

**Logistic collaboration and improvement of the quality of care:
Case of “Hôpital du Mali” (the Hospital of Mali)**

**Collaboration logistique et amélioration de la qualité des soins :
cas de l’Hôpital du Mali**

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Date submitted : 05/03/2023

Date of acceptance : 25/04/2023

To cite this article :

TRAORE A. (2023) «Logistic collaboration and improvement of the quality of care: Case of “Hôpital du Mali” (the Hospital of Mali)», Revue Internationale des Sciences de Gestion « Volume 6 : Numéro 2 » pp : 394 - 403

Abstract

In recent years, Mali has initiated a reform of its hospitals in order to ameliorate the quality of care. Within the frame of a management vision, this research consists in trying to understand how inter-organizational logistics, through the analysis of physical (medicines, materials, and equipment) flows and information flows, contributes to improving the quality of care within the Hospital of Mali. The analysis of semi-structured interviews has allowed us to discuss research proposals from the literature review and their degree of acceptance. Then, we have formulated some recommendations on logistic best practices to improve the quality of care. Specially, we made these recommendations toward hospital, distribution centre, authorities and national agency for evaluation. In doing so, our research contributes to understand the logistical issues in Africa, particularly in Mali. It also contributes to the literature on hospital logistics and gives way to future research in the field of healthcare logistics.

Keywords : Hospital; Logistical flows; Logistical collaboration; Quality of care; Mali.

Résumé : Ces dernières années, le Mali a initié une série de réformes visant à améliorer la qualité des soins dans les hôpitaux publics. Cette recherche consiste dans une vision managériale à comprendre comment la collaboration logistique inter-organisationnelle sur les flux physiques (médicaments, matériels et équipements) et d'informations contribue à l'amélioration de la qualité des soins. L'analyse du contenu des entretiens semi-directifs nous a permis de discuter les cinq propositions de recherche issues de la revue de littérature et leur degré d'acceptation. Des recommandations à l'endroit de nombreuses structures (hôpital du Mali, PPM, DPM, pouvoirs publics et ANEH) ont été formulées afin d'améliorer la pratique logistique et la qualité des soins prodigués aux patients. Ce faisant, notre recherche contribue ainsi à la littérature sur la logistique hospitalière et ouvre la voie à d'autres recherches futures dans le domaine de la logistique dans les structures de soins.

Mots clés : Hôpital ; Flux logistiques ; Collaboration logistique ; Qualité des soins ; Mali

Introduction

Research in healthcare logistic has become an interesting topic, the number of publications produced in recent years shows the importance of this subject (Volland *et al.*, 2017; Beaulieu *et al.*, 2020 ; Beaulieu *et al.*, 2021). Regardless of this amount of publications, African countries have remained outside the dynamic of developing logistical solutions to improve the quality of hospital care. In Mali, public hospitals are under enormous pressure to improve the quality of care given to patients. This situation has enabled the Malian authorities to initiate a reform which aims to put the patient at the heart of the hospital and reorganise hospitals in terms of management, quality, accessibility to care and improvement of financial performance. Despite these reforms and the efforts of the Malian government to allocate a substantial budget to the health sector (healthcare spending represented 347 million Euros in 2020), enormous difficulties remain and the performance of hospitals is still not up to expectations. Due to the particularity of our recherche, the main question that we are trying to understand is: how logistic collaboration between hospital supply chain actors can ameliorate quality of care?

Our research is expected in one hand to contribute to the achievement of the objectives of the hospital reform. On the other hand, to help the National Agency for Hospital Evaluation to integrate the logistics components as part of their evaluation mission and to provide them with recommendations in order to improve the hospital supply chain. Our analysis will be limited to physical flows (drugs, medical equipment and materials) and informational flows. This does not mean that we do not attach more importance to other logistics flows that could have an impact on improving the quality of care. Our methodology is qualitative, and our reasoning approach is deductive, the research was conducted in two phases. The first phase was an exploratory phase, in which, we ameliorated our thematic and proposals before doing the confirmatory phase. We used a semi structured interviews.

Understanding the supply chain of the Hospital of Mali and its involvement in quality of care improvement is the primary objective of our research. First of all, we describe the hospital logistic chain in Mali in order to identify elements of logistical collaboration and to try to understand their contribution to improving the quality of care. Our research proposes a complementary theoretical contribution through the development of an analysis model to better understand the healthcare logistic in Africa, mainly in Mali. To our knowledge, there is no research of this importance that deals with logistical collaboration and improving the quality of care. The managerial objective of the research concerns recommendations made to decision-makers for the purpose of improving the logistic healthcare and quality of care.

1. Literature review

Many studies have been done on healthcare logistic (Kim and Kwon, 2015; Beaulieu et al., 2021), on inter organisational collaboration (Abbad, 2014 ; Paché et al., 2018). However, in Mali, few works have focused on the case of hospital logistics and its impacts on quality of care. The literature review in the field of logistics shows us that we can identify two main types of collaboration, which are: vertical collaboration and horizontal collaboration. However, some authors such as Simatupang and Sridharan (2018) support the idea of a transversal, more flexible collaboration, sharing both vertical and horizontal resources within the supply chain. Abbad et al. (2019) try to understand the benefits and effects of collaboration on overall supply chain performance. While hospital logistics has evolved a lot in Europe, its place in Africa is poorly understood and not clearly defined enough. Supply chain management is more than the simple principle of purchasing goods and services (Sampieri-Tessier and Livolsi, 2018), it aims to significantly reduce costs but also to add value through a better synchronization of the organization's activities with those of suppliers.

