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Value stream mapping: an application *lean* in the process of accountability in a philanthropic hospital

Mapeamento do fluxo de valor: uma aplicação lean no processo de entregas de contas em um hospital filantrópico

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ABSTRACT

Objective: This study aimed to map the value flow of medical records of a philanthropic hospital, identifying opportunities for improvements in the process.
Design/methodology/approach: A qualitative research of descriptive and exploratory bias was developed, in which the sources of evidence emerged from participant observation and documentary analysis. Therefore, data collection took place for three months in 2021, which took place in the administrative sectors of a large philanthropic hospital, and the process chosen to be mapped and analyzed was the surgical record.
Result: The analysis of the process took place from the patient's discharge to the delivery of the accounts to the typing/billing sector, where the routine of the post desks was observed and the current flows were mapped through the Value Stream Mapping tool (VSM), with several wastes being detected. The time spent in the process was approximately 56 days, after the suggested improvements and drawing up the map of the future situation, this time was reduced to 28 days. With the application of the tool, waste was identified and eliminated in the mapped process, generating a possibility of cost reduction.
Originality/value: The study stands out as it seeks to link the context of value stream mapping in a hospital space, opening space for new research and contributing to practical results.

Keywords: *Lean Healthcare*; Value stream mapping; Philanthropic hospital

RESUMO

Objetivo: Este estudo teve como objetivo realizar o mapeamento do fluxo de valor dos prontuários de um hospital filantrópico, identificando oportunidades de melhorias no processo.
Design/metodologia/abordagem: Foi desenvolvida uma pesquisa qualitativa de viés descritivo e exploratório, em que as fontes de evidência emergiram de observação participante e análise documental. Para tanto, a coleta de dados aconteceu durante três meses no ano de 2021, a qual ocorreu nos setores administrativos de um hospital filantrópico de grande porte, e o processo escolhido para ser mapeado e

analisado, foi o prontuário cirúrgico.
Resultados: A análise do processo deu-se desde a alta do paciente até a entrega das contas ao setor de digitação/faturamento, onde foi observada a rotina das secretárias de posto e mapeados os fluxos atuais por meio da ferramenta Mapeamento de Fluxo de Valor (MFV), sendo detectados diversos desperdícios. O tempo gasto no processo era de aproximadamente 56 dias, após as melhorias sugeridas e elaboração do mapa da situação futura, este tempo foi reduzido para 28 dias. Com a aplicação da ferramenta, foram identificados e eliminados desperdícios no processo mapeado, gerando uma possibilidade de redução de custos.
Originalidade/valor: O estudo destaca-se à medida que busca atrelar em um espaço hospitalar o contexto do mapeamento do fluxo de valor, abrindo espaço para novas pesquisas e contribuindo com resultados práticos.

Palavras-chave: *Lean Healthcare*; Mapeamento do fluxo de valor; Hospital filantrópico

1 INTRODUCTION

Philanthropic hospitals have been affected for a long time by certain exhaustion of their systems, in which the main difficulties faced are due to the low remuneration practiced by the Unified Health System (UHS) and the lack of resources that should be invested directly by the public power (Wernke, 2018). When a patient enters a hospital seeking medical assistance a hospital bill is generated.

In this sense, each procedure, material and drug developed and/or used needs to be described and recorded, and subsequently delivered to the billing sector, to be calculated and informed of the billing process appropriately. When there are failures in this registry, in addition to causing rework, it generates delays in the payment of providers to the organization. Thus, the improvement of these processes becomes fundamental and relevant, with a view to reducing financial losses and optimizing deadlines, and improving the quality of medical records (Oliveira, 2019). The records of procedures, materials, and medications developed/used are made in the medical record by the care team. Such information feeds the hospital account, analyzed and controlled by the administrative team. Given this, a management philosophy focused on continuous improvement and waste reduction is the *Lean* philosophy (*lean*).

Fernandes, Jesus, Silva, and Guirardello (2020) and Turati, Saes, and Vasconcelos (2019) argue about the *Lean* philosophy, which is not characterized by a cost-cutting

plan or a manufacturing strategy, but by a management strategy that applies to all organizations, including organizations in the health sector. Since these organizations are also composed of a series of processes and a set of actions, in the specific case, designed to add value to those who use it, whether customers or, in cases of health, patients (Fernandes et al., 2020, Turati, Saes, & Vasconcelos, 2019).

From this, many of the problems in hospitals are related to the lack of organization and standardization in their processes, which causes a lack of control in various sectors and can even interrupt the general development of the hospital. According to Fernandes et al. (2020), Freitas and Guareschi (2012), and Turati, Saes, and Vasconcelos (2019), the standardization of the process helps in reduce losses of the organization, since the performance of activities is maximized, and reduces the possibility of waste and failures.

Thus, it is relevant for health institutions to apply tools that enable competitive advantage, from alternatives that reduce costs, waste of time, and rework, in order to eliminate everything that does not add value to the service and increase productivity. Faced with this, hospitals have become interested in management strategies adopted in manufacturing to improve their processes and operations, because the quality of Health Services is a primary factor and, therefore, resources need to be managed more effectively. Thus, some methods and tools commonly used in manufacturing have been adapted for the health area, such as lean production (Cunha & Correa, 2013; Hicks, Mcgovern, Prior, & Smith, 2015, Turati, Saes, & Vasconcelos, 2019), also known as *Lean Healthcare*.

