of operation.

MATERIALS AND METHODS

The database of a large laboratory in the city of Porto Alegre, Rio Grande do Sul, was analyzed from January 2013 to July 2014, totaling 19 months.

RESULTS

During the 19 months, 33,826.47 visits were made; the average of recollection was 82.47. The average material cost was R$ 263.83, and the cost of the operation was R$ 1,027.26, totaling an expense of R$ 1,291.09 in the study period, as shown in **Table 1**.

The monthly average of recollection in 2013 was 81.92 and in 2014, 83.43. The average monthly cost of direct material in 2013 was R$ 231.82 and in 2014, R$ 318.70. The average monthly operating cost in 2013 was R$ 995.29 and in 2014, R$ 1,082.07. The total monthly cost in 2013 was R$ 1,227.11 and in 2014, R$ 1,400.77. The result of the total annual cost of recollections in 2013 was R$ 13,525.32 and in 2014, R$ 9,805.39, as shown in **Table 2**.

TABLE 1 – General averages

Variables	*n*	Minimum	Maximum	Average	Standard deviation
Services	19	25537	39774	33826.47	4086.95
Recollection	19	57	107	82.47	15.23
% recollection	19	0.16	0.38	0.25	0.05
Material cost	19	161.31	408.74	263.83	66.69
Operational cost	19	692.55	1387.79	1027.26	195.76
Total cost	19	853.86	1796.53	1291.09	256.51

TABLE 2 – Representative monthly expenses

Year	Months	Recollection				Direct material cost		Operational cost		Total cost	
		A	SD	%	SD	A	SD	A	SD	A	SD
2013	12	81	13.94	0.25	0.05	R$ 231.82	R$ 39.46	R$ 995.29	R$ 169.42	R$ 1,127.11	R$ 208.89
2014	7	83	13.94	0.24	0.05	R$ 318.70	R$ 39.46	R$ 1,082.07	R$ 169.42	R$1,400.77	R$ 208.89

A: average; SD: standard deviation; R$: Brazilian Real currency.

DISCUSSION

The management cost is committed to the reduction of expenses, through studies and analyzes aimed at changing the processes of proper financial management and to address special issues related to the logistics of customer support[6].

Ricós *et al*. (2004)[7] define laboratory indicators as numerical measures of errors or failures of certain processes (successes and errors). These are quality specifications, as the performance of a process is considered satisfactory if it is within the limits established in the indicators. The objective is not to provide answers, but to indicate potential problems that need preventive actions[8, 9], allowing an analysis of the root cause that can revert in behaviors that improve results. These are valuable quality tools for quantifying quality, as they can help with accountability and assist in decision making and priority setting within companies[10]. The ISO 15189:2012 international standard for laboratories highlights the need to establish quality indicators to monitor and evaluate performance and the critical aspect of pre-exam, exam and post-exam[11].

The use of indicators has been valued in the management of clinical analysis laboratories to optimize the qualification and quantification of failures in the different laboratory processes. They allow internal and external comparisons with other services within the same characteristic, making it possible to evaluate the effectiveness and efficiency of the different stages of the laboratory testing, they are referred to in quality management as control items[7]. When processing a biological sample not suitable for analysis, an error will occur that will affect the quality and reliability of the customer's test result[10, 12-14].

In recent years, the laboratory community has followed the evidence that the pre- and post-analytical phases are more likely to errors than the analytical phase due to the internal and external quality control programs[15]. It is estimated that 46% to 68% of the percentage of laboratory errors are related to problems that occurred during the pre-analytical phase. The most prominent errors are incorrect identification, wrong sample or insufficient volume, and bad condition during transport or preservation. Furthermore, the inappropriate choice of laboratory tests or their panels can also be considered a pre-analytical error. The indicators most commonly cited in the literature, associated with this phase, refer to recollection rates[9].

This work also shows that laboratory errors can occur, among other factors, due to economic pressure, which causes team reduction; increased task flow and productivity requirements; and centralization of exams, which makes it difficult to control the pre-analytical phase of the laboratory process[12]. The cost of R$ 23,330.71, in 19 months, for pre-analytical errors could be avoided by staff training, better payment, new hires, and better facilities to increase employee productivity.

Vieira *et al*. (2011)[9] point out that the cultural aspects of the population influence the health organization in order to increase the quality levels of their processes, effectively ensuring the patients safety. Therefore, management focused on control through indicators must be observed daily, aiming to act on the errors and failures of the day-to-day nursing technicians and laboratory attendants, and not acting only when the indicator lies outside the target required by the company. Often the analysis of the cause of recurrent errors of the same employee may not be related to a technical failure, but to a personal one, which may be solved by new training programs, updating and carrying out a closely follow-up of this professional through monitoring, opinion registration forms, dialogue and understanding, with the objective of bringing out the best from the employee. The conscious involvement of the health professional is of great importance to overcome the problems and ensure the continuous improvement activity[4].

Practice benchmarking makes it possible to evaluate the performance of all processes and aims to systematically compare information, or even, a benchmark by which other procedures can be measured or judged, provided that the comparison takes place between similar institutions, but operating in different markets. There is also the competitive form, the most used, which is about comparing similar processes between direct competitors[9, 16]. Each laboratory must adapt to their reality and follow specific protocols to measure this data for continuous improvement.

Brazilian laboratories have increasingly valued and focused on the satisfaction of their customers through satisfaction surveys and feedback from physicians[17]. These surveys are available at the service units and on the laboratories' websites; they are also widely used in social networks, on company web page. However, the best advertisement for the laboratory that shows the best outcome

remains the client, as they are the one who takes the laboratory name to their acquaintances and family.

Complaints received are monitored and classified as satisfaction measures. Among the main attributes considered at the time of laboratory evaluation are: confidence in the results (reports), agility in the service (collection), cleanliness and hygiene of the place, effective delivery time of the reports, team attention and good caring for clients[18].

CONCLUSION

Clinical analysis tests are part of people's daily lives, playing a fundamental role in their lives, as they bring disease diagnoses and define the beginning, evolution and end of a treatment. In this context, the laboratories aim to be prepared to serve their clients with high quality, satisfaction and loyalty. To make all this balanced, it is essential to manage the positive and negative costs of all this work.

Cost management is necessary in any company; if not carried out effectively, the institution is at risk of bankrupt. The result of R$ 23,330.71 spent on recollections, in 19 months, should not go unnoticed and without actions by the directors and managers of laboratories, since they not only bring negative costs, but also impact on customer and physician satisfaction. Therefore, it is mandatory to administer and manage recollections, because the impact is very negative for the company in the economic aspects and in the satisfaction of customers and physicians.

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