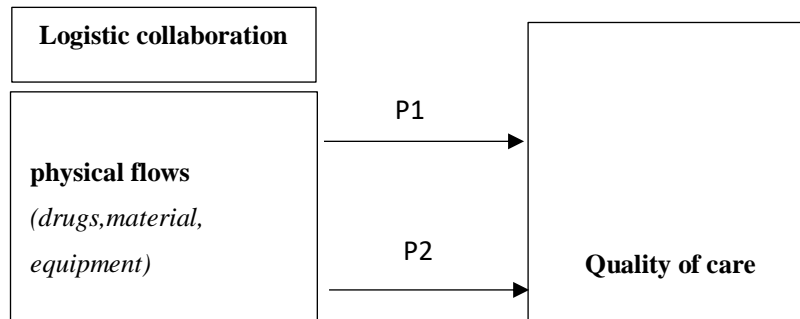
The notion of quality is not unique to the hospital system, the quality approach has long been practiced in industrial companies. The quality of care is undoubtedly distinguished by its purpose: the disease as a problem to be solved, the nature of the care to be provided to the patient and the professional environment in which the care is carried out. According to the WHO, quality of care can be defined as the available resources to provide optimal care to patients."(WHO, 2019, p. 43). To be clear, for a health system to be functioning properly, there must be health personnel, care facilities, drugs, materials and equipment, information system and funding (Beaulieu, 2019).

The availability and operational capacity of health services are necessary conditions for the quality of care. However, they are not sufficient to ensure the quality of health services. In Mali, basic care tools and equipment such as X-rays and scanners are not available in some hospitals.

The hospital supply chain contains several flows (drugs, material and equipment) that can be the subject of collaboration. Collaboration may focus on the continuous replenishment of the hospital. But this relies on the hospital sharing data on stocks and movements of drugs in the hospital pharmacy in order to allow the distribution centre to generate order for the hospital's replenishment. This process requires all stakeholders to adapt their management system to facilitate the exchange of data. Electronic data interchange (EDI), based on computer-to-computer communication is an essential element in the implementation of collaborative approaches (Kumar, 2021). EDI facilitate interoperability between actors in the hospital supply chain. The advantages of using such a system are: control of logistics costs, namely the reduction of the lead time, the reduction of the cost of storage, a better forecast of needs and reduce stock-outs. It can save on administrative costs, such as no data entry, reduction of errors, etc.

1.1. Conceptual Model and proposals

Figure 1.1. Conceptual model



Proposal 1: Logistical collaboration on physical flows improves the quality of care

Logistics activities are highly fragmented and therefore there is a need to better manage physical flows (medicines, materials and equipment) throughout the hospital supply chain. Medicines can save lives, but they need to be available, affordable and used wisely. These drugs should be available at all times in sufficient quantities in hospitals. The availability of medicines helps to improve the quality of care. Medical materials and equipment make it possible to diagnose and treat patients. They are working tools for health professionals, the hospital in these circumstances must ensure the availability of good quality medical equipment in order to provide quality care to its patients.

Proposal 2: Logistical collaboration, involving the implementation of an information system to better manage activities and processes between the various actors in the chain (communication, traceability and monitoring of physical flows, stock management), improves the quality of care. It can improve availability and facilitate the traceability and tracking of medicines and the management of healthcare equipment and materials.

The hospital logistics information system has been extensively developed by authors such as Karaa et al. (2016), Fabbe-Costes and Ziad (2019) and Garidi (2020). All these researchers demonstrate the importance of information systems as an important element for the functioning of logistics activities in the hospital. For these authors, the use of technology promotes accessibility to patient records, the traceability of drugs and the management of materials and equipment. Traceability consists of monitoring physical and informational flows within the supply chain (Bhakoo et al., 2012). Information flows can be either paper or electronic. The research of Fabbe-Costes and Romeyer (2004) on the modernization of the hospital information system and the operating theatre planning system concludes that there was considerable heterogeneity in health facilities.

2. Materials and methods

This research was conducted in two phases. The first phase was an exploratory study. Its main purpose was to better understand the organisation but also to make sure our questionnaire was strong enough. In an exploratory phase, we used semi-structured interviews. At the end of this first exploratory phase, we improved the themes representing the proposals of the conceptual model. In other words, the results of this phase have made it possible to adapt and improve the specific framework of our research. The next step is a second confirmatory phase based on semi-structured interviews with stakeholders (the Hospital of Mali, distribution centre, the government division for drugs and pharmacy) in the hospital supply chain. Ultimately, our methodology is qualitative, and our reasoning approach is deductive. We have 18 respondents in the confirmatory phase: 6 for the hospital, 10 for the distribution centre and 2 for the drugs and pharmacy division. The 18 interviews were proven to be sufficient with regards to the saturation criterion, this means that additional interviews would not have brought new elements to the survey (Dumez, 2013). An official letter was sent by the National Agency for Hospital Evaluation to the various structures concerned by the interviews giving the way to present the importance of the research, the objectives and the practical modalities of realisation. All this was intended to facilitate the data gathering from key people.