In this way, having knowledge and verifying the processes, managers can obtain a broader view of the whole, which facilitates the identification of sources of waste or unnecessary steps that do not add value to the service. In this sense, the use of quality tools directly assists in decision-making, since they are techniques used in order to measure, define, analyze and propose solutions to problems that interfere with the good performance of work processes (Galdino et al., 2016).

One of the most used tools is the Value Stream Mapping (VSM), a reference in the Toyota Production System. It should be noted that the Toyota Production System was the origin of this management philosophy, which today adopts the generalizable term *lean* production, *lean* production). The VSM is a tool coming from the philosophy of *Lean Manufacturing*, which assists in the development of an efficient process. According to Rother and Shook (2003) and Vieira, Menezes, Pimentel, and Juventino (2020), the mapping is divided into maps of the current state and future state. The map of the current state presents the real situation in which the company lives, being possible to identify, analyze, identify points of reduction or elimination of waste (where there is no value addition) and, from this analysis, propose the map of the future state, which shows how the process would be if the proposed improvements were implemented (Rother & Shook, 2003, Vieira et al., 2020).

That said, the article aims to map the value stream of the medical records of a philanthropic hospital, identifying opportunities for improvements in the process. The relevance of the study is the need to organize the flows of a large philanthropic hospital located in the city of Rio Grande/RS, since in this hospital the process of accountability to the billing sector is slow, which ends up negatively affecting financial income. It is also noteworthy that, with the precariousness of the UHS and the high costs of in-hospital services, a more careful analysis is necessary in relation to the collection of medical records. Such analysis can reduce the time of processes involving billing activity and seek measures to control costs at the risk of making operations unfeasible (Castilhos, 2002).

It is emphasized based on Turati, Saes, and Vasconcelos (2019), that *lean healthcare* has attracted attention, especially in spaces directed to health, since it demonstrates easy adaptation, as well as ends up engaging employees in search of continuous improvements. In addition, the research by Da silva, Nunes and Nunes (2022) is highlighted, who investigate the mapping of the value stream in a dental clinic and highlight the importance of studies focused on Lean Healthcare involving

other sectors of the area. Zeferino et al. (2019) studied the value stream in order to list unnecessary steps in a hospital disinfection space, which show that Lean presented positive results in eliminating waste of time and resources. Also, Vanichchinchai (2023) explores the relationships between leadership and culture in lean hospital spaces with human resources, these elements being relevant for improving processes.

Therefore, the study is organized in six sessions, after this introduction. In sections two and three, the theoretical basis for lean healthcare and Value Stream Mapping. Then, in the fourth section, the methodological procedures are highlighted and in the fifth section, the analysis and discussion of the results are presented. Finally, in the sixth section are the final considerations, limitations, and suggestions for future studies.

2 LEAN HEALTHCARE

The conceptual basis of philosophy *lean* it is derived from methods developed in manufacturing, which aim at the systematic elimination of waste, reduction of *lead time*, and customer satisfaction through better use of resources (Fernandes et al., 2020, Turati, Saes, & Vasconcelos, 2019, Shiver & Eitel, 2010). In *lean healthcare*, it aims to improve the way hospitals are organized and managed through a series of concepts, techniques, and tools (Fernandes et al., 2020, Graban, 2016, Turati, Saes, & Vasconcelos, 2019). Thus, health professionals and managers from several countries have adopted this management philosophy in order to reduce waste and costs, in order to optimize financial performance and sustainability, in addition to adding value to the service provided (Andrea Matteo, Ianni, Lega, & Sargiocomo, 2015; Fernandes et al., 2020; Turati, Saes, & Vasconcelos, 2019).

Some authors argue that the application of *lean healthcare* is broader, not only being a manufacturing strategy or cost reduction plan, but a management strategy that applies to all organizations, including the health sector, as it is related to the improvement of processes, composed of a series of actions aimed at creating value

for those who use (Turati, Saes, & Vasconcelos, 2019; Womack, Byrne, Flume, Kaplan, & Toussanti, 2005). Given this, as well as in industries, the health sector also needs to meet high-quality requirements, that is, have flexibility and speed, in addition to high safety standards (Turati, Saes, & Vasconcelos, 2019).

According to Khlie, Serrou, and Abouabdellah (2016) and Turati, Saes, and Vasconcelos (2019), health organizations constantly face the challenge of providing high-quality services in their environments, but with limited resources. Therefore, it becomes relevant to benefit from the elimination of waste, proposed by lean approaches. Thus, in in-hospital process improvement practices, *Lean Healthcare* has been an important ally, since it helps to improve performance and a more efficient flow (Andrea Matteo et al., 2015, Turati, Saes, & Vasconcelos, 2019).

Borges, Tortorella, Martínez, and Thurer (2020) point out that *lean healthcare provides* a new way of acting within hospital spaces, by encouraging the participation of all in order to meet the needs of patients, optimize time, minimize costs and increase the quality of services provided. In this environment, Fernandes et al. (2020) and Turati, Saes, and Vasconcelos (2019) claim that *lean healthcare* optimizes workflow, reduces waste, increases the satisfaction of both patients and professionals, as well as improves the financial results of institutions.

According to Turati, Saes, and Vasconcelos (2019), although the tool has not been developed especially for hospital spaces, its suitability is possible, which should focus on looking at people, with the intention that they perceive the relevance of the processes and engage with the possibilities for improvements. In this sense, "*Lean Healthcare* requires observation and criteria for choosing improvement tools for each use case. This situation arises from the differences existing within the complex health system " (Turati, Saes, & Vasconcelos, 2019, P.86).

