



MANAGEMENT OF VARIABILITY IN EXAM REQUESTS: THE WORK OF RECEPTIONISTS AT THE CLINICAL ANALYSIS LABORATORY OF A PUBLIC UNIVERSITY HOSPITAL

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Summary

Hospital work involves managing several variables that arise depending on what is at the center of such contexts: the sick human being undergoing treatment. The present study was carried out in the clinical analysis laboratory of a public university hospital. It was based on a complaint from the workers themselves about delays and rework in the processing of exams. Therefore, the main objective was to expand the understanding of the work of receptionists in such a laboratory. To this end, the Ergonomic Work Analysis method was used. The main elements of the task and activity were highlighted. Numerous variabilities present in the processing of laboratory tests were identified, as well as several strategies developed by receptionists to manage these variabilities. It was observed that such strategies are important especially with regard to communication between the different professionals involved in processing the exams. Finally, the important role of receptionists in managing the variability that arises, such as the patient's clinical situation, the types of tests requested and the urgency, is highlighted.

Keywords: Ergonomic Work Analysis; Activity Ergonomics; operative strategies; hospital work.

1. Introduction

Working in hospital contexts involves several variables. Martin and Gadbois (2007) mention that working conditions in a hospital constitute a particular field of problems for the ergonomist due to what is at the center of such contexts: the sick human being. In this sense, it is also possible to highlight the association of some treatment

process. In other words, changes in the patients' health status are expected to be present. Thus, the development of activities in hospital contexts depends on the collection and processing of complex and constantly changing information (MARTIN, GADBOIS, 2007).

In the context of carrying out a supervised internship, the main author of this study followed the routine of workers in the clinical analysis laboratory of a public university hospital. Recurrent complaints from workers were observed regarding delays and rework in the processing of exams. From then on, an analysis process began aiming at a better understanding of such issues.

Guérin et al. (2001, p. 85) mention that conducting the ergonomics analysis process is a construction that, starting from demand, is elaborated and takes shape throughout the course of the ergonomic action. Thus, based on the preliminary analysis of workers' complaints, the work carried out at the laboratory reception was outlined as the object of study.

The analysis was supported by the theoretical foundations of Activity Ergonomics. As a starting point, we highlight the conceptual distinction between task - prescribed work - and activity - real work. Antipoff and Soares (2021, p. 365) interpret the prescriptions or even the objective proposed by the organization for workers as a task. Regarding the concept of activity, the authors, in reference to Dejours (2002, p. 43), explain that:

To achieve the proposed objective with the available means and under the given conditions, the worker develops an activity, which is the way in which he or she, in a work situation, relates to the proposed objectives, to the organization of work, with the means provided and with reality (ANTIPOFF, SOARES, 2021).

For Nascimento and Rocha (2021, p. 414), activity is the product of a continuous process of interaction between the subject and the environment.

The concept of operational strategies is also relevant for the development of the analysis. In the context discussed by Gemma et al. (2021), understanding strategies and operational methods helps to detect situations that could lead to errors, failures and accidents at work. Operative strategies are logical steps used to solve problems, while operational modes are actions adapted to the demands of the task and the individual's

skills, crucial to promoting safety and success in the work environment (GEMMA et al., 2021).

Therefore, the general objective of this study was to expand the understanding of the work of clinical analysis laboratory receptionists in processing laboratory tests. The specific objectives include: (i) identifying the variability present in the processing of laboratory tests, specifically in the arrival and registration of test requests; (ii) present some of the strategies developed by receptionists to deal with the identified variabilities.

2. Development

As mentioned, the present study originated in the context of a supervised internship, carried out between November 2021 and April 2022, in a public university hospital.

Taking as a starting point the complaints of workers in the clinical analysis laboratory regarding delays and rework in processing exams, Ergonomic Work Analysis (AET) was used, a method systematized by Guérin et al. (2001). Data collection was conducted using techniques and tools recommended by the method, such as direct observation of the receptionists' work activity and the collection of verbalizations.

To analyze the tasks, documents made available by the organization were consulted, such as Operational Procedures, as well as materials available on the hospital's website. Minutes of previous sectoral meetings were also examined, seeking to identify recurring topics that signaled possible previously identified causes for the problems in question.

Regarding the results of the analysis, the main variables taken into consideration by receptionists when processing exams were identified. Using process mapping techniques, 6 characteristic groups were formed based on the main actions and decisions taken by these professionals. APPENDIX A presents a flowchart designed to represent the receipt and registration of test requests at the laboratory reception for each of the identified groups.

