PLANNING OF THE MAIN MATERIAL RESOURCE USED IN THE OPERATING ROOM

PLANEJAMENTO DO PRINCIPAL RECURSO MATERIAL UTILIZADO EM SALA OPERATÓRIA PLANIFICACIÓN DEL PRINCIPAL RECURSO MATERIAL UTILIZADO EN EL QUIRÓFANO

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ABSTRACT

Objective: to analyze the flow of the main material resource used in an operating room of a university hospital. **Method:** this is a qualitative, descriptive, documentary and observational study carried out in a university hospital. The two initial phases were: documentary analysis of the material resources used in the operating room; and construction and descriptive analysis of the flowchart with the material listed. These resources were subsequently cataloged and stored in a database using Microsoft® Excel, version 2016, in order to perform the descriptive analysis. **Results:** it was found that the most used materials were gauzes and compresses, with 3,415 and 3,325 units, respectively. The flowchart indicated 44 phases, 10 departments involved, and 15 mapped processes. **Conclusion:** it was observed that the lack of compresses resulted in emergency purchases aimed at maintaining the operation of the sector and the institutional flow. The acquisition of materials is complex, bureaucratic, and time-consuming. The lack of material resources can be minimized with a more evident insertion of nurses in operating room planning. **Descriptors:** Health Administration and Planning; Perioperative Care; Workflow; Nursing in the Surgical Center; Hospital Materials Management; Nursing.

RESUMO

Objetivo: analisar o fluxo do principal recurso material utilizado em sala operatória de um hospital universitário. **Método:** trata-se de um estudo qualitativo, descritivo, documental e observacional realizado em um hospital universitário. Executaram-se duas etapas: análise documental dos recursos materiais utilizados em sala operatória; e construção e análise descritiva do fluxograma do material elencado. Catalogaram-se, posteriormente, esses recursos, armazenando-os em um banco de dados no Microsoft® Excel, versão 2016, para a realização da análise descritiva. **Resultados:** revelou-se que os materiais mais utilizados foram gaze e compressa com 3.415 e 3.325 unidades, respectivamente. Evidenciaram-se, pelo fluxograma, 44 etapas, 10 departamentos envolvidos e 15 processos documentais mapeados. **Conclusão:** observou-se que a falta de compressa resultou em compras emergenciais para garantir o funcionamento do setor e o fluxo institucional. A aquisição de materiais é complexa, burocrática e morosa. Pode-se minimizar a falta dos recursos materiais com uma inserção mais evidente do enfermeiro no planejamento em sala operatória. **Descritores:** Administração e Planejamento em Saúde; Assistência Perioperatória; Fluxo de Trabalho; Enfermagem de Centro Cirúrgico; Administração de Materiais no Hospital; Enfermagem.

RESUMEN

Objetivo: analizar el flujo del principal recurso material utilizado en el quirófano de un hospital universitario. **Método:** se trata de un estudio cualitativo, descriptivo, documental y observacional realizado en un hospital universitario. Se llevaron a cabo dos etapas: análisis documental de los recursos materiales utilizados en el quirófano; y la construcción y el análisis descriptivo del diagrama de flujo del material enumerado. Esos recursos fueron posteriormente catalogados y almacenados en una base de datos usando Microsoft® Excel, versión 2016, para la realización del análisis descriptivo. **Resultados:** se encontró que los materiales más utilizados fueron gasa y compresa con 3.415 y 3.325 unidades, respectivamente. El diagrama de flujo mostró 44 etapas, 10 departamentos involucrados y 15 procesos documentales mapeados. **Conclusión:** se observó que la falta de compresas resultó en compras de emergencia para asegurar el funcionamiento del sector y el flujo institucional. La adquisición de materiales es compleja, burocrática y morosa. Se puede minimizar la falta de recursos materiales con una inserción más evidente del enfermero en la planificación en el quirófano. **Descriptores:** Administración y Planificación en Salud; Atención Perioperatoria; Flujo de trabajo; Enfermería de Centro Quirúrgico; Administración de Materiales en el Hospital; Enfermería.

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INTRODUCTION

It is known that nursing management aims at control, organization, and resource planning. In the surgical center (SC), these goals are achieved through surgical planning performed by the nursing team, i.e., the organizational process leading to the performance of surgeries, ensuring safety to the patient and the team. This surgical planning will be responsible for predicting, providing, and maintaining the necessary resources for the intraoperative period.¹

Material resource (MR) planning is linked to nursing and care provided to the patients. A study pointed out the lack of MR and equipment as the main barrier in the care process according to 87.5% of nurses interviewed. In addition, that study found that the problems with MR were an institutional condition for the cancellation of surgeries, accounting for 8.6% of these cancellations.²⁻³

The administration of MR, specifically, considers the materials needed in health services for the production of goods and services. To that end, it involves the delivery of health products to the right user, at the right time, and in the right amount, becoming an essential part in the production of services.⁴

In public institutions, among the processes for the acquisition of materials, the bidding process is an administrative procedure regulated by specific legislation expressed in Federal Law No. 8666/1993. It refers to the norms for the acquisition of goods by public institutions, aiming at ensuring compliance with the constitutional principle of isonomy and selecting the most advantageous proposal to be contracted.⁵