From the point of view of lean logistics in healthcare, one must first understand what adds value or not to the patient. According to Ohno (1988), this is a challenge, since transportation itself is a waste activity. Therefore, to optimize internal logistics

through *Lean Healthcare*, a study is needed on the flow of information, materials, and clients/patients, to identify activities that add value or not (Vieira et al., 2020).

Table 1 – Waste lean gifts in health

Waste	Setting	Exemples in health
Defect/ Error/ Rework	Frequent errors in processing information or time spent doing some activities incorrectly.	Medication errors, surgeries performed on the wrong limb, or lack of information in the patient's medical record.
Overproduction	Do more than the defendant or before it becomes necessary.	Prepare medications in search of accelerating their demand or perform/repeat unnecessary tests.
Transport	Unnecessary movements of goods or information, resulting in wasted time or cost Generation.	Excessive transport of patients or medicines due to *layout* unsuitable, which may cause wear or loss of materials.
Standby	Waits for the next event to occur or next work activity.	Employees waiting for information, patients or work to be done; patients waiting for consultation, tests or discharge.
Inventory/ Stock	Cost of excess inventory is represented in financial costs, storage, and transportation costs.	Supplies or drugs that are out of date or laboratory results to be analyzed.
Movement	Unnecessary movements by employees within the system itself.	Or administrative staff walking in excess due to inefficient planning of the *layout* of the institution.
Super Processing	Do something with higher quality than necessary, something unnecessary with ineffective methods or extra processing.	Filling out duplicate documentation, and information collected, but not used.
Human potential	Competencies, capabilities, and skills of employees that are not used to improve processes.	Employees who are demotivated by lack of opportunity stop making suggestions for improvements.

Source: developed by the authors (2022) based on Graban (2016)

According to Graban (2016), it is possible to fit activities that do not add value to the customer into eight types of waste: (I) defect; (ii) overproduction; (iii) transport; (iv) waiting; (v) inventory; (vi) movement; (vii) overprocessing; and (viii) human potential. Table 1 below shows concepts and examples of these eight wastes *lean* present in health services. It should be noted that the types of waste were not proposed by Graban but by Ohno. The following table illustrates the types of waste in the context of Health, presented by Graban (2016).

It should be noted that one of the main advantages of using lean in hospitals is the reduction of waste and errors. By eliminating unnecessary tasks, employees can dedicate themselves to activities that add greater value to the hospital (Fernandes et al., 2020). Therefore, when considering the lack of resources and the high hospital expenses faced with the need to care for patients, it is necessary to investigate the origin of waste related to material resources, equipment, processes, physical structures, and human resources, both in public and private hospitals (Castilho et al., 2011).

2.1 Lean Office in Healthcare

O *Lean Office* was created to integrate existing management tools and techniques, which are based on the philosophy of *lean*, being adapted to the administrative sector with the purpose of reducing and eliminating waste, and adding quality and efficiency linked to the flow of information (Greef, Freitas, & Romanel, 2012). In the perception of Womack et al. (2005), to maximize added value and reduce waste, representatives of health institutions need to evaluate processes from the point of view of what is valuable for the customer from the identification of each step of the process/flow, in order to make them leaner.

In this context, the adoption of systems *Lean Healthcare* in non-manufacturing areas represents a huge potential to improve its structure. Thus, Tapping and Shuker (2010) propose eight steps for the implementation and maintenance of a *lean office,* as shown in Table 2.

Table 2 – Steps for the implementation of lean office

Step	Description
1. Commit to the lean	Senior management and all employees should support lean transformation efforts to reduce and eliminate waste. Therefore, teamwork must be stimulated so that everyone involved in the application of lean concepts has a commitment.
2. Choosing the value stream	It is understood that what is being created has some value for customers, who are willing to pay. In addition, the flow refers to a series of activities necessary to perform the service requested by the customer. In this case, the step involves selecting the value stream in such a way that, in addition to observing the individual process, the previous and subsequent processes that will be impacted are also observed.
3. Learn about the lean	Each organization has a different learning process for learning, which makes it necessary to explain concepts and tools to employees. Such knowledge on the part of employees can emerge from courses and delivery of materials. However, it is necessary to develop a training plan, because each person learns in one way.
4. Map the current state	It consists of a visual representation by means of symbols or icons of the flow in general. For good mapping, one must observe and understand the value stream and start it at the point closest to the customer and then return to the initial value stream process or activity.
5. Identify the metrics of lean	The Selected Value Stream will always have a specific indicator and will be determined based on this value stream. In search of determining an index lean effective, one should look for the one that allows stratification into components that address the identified wastes. However, indicators should be easy to understand and collect data.
6. Mapping the future state	Everyone involved in the process should collaborate with ideas for the plan and to achieve the future state, it should be understood as a process ofvolution.
7. Create continuous improvement plans	This is a fundamental step, as it allows improvements and that the work efforts are recognized. Therefore, in order to implement the idea of improving the value stream, it is necessary to divide it into several stages.
8. Execute continuous improvement plans	For a successful transformation in an organization, people must always look for ways to improve the value stream. In addition, it should be noted that every plan can be improved, so it needs to be adequate and adjusted.

Source: developed by the authors (2022) based on Tapping and Shuker (2010)

It is noticed that the sequence of items listed in Table 2, despite being similar to the stages of lean Manufacturing, maintains its primary focus on the flow of information. Thus, to assist in the implementation of the philosophy lean, a number of tools and techniques are used for the reduction/elimination of waste or activities that do not add value, as well as VSM.