3. Results

The university hospital where the present study was developed offers health care services through the Unified Health System (SUS), focusing on high and medium complexity. It has 296 fully functioning hospitalization beds and serves 27 municipalities in the interior of the state of Minas Gerais, covering a population of approximately 633,191 inhabitants.

To meet the monthly demand of approximately 65,000 tests, the hospital has a clinical analysis laboratory operating 24 hours a day, every day of the week. The laboratory has the capacity to perform around 250 different types of laboratory exams and clinical tests, which contribute significantly to medical reasoning, diagnosis and confirmation of pathologies.

Exams are carried out using biological samples such as blood, urine, cavity fluids, sweat, secretions, among others. The diversity of available exams is also accompanied by a wide range of time for generating clinical results: tests can present results in short periods, of approximately 90 seconds, to longer periods, of up to 7 days, depending on the exam.

3.1. The processing of laboratory tests in the hospital context

In a simplified way, the processing of exams begins with the issuance of the request for laboratory tests (PE), made exclusively by the responsible doctor. The PE contains essential information such as the patient's name, bed, medical record number, care unit, other tests requested, time for sample collection and testing, as well as other relevant clinical information. The PE is issued using the Hospital Information System (HIS), the hospital's main management system, providing management of the flow and storage of information for routine hospital services.

Once the PE is issued, it is sent, via the system or physically, to the laboratory for processing. The beginning of such processing occurs with the reception and registration of the EP, tasks of the laboratory receptionist. To this end, the laboratory management computer system, here called Laboratory Information System (LIS), is used.

It is important to highlight a central aspect for understanding the work involved in processing exams: both systems, HIS and LIS, do not work in an integrated manner, that is, data from HIS needs to be transcribed and inserted into LIS so that exams can be performed. are processed by the laboratory.

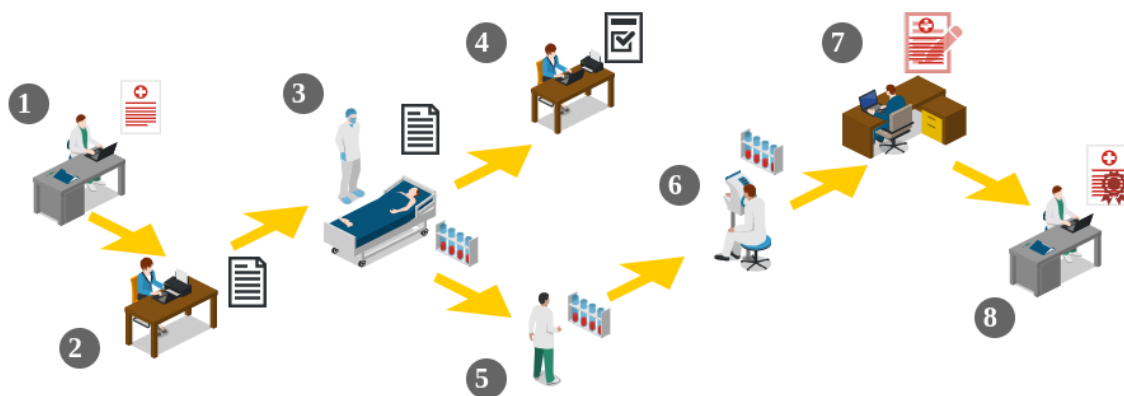
After registration, the LIS generates identification labels that must be attached to the EP (label identifying the patient - ID_P) as well as on the corresponding biological samples (label identifying the sample - ID_A). Labels offer traceability for both samples and PE.

Biological samples from patients must be labeled, transported and delivered to the laboratory separation sector, which is the responsibility of the collectors. Subsequently, the samples are sent for testing and the EPs are retained at the laboratory reception for appropriate "registration" in the LIS.

After obtaining the test results, a technical report is issued and is reviewed in the release department. The final report is then made available in HIS to the doctor.

Figure 1 illustrates the simplification of exam processing described above.

Figure 1 – Simplification of exam processing



Legend: 1 Doctor generates the order; 2 Receptionist receives and registers the order; 3 Collector collects samples; 4 Receptionist “writes off” the order with collection carried out; 5 Separation sector carries out screening; 6 Clinical tests are carried out; 7 Release sector issues report; 8 Doctor receives report. Source: Created on IcoGrams by the author, 2022

3.2. The work of clinical analysis laboratory receptionists

3.2.1. The organization of work

As mentioned, the clinical analysis laboratory operates around the clock. Several professionals work directly and indirectly in the processing of exams, organized in positions such as receptionists, technicians, managers, among others.

