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Components of Logistics Management in Healthcare: Case of a Private Medical Center*

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ABSTRACT: Logistics management is an area of activity that has the potential to provide a competitive advantage for businesses. The main purpose of this study is to investigate logistics management in the context of healthcare businesses. The study aims to define the logistics activities in healthcare organizations and explore their connections with medical processes. A case study was employed in a private medical center. Data were collected through direct observation, and document review. Processes were visualized and analyzed using flow diagrams. The findings of the research show that nine logistics activity centers including patient services, medical accounting and invoicing, purchasing, warehouse, transfer-transport, sterilization, waste, laundry, maintenance and repair can be identified. The study also indicates that a significant level of logistics activity is embedded into medical processes. Therefore, improving these activities can lead to higher quality of healthcare services and customer satisfaction. Logistics management is mostly defined from the perspective of industrial enterprises. However, a significant portion of the daily activities in hospitals, is related to logistics activities. This study, having addressed the application of logistics management in healthcare organizations, is expected to provide theoretical insights that will support future research.

Keywords: Logistics, Healthcare, Hospitals, Case study
JEL Code: M11, I11

Sağlık İşletmelerinde Lojistik Yönetiminin Bileşenleri: Bir Özel Tıp Merkezi Uygulaması*

ÖZ: Lojistik yönetimi, işletmelere rekabet avantajı sağlayabilme potansiyeline sahip bir faaliyet alanıdır. Bu çalışmanın temel amacı, lojistik yönetimini sağlık işletmeleri bağlamında incelemektir. Araştırma, sağlık işletmelerinde yürütülen lojistik faaliyetleri tanımlamayı ve bu faaliyetlerin tıbbi süreçlerle olan ilişkilerini ortaya koymayı hedeflemektedir. Çalışma, özel bir tıp merkezinde, vaka çalışması yöntemi kullanılarak yürütülmüştür. Veriler gözlem, doküman incelemesi ve alan ziyaretleri yoluyla elde edilmiştir. Süreçler akış diyagramları aracılığıyla görselleştirilmiş ve analiz edilmiştir. Araştırma bulguları, hasta hizmetleri, medikal muhasebe, satın alma, depolama, taşıma/transfer, sterilizasyon, atık yönetimi, çamaşırhane, bakım ve onarım olmak üzere dokuz lojistik faaliyet merkezinin tanımlanabileceğini göstermektedir. Ayrıca, lojistik faaliyetlerin önemli bir kısmının tıbbi süreçlerle entegre olduğu belirlenmiştir. Bu nedenle, söz konusu faaliyetlerin iyileştirilmesi, sağlık hizmetlerinin kalitesinin ve hasta memnuniyetinin artırılmasına katkı sağlayabilecek alanlar olarak tanımlanmıştır. Lojistik yönetimi çoğunlukla üretim işletmeleri perspektifinden ele alınmaktadır. Ancak hastanelerde rutin işlerin önemli bir bölümü lojistik faaliyetlerle doğrudan ilişkilidir. Sağlık işletmelerinde lojistik yönetimine odaklanan bu çalışmanın, gelecekteki araştırmalara teorik altyapı sunması beklenmektedir.

Anahtar Sözcükler: Lojistik, Sağlık Hizmetleri, Hastaneler, Vaka Çalışması
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Introduction

Logistics management focuses on a dynamic system consisting of many components within an organization. Council of Supply Chain Management (CSCMP) defines logistics management as "a part of supply chain management that plans, implements, and controls the efficient, effective forward and reverses flow and storage of goods, services and related information between the point of origin and the point of consumption in order to meet customers' requirements (CSCMP, 2013). Considering a basic view, logistics in hospitals refers to an operational function that aims to ensure the efficient delivery of medical supplies and medicines to patients, who are the ultimate consumers (Poulin, 2003). Including this, a wider perspective of logistics management can be expressed as; the activities from patient registration and test results to the transfer of medical supplies, sterilization services, hospital waste, and food services (Rais et al., 2018). This study builds on the wider perspective. We consider logistics activities in healthcare as combination of procurement, material and patient flow, documentation, information processes, technological procedures and other auxiliary services.

An effective logistics management creates value and cost advantage for companies in the competitive conditions of today's market (Christopher, 2011). In healthcare, by improving logistics, significant cost reductions can be achieved. Because numerous studies indicated that cost of logistics related activities in hospitals and healthcare constitute a significant share in the total cost of production (Moons et al., 2018). A study clarified that the costs of logistic activities accounted for 15.42% of the total cost of service (Cavmak & Aksoylu, 2024). Another study also calculated the share of logistics activities as 30% of total hospital expenditure (Poulin, 2003). Logistics activities are also important for being embedded into the daily duties of health workforce. Dobrzańska et al., (2013) found that nearly 10% of the working time of nurses were dedicated to logistics activities in the care processes. Therefore, improving logistics can also improve patient care and reduce burden of workload. There are numerous studies proved that improving logistics by optimizing patient flow (Kriegel et al., 2016), material and pharmaceuticals flow (Landry, 2016; Pinna et al., 2015), sterilization processes (Van de Klunders et al., 2008), and other services such as cleaning, waste management, laundry and catering (Görçün et al., 2023; Kriegel et al., 2013), enhancing automation (Granlund & Wiktorrson, 2013) and digitalization (Beaulieu and Bentahar, 2021), will improve quality of care and increase customer satisfaction level. Understanding the components of logistics management should be the first step in improving these processes. Logistics as a part of supply chain involve multi-tier relationships among providers, suppliers, and other stakeholders. The nature of logistics activities is also quite complex due to their indispensable role in all other procedures in the hospitals and healthcare. Therefore a systematic approach based on colloboration and efficiency is required to address this complexity (Abdulsalam et al., 2018).

It is stated that the theoretical framework in this area has not yet sufficiently developed and is far behind in terms of maturity (Feibert et al., 2017). Functionality of logistics management is also still poorly developed in healthcare when compared to other industries (Kritchanchai et al., 2018). Therefore, the significant role of logistics management in healthcare organizations makes the studies aimed at defining this phenomenon quite important.

