Hospital Logistics - A Tool for an Increased Productivity: Hospital Universitario Mayor (MEDERI) Case

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Abstract

Nowadays the Logistics has increasingly become a key tool in business competitiveness and sustainability. As Sahid C. suggested in the document "*Logística pura más allá de un proceso logístico* (1998)", logistics is a tool for the design, development, management and integration of internal and external organization processes that seek greater competitiveness and know the needs of the final costumer. The paper present some logistical tools that have been implemented in the emergency department of the "Hospital Universitario Mayor (MEDERI)", where from proactive actions, based on forecasts and reactive, as plant redistribution, redesign and process tracking, there have been significant improvements in the timeliness of the service; thus healthcare logistics, provides efficient and effective solutions in a chaotic micro universe, such as health institutions.

Keywords
Logistic, service, forecast

1. Introduction

Bowersox affirms that a big mistake has been writing about supply chain (and logistics) "without having set out a formal definition" (1) and that in previous decades, logistics "moved from warehouses and transportation bays to the boardrooms of the major companies in the world" (1). Unfortunately, in some hospitals, these concepts are still not clearly understood and logistics has not even reached the warehouse. For that reason, it is considered important to display a case where logistics coupled with healthcare processes contributes to improvements in the provision of the service. According to the Council of Logistics Management in Service Industries, the logistics activities developed in a hospital are: "patient services, facilities programming, material handling, supplies, surgery rooms scheduling, drug purchase, medical records, inventory management, admission programming, emergencies, transportation, capacity planning, surgical equipment programming, meals preparation and delivery, generic supplies, nursing scheduling, and emergency programming, each having a similar importance" (2).

In this case, we used logistics to accelerate the departures of the hospital emergency service. Therefore, it is essential to distinguish among hospital discharge "… a patient, who has been previously hospitalized (i.e. at least one stay), vacates the bed that he/she had been assigned in the center."(3); deferred discharge "is the one that takes place when, from the clinical standpoint, a patient is discharged from the hospital, but continues occupying a bed for a nonmedical problem" (4); and egress "is the departure of the patient from the ward to any of the following destinations: house, another health institution, another service, amphitheater, voluntary discharge, permission or escape" (5).

In most companies, having high occupancy rates is considered appropriate. However, Chase affirms that "…the hospital emergency wards and the fire stations should seek a limited use due to the high degree of uncertainty and the life or death nature of their activities" (6). In most health service provider institutions (IPS, which stands for "Instituciones prestadoras de salud" in Spanish), this is not feasible due to various causes, such as: recruitment frameworks with the health promoting companies (EPS, which stands for "Empresas promotoras de salud" in Spanish) and legal regulation, among others. In Colombia, it is common to find headlines similar to "Emergency department is under coma due to overcapacity" (7) or "the lack of beds makes emergency wards collapse in hospital network" (8), which supported by the government's official figures make reference to occupancy rates up to 252% (8).

The literature on the subject mentions several cases, where the beds demand exceeds the service capacity (9). In some cases, this is due to the health system's structural factors and in other cases, due to demographic factors, but in many cases this is due to inefficiencies in the hospitals' departures system, which delay the egresses preventing the beds to be used more efficiently. If to this situation, we add the fact of involving the healthcare staff in activities outside the provision of that service, cost overruns are generated, which could be avoided (6).

Having said that, emergency saturation, which affects most countries regardless of their socioeconomic level (10), has multiple causes. Some of the most relevant are: the duty to treat non-urgent pathology patients, the referral of elderly people with pluripathologies and certain seasonal peaks (11). These aspects exceed the demand and the operational capacity of the service, which causes long waits by patients generating a perception of a poor-quality service both in patients and their companions as well as a bad working environment for the service staff, in some cases, affecting the patient's health (11).

If to the structural overcapacity that has been present in the health system we add the economic crisis and the demographic pressures that suppose a dramatic increase in the use of hospital beds (12), it is imperative for the health service provider institutions (IPS) to be more efficient in the management of this resource since the possibility of increasing infrastructure generates very high costs and sometimes is not feasible. The solution should not rely solely on investments (10); the different processes should be analyzed and improved continuously.

It is important to highlight that one of the processes that generates problems in a number of health service provider institutions (IPS) is related to departures of the emergency service as it is common to find patients who remain occupying a bed even though from the clinical point of view, they can leave the hospital (4). This situation impedes the use of beds by new patients (13) causing significant inefficiencies in the system, which prevent the proper use of their capacity and generate discomfort and complaints by patients and their relatives. So the redesign of processes

and their follow-up may cause significant decreases in the stay times allowing capacity improvements that are visible in the short term with low implementation costs and sometimes without generating any cost overrun. The generated improvements have an impact on increased profits for the institution and considerably improve the system users' perception.