The laboratory reception operates in shifts starting at 7:00 am and ending at 7:00 pm. During day shifts, a receptionist occupies the position, while during night shifts, a

period characterized by a low demand for exams, laboratory technicians take on the same tasks.

During this study, work at the reception was carried out by two receptionists, one with 3 years of experience and the other with 5 years of experience in the same role. The two receptionists alternated on 12-hour shifts for 36 hours.

3.2.2. The receptionists' tasks: registration of exams and customer service

The set of prescriptions and Standard Operating Procedures (SOP) provided by the hospital organization for the work of receptionists mainly mentions two tasks: registering exams and serving the public. Guidelines also describe some procedures to be followed, as illustrated in Table 1.

All tests carried out in the laboratory must be registered in the LIS, a task carried out exclusively at the laboratory reception. The main procedures describe: the need to verify new EPs in the HIS, register them in the LIS, make identification labels and deliver them to the person responsible for collecting the samples.

In relation to customer service, receptionists are responsible for guiding doctors in viewing the results of tests processed by the laboratory and answering the phone quickly.

Table 1 – Tasks and procedures of clinical analysis laboratory receptionists

Task	Procedures
Cadastro de exames	The receptionists must check the HIS every moment for new exam requests.
	Register all exam requests during the current shift period. At the same time, make identification labels.
	Deliver the labels to those responsible for collection to label the bottles, and the labels can be made prior to collecting the material.
	Answering the bell signal must be carried out simultaneously by reception and the technical area. Reception must not come into contact with any biological material.
	The reception will immediately register the exams, generating the necessary labels and the laboratory technician will receive the biological sample, checking whether it is “compliant” to carry out the requested exams.
	“Dismiss” requests for exams carried out.
Telephone service Customer Service	Guide doctors to view results with “Released” status in the LIS adopted by the Institution.
	The telephone should be answered as quickly as possible, avoiding possible future complaints, but the more exams have a “Released” status, the lower the chances of exams being communicated by telephone.

Source: Adapted from the hospital website, 2022

3.2.3. The activity of receptionists: managing variability

The analysis of the activity showed the existence of several variables inherent to the processing of EPs at the laboratory reception. It was possible to identify different treatments depending on the type of patient, whether or not samples were scheduled to be collected, the level of urgency of the exams, among others.

As mentioned, the main actions and decisions taken by the receptionists were mapped as well as the main variables involved. The flowchart in APPENDIX A visually represents the 6 identified groups and below describes how EPs are received and registered at reception for each group.

3.2.3.1 Receiving exam requests

Receiving the EP at reception marks the beginning of the receptionist's participation in the processing of laboratory tests. The first relevant information considered for proper referral by the NP is whether the patient is hospitalized or not.

For hospitalized patients (Groups 1, 2, 4, 5 and 6), the following is as prescribed: once a new EP has been identified in the HIS, the receptionist prints it. It then transcribes the information contained in the PE and registers it in the LIS. However, in the case of exams requested from patients in emergency care, the EP is printed in the sector where the patient is and the EP is delivered to reception in person (Group 3). In this case, only the transcription and registration of the PE in the LIS is carried out.

It was observed that while in-person delivery follows the regime of individual and batch arrivals, the launch at HIS occurs punctually, but with greater concentration in the morning given that most exams require compliance with a minimum fasting period.

3.2.3.2 GROUP 1 – Requests for exams for clinical routine

Group 1 is mainly formed by the set of low urgency exams intended for the monitoring and evolution of hospitalized patients. Processing this group's PE is among the first activities of the receptionists' working day. Once the PEs that are accumulated throughout the night shift have been registered, the receptionists update the HIS throughout the day, in order to check the launch of new PEs.

However, exams in this group may or may not have a scheduled time for sample collection. It was observed that receptionists separate EPs according to scheduling or not. It is worth highlighting the use of organizing boxes and a board, shown in Figure 2. While PE without scheduling are placed in the organizing box located on the left (Figure 2-1), PE with scheduling are pasted on the scheduled collection board (Figure 2-3). The PE separated into the boxes and on the board by the receptionists accumulate until they are collected by the laboratory collection team. In other words, these are operational strategies developed collectively by the laboratory team to help organize EPs at reception, visualize EPs being processed, as well as communication between receptionists and collectors.

Figure 2 – Organizing boxes and scheduled collection board



Caption: 1 PE organizing box without collection schedule; 2 Organizer box for test requests in which the collection of biological samples is not carried out by the laboratory team; 3 Scheduled collection table.
Source: From the author, 2022

After collecting EPs at reception, collectors collect samples from patients. Afterwards, they return the PE to the receptionists and deliver the samples to the laboratory separation sector.