Considering this reality, this study aims to identify logistics activities in healthcare businesses and investigate the interaction between medical procedures and logistics. The study is built on the premise that all medical processes carrying out in healthcare organizations inherently involve a significant level of logistic activities. In this context, the present study focuses primarily on identifying and defining the logistics activities within the health facilities, aggregating these activities to develop logistic activity centers, and examining the connections between these activities and medical service production processes. Hence, the study sought to answer the following questions;

- Which logistics activities are carried out by which departments across medical centers?

- What are the logistics activities carried out in the service production process in medical centers?
- What are the logistics activities involved in the treatment process according to patient types?
- Which challenges and problems do the medical centers have in logistics management?

Methods

Research Approach

The study applies a case study approach to the logistics management within healthcare organizations. Although phenomena in businesses cannot be fully defined in all aspects, a combination of their general and specific characteristics can be identified. Case studies can be a significant approach to uncover the structure of underlying realities within processes and the relationships among these realities, thereby generating knowledge for new applications (Easton, 2010). The case study method provides the opportunity to explore and resolve a complex set of factors and relationships within an organization. This approach involves a continuous research process that moves forward and backward across various stages of the investigated process. Thus, it is possible to obtain practical findings that can be utilized for diverse managerial purposes from different data sources using case study approach. (Verschuren, 2003).

Details of the medical center

The medical center where the case study was carried out is in Istanbul/Türkiye. It occupies a closed area of 6500 m^2. The center provides services through 5 internal units and 5 surgical units. The internal units consist of neurology, dermatology, internal medicine, anesthesia and reanimation, and physical therapy and rehabilitation units. The surgical units are urology, general surgery, otorhinolaryngology, pediatrics, gynecology and obstetrics units. The organization also has one general operating room and a sterilization unit operating in connection with the operating room. Total bed capacity is 20 including the emergency care department. The number of staff is 80. Total patient capacity for the date when the study carried out was 26.406 outpatients and 801 inpatients with 880 days of hospitalization.

Data collection and analysis

Workflow diagrams were used to define logistics activities within the organization. Workflow diagrams provide significant benefits, the most notable being the visualization and analysis of activities within the process flow. This enables the analysis of value-creating activities and the identification of unnecessary steps in a specific activity flow. Moreover, these diagrams make the exchange of inputs between activity centers more transparent.

Data were collected from June to December in 2021. Direct process observations, and document examination were used in order to map the processes. All determined activity centers were observed by the author with accompany of the deputy manager and staff.

Logistics activities were explored within the two different framework considering various processes occurring in the center. The first perspective focused on examining the logistics activities within their unique characteristics considering each as independent activity centers within the processes of the organization. Conducting research in the organization including interviews, document examination and observation, logistics activities were classified into the nine activity centers as follows; patient services activities, purchasing activities, warehousing, transportation, medical accounting and invoicing services, waste management, sterilization management, laundry, maintenance and repair activities.

The second approach focused on defining the share and importance of logistics activities in medical procedures examining different types of patient care process in the medical center. The patient groups were identified as outpatients, surgical patients, and emergency department patients. We provided data on outpatients and surgical patients in this study. In this phase, the steps carried out throughout the treatment process were identified, and logistics-related activities

were identified. Throughout the case study, the importance of each logistics activity center for other activity centers was analyzed. For each patient group, the process from the patient's admission to the medical center to the conclusion of treatment and the submission of the patient's bill to the relevant parties (social/private insurance or contracted institutions) was mapped. In this way, the relationship between each patient group and logistics activities was defined. The Barriers and Challenges faced in the logistics activities of the medical center were also identified.

Ethical Approval

Because the study does not contain and proceed any information of any human participant, ethical approval is not required. To conduct the study, written approval was obtained from the hospital administration.

Findings

Nine activity centers were identified and details of each logistics activity center are provided below.

Logistics Activity Centers

Patient Services

The patient services department organizes outpatient clinic services according to appointments, coordinates patients according to their scheduled appointments, conducts patient registration and documentation processes, manages insurance, authorization, and payment procedures, assists with inpatient services, and supports medical archiving and medical accounting processes. For patients benefiting the coverage of Social Security Institution-SSI (SGK in Turkish), the insurance branch they are affiliated with is verified, and authorization is confirmed through palm vein scanning or other methods for verifying identity. If the patient is actively employed, co-payments and price differences allowed under the Healthcare Implementation Communiqué -HIC (SUT in Turkish) which contains procedures and payment list for hospitals are collected. Subsequently, the patient may need to revisit the registration desk if additional tests are requested. For patients with private health insurance, supplemental health insurance or contracted institutions, verification is conducted through the insurance company’s authorization system. Information regarding the procedures to be performed for the patient is sent to the insurance company, and payment approval is requested. If a service not covered by the patient’s insurance policy is identified, payment approval is obtained from the patient before proceeding with the service.

Purchasing

The activities of the purchasing department in the hospital are determining material and equipment needs, evaluating material requests from various departments, carrying out integrated processes with the warehouse, establishing communication with suppliers, contract management, and purchasing and delivery of materials. A material need in medical units is directly reported to the purchasing department by the relevant department. In the initial stage, the purchasing department checks the stock levels in the warehouse and, if the required material is available, instructs the warehouse to deliver it to the requesting unit. Periodic monitoring is conducted to ensure that no material in the warehouse falls below the predefined minimum stock levels. If a new purchasing is required based on these periodic monitoring or requests from departments, the supplier communication phase begins. The department conducts a dynamic purchasing process for materials routinely obtained or covered under existing supplier contracts. This involves sending purchase order forms to the relevant suppliers and monitoring their delivery. For materials not purchased regularly or when there is a need to change suppliers, a price quote is requested from at least three suppliers along with technical specifications. If necessary, sample products are requested. The process is finalized with the supplier offering the most suitable combination of price and quality.

Warehousing

The central warehouse operates under the subordination of purchasing department in the analyzed hospital. The ware house has the responsibility of monitoring the expiration dates of stored materials, ensuring the cleanliness of the warehouse, updating inventory records to reflect materials dispatched to units and assigning them to the receiving department, checking stock levels by material type, and reporting materials that fall below critical stock levels to the purchasing department.