2. Development of the research

The first research stage consisted in making a diagnosis of the whole process in general, identifying areas for improvement and creating a scenario on which the proposals to work on were set out. The discharge process was divided in four successive phases, which allowed organizing the whole process and defining the responsible staff within it. The following figure shows the raised phases for all the Mederi's hospital discharge process.

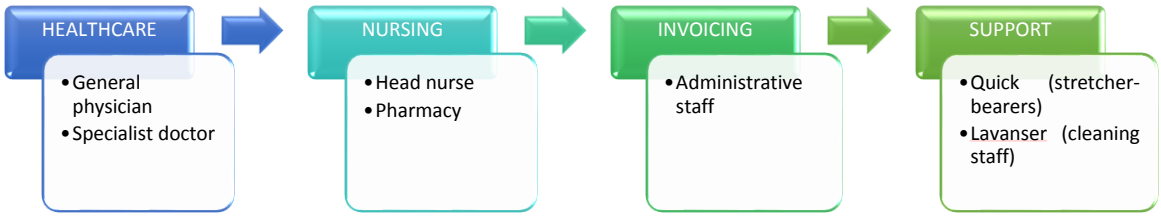

Figure 1.Phases for hospital discharge process.

Initially, a sample of the overall process, which involves the four aforementioned stages, was carried out. This first sample indicates the average time in which the whole discharge process is developed, and simultaneously bottlenecks and idle times are identified. From the first sample obtained, the total hours were classified into four ranges, where the percentage of the beds obtained in the sample was distributed accordingly.

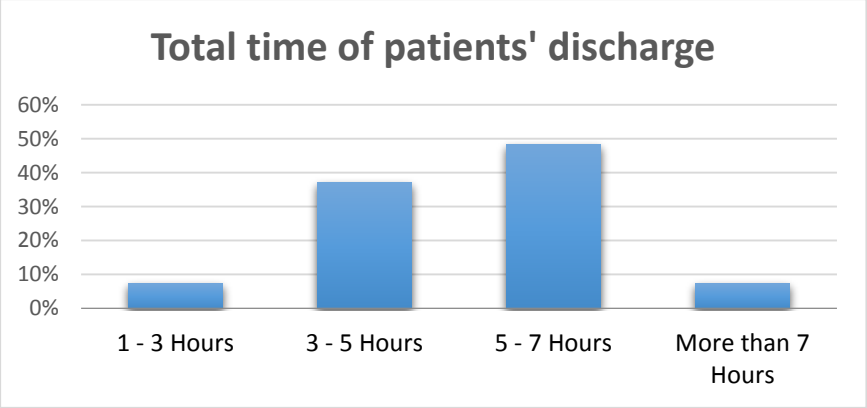

Figure 2. Total time of patients´ discharge

From the sample obtained, on average, 56% of the hospital departures had delays higher to five hours in all the process related to the patients' discharges; only 44% of the egresses took place in less than five hours. Considering the first sample obtained, it is evident that there are downtime, which do not allow to generate value to the operation and that affect not only the patients' perception (quality), but also the hospital's operational flow.

Given the magnitude of each of the aforementioned stages and in order to delimit this research a little bit more, a value engineering box was used as a method to help determine the most critical area of all the hospital discharge process. The factors to evaluate and their respective weights were previously chosen by the hospital managers and a group of stakeholders, taking into account the hospital's mission and the aspects that this attempts to improve and strengthen within its service.

Table 1. Engineering box

			MEDICAL DISCHARGE STAGES							
		Wt	Healthcare		Nursing		Invoicing		Support	
FACTORS	Re-proccesses	7	2	14	3	21	3	21	3	21
	Downtime	8	3	24	3	24	1	8	2	16
	Value production	6	3	18	2	12	2	12	2	12
	Control indicators	9	4	36	2	18	3	27	1	9
	TOTAL		92		75		68		58	

From the engineering box, the lowest weighting stage was chosen based on the assumption that the lower valuations assigned to each stage according to the factors correspond to the low impact of the factor within the stage in general. On the whole, the engineering box shows that the four phases have downtime in the development of their processes. It is plain knowledge that reprocesses remain a headache for some areas. Regarding the value production, an important item for the hospital, there is no fulfillment to 100%. That is why it is important to strengthen this aspect throughout the process, as this has a direct influence on the patient's perception about the service. The control indicators that are present in a lot of the discharge stages are highlighted, indicating that the hospital is very interested in making continuous improvement processes since it is being constantly measured.

As for the overall result that the box engineering yielded, the support stage is the most critical one of the process, so it will be the main phase in the development of this research. According to the results in each of the alternatives, it can be said that this is an area that does not have clear indicators to measure the process, has a lot of downtime in the functioning, lacks a clear value production, and the reprocesses are tangible. By having such a low result, it can be affirmed that the support phase will be one of the areas where improvements will significantly impact and its results may be evident more easily.