3.2.3.3 GROUP 2 – Requests for tests in which the collection of biological samples is not carried out by the laboratory team

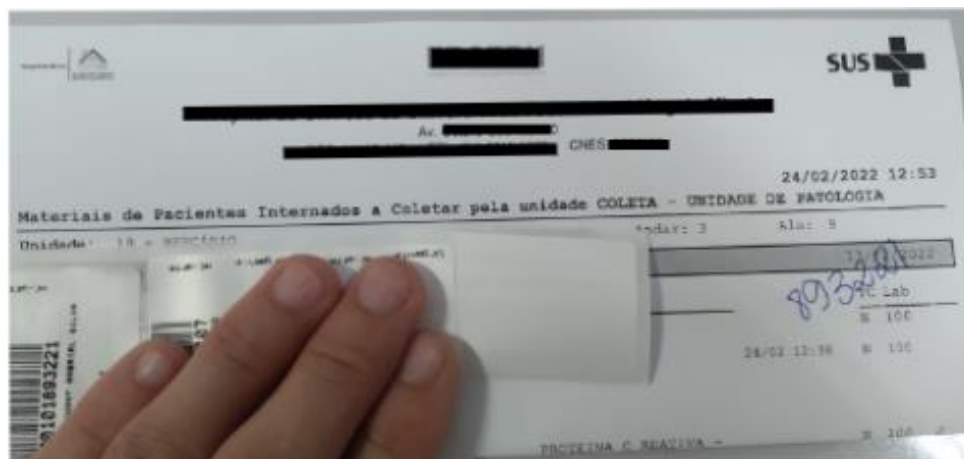
The beginning of processing a Group 2 EP is similar to Group 1. However, some of the actions taken to process Group 2 EPs differ in that they involve hospital professionals who are not members of the laboratory team. Generally, these are exams for patients admitted to units with access restrictions.

Once the EP has been registered in the LIS, it is placed by the receptionist in the specific organizing box (Figure 2-2), located to the right of the organizing box intended for clinical routine requests without an appointment. EPs are collected at the laboratory reception by professionals from the unit where the patient is hospitalized. The collection of biological samples and their delivery are also the responsibility of the team in the sector where the patient is hospitalized.

As an example of Group 2, we can mention the Nursery PEs. The receptionists reported that, usually, between 8:00 and 8:30 in the morning, a Nursery technician is sent to the laboratory to collect the EPs released by the sector's doctors. Therefore, after registering Group 1 EPs issued during the night shift, priority is given to registering EPs coming from the Nursery.

However, a variability was observed to be considered in the processing of PE from the Nursery: the ID_P identification label is pasted on a control notebook instead of being attached to the PE. In this case, the receptionists manually write down the ID_P barcode number on the printed EP, as shown in Figure 3.

Figure 3 – Nursery exam requests



Caption: ID_P identification number written in pen on the exam request.

Source: From the author, 2022

3.2.3.4 GROUP 3 – Requests for exams for patients in emergency care

As mentioned, the PE that characterize Group 3 are printed in the emergency care unit where the patient is and delivered to reception in person. In this case, the laboratory collectors collect the PE at the emergency room, collect the biological samples and go to reception to deliver them. As soon as they arrive at reception, the receptionists transcribe and register the PE in the LIS and issue identification labels. The identification labels for the ID_A sample are given to the collectors and the EPs, identified with the ID_P, are retained at the laboratory reception.

It was observed that when the collectors arrive at the laboratory reception with the EP and samples, if there is a queue for service at the reception, they are instructed by the receptionists to wait until the queue is empty. This is, therefore, another strategy used by receptionists to manage their tasks.

3.2.3.5 GROUP 4 – Requests for high urgency exams

The processing of highly urgent EPs, classified as Group 4, can be understood as an “express lane” format. It is intended for blood gas and hematology tests, carried out

on venous blood samples. These exams, which can be performed in about 2 minutes, are commonly important for taking urgent clinical measures.

The NPs in this group are identified by the receptionists based on their knowledge of the hospital's care units as well as informal clinical knowledge acquired through experience, as reported in the following excerpt transcribed from the interview with one of the receptionists:

“we go here [at the HIS] every minute and see what they are going to ask for, so we start doing it mainly from the adult ICU [...] there are doctors who arrive in a big hurry for the blood gas results, because they want determines whether the patient will be intubated or not.”

Therefore, as soon as a PE that fits into this group is identified in the HIS, the receptionists promptly print it, register it in the LIS and generate identification labels.