Transportation

These activities encompass medications, medical supplies, and patients. The primary distinction between medications and medical supplies logistics is that medications must be recorded in the physician's care plans (orders) and assigned to the relevant patient using medication slip numbers, along with the specified dosages for each medication. In contrast, while directly attributable medical supplies are recorded in patient files, the majority of consumed supplies are frequently used, standardized products. This results in a more straightforward inventory recording process in unit-specific warehouses. The most obvious common feature of both medicine, medical supplies and patient logistics processes is that in addition to the porters who deal with warehouse and transportation activities, the employees in the relevant medical units (nurses or medical secretaries) also play an important role in the process. The flow of outpatients within the healthcare organization is managed with the accompaniment of the relevant medical unit's nurse or assistant. For patients with surgical interventions, professional patient transportation and bed logistics activities are carried out. Samples for routine laboratory tests of the patient who is admitted are taken by the service nurse and sent to the laboratory via porters. In case of need for medical imaging service, porters accompany the patient.

Medical Accounting and Invoicing

The medical accounting department of the hospital mainly coordinates the invoicing processes for patients who receive services under the SSI in accordance with the HIC, and private insurances' framework. The payment method utilized by SSI varies depending on the patient type and the nature of the services provided. Therefore, it makes the medical accounting a complex combination of activities, challenging to establish a standardized workflow.

For the billing of outpatients, it is crucial to carefully review elements such as the patient's anamnesis, assigned diagnoses, the justification for diagnostic tests, and the compatibility between tests and specialties. In the case of inpatient treatments, several critical factors including: proper documentation of the discharge summary (epicrisis), accuracy in assigning diagnosis and treatment codes, availability of test reports, consistency between the epicrisis and diagnosis codes, utilization of blood products, and utilization of specialized materials.

Medical Waste Management

Cleaning and waste management services are coordinated by the head nurse of the hospital. Waste logistics generally involve the collecting hazardous, medical, and domestic waste generated during healthcare service delivery and transport to external waste disposal facilities. There are waste bins according to the relevant types in each medical unit in which waste is collected. The bins are emptied daily by personnel responsible for waste collection, the contents are transferred to the organization's temporary waste storage area. The wastes are collected from the temporary storage twice a week by the contracted medical waste disposal company.

Sterilization

The sterilization unit is connected to the operating room. It undertakes receiving, classifying, sterilizing and storing reusable surgical instruments after use until they are received again for use. The sterilization process is carried out using an autoclave. The unit also uses non-medical consumables (especially package bags and colored labels) to indicate packaging and sterility.

Laundry

Laundry activities in the health facility include the basic stages of collecting dirty laundry, washing it and making it ready for reuse. Covers, bed linens, reusable surgical and physician aprons, and general use cloths in the inpatient wards and operating rooms are handled by the laundry staff.

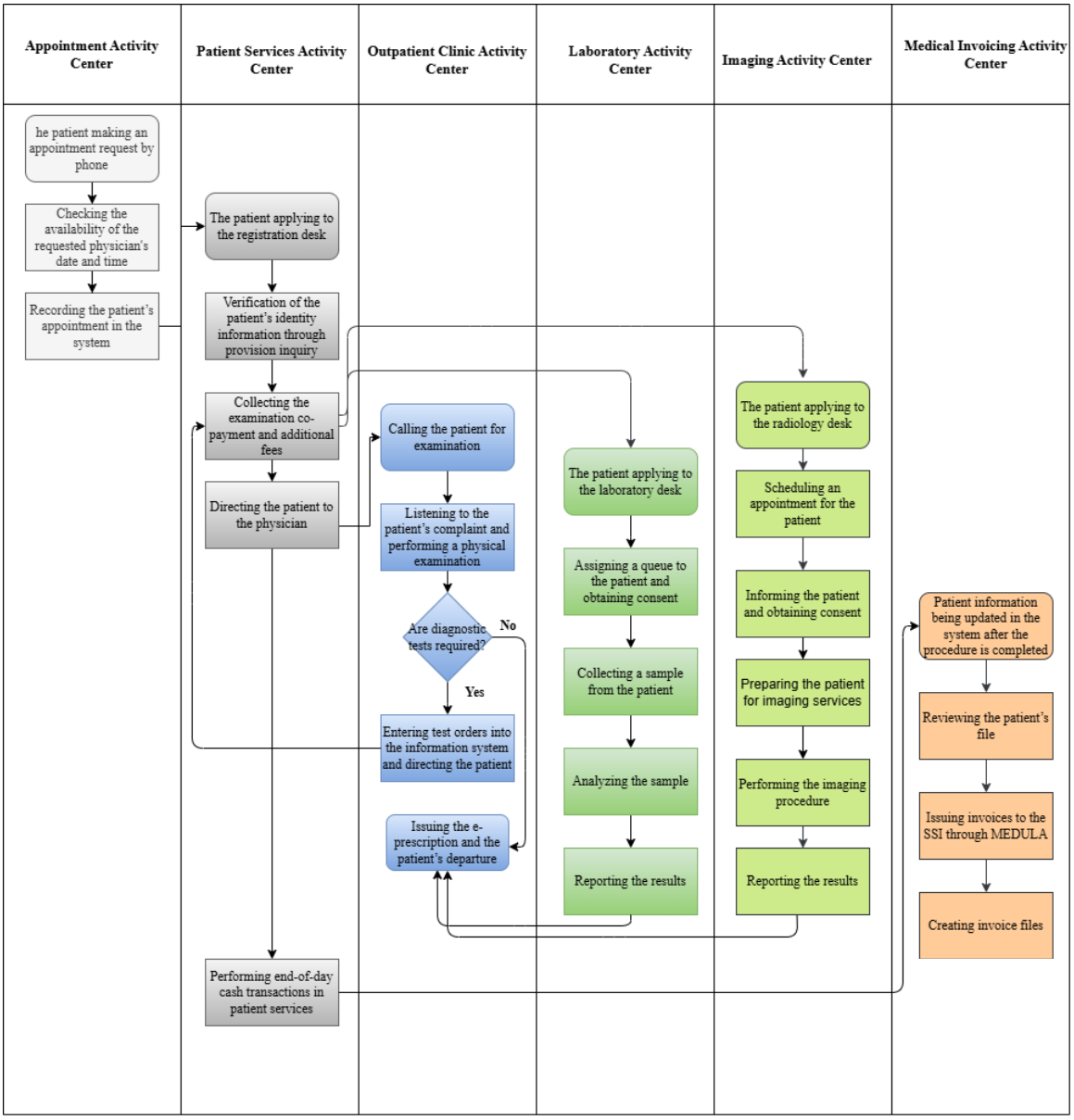
Maintenance and repair

Maintenance-repair activities consist of two basic parts. The first of these is the maintenance and repair services needed in the facility in general, while the second is the maintenance-repair and calibration services of medical devices. The personnel responsible for maintenance-repair directly deal with the routine maintenance and problems that arise regarding the building's energy line, elevators and general installation. In particular, elevators, which have an important place in patient transfer processes, are periodically checked and maintained. In addition to these duties, any damage, breakage, energy outage, technological equipment problems in the facility that can be seen quite frequently are followed up by the same responsible personnel.