The first diagnosis that was made was focused on analyzing two samples carried out at different periods and which aimed at displaying a comprehensive overview of the entire healthcare operation behavior. Under the first analysis, process interfaces started to be created, which aim at creating synergy, order, and greater traceability of the whole operation. This process management, which is the starting point to work on this phase, is important because:

> *"It will determine the limits and how these passages must be made among them, whether it will be the stretching type (the next process will look for the elements to continue), which is the most appropriate, or whether this interface will be pushed (when the sector has completed its task and waits for the next sector to do something about this process)"* (10 Pasos Fundamentales a la hora de Gestionar Procesos Hospitalarios, 2013).

Due to the aforementioned situation, the functions or tasks of each of the interfaces to work were defined, allowing an analysis at the time of each of them and in their tasks development to avoid reprocesses. The following figure lists the tasks of the three interfaces that make up the whole healthcare process.

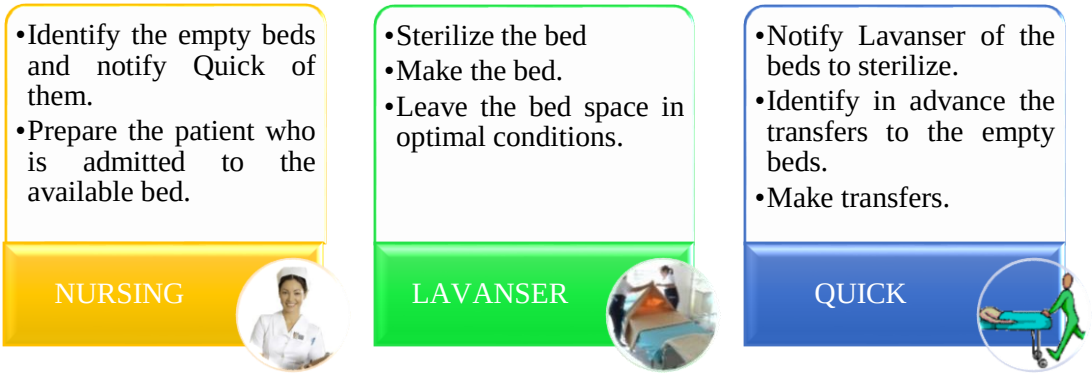

Figure 3. Interfaces of the healthcare process

Bearing in mind that it would be deepened on the support phase, several samples that would be the first picture or plane of the support stage were made. This result was the foundation to set out strategies to implement in order to improve some weaknesses that were found within the processes developed in each interface. The following figure shows the average time in which the entire operation takes place.

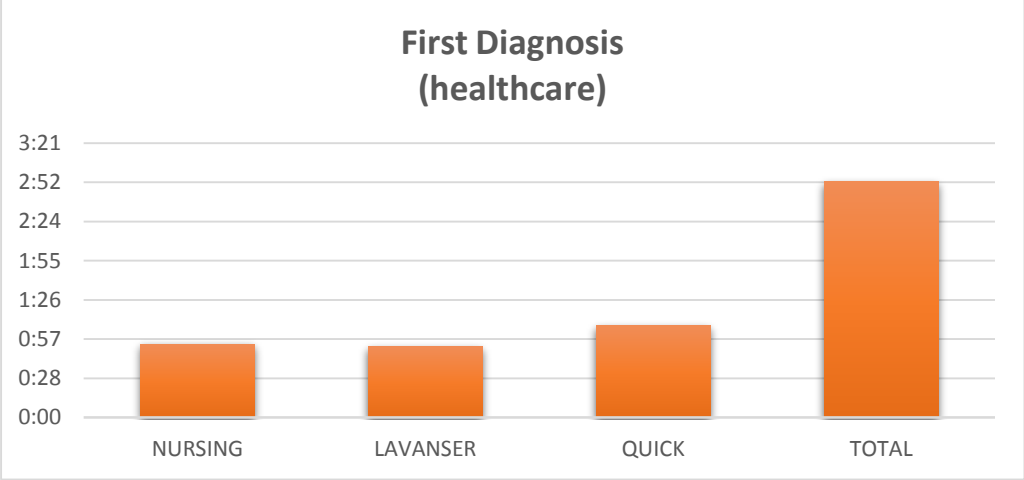

Figure 4. First Diagnosis

The average time in which the processes are developed is between one hour and less than an hour; time that evidenced downtime and lack of clarity in the involved participants' roles. Regarding the total operation time, two hours and 52 minutes, the importance of taking part in this area is confirmed since it has a participation percentage of 41% of the total delay time of the patients' discharges.