3 VALUE STREAM MAPPING - VSM

Eliminating non-value-adding activities along with other waste, e. g., unnecessary delays, excessive documentation, and waste of materials help establish a "value stream" of an analyzed process. Rother and Shook (2003) state that the value stream is every action that transforms and transports the product to customers through channels, regardless of adding value or not. Rother and Shook (2003) also point out that through its adoption, all flows of materials and information are mapped for communication purposes, business planning, management of change processes, and improvements. This flow can be macro, from the origin of the raw material to the final consumer, or micro, from the stock of the raw material to the stock of finished products (Da Silva, Nunes, & Nunes, 2022, Rother, & Shook, 2003).

According to Vieira et al. (2020), the VSM is used as a means to differentiate the phases that carry value or not to the process. Thus, we seek to create a visual map for better visualization, which facilitates the understanding and detailing of such processes. Thus, after its construction, questions about 'why' and 'how' usually emerge among the team involved. Cardoso (2020) highlights that it is about designing the steps that involve the process sequentially and identifying waste in order to propose improvements later.

According to Gabran (2016), the VSM is a popular tool that helps hospital managers see the full picture of departmental boundaries. It is basically drawing the steps of the process from the current state of the organization, with the identification of bottlenecks and waste points to later map the future state, where these processes

become visible opportunities for improvement and promote a better understanding of actions that should be implemented.

For Rother and Shook (2003), the VSM is a tool that supports the structuring of a lean production system. Therefore, the authors point out reasons why mapping is important to reduce waste, among them:

- Provides visualization of a set of processes (full flow);
- dentifies sources of waste in the value stream;
- Provides an easy-to-understand language for handling processes;
- Flow decisions become visible for future discussion;
- Brings together lean concepts and techniques, avoiding implementing techniques in isolation; and
- It demonstrates the relationship between information flow and material flow.

Still, according to Rother and Shook (2003), to make the map of the current state efficient so that it more easily achieves the desired objectives, it becomes necessary to collect information along the processes and flows. Thus, the points to be improved are noted, identified, and mapped. The mapping takes place through a visual representation, based on symbols to represent the work activities and information of the specific flows. For the process to be successful, it is necessary to observe and understand the flows, continuing through the point closest to the customer and then returning to the initial process of the value stream (Tapping, & Shuker, 2010). Therefore, initially, it is not necessary to add all the observed details, but the essential ones of the process.

On the other hand, the map of the future situation aims to identify and eliminate sources of waste, building a productive and continuous flow so that only what the customer needs and wants is produced (Rother, & Shook, 2003). To carry out this mapping, accurate analysis of the map of the current situation is essential, in order to solve the observed problems. Thus, according to Rother and Shook (2003), it is necessary to understand the main needs of these customers. In addition, Tapping and

Shuker (2010) argue that it is necessary for those involved in the activities to collaborate with ideas for the elaboration of the map of the future situation, understanding the process as an opportunity for evolution.

4 METHOD

The present study is qualitative research, framed as descriptive and exploratory (Augusto, Souza, Dellagnelo, & Cario, 2013; Minayo, 2016). The object of study for the development of this research was a large philanthropic hospital, located in the city of Rio Grande/RS, a reference for 22 other municipalities. This hospital is aimed at medium and high-complexity care in Traumatology, Neurology, Oncology, and Cardiology, among others. It should be noted that the hospital has a staff of approximately 1,250 contracted employees and around 100 service providers. It has 300 beds, including surgical, clinical, obstetric, pediatric, intensive care unit, and complementary beds, which are distributed in two hospital complexes.

The sources of evidence emerged from participant observation and document analysis. Data collection was carried out in approximately four months with the direct action of the researcher, who is a collaborator of the hospital in the billing sector. In this situation, given the availability of a large amount of information, it was decided to analyze the periods of one quarter (June, July, and August) of the year 2021.

The observations occurred in the administrative sector of the hospital units, where there was monitoring, analysis, and mapping of the entire process of collecting documentation/medical records. The observations began with the observation of the units that were supposed to carry out the process of delivering the medical records, but this was delaying up to 60 days. Thus, observations and informal conversations were made with the post secretaries who work directly with the medical records.

During data collection, a field diary was used to make notes about what was perceived during the collection. Secondary data were also collected, through access and analysis of documents that were in the bin and were late delivery. The surgical record

was the focus of the study since it is the one that takes the longest to be processed due to various 'bureaucratic' issues, which highlights the need to optimize the process. It is also noteworthy that at the end of each day, there was the organization of all the information that was obtained, in order to have greater control over the data, which facilitated the analysis process.

In addition, the documentary sources were based on operational procedures, such as the control of hospital discharges/month, the number of discharges/month in each health insurance, and the accounts not invoiced by competence, which served to complement the observations. From these data, a map of the current state of the sector was prepared, where possible occurrences of failures in daily processes can be observed. After having knowledge of all the stages, the data available in the hospital were studied, through internal systems for checking discharges by periods, and delivery control systems, among others. It measured the amount of time spent in each stage where the medical record was stagnated waiting for the return of signatures of healthcare professionals, test results, Surgical reports, and other documentation that was lost during hospitalization.

5 THE PHILANTHROPIC HOSPITAL: UNDERSTANDING THE REVENUE STREAM

From the moment a patient enters the hospital, a hospital account is generated, in which billing begins. Each procedure, tests, drugs, and material need to be accounted for in the medical record. This medical record is physical, that is, it is necessary to print all the documentation with the proper signatures and stamps of the care professionals and attached to the patient's folder for the construction of the same.