The Interactions Between Medical Care Procedures and Logistics Activities

Flow of a typical outpatient within the medical center is presented in Figure 1.

Figure 1: Flow of an outpatient

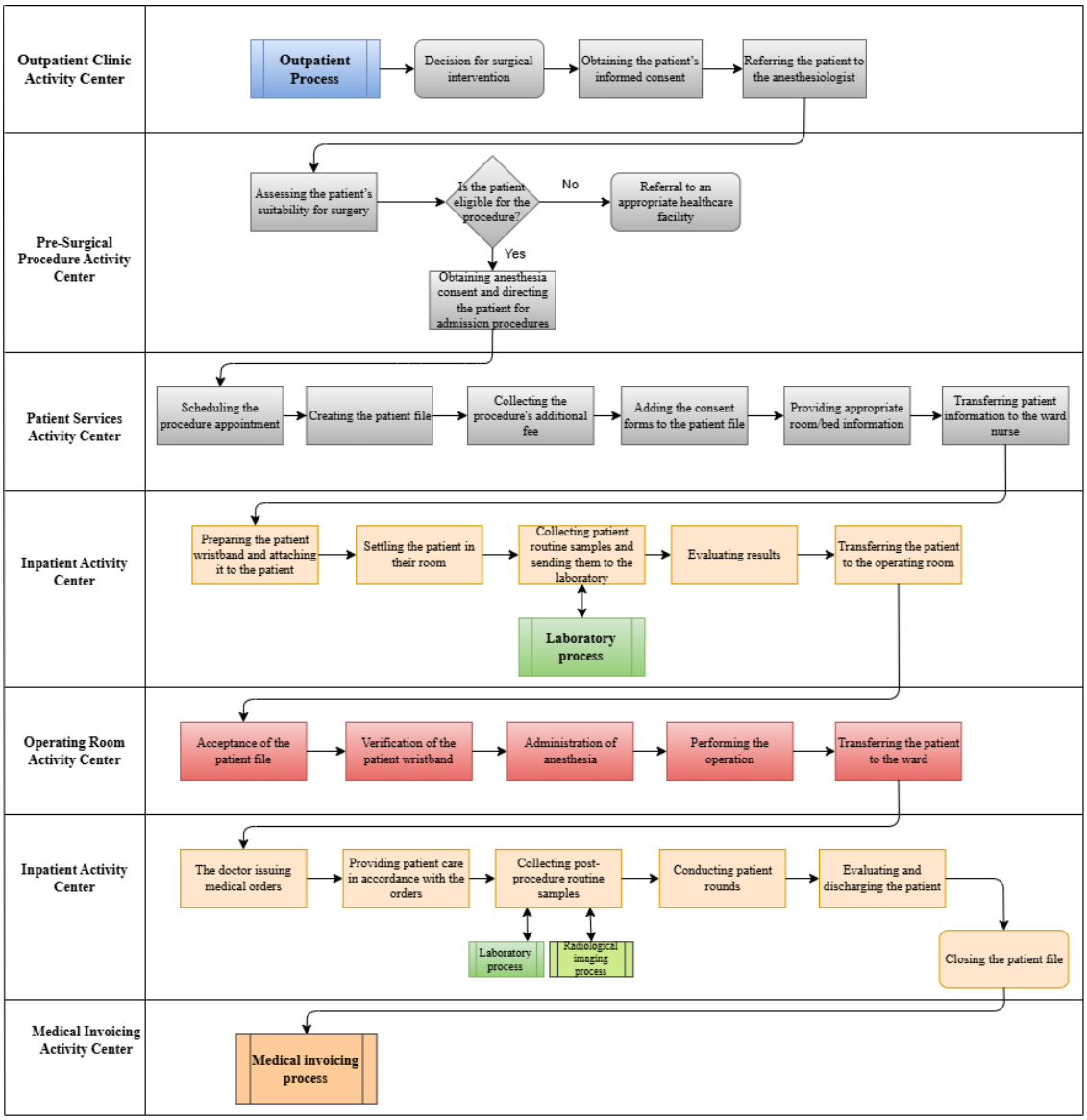


Only a small portion of the activities is directly related to medical care during the process of an outpatient. Most of the activities performed by physicians, nurses, medical secretariates, and the medical imaging and laboratory units involved in the patient's care pertain to non-care-related tasks. More than 75% of total workload is related to logistics activities. Therefore, the following logistical activities were found to play a significant role, when examining the entire care process of a typical outpatient:

1. Communication and guidance activities,
2. Information processing and transfer activities,
3. Patient mobility,
4. Laboratory sample logistics,
5. Filing/archiving activities,
6. Invoicing and payment collection processes.

Flow of a typical surgical/inpatient within the medical center is presented in Figure 2.