A fundamental strategy was observed to monitor the processing of exams in this group: the receptionists stick the ID_A sample identification labels on the corner of the computer monitor, always keeping them visible. As soon as the responsible professional arrives at the laboratory reception with the collected sample, the receptionist promptly hands over the ID_A identification label and the identified sample is sent to the separation sector.

3.2.3.6 GROUP 5 – Requests for exams in which registration is dependent on the arrival of biological samples

This group includes tests performed on urine and fecal samples, that is, samples in which collection depends on the patient's ability to provide them. Therefore, the processing of PE from this group by the laboratory occurs at uncertain times.

This way, as soon as they identify a new PE in the HIS, the receptionists print the PE and leave it on hold. Only when the sample arrives at the laboratory does the receptionist transcribe and register the PE in the LIS and generate identification labels. Again, the ID_A is delivered to be glued to the container with the sample and the ID_P is glued to the printed PE.

GROUP 6 – Arrival of samples for orders that were not released in HIS

Group 6 is characterized by the arrival of biological samples at the laboratory reception, but which, however, did not have the EP entered into the HIS. Despite the

triviality, it is observed that the decisions and actions taken by receptionists to process the PE of this group are carried out in a dynamic work context.

In these cases, receptionists must quickly discern and read the situation. Based on this reading, acquired with work experience and skills obtained, receptionists prepare to adopt different operating methods for each situation.

4. Discussion

The development of activities in hospital contexts depends on the collection and processing of complex and constantly changing information (MARTIN, GADBOIS, 2007).

It was possible to observe, through monitoring the work routines of receptionists at the clinical analysis laboratory, that the processing of exam requests is done differently depending on the information on the patients' health status, but also on several other inherent variables. the process, as well as the conditions under which the work is carried out. The list of exams carried out in the laboratory, the variation in the time required to process certain types of exam, in addition to external factors such as urgency, unpredictability of arrivals as well as the patient's ability to provide samples, constitute variables considered for a correct and agile processing of EPs. Receptionists manage these variabilities, guiding their actions and decisions from the arrival of exam requests, through registration in the LIS, until their “registration”.

The strategies developed allow the collection and transport of biological samples to occur more quickly. Organizing boxes and boards facilitate the organization of information and help receptionists communicate with other hospital professionals. Still on the strategies, one can also give an example of the simple action of folding the sheet of paper with the exam request and stapling the leaflet with the identification labels. This cooperation strategy considers the need for collectors to view information regarding the location of the hospitalized patient.

Regarding complaints of delays and rework, the starting point of the analysis, it was possible to associate them with the way in which information flows within the hospital. The deficiencies present in the flow of information become evident at the

laboratory reception because, during the registration of orders, problems arise due to the variability inherent to hospital work. This raises an alert about the working conditions and expected results of the receptionists' work, as well as the role of these workers in transmitting information that is essential for the care provided to patients. Martin and Gadbois (2007, p. 524) point out that paper tools are the product of an elaboration based on general professional practices and local options. In this sense, the discussion opens up on how the LIS is used in the analyzed hospital and, consequently, the effectiveness of the information tools available, whether manual or computerized.

Considering the way exam requests are processed, it is possible to infer that receptionists also have the secondary role of monitoring the laboratory's performance of exams. It was possible to observe, in the context of carrying out this study, that receptionists act as the front line of the meeting between various hospital professionals (nurses, stretcher bearers, residents, etc.) and the internal laboratory team, such as technicians and biomedical professionals. Occasions were observed in which receptionists were asked to inform whether or not biological samples had been delivered, for example. In other words, aware of the environment around them, receptionists indirectly monitor patient care in the hospital.

5. Final considerations

The present study, developed in the context of a supervised internship, focused on the work carried out by receptionists in the clinical analysis laboratory of a public university hospital. Complaints regarding delays and rework in the processing of exams by the clinical analysis laboratory constituted the starting point. The analysis was conducted using the Ergonomic Work Analysis method and supported by the theoretical concepts of Activity Ergonomics.

The identification of variability during the arrival and registration of exam requests showed the differences between the task and the activity and allowed to expand the understanding of the work carried out by the laboratory receptionists. The strategies developed to manage these variabilities support exam processing and optimize communication with several other hospital professionals.

The present study revealed that the work of clinical analysis laboratory receptionists involves much more than the registration of test requests, at first sight necessary due to the simple fact that the two information systems, the hospital and the laboratory, are not integrated: it involves the management of several variables. It can be mentioned that it includes the understanding and evaluation of specific situations, their appropriate referrals, and indirectly, the monitoring of the health status of patients undergoing treatment.

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APPENDIX A - Flowchart for receiving and registering exam requests

