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A utilização das tecnologias de informação e comunicação na gestão de produtos clínicos. Implementação de armazéns avançados num centro hospitalar português

The use of information and communication technologies in the management of clinical products.
The Implementation of Advanced Warehouses in a Portuguese hospital center

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Resumo • Abstract

A introdução de tecnologias da informação e comunicação (TIC), no âmbito dos sistemas de saúde, nas suas diferentes dimensões e níveis de ação, produz potenciais benefícios para os cidadãos e para os prestadores dos serviços. Promove a eficiência dos cuidados de saúde, eficiência económica e controlo da despesa pública. Existem requisitos diferentes para cada método, sendo necessário, para cada unidade hospital, determinar se o método utilizado é o melhor para o seu caso em particular. A melhoria de gestão requer um compromisso por parte da logística e dos prestadores de cuidados. A interligação, informação e comunicação entre as partes é fulcral para se poder agir com eficácia e eficiência na saúde. É objetivo deste trabalho, analisar a gestão de produtos clínicos após implementação de armazéns avançados num centro hospital.

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The introduction of information and communication technologies (ICT) within health systems in their different dimensions and levels of action has potential benefits for citizens and service providers. It promotes health care efficiency, economic efficiency and control of public spending. There are different requirements for each method, and it is necessary for each hospital to determine if the method used is the best for your particular case. Improved management requires a commitment on the part of logistics and care providers. Interconnection, information and communication between the parties is central to being able to act effectively and efficiently in health. The objective of this work is to analyze the management of clinical products after the implementation of advanced warehouses in a hospital center.

Palavras-Chave • Keywords

Sistemas de Informação; Logística Hospitalar; Centro Hospitalar; Armazéns Avançados. Information Systems; Hospital Logistics; Hospital Center; Advanced Warehouses.

1. Introduction

The World Health Organization (WHO) understands health as “physical, mental and social well-being, not merely the absence of disease or infirmity” (WHO, 2016).

Social health (social well-being) is the response or adjustment to environmental demands, and it fundamentally depends on the social-economical conditions of the surrounding environment, of the distribution of wealth, and of the opportunities granted to the individual so that they may become part of the community’s organized effort. “Social Health” is more of a collective than individual (WHO, 2016).

Some of the planned orientations for 2016 (Plano Nacional Saúde, 2010) sought the creation of a system for management, articulation/integration and continued care as well as the reinforcement of measures for the rational use of medicine and medical apparatus based in cost-efficiency analysis’s.

The acquisition and management of materials must be the target of a very special care, the Supply Chain Management (SCM) being one of the main areas where it is possible to gain some improvement. The main use of Advanced Warehouses (AW) would be to fulfill that role. An investment in information systems that optimize the data gathering process while translating the information to management making it effective and efficient for service providing while advocating its profitability.

In this study, we will approach information systems in health as well as logistics’ management with the purpose of defining how important their connection is. We intend to evaluate and measure their interconnection and efficiency in a hospital center and if necessary, propose improvements.

2. Information Systems in Health

One of the strategic objectives in The National Health Service (NHS) is the rational and efficient use of available resources. Improving performance and increasing the rigor in management will lead to an investment in information systems (Plano Nacional Saúde, 2015). Their use in the field of health constitutes an essential element for the promotion of safer relationships in healthcare as well as increased accessibility and efficiency that stem from their ability to supply useful information for the decision-making by health professionals (Jardim & Martins, 2016). The introduction of ICT in healthcare also plays a predominant role in economic efficiency and control of public debt (Pereira, 2009). There has been investment in ICT, but that investment, when applied to information systems of hospital units is rudimentary. There are different requirements, in human resources, supplies, space and finances for different methods, which requires that each hospital must determine which single or conjugation of methods it believes will be best applied in their case.

In the last few years, a great number of economical, logistics, operational and management studies have greatly increased knowledge in the health area (Costa, 2013).

According to the National Health Plan (Plano Nacional Saúde, 2010) information systems in health are understood as not only tools for authorities and health professionals, but also as personalized health systems for beneficiaries. They are formal and technological systems used (or to be used) in an institutional context of healthcare, in order to provide health care for management and administrative purposes, be it in public, private or other hospitals. The beneficiary may or may not be one of those systems' users.

ICT in health are intimately connected with the E-Health (Plano Nacional Saúde, 2010). The production of updated and reliable information on health is a key element for strengthening and developing health systems, rectifying disparities in health access by different users (Olaniran & Zhang, 2016), and should be available to health professionals globally. Health institutions must be equipped with ICT that can respond to any looming emergencies.

The variables to consider, must be, in order to best fit the national reality, separated by the objectives given to each system, while maintaining a set of questions/variables that can be gathered to help understand and evaluate their functionality, health gains, time and efficiency for the beneficiary which will lead to an efficient, effective and equitable system (Rouse & Serban, 2014).

Due to the high investment associated with stocks, the need to adopt stock management systems, for supply and distribution, which are adequate and effective,

becomes much more visible, in order to deal with the inherent complexity of product consumption while gaining significant gains in health organizations.