Figure 2: Flow of a surgical inpatient



Surgical procedure patients mostly apply to the health institution as outpatients. Similarly, they go through an appointment, polyclinic and examination process. The point where they differ

from outpatients begins with the decision for surgery made by the physician at outpatient level. The most important difference of surgical procedure processes is that they include patient transfer, medication, material and bed logistics processes. More than half of the workload is related to logistics activities in the process of a surgical inpatient. In addition to the logistics activities in an outpatient patient process for a surgical procedure patient;

- Patient logistics,
- Bed logistics,
- Medication logistics,
- Cleaning and food/catering logistics activities

Problems and Challenges in Managing Logistics Activities

We identified problems in five main logistics area for the hospital as shown in Table 1

Table 1: Problems in logistics management of the medical center

Activities	Problems and Challenges
Patient Services Medical Accounting	Incomplete or incorrect patient data entry
	Insufficient communication and information-sharing processes with patients.
	Experiencing revenue losses due to incorrect invoices
	Incomplete or inaccurate entry of laboratory test requests into the system
Purchasing -Stock Management	Stock-outs of essential materials in the warehouse
	Expiration of materials in the warehouse
	Experience of material shortages in medical units
	Incidents of material loss within medical units.
	Unscheduled transfers to medical units due to irregular material requests.
	Purchased materials not complying with user (physician-nurse) requests/expectations
Transport and Transfer	Inability to track material movements within the organization
	Delivery of incorrect quantities or types of materials from the warehouse to medical units
	Damage to materials while being transported within the facility
	Unplanned transportation activities.
Cleaning/Waste and Sterilization	Delayed cleaning in areas with high patient contact or presence.
	Improper waste collection in certain medical units.
	Wastes in material consumptions
Maintenance and Repair	Insufficient planning for medical device maintenance.
	Excessive workload due to unscheduled tasks

Patient services and medical accounting management demand significant labor within healthcare organizations, particularly due to incomplete or inaccurate data entry, medical coding errors, and scheduling inefficiencies. Additionally, test orders are frequently recorded with inaccuracies or omissions, which further burden operational workflows. Purchasing and inventory management processes often lack evidence-based methodologies or standardized inventory management systems and consumption forecasts are frequently based on subjective estimations rather than data-driven analytics. Another notable issue is the occurrence of material losses within medical units. Examinations of distribution and transportation processes highlight traceability and visibility as the most pressing issues. The movement of materials within the healthcare organization is poorly monitored, with most processes relying on manual operations. Documentation levels are notably low. It has been observed that materials withdrawn from the warehouse are sometimes distributed without clear records of the recipient unit, leading to speculative distribution practices. This issue is particularly evident in pharmaceutical logistics. The internal movement of medications lacks technological tracking mechanisms, such as barcoding, resulting in traceability issues. Consequently, instances of expired or spoiled medications and materials have been reported by healthcare management, necessitating retrospective investigations to determine when and by whom they were obtained. Regarding the maintenance and repair activity center, the primary issue lies in irregular workflow processes. Maintenance and repair activities suffer from inadequate planning, leading to an overwhelming workload outside of scheduled plans. This lack of organization exacerbates operational inefficiencies and delays in addressing critical maintenance needs.

Discussion and Conclusion

Based on the case study conducted within the medical center, nine logistic activity centers were identified. These centers are categorized as patient services, medical accounting, purchasing, warehouse, transportation services, sterilization, waste management, laundry, and maintenance-repair. The logistics management literature in industrial organizations, which emphasizes core functions such as demand forecasting, order processing, procurement, transportation, warehousing, and information management, was found to have distinct reflections in healthcare organizations. Mapping the workflows within the logistic activity centers enabled discussions on their positioning in light of the literature and an analysis of their weight across different patient types.

The patient services activity center represents the healthcare organization’s counterpart to the order processing function in logistics. Activities such as scheduling appointments, collecting patient information, and guiding patient mobility throughout the treatment process render the patient services activity center a vital part of logistic operations. In addition to its substantial operational volume and resource consumption, it is also a critical determinant of the success of treatment processes. This center is responsible for managing all administrative and medical registration and documentation processes for both outpatient and inpatient groups, handling insurance correspondence and pre-authorization processes, defining and tracking diagnostic requests, and collecting co-payments and additional fees. Consequently, the success of the patient services activity center significantly influences both service quality and the organization’s revenue flow. The “medical accounting” activity center, directly linked to patient services, corresponds to the "billing/invoicing processes" in the logistics management literature. As the final link in the service production chain, medical accounting manages billing and collection processes with health insurers (particularly SSI), playing a critical role as the primary determinant of receivables collection for the organization. While it does not involve direct contact with patients, it demands significant time spent handling patient files. The success of the medical accounting activity center heavily depends on the completeness and accuracy of activities performed during the patient

services process. Therefore, these two activity centers are interdependent and must operate in an integrated manner to ensure uninterrupted revenue flow for the organization.

The purchasing activity center is responsible for meeting the material and supply needs of the units, managing procurement processes, and relations with suppliers. The success of this center is of critical importance to ensure the continuity of patient care processes. The fact that a large amount and variety of materials are consumed in the healthcare institution necessitates the purchasing activity center to be in constant communication with both the medical units of the institution and the suppliers outside the institution. Studies in the literature indicate that procurement and inventory management activities significantly impact the success of healthcare organizations (Adirektawon et al., 2024; Modisakeng et al., 2020). Transport activities within the center mainly consists of two dimensions: the flow of materials and people. Transportation activities are a quite important for healthcare institutions since they handle different elements such as medicine, medical consumables and patient's flow. The literature highlights substantial research focusing on patient and bed logistics, and medical materials to improve logistics in hospitals (Zamani et al., 2024; Dehaghani et al., 2021; Villa et al., 2009). Within the medical, both human and material mobility is mostly managed by the same personnel. One notable finding is that nurses and medical secretaries working in medical units have important roles also in purchasing and transportation activities. It has been observed that a substantial portion of the workload for these individuals, who are expected to focus on medical care, is occupied by these logistic operations.

Other logistic activities of cleaning, waste management, sterilization are not observed to contribute to the workload of medical personnel. These areas are primarily carried out more independently by the human resources within their respective centers. Nevertheless, they retain their essential role as a critical component of medical service production.

When examining the problems in logistics management, it has been observed that issues related to information processing, material visibility and usage, compliance with expectations, and patient safety often resulted in repetitive activities. These problems have been more prevalent in the patient services, purchasing/procurement-warehouse, and transportation services activity centers. Frequently encountered issues include material shortages, losses, and spoilage. Additionally, workload imbalances in transportation and maintenance-repair activities have also been identified among the reported problems. The aspects of these issues that affect medical personnel include service disruptions, negative communication processes with patients, high workloads, and unnecessary mobility. The cost structure of logistic activity centers predominantly consists of labor expenses (Çavmak & Aksoylu, 2024). Consequently, it is evident that problems negatively impacting workload also have significant effects on overall costs.