Considering the results of the samples, the operation development, and the initial approaches that were conducted with the responsible staff of each of the processes involved, the plan to develop will be focused on two key aspects. Initially, the operations integration will be reviewed applying different models and/or strategies to improve productivity. The second aspect to work will be focused on traceability and control that must be made in the different processes since they are fundamental in providing a service.

- **Operations integration:** a flow chart was developed, where the role of each of the involved participants and the times in which the processes were developed were specified. Weekly meetings with the areas were held, where aspects or cases to improve and take into account in the operation were discussed. Simultaneously, goals within the areas were set.

In order to obtain productivity indicators, each of the areas started to keep record, in control formats, of the bed turning process, which had to receive feedback with the emergency service and the involved participants monthly.

- **Control and traceability:** Considering the process map developed for each service, shift changeover formats were implemented, which should summarize the average time of the transfers and the number of transfers per shift. At the same time, the patients or beds that were pending for the next shift were specified. In the shift changes, the format was delivered and the staff was informed. This format was consolidated and was part of a monthly report that gave information about the development of processes each week.
  The two-month control that was developed on a weekly basis was then carried out on a monthly basis, achieving greater feedback on the processes developed in the service and their traceability.

After all the plans, tools, and strategies used in the turning bed processes, samples were taken in two different periods again and a considerable decrease in the time of each of the processes and the total time of the support stage was identified. The following chart compares the initial and current times with the support phase drop times.

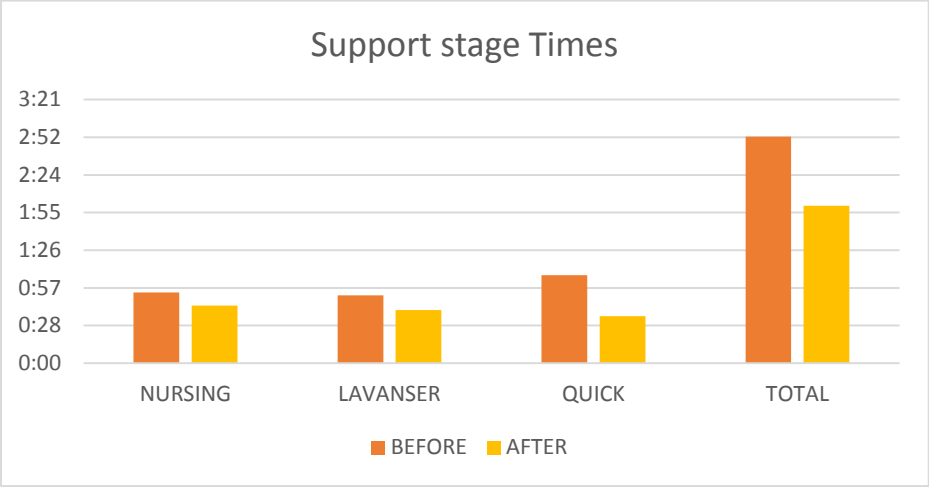

Figure 5. Support stage times.

From the processes developed in the turning beds, the Quick process that had a drop of 47% was the most heavily weighted against other processes. Regarding the support stage's total time, there was a decrease of 30% changing from a 173-minute process to a 120-minute process. These falls also impacted the participation percentage of the support stage on the total times of the patient discharge process, going from a 41% to a 29% in the participation. Regarding capacity terms, this decrease freed up three beds per day on average, which in financial terms saves nearly $ 50,000 per year. This saving can increase intervening the other phases previously mentioned.

3. Conclusions

- Although a high percentage of logistics literature focus on topics related to the industry, storage and / or transportation, there is a small group of writers that talk about logistics on service companies; at the same time there are some investigations developed by different hospitals and universities around the world that begin extrapolate the good logistics practices developed on hospitals and health centers.

- The high of a patient is one of the simplest processes inside the hospital management, but it is one of the processes that count with more delays and retardment in implementation. Downtime, re-proccesses and lack of control are the main weaknesses which are evident in this process. Additionally it is one of the processes that has more impact on hospital capacity, which lives overflowing daily by inefficiency in turning bed, so its improvements have great visibility and importance in daily management.

- The strategies implemented in the processes of support generate great benefits inside this. In a 47% reduction was obtain in the process developed by Quick, which at the same time generate a reduction of 30% in all the times of the support phase. These reductions have generated an impact in effectiveness of hospital egress; improving the turning bed, increasing the capacity of service in the hospital and generating higher levels of perception. This has proven that continue working together, the caregivers with the logistic managers they can have significant improvements.

- One of the main achievements obtain with the strategies implemented and decreasing times in process has been the improvement in the rotation of the beds in the emergency room, which generates the equivalent of having three more beds in service, this in economic terms has generated savings of $ 50,000 for the hospital. This achievement demonstrates that through logistic tools, the organizational strategies and some changes, which do not generate high cost, it can generate benefits that exceed the expectations of management.

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Biography

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