“This in turn, leads to an increased awareness of stock management, as in the hierarchy of hospital unit expenses, medicines, consumables, supplies, external services and fixed asset purchases will be in second and often times first place” (Costa, 2013). The importance of stock purchase and management is recognized due to its dimension, as well as the care that must be taken by the organizations in handling the chain of supply, which is one of the main areas where improvement is possible. There are several methodologies and tools, and is up to each organization to adequately adopt them.

The lean philosophy (do more with less) first introduced in the automobile production (Ohno, 1998) after the second world war, has been in the last few years applied to the health sector, with the purpose of optimizing, reducing waste and increasing productivity, in patient healthcare and resource use. According to Vargas (2015), therein unanimity in the literature in the distinction between methodology and tool, methodology being defined as the orientation (path) followed in implementing and maintaining the lean philosophy which aims to organize and standardize space, while promoting a spirit for rigor, discipline and organization in the workplace; and tool being defined as the practice (technique) used to achieve the goals, be them identification or elimination of waste.

There are five stages “5S”:

- › 1º Classify (Seiri) - consists of classifying materials in the workplace as necessary, frequently used, infrequently used, unnecessary/obsolete and segregate the latter so that all may deem them unnecessary;
- › 2º Organize (Seiton) - this organization defines “a place for each thing and everything in its place”. Of the non-segregated materials, those of frequent use should be close to the workspace, and the infrequently used further away in order to optimize movement and dislocations;
- › 3º Clean (Seisou) - All the workspace, machines, tools and the floor itself, must be clean in order to guarantee the preservation of machines and tools as well as to facilitate the detection of anomalies;
- › 4º Standardize (Seiketsu) - Create space organization practices. This standardization consists of defining norms for shelving and cleaning, identifying visual aids, including colors, lights, and direction indicators that allow the fulfillment of the previous three “Ss”;

- › Discipline (*Shitsuke*) - maintain the previous four “Ss”. This discipline requires the development of self-discipline as well as creating the habit of involving collaborators in periodical audits of the workplaces with the purpose of improving workspaces, rectify deviates and cultivate the appreciation and pride for the workspace.

There are many advantages to applying this tool: the creation of a clean and pleasant workspace, that promotes a preventive approach and reduces possible means of contamination; eliminates variability; optimizes movements and increments the speed of access to tools and supplies, thereby reducing setup and cycle times; eliminates excess stock and reduces or eliminates non-quality.

It is a very useful and extremely important tool, for it simultaneously acts to eliminate many of the wastes identified above.

3. Logistic Management

According to Poulin (2003), we can consider logistic management as an integrated function of a company, whose mission, is to make available desired products and services, in the correct time and place, with the highest efficiency possible for the organization in order for it to maintain it financially competitive and productive. For this reason, at present, logistic management is treated as a strategic affair, with a prominent role in corporations, due to its perceived role in their success or failure.

Considering that health care providers are one of the areas that require greater attention, where the expectations of the users and the levels of expenses are growing, the reduction of costs in health care assume the greatest importance.

The main advantage in optimizing the whole hospital’s logistics circuit, in comparison with other improvements, is that a hospital’s efficient and effective logistics’ management reduces the hospital costs without reducing the service and quality for the beneficiary (Jarret, 2006).

Thus, it is fundamental for hospitals that they reduce costs in logistics activities by adopting modern techniques for managing and controlling stocks.

The SCM is the process that integrates the management of all the logistics from the supplies to the client. In spite of the apparent simplicity of the concept, the advances in the ICT as in the strategic concepts, have led to the rise of new concepts, among which: an integrated management of the supply chain, management of the logistics’ channel, organizational efficiency, environmental logistics, reverse logistics and the awareness of the globalization effect.

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The hospitals supply chain does not differ in its essence from any other corporations supply chain (supplier-warehouse-consumption). From the shipping of supplies until its arrival to the hospital, storage, transport from the main warehouse to the services' warehouses and finally the delivery of the supplies to the places where the beneficiary will receive treatment and will consume the product.

One of the issues that occurs in the hospital's chain of supply comes from the fact that its actions are independent, which leads to maladjusted incentives and opposing objectives, which hinders the proper functioning of the whole (Schneller, & Smeltzer, 2006).

Hospital logistics have different methods that help with goods management, some of them are the level restocking and supply system of electronically controlled cabinets (Osório, 2009).

In the level restocking it is necessary to determine minimal and maximum stocks.

These levels are determined both by the provisioning process and the consumer service.

Subsequently the identification of the storage area, with the placement of coded tags for articles and their designation. In the provisioning, the missing quantities are prepared by "picking" and then the level restocking takes place in the service warehouse. This process is automated, and for this, it is necessary that the articles have a bar code as well as the coded tag and designation. It is also necessary to possess portable equipments with optical readout and the use of stock management compatible software, which will allow the reduction of stocks, and ensure shelf life as well as a control for misplaced supplies.