Considering the defined logistics areas and identified problems, various approaches from the literature can be utilized to improve these processes. Among the prominent approaches in the literature are lean management techniques (Machado et al., 2014; Adebanjo et al., 2016; Khorasani et al., 2020) and the agile approach (Aronsson et al., 2011; Tolf et al., 2015). In addition to lean and agile management practices, cost-saving strategies such as value-chain, workflow mapping, order/replenishment quantity determination, stockless systems, just-in-time production, RFID and barcode technologies, and vendor-managed inventory are also recommended (Feibert et al., 2019). Recommendations for improvement tools tailored to the logistic areas covered in this study are presented in Table 2.

Table 2: Improving logistics management of the medical center

Logistics Management Area	Proposed Implementation
Patient services, invoicing and receivables collection	1- Process management 2- Value stream mapping
Material availability	1-Two-Bin Kanban system 2- 5S Lean
Material traceability	1- Two-Bin Kanban system 2- RFID and Barcode technologies
Patient transport safety	1-Balancing workloadHeijunka) 2- Value stream mapping
Waste and cleaning management	1- 5 Whys analysis
Planned logistic processes	1-Kaizen groups 2- Work flow diagrams 3-Control lists
General cost and quality ımprovement practices	1-Electronic Order Application 2-Unit Dose Drug Distribution

As a conclusion, this study is expected to support the literature by explaining what the logistics activity management, which has been developed for industrial enterprises, signifies for healthcare organizations. Typically considered in terms of material and human mobility, logistics activities in healthcare organizations encompass a broader range and are a crucial determinant of service production quality and customer satisfaction. This study underscores the interconnectedness of logistics and clinical processes, reinforcing the idea that optimizing logistics can have a direct impact on patient outcomes.

The study also has some limitations. It was conducted in a small healthcare organization with relatively low technological investment and higher outpatient mobility. It is expected that logistics activities in larger hospitals with higher bed capacities, intensive care units, and operating rooms would be more complex and intensive. Future studies may expand on the classification provided in this work, incorporating logistics activities in greater detail, particularly in performance measurement, cost studies, or process improvement initiatives.

References

Abdulsalam, Y., Gopalakrishnan, M., Maltz, A., & Schneller, E. (2018). The impact of physician-hospital integration on hospital supply management. *Journal of Operations Management*, *57*, 11–22. https://doi.org/10.1016/j.jom.2018.01.001

Adebanjo, D., Laosirihongthong, T., & Samaranayake, P. (2016). Prioritizing lean supply chain management initiatives in healthcare service operations: A fuzzy AHP approach. *Production Planning & Control*, *27*(12), 953–966. https://doi.org/10.1080/09537287.2016.1164909

Adirektawon, S., Theeraroungchaisri, A., & Sakulbumrungsil, R.C. (2024). Efficiency of inventory in Thai hospitals: Comparing traditional and vendor-managed inventory systems. *Logistics,* *8*(3), 89. https://doi.org/10.3390/logistics8030089

Aronsson, H., Abrahamsson, M., & Spens, K. (2011). Developing lean and agile health care supply chains. *Supply Chain Management: An International Journal*, *16*(3), 176–183. https://doi.org/10.1108/13598541111127164

Beaulieu, M., & Bentahar, O. (2021). Digitalization of the healthcare supply chain: A roadmap to generate benefits and effectively support healthcare delivery. *Technological Forecasting and Social Change*, 167, 120728. https://doi.org/10.1016/j.techfore.2021.120717

Cavmak, D., & Aksoylu, S. (2024). What is the cost of logistics activities in healthcare businesses? A case study of a medical centre in Türkiye. *Journal of Health Management*, *26*(3), 442–448. https://doi.org/10.1177/09720634241246904

Christopher, M. (2011). *Logistics and supply chain management (4th ed.)*. Pearson Prentice Hall.

CSCMP. (2013). Supply chain management terms and glossary. https://cscmp.org/CSCMP/Educate/SCM_Definitions_and_Glossary_of_Terms.aspx (Accessed 16 November 2024)

Dehaghani, A.R., Nawaz, M., Sultanie, R., & Quartey-Papafio, T.K. (2021). Mathematical modeling for optimizing the blood supply chain network. *Modern Supply Chain Research and Applications*, *3*(3), 174–190. https://doi.org/10.1108/MSCRA-09-2020-0024

Dobrzańska, M., Dobrzański, P., & Śmieszek, M. (2013). Modern logistics in health service. *Modern Management Review, 18*(20), 53–64.

Easton, G. (2010). Critical realism in case study research. *Industrial Marketing Management, 39*(1), 118–128. https://doi.org/10.1016/j.indmarman.2008.06.004

Feibert, D.C., Andersen, B., & Jacobsen, P. (2019). Benchmarking healthcare logistics processes – A comparative case study of Danish and US hospitals. *Total Quality Management & Business Excellence, 30*(1–2), 108–134. https://doi.org/10.1080/14783363.2017.1299570

Feibert, D.C., Jacobsen, P. & Wallin, M. (2017). *Improving healthcare logistics processes (Doctoral thesis*). DTU Management Engineering, Denmark.

Görçün, Ö.F., Aytekin, A., Korucuk, S., & Tirkolaee, E.B. (2023). Evaluating and selecting sustainable logistics service providers for medical waste disposal treatment in the healthcare industry. *Journal of Cleaner Production, 408*, 137093. https://doi.org/10.1016/j.jclepro.2023.137194

Granlund, A., & Wiktorsson, M. (2013). Automation in healthcare internal logistics: A case study on practice and potential. *International Journal of Innovation and Technology Management, 10*(3), 1340013. https://doi.org/10.1142/S0219877013400129

Khorasani, S.T., Cross, J., & Maghazei, O. (2019). Lean supply chain management in healthcare: A systematic review and meta-study. *International Journal of Lean Six Sigma, 11*(1), 1–34. https://doi.org/10.1108/IJLSS-07-2018-0069

Kriegel, J., Jehle, F., Dieck, M., & Mallory, P. (2013). Advanced services in hospital logistics in the German health service sector. *Logistics Research, 6*(2–3), 47–56. https://doi.org/10.1007/s12159-013-0100-x

Kriegel, J., Jehle, F., Moser, H., & Tuttle-Weidinger, L. (2016). Patient logistics management of patient flows in hospitals: A comparison of Bavarian and Austrian hospitals. *International Journal of Healthcare Management, 9*(3), 196–207. https://doi.org/10.1080/20479700.2015.1119370

Kritchanchai, D., Hoeur, S., & Engelseth, P. (2018). Develop a strategy for improving healthcare logistics performance. *Supply Chain Forum: An International Journal*, *19*(1), 55–69. https://doi.org/10.1080/16258312.2017.1416876

Landry, S., Beaulieu, M., & Roy, J. (2016). Strategy deployment in healthcare services: A case study approach. *Technological Forecasting and Social Change, 113*, 429–437. https://doi.org/10.1016/j.techfore.2016.09.006

Machado, C.M., Scavarda, A., & Vaccaro, G. (2014). Lean healthcare supply chain management: Minimizing waste and costs. *Independent Journal of Management & Production, 5*(4), 1071–1088.