3. Findings and discussion

The discussion of the results is based mainly on the content of the semi-structured interviews conducted with the individuals in our sample (hospital, distributors, drug and pharmacy and experts) as well as all the documentation concerning the logistic issues. The results of this survey are obtained following a thematic analysis to highlight the elements of logistical collaboration that contribute to improving the quality of care. From the analysis of the interviews and documentation, two logistical elements emerge that have an impact on the quality of care in hospitals: (a) availability of drugs; (b) availability of materials and equipment.

3.1. Collaboration on physical flows

The distribution centre (Pharmacie Populaire du Mali) is at the heart of the supply chain system of all hospitals in Mali. Its role is to organise procurement at a lower cost, while ensuring the quality of health products from manufacturers and laboratories but also to ensure that the quality of products obtained from suppliers complies with the country's regulations. As part of the country's drug supply plan, the distribution centre must make sure that quality health products are available to hospitals and health centres throughout Mali. At the Hospital of Mali level, our findings focused exclusively on the logistical elements that have an impact on the quality of care.

Clearly there is a difficulty in coordinating activities between the Pharmacy and the Administrative and Financial Department in order to guarantee the correct execution of drug supply operations at the level of the distribution centre. Even when we send purchase orders to the distribution centre, (Pharmacie Populaire du Mali), we notice that all products are not available. In addition to that, the administrative procedures have an impact on the availability of products and the lead time (said the manager of the hospital pharmacy).

At the hospital, the non-availability of spare parts for medical equipment and the absence of maintenance rooms are the main causes of equipment not functioning correctly and the impossibility of carrying out prescribed medical examinations for patients. Added to this, the lack of qualified personnel and the absence of a training strategy at the maintenance service level. Equipment tracking sheets are not correctly filled in. In 2020, the 10 keys equipment selected by the hospital experienced 119 days of breakdown. The failure of key equipment may cause a disruption in the care process.

3.2. Collaboration on information flows

Logistics activities are fragmented between departments, which leads to a difficulty in coordinating logistics flows between actors in the supply chain. The pharmacy operates in a traditional way with a centralised and poorly organised storage system. Products are not stocked according to product families. Some products are stored on the ground. The lack of best practice in terms of stock rotation, control of volumes of products in stock. Even expired products were also highlighted at the level of the hospital pharmacy. We can see the inefficiency of the logistics information system to allow automatic exchanges of data between the central distributors and the hospital pharmacy.

We operate with semi-manual management of stock and order tracking, very often leading to delays and errors in the execution of customer orders. The exchange of stock data between structures is not automated. Poor organisation of warehouses most often leads to inventory discrepancies, increases the quantity of expired products, missing products and indicates low turnover rates (said a manager from Pharmacie Populaire du Mali).

In our conceptual model, we have retained physical flows (medicines, consumables, materials and equipment) and information. The aim was to analyse logistics collaboration on physical and information flows between the different actors in the supply chain. The success of the supply chain depends on the level of management of physical and information flows between the different links in the chain (Frichi et al., 2019).

Conclusion

The managerial contributions of our research concern not only the hospital but also the other stakeholders in the healthcare system, namely the distribution centre and its suppliers), the public authorities and National Agency for Hospital Evaluation. Our recommendations are formulated to contribute to the implementation of best logistical practices in order to improve the quality of care and to increase the performance of the hospital.

Hospital
<ul style="list-style-type: none"> - Improve the inventory management and replenishment system - Coordinate activities between the pharmacy and the purchasing department - Improve the management of the hospital pharmacy - Improve the emergency service replenishment model Inform and regularly follow the - stock sheets of medical materials and equipment - Recruit qualified personnel for the maintenance department - Implement a national policy for the maintenance of health equipment - Develop solutions to better organize the reception and orientation of patients - Communicate and raise awareness about the mechanism of patient care - Set up intra- and inter-organizational information systems - Train on skills aimed exclusively at logistics activities
Distribution centre (Pharmacie Populaire du Mali)
<ul style="list-style-type: none"> - Improve the public offering system for the purchase of pharmaceutical products - Centralise all flows within a logistics platform - Improve the logistics information system
Authorities and National agency for hospital evaluation
<ul style="list-style-type: none"> - Set up an automated data sharing system between distribution centre and hospitals - Review regulatory arrangements for hospital supply chains - Improve hospital evaluation tools by integrating a logistics performance component

In Malian hospitals, logistics is undoubtedly at its beginning, and its appropriation by the actors requires a radical change in managerial philosophy in order to impulse a real logistics management culture. To meet the expectations of public authorities, health professionals and patients, the way to improve the quality of care must pass imperatively by a better organisation of supply chain. Our research is not certainly without critics. By referring specifically to the African context, it ignores the methods of coordination being implemented in other countries like in Europe.

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