The creation of advanced warehouses comes about with that purpose. They are "built" according to levels:

- › It is a warehouse that has defined minimum and maximum stock levels, where products are reset in accordance with those levels (level restocking) - proactive restocking;
- › It enables a consumption of stock at moment of use, avoiding stock errors by oversight or absence of registry;
- › It allows the browsing of updated stocks (online) for each warehouse at any moment.

Requests and shelving cease to be a responsibility of the service and become a responsibility of Logistics, which with this implementation, also ensures the maintenance and shelving. The one thing that is requested of the service is the correct consumption of products so that the stock is as close to reality as possible,

that is, that the physical stock matches the computer stock. With this new system, nurses and assistants are granted more time for what is really important, healthcare provision, but it also demands a great commitment on behalf of the service and leads to a great change in the work method.

In the organization, as in many other hospital units, the responsibility and concern of request and material shelving in the various clinical services was entirely up to the head nurses and assistants. These were forced to carry out a request, where they registered the name and quantities produced monthly, fortnightly, weekly and in some cases daily. All this process soaked up an enormous amount of time, because of the required counting and controlling of all the material, while at the same time estimating future needs and drafting the requests. The supply tasks were carried out by the warehouse assistants and the shelving by the service assistants all supervised by the head nurses.

This method led to overblown requests, with an end result of high stockpiles, often over passing the ones in the central warehouse, while other items would be in a state of rupture.

The elevated number of items in the services often lead to the existence of large quantities of expired products. Furthermore, some material would be sent directly to the services, without going through the main warehouse, which made it impossible to catalogue, for example, items used and discarded would only show up in the invoices.

Currently a large part of services make use of stock management based on the advance warehouse system for clinical and pharmaceutical material.

4. The Study

The level restocking method in advanced warehouses was implemented in 2012 in the hospital center in focus, based on a project with the theme “Patient Quality and Security”. It aimed to standardize stock management practices in clinical and support services, by adopting more efficient practices which in the long run would reduce costs, improve traceability and security on the patient side.

The project committed itself as one of the strategies of quality sustainable health care improvement, by allowing, via practice standardization, to offer equity in health care providing. The accessibility would be achieved by improving supplies’ management, which when rigorous, allows for the necessary supplies at the right time.

Different stock resupplying practices in the units; waste generated by the tendency to hoard supplies, improper use, weak standardization on the use of clinical

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supplies and associated procedures, weak user accountability; losses on expiration dates, by improper shelving and misplacement, all lead to the project implementation.

It is however fundamental to understand if the implementation process was a success and examine how the system is being applied by the users. It is necessary to measure its effectiveness and validate if it answers the needs of the organization and the users. Measuring the user satisfaction and listening to their opinion is fundamental for the program's success.

Considering the factors previously mentioned, this research question is "What is the impact of information systems in management improvements after implementation of Advanced Warehouses?"

Up until present day, the implementation and maintenance of AWs is adjusted according to service needs and the proposal of the logistics, by complying with the specifications and consumptions. It is necessary at times, to create AWs that one might label as "seasonal".

With this case study, we intend to assess an information system for hospital management. We will look at a public hospital entity with an area of impact of 15 municipalities, serving about 266 thousand inhabitants. Based on the information gathered and the work conducted in management, we will measure the effectiveness and efficiency of the information system according to its implementation and maintenance and its subsequent financial impact on the institution.

It is the specific objective of this study to:

- › Determine if the implementation of AW fulfils the goals;
- › To assess the satisfaction of the parties involved with the information system;
- › To analyze the stock management.

For the study, the techniques used will be, content analysis, observation and survey.

We began by conducting and analysis of IS (Information Systems) in health in the field of AWs in Portugal, and by identifying the IS a requirement for the hospital center in the study as well as the critical factors of success:

- › Commitment on the part of the hospital in defining objectives and analyzing specifications;
- › Active participation by all parties in the different phases of the project;
- › Clear definitions for use and accountability;
- › Acknowledgment of the need for the system by the users;

- › Users training and support for system use.

The following step will be creating instruments for data collection.

5. Conclusion and Future endeavours

For health, logistics management is more inclusive, because, not just planning and stock management are involved but also purchases, as well as supplier management and qualification, this makes it a complex and ambitious project. It also impacts Hospital management in particular, because if on the one hand, costs must be taken into account, on the other, health must be a priority, since actions taken will determine the quality and efficiency of the service provided. An integral part of health logistics management is optimizing resources in order to minimize costs and unnecessary labor. The lean principles are seen as tools that allow greater efficiency in health connected services, their main objective being the maximization of value for the patient through an efficient and waste free process.

One of the key points for the correct development of Advanced Warehouses (level restocking) is a well-adjusted IT development that follows the needs of the different parties involved in the process.

The case study presented, meets the need to evaluate the implementation of Advanced Warehouses in a hospital center, by assessing their effectiveness and as a result, minimize/fix problems found daily *in loco*.

To sum up, logistic management in hospital settings is faced with enormous pressure to reduce costs, manage spaces, resources and stocks, without letting it affect the level of service provided. This cost reduction through elimination of wastes, with the optimization of all the inherent process, strives to standardize services and to achieve effective quality by integrating the featured tools as fundamental to all management and organization of health logistics.

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