Modisakeng, C., Matlala, M., Godman, B., & Meyer, J.C. (2020). Medicine shortages and challenges with the procurement process among public sector hospitals in South Africa: Findings and implications. *BMC Health Services Research, 20*, 1–10. https://doi.org/10.1186/s12913-020-05080-1

Moons, K., Waeyenbergh, G., & Pintelon, L. (2019). Measuring the logistics performance of internal hospital supply chains – A literature study. *Omega, 82*, 205–217. https://doi.org/10.1016/j.omega.2018.01.007

Pinna, R., Carrus, P.P., & Marras, F. (2015). The drug logistics process: An innovative experience. *The TQM Journal, 27*(2), 214–230. https://doi.org/10.1108/TQM-01-2015-0004

Poulin, É. (2003). Benchmarking the hospital logistics process. *CMA Management, 77*(1), 20–26.

Rais, A., Alvelos, F., Figueiredo, J., & Nobre, A. (2018). Optimization of logistics services in hospitals. *International Transactions in Operational Research, 25*(1), 111–132. https://doi.org/10.1111/itor.12370

Tolf, S., Nyström, M.E., Tishelman, C., Brommels, M., & Hansson, J. (2015). Agile, a guiding principle for health care improvement? *International Journal of Health Care Quality Assurance, 28*(5), 468–493. https://doi.org/10.1108/IJHCQA-04-2014-0044

Van de Klundert, J., Muls, P., & Schadd, M. (2008). Optimizing sterilization logistics in hospitals. *Health Care Management Science, 11*(1), 23–33. https://doi.org/10.1007/s10729-007-9037-4

Verschuren, P.J.M. (2003). Case study as a research strategy: Some ambiguities and opportunities. *International Journal of Social Research Methodology, 6*(2), 121–139. https://doi.org/10.1080/13645570110106154

Villa, S., Barbieri, M., & Lega, F. (2009). Restructuring patient flow logistics around patient care needs: Implications and practicalities from three critical cases. *Health Care Management Science, 12*, 155–165. https://doi.org/10.1007/s10729-008-9091-6

Zamani, H., Parvaresh, F., Izady, N., & Farahani, R.Z. (2024). Admission, discharge, and transfer control in patient flow logistics: Overview and future research. Transportation Research Part E: *Logistics and Transportation Review, 191*, 103119. https://doi.org/10.1016/j.tre.2024.103722

Author Contributions

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Conflicts of Interest

The authors declare no conflict of interest

Genişletilmiş Özet

Literatür Taraması: Temel bir bakış açısıyla ele alındığında, sağlık işletmelerinde lojistik yönetimi; tıbbi malzemelerin ve ilaçların nihai kullanıcılar olan hastalara etkin bir şekilde ulaştırılmasını amaçlayan operasyonel işlevlerin yürütülmesi olarak ifade edilebilir. Ancak, bu çerçevenin ötesinde, lojistik yönetimi daha geniş bir perspektifle; hasta kaydından test sonuçlarına, tıbbi malzemelerin transferinden sterilizasyon hizmetlerine, hastane atıklarının yönetiminden yemekhane hizmetlerine kadar uzanan faaliyetlerin bütünü ile ilgilenen bir alandır. Sağlık işletmeleri genelindeki ağırlığı göz önünde bulundurulduğu zaman, etkin bir lojistik yönetimi, günümüz rekabetçi pazar koşullarında işletmelere maliyet avantajı ve aynı zamanda hizmet kullanıcıları için değer sağlamaktadır. Zira birçok çalışma, hastanelerde ve sağlık kuruluşlarında lojistikle ilişkili faaliyetlerin toplam üretim maliyetleri içerisinde önemli bir paya sahip olduğunu ortaya koymaktadır. Dolayısıyla lojistik yönetimi alanında yapılabilecek iyileştirmelerin hem bakım kalitesine hem de işletmenin finansal olarak sürdürülebilirliğine katkı sunabileceği açıktır. Ancak lojistik, daha çok üretim veya taşıma işletmeleri bağlamında değerlendirilmektedir. Lojistik faaliyetlerin sağlık işletmeleri özelinde tanımlanması, haritalanması ve iyileştirilmesi, bu alandaki önemli bir boşluğa katkı sunabilecek mahiyettedir. Bu gerçekten hareketle, bu çalışma sağlık işletmelerindeki lojistik faaliyetleri tanımlamayı, görselleştirmeyi ve tıbbi süreçler ile lojistik faaliyetler arasındaki etkileşimi incelemeyi amaçlamaktadır. Çalışma, sağlık işletmelerinde yürütülen tüm tıbbi süreçlerin doğası gereği önemli düzeyde lojistik faaliyet içerdiği varsayımına dayanmaktadır.