The institution has two hospital complexes, the first General hospital, and the second cardiology/oncology hospital, with an average of approximately 965 discharges/month, among UHS patients, health insurance, and private practice. Table 3 shows a statement of discharges by health insurance and competence:

Table 3 – Quantitative of discharges by Competence and Health insurance

General Hospital and cardiology / oncology Hospital			
	June/21	**July/21**	**August/21**
UHS	663	700	737
Health insurance	204	198	209
Private Practice	58	72	55
Total	925	970	1.001
Average discharges /day	30	31	32

Source: prepared by the authors (2022)

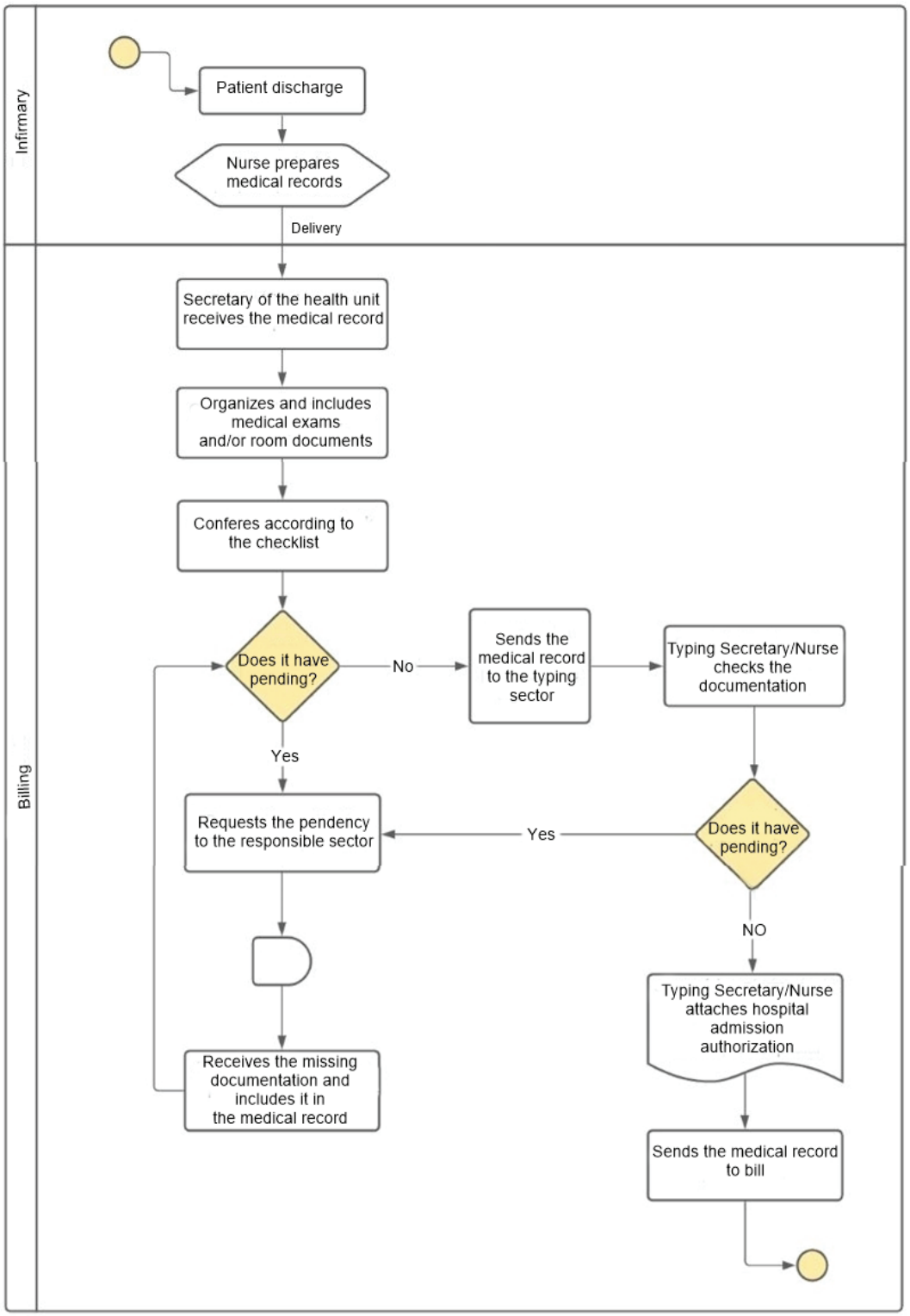
In each unit, there is a post secretary, with the responsibility of conference and assembly of the medical record. Along with the medical record, all prescriptions/ evolutions, exams, and operating room sheets are attached to later be delivered to the typing/billing sector and then the final account of that patient is processed.

When arriving at the typing/billing sector, the data for the calculation of this account go through another conference, in the cases of UHS accounts this conference is done by a secretary who is next to the typing sector, and in accounts of Health insurance by a nurse, being carried out a “pre-audit”. In cases of errors, this account is returned to the post secretary, and when the accounts are correct the secretary/ nurse attaches the hospital admission authorization document and continues billing the account.

According to the system’s operational technical manual, The Hospital Information System (HIS), made available by the Ministry of Health, for UHS patients these medical records require a hospital admission authorization (HAA) and the billing period is a maximum of three months, also counting from the date of discharge of the patient.

It is important to note that this sector has a high demand for service, due to being completely manual and dealing with large amounts of documents. Sometimes, some documentation ends up being lost, generating a rework in the reprint of new documents. Figure 1 below shows the flowchart that represents the current process from the patient’s discharge to the delivery of the medical record to be invoiced:

Figure 1 – Flow chart of the medical record delivery process



Source: prepared by the authors (2022)

As a rule, these records should reach the billing department within 48 hours after discharge, to be invoiced within their own competence. However, due to the high

demand attached to the secretariats, this deadline is not met, which generates a delay that sometimes exceeds 60 days. Thus, Table 4 shows a statement of accounts not invoiced by competence and health insurance:

Table 4 – Accounts not invoiced by competence

Accounts not invoiced by competence			
	June/21	**July/21**	**August/21**
UHS	447	551	626
Health insurance	112	108	137
Private Practice	0	0	0
Total	559	659	763

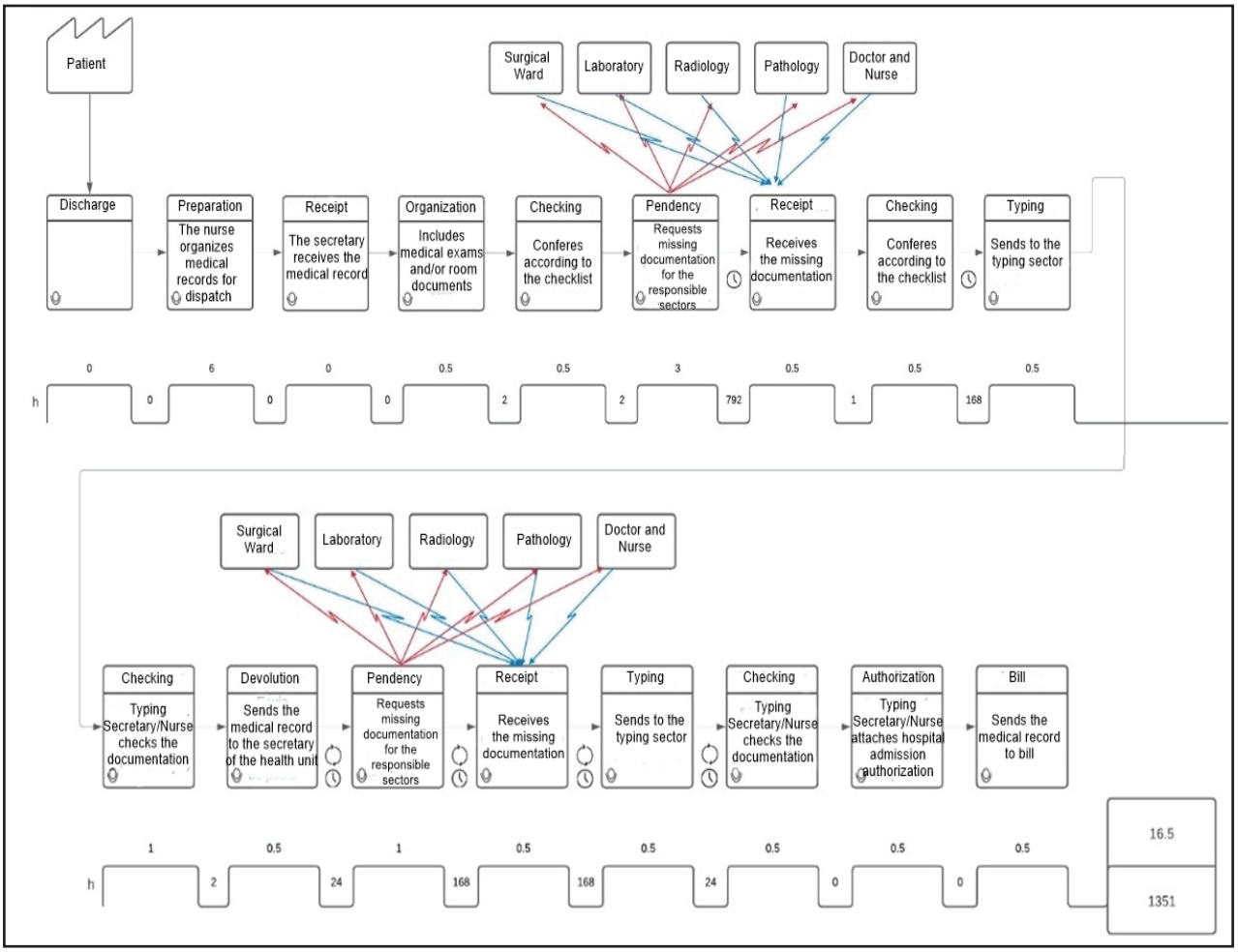
Source: prepared by the authors (2022)

5.1 Mapping and exploring the processes: problems encountered in the current state and possibilities for the future state

The map of the current state is a snapshot of the value stream of the medical record, obtained from the post desks. Thus, from the construction of the VSM, it was possible to see the inefficiencies of the processes from the point of view of the medical records. In view of this, it was identified that while the patient is hospitalized, the medical record is the responsibility of the medical and nursing team, which are responsible for the evolution, checks, materials, and medications dispensed to each patient, respectively. Due to the large flow and turnover of patients admitted to the floors, the main flaw found was the loss of documentation, which entails reworking in reprinting new documents.

It is noteworthy, based on the application of the VSM tool, that it was possible to visualize the flow of information and build a map of the current situation, facilitating the identification of waste points, which is demonstrated in Figure 2.