Yöntem: Çalışmada, sağlık işletmelerinde lojistik yönetimini incelemek amacıyla vaka çalışması yöntemi uygulanmıştır. Vaka çalışması yöntemi, bir organizasyon içerisindeki karmaşık faktörler ve ilişkiler bütününü derinlemesine inceleme ve çözümleme olanağı sunar. Bu yaklaşım, araştırma sürecinin incelenen süreç boyunca ileri ve geri hareket ederek sürekli bir şekilde ilerlemesini sağlar. Böylece farklı veri kaynaklarından elde edilen bilgilerle çeşitli yönetsel amaçlara hizmet edebilecek pratik bulgulara ulaşmak mümkün olmaktadır. Kurum içindeki lojistik faaliyetlerin tanımlanmasında iş akış şemaları kullanılmıştır. Veriler, 2022 yılının Haziran ve Aralık ayları arasında toplanmıştır. Süreçlerin haritalandırılmasında doğrudan süreç gözlemleri ve belge incelemeleri yöntemlerinden faydalanılmıştır. İşletmenin müdür, müdür yardımcıları ve ilgili personel sürece eşlik etmiştir. Lojistik faaliyetler, merkezde gerçekleşen çeşitli süreçler göz önünde bulundurularak iki farklı çerçeve kapsamında incelenmiştir. İlk çerçeve, organizasyon süreçleri içerisinde her birini bağımsız faaliyet merkezleri olarak ele alarak lojistik faaliyetleri kendi özgül nitelikleriyle değerlendirmeyi hedeflemiştir. İkinci yaklaşım ise, tıbbi işlemler içerisinde lojistik faaliyetlerin payını ve önemini ortaya koymayı amaçlayarak merkezde yürütülen farklı hasta bakım süreçlerini incelemiştir. Bu kapsamda hasta grupları; ayakta tedavi gören hastalar, cerrahi hastalar ve acil servis hastaları olarak belirlenmiştir.

Bulgular ve Tartışma: Vaka çalışması sonucunda dokuz lojistik faaliyet merkezi tanımlanmıştır. Bu merkezler; hasta hizmetleri, medikal muhasebe, satın alma, depolama, taşıma ve transfer hizmetleri, sterilizasyon, atık yönetimi, çamaşırhane ve bakım-onarım olarak kategorize edilmiştir. Üretim işletmelerine yönelik lojistik yönetimi literatüründe öne çıkan talep tahmini, sipariş işleme, tedarik, taşıma, depolama ve bilgi yönetimi gibi temel işlevlerin, sağlık kuruluşlarında kendine özgü yansımalarının bulunduğu tespit edilmiştir. Hasta hizmetleri faaliyet merkezi, lojistikteki sipariş işleme işlevinin sağlık kuruluşlarındaki karşılığı olarak gözükmektedir. Randevu planlama, hasta bilgilerini toplama ve tedavi süreci boyunca hasta hareketliliğini yönlendirme gibi faaliyetler, bu merkezi lojistik operasyonların hayati bir unsuru haline getirmektedir. Medikal muhasebe faaliyet merkezi ise doğrudan hasta hizmetleriyle ilişkili olup, lojistik yönetimi literatüründeki faturalama/tahsilat işlemlerine karşılık gelmektedir. Satın alma faaliyet merkezi; birimlerin malzeme ve tedarik ihtiyaçlarını karşılamaktan, tedarik süreçlerini yürütmekten ve tedarikçilerle ilişkileri yönetmekten sorumludur. Taşıma faaliyetleri merkez esasen iki boyutta gerçekleşmektedir: malzeme akışı ve insan hareketliliği. Taşıma faaliyetleri, ilaç, tıbbi sarf malzemeleri ve hasta akışı gibi çeşitli unsurları yönettiği için sağlık işletmeleri açısından oldukça önemli bir yere sahiptir. Temizlik, atık yönetimi ve sterilizasyon gibi diğer lojistik faaliyetlerin ise tıbbi personelin iş yüküne doğrudan katkıda bulunmadığı gözlemlenmiştir. Bu alanlardaki işler, ilgili merkezlerde görevli insan kaynakları tarafından büyük ölçüde bağımsız şekilde yürütülmektedir. Ancak, bu faaliyetler yine de tıbbi hizmet üretiminin kritik bir bileşeni olarak önemini korumaktadır. Ayakta tedavi gören bir hastanın süreci boyunca yürütülen faaliyetlerin yalnızca küçük bir bölümü doğrudan tıbbi bakım ile ilişkilidir. Hekimler, hemşireler, tıbbi sekreterler ile görüntüleme ve laboratuvar birimlerinde görevli personel tarafından gerçekleştirilen faaliyetlerin büyük bir kısmı, doğrudan bakım ile ilişkili olmayan görevlerden

oluşmaktadır. Toplam iş yükünün %75'inden fazlasının lojistik faaliyetlere ilişkin olduğu tespit edilmiştir. Cerrahi müdahale süreçlerinin en önemli farkı ise, hasta transferi, ilaç, malzeme ve yatak lojistiği gibi ek süreçleri içermesidir. Cerrahi yatan hasta sürecinde, iş yükünün yarısından fazlası lojistik faaliyetlerle ilişkilidir. Lojistik yönetimi kapsamında karşılaşılan sorunlar incelendiğinde; bilgi işleme, malzeme görünürlüğü ve kullanımı, beklentilere uyum ve hasta güvenliği ile ilgili problemlerin, faaliyetlerin tekrarlanmasına yol açtığı gözlemlenmiştir. Bu tür sorunların en yoğun şekilde hasta hizmetleri, satın alma/tedarik–depo ve taşıma hizmetleri faaliyet merkezlerinde ortaya çıktığı belirlenmiştir. Tanımlanan lojistik alanlar ve tespit edilen problemler dikkate alındığında, bu süreçlerin iyileştirilmesinde literatürde öne çıkan yaklaşımlar arasında yer alan yalın yönetim teknikleri ve çevik yaklaşım uygulamalarından faydalanabileceği görülmektedir.

Sonuçlar ve Öneriler: Sonuç olarak, bu çalışmanın, üretim işletmeleri için geliştirilen lojistik faaliyet yönetiminin sağlık işletmeleri açısından ne ifade ettiğini açıklaması yoluyla literatüre katkı sağlaması beklenmektedir. Genellikle malzeme ve insan hareketliliği bağlamında ele alınan lojistik faaliyetler, sağlık işletmelerinde çok daha geniş bir kapsamda değerlendirilmekte olup, hizmet üretim kalitesi ve hasta memnuniyetinin belirleyici unsurlarından biri haline gelmiştir. Bu çalışma, lojistik süreçler ile klinik süreçler arasındaki karşılıklı bağı vurgulayarak, lojistik optimizasyonunun hasta sonuçları üzerinde doğrudan etkisi olabileceği fikrini pekiştirmektedir.