Figure 2 – Map of the current situation



Source: prepared by the authors (2022)

Thus, based on the analysis of the current situation, operational failures were noted in the value flow of the medical record, due to the lack of documentation due to misplacement, lack of signatures of professionals, or delay in the delivery of exams and room sheets, where it generates a rework in reprinting and requesting these demands to the responsible sectors. However, the biggest problems identified were:

1. The medical record was requested several times during the day, so it was never in the place it should be;

2. Lack of necessary documentation such as Anamnesis and discharge notes, which are mandatory documents in the medical record, but doctors do not fill out the

due form at the time of hospitalization and departure of the patient;

3. Examinations carried out are not included in the medical record, due to the delay in delivery of the responsible sectors;

4. The room sheets (when performed surgical procedure) took an average of 20 days to be delivered to the stations. Primarily, because they are medical issues (signatures and stamps). Secondarily because they are suppliers of materials (Orthoses, Prostheses, and Special Materials - OPSM) used in the surgical procedure, of which the suppliers only sent the invoices and labels by mail;

5. Lack of information in the prescription, causing most of the time there is a return of the billing accounts to the secretarial sector for correction;

6. The process of delivering accounts to the billing sector is extremely slow, due to the fact that it is completely manual. Thus, one of the problems is the lack of an integrated information system;

7. Lack of initial training, where professionals are hired and soon inserted into the routine to meet the desired demand;

8. Some doctors work once a week or every 15 days, making it difficult for secretaries to communicate with them to fill out medical records.

It is worth noting that all medical records “stagnated”; it characterizes the waste of waiting. That is, in the sector it is something that does not add value to the hospital, since these patients have already received the due care, the institution has already borne the due expenses for the care provided and, on the other hand, the delay in the delivery of medical records generates a “delay” in the financial receipt, which contributes to a possible imbalance in the management of the hospital. From the map of the current state, critical stages of the operation were identified and, with this, we sought to propose improvements for such problems, which are listed in Table 5.

Table 5 – Suggested Improvements

Suggested improvements	Expected Results
Organization of physical space	Availability of shelves and bins for centralization of documents in only one place, reducing future losses of the same.
Determination of mandatory document	At the time of assembling the medical record, the documents will already be ready.
Daily billing to the sectors responsible for conducting the exams and printing them directly in the system	Decreased waiting time for medical records since they were "stagnated" waiting for their arrival.
Placement of a post secretary within the operating room	To conference the room sheets immediately after the end of the procedure, detecting the problems in the same act and correcting them with the professionals who are still in the sector.
Negotiation with OPSM suppliers	Send invoices and labels by e-mail and print them at the hospital itself, reducing the waiting time for them.
Training	Conducting training, at least once a month to share knowledge, and pass on improvements and changes.
Inclusion of medical references	To determine in each service unit a doctor "responsible" for resolving medical pending issues in your sector.
Contracting an integrated Hospital Information System	With the implementation of an integrated system, it is possible to monitor the patient's flow, reduce the amount of paper, as well as make the process faster and more efficient.

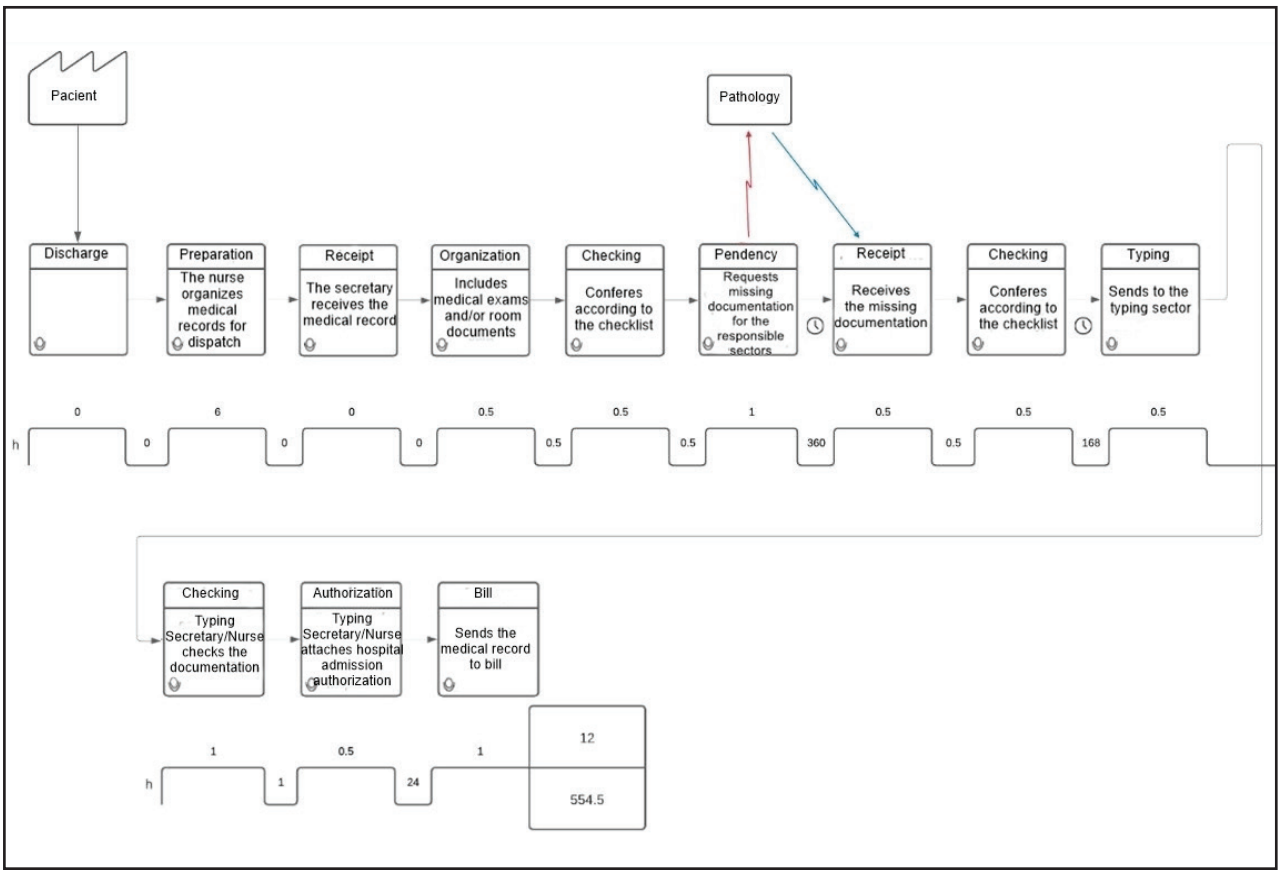
Source: Prepared by the authors (2022)

In view of the above, in conjunction with the layout proposed, a map of the future state was drawn up with the prospect of reducing the time spent on the operation since according to the suggested improvements it would avoid possible rework. Thus, Figure 3 presents the future state map, which contemplates the new time spent in the processes.

Based on the discussion in the analysis of the future situation, it is noted that it meets what was stated by Tapping and Shuker (2010), where to implement and build constant maintenance, everyone needs to be involved and committed to the process,

supporting transformation efforts to reduce and eliminate waste. Still in the same line of thought, investing in training and encouraging the completion of specific courses in the area becomes paramount (Tapping & Shuker, 2010), because in the case of the institution, if each one knew and respected their position, there might not be so much reworked.

Figure 3 – Map of the future situation



Source: prepared by the authors (2022)

Based on the discussion in the analysis of the future situation, it is noted that it meets what was stated by Tapping and Shuker (2010), where to implement and build constant maintenance, everyone needs to be involved and committed to the process, supporting transformation efforts to reduce and eliminate waste. Still in the same line of thought, investing in training and encouraging the completion of specific courses in the area becomes paramount (Tapping & Shuker, 2010), because in the case of the

institution, if each one knew and respected their position, there might not be so much reworked.

It is argued that such identified problems would hardly be diagnosed by other models because according to Rother and Shook (2003) and Vieira et al. (2020), this is a tool that provides an easy-to-understand language and allows organizations to clearly analyze their production flow on a single map, which makes it possible to see the process as a whole and not only in isolated processes, as well as detect waste points. In the case of the hospital, it was possible to visualize the lost time that the medical record was "stagnated" while waiting for mandatory documentation, which opens space for the adjustment of its processes, as it clearly highlights the points that contribute least to the development of the value stream.

6 FINAL CONSIDERATIONS

Objective: This study aimed to map the value flow of medical records of a philanthropic hospital, identifying opportunities for improvements in the process. It was identified that the process of delivery of accounts was slow, that is, there was a large *lead time*, which caused delays in collections and, automatically, the delay in transferring the financial amount to the hospital. Given this situation, an analysis of the process from the patient's discharge to the delivery of the accounts to the typing/billing sector was carried out, in order to observe the routine of the post desks and map the current flows through the VSM tool, and several failures/bottlenecks were detected.

As seen on the map of the current situation, the time spent was approximately 56 days, after the suggested improvements and drawing up the map of the future situation, this figure fell to 28 days. It is concluded that the proposed model met the intended requirements, as estimated to reduce the delivery time by half. The possible limitations found can be explained by the fact that it was not possible to implement these actions immediately, as well as the data source was limited to observations and

documentary data. As a suggestion, a new flow is proposed, reorganizing the processes that generate and do not generate value, inserting the following improvements:

a) Continuous training (capacitation) for all secretaries, making them more proactive and organized;

b) Organization of the space, because in a hospital institution the organization is important, with adequate facilities, contributing to the quality of service, reduction of document losses and future revenue evasion;

c) Inclusion of medical references, to improve the care issue and resolve medical issues since there are doctors who only appear at the hospital every 15 days; and

d) Daily charge to the sectors responsible for patient examinations.

Finally, it is worth highlighting the relevance of an integrated hospital system and the implementation of the Electronic Medical Record (EMR), because with these technologies it would be possible to monitor patient flow, reduce the amount of paper, make the process faster and more efficient and contribute to quality hospital management. In view of this, mention is made of the relevance of optimizing processes and documenting them in order to obtain greater control of how they should occur, more easily identifying bottlenecks and possible improvements. Furthermore, the implementation of the EMR must be recognized and understood by the users, in order to facilitate the work carried out, revealing itself as a tool to optimize the processes, reducing unnecessary and/or repetitive activities.

As a suggestion for future work, the creation and execution of continuous improvement plans are recommended, as they allow improvements and recognition in the work environment and, consequently, changes in the institution. Thus, it is also suggested to implement the VSM in other hospital sectors, since this tool is effective in identifying failures and reducing waste.

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1. Definition of research problem	√	√	√		
2. Development of hypotheses or research questions (empirical studies)	√	√	√		
3. Development of theoretical propositions (theoretical work)	√	√	√	√	√
4. Theoretical foundation / Literature review	√	√	√	√	√
5. Definition of methodological procedures	√	√	√		
6. Data collection	√				
7. Statistical analysis	√	√	√		√
8. Analysis and interpretation of data	√	√	√		√
9. Critical revision of the manuscript			√	√	√
10. Manuscript writing	√	√	√	√	√

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