Considering the high complexity of care provided in a SC, and the diversity of materials used in the operating rooms and their high costs, nursing is responsible for rethinking the meaning of MR management when performing managerial activities. The control procedure to ensure the availability of these resources is based on quality, amount, time, and cost.¹

In hospital institutions, it is common to observe that insufficiency, lack, or low quality of the materials used create delays or cancellations of surgeries, thus increasing the stress in the whole multiprofessional team. There are, therefore, interruptions in the care provided or barriers in care planning.⁶

The conduction of the present study is based on the fact that 23% of the delays in surgeries in the analyzed institution were

attributed to the lack of MR. The difficulty in predicting the amount of health products to be ordered according to hospital demand becomes a barrier in the management of the stock when it reaches a minimum amount or is exhausted.⁷

The present study may contribute to the understanding of the phenomena that involve planning in the operative room, i.e., the situational picture relating to intraoperative and nursing care. We also categorize information about the planning process in a public university hospital, describing the management profile with its technical and strategic aspects of surgical planning. From this perspective, we raised the following research question: "What is the flow of the main MR used in the operating room of a university hospital?"

OBJECTIVE

- To analyze the flow of the main material resource used in the operating room of a university hospital.

METHOD

This is a qualitative, descriptive, documental and observational study carried out from April to June 2018, in the operating room of a large university hospital in the city of Rio de Janeiro, Brazil. It offers various surgical specialties, with an average volume of 420 surgeries per month, which is a number that may vary according to the demand. Surgeries were distributed between twelve operating rooms, with areas for small, medium, and large procedures, used by the multidisciplinary team with characteristics aimed at teaching, research, and extension, serving undergraduate and postgraduate students, *Lato* and *Stricto sensu*.

Based on the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE)⁸ tool for observational studies, we prepared the flowchart of the main MR planning used in the operating rooms. The flowchart was based on the material of greater consumption during elective and emergency surgeries that occurred in the operating rooms of the SC. The lack of this material would prevent the development of daily surgical planning. Subsequently, we monitored the documentary flow for requiring this material in the institution.

The inclusion criteria considered the materials sent to the operating rooms of the institution, purchased through bidding or sequential and periodic purchase, and those used for elective and emergency surgeries during the daytime period. The materials

excluded were: orthoses, prostheses, and special materials, because they were purchased through a different process than that of other MR; materials donated, or those that did not follow the flow of the purchase process through bidding or financial allocation; and those that had not been booked by the central warehouse and the SC warehouse. The surgeries excluded from the surgical planning were those that had taken place at night and weekends, and surgeries that did not occur in the operating rooms of the SC, namely: ophthalmic surgeries, endourological treatments, and hemodynamic procedures.

Data collection was carried out in two stages. In the first, in April, we performed the documentary analysis of the instrument "material consumption in the operating room", already used at the institution and completed by the team after each surgical procedure. Subsequently, the MR were cataloged and stored into a database, using Microsoft® Excel, version 2016, in order to perform the descriptive analysis. In this study, MR were those products that had a duration of up to two years, for single and immediate use.⁹

In the second stage, from May to June, we performed data collection based on the observation of the processes of reception,

distribution, and documentary search of the MR in the sectors involved to support the completion of the observational road map. Subsequently, the flowchart of this material was prepared, from its entrance into the hospital to the use in the operating room, using the graphic representation provided by the standard norms for flowcharts and specified in the legend.¹⁰

The present study was approved by the Research Ethics Committee, under Opinion No. 2,541,747 and CAAE: 82754217.6.0000.5259, in compliance with the criteria set forth in Resolution 466/2012.

RESULTS

The results of the first stage of the study indicated that there were 434 surgeries in the SC of the institution in April 2018, of which 361 were elective and 73 emergency surgeries. From this amount, we collected 367 (84.5%) instruments referring to the MR used in the operating rooms, taking into account the inclusion and exclusion criteria of the study. The most consumed MR in the operating rooms are presented in Figure 1.

Material resource	No.
Gauze	3,415
Operative field compress	3,325
Sterile gloves	3,233
Surgical scrub brush	1,713
20 mL-Syringe	1,708
40x12mm needle	1,490
10 mL-Syringe	1,423
30x7mm needle	961
30x8mm needle	955
Scalpel blade	916

Figure 1. Distribution of most consumed material resources in the operating rooms of a university hospital. Rio de Janeiro, RJ, Brazil, 2018, (n=367).

The data collected in the second stage indicated that there had been four surgeries cancelled due to the lack of compresses and adjustments in the surgical schedule for the

acquisition of this input by the nursing and medical management of the SC. Figure 2 is the flowchart illustrating the path of these MR.

Figure 2. Flowchart of the surgical compresses in a university hospital. Rio de Janeiro, RJ, Brazil, 2018.

The flowchart illustrates the managerial steps for the acquisition of compresses in the institution. The enumeration illustrates the procedural and documentary stages that took place in the MR flow.

DISCUSSION

Considering the cataloging of the items of greater consumption in the first stage, gauzes and compresses were used in greater amount in the operative field in the operating room. Administratively, the process of acquiring the two materials was through bidding.⁴

The two MR were submitted to a bidding process and purchased; however, there was no lack of gauze in the institution and only the compresses followed the purchase flow due to exemption from the bidding process for consumption due to its lack. As described in the observation stage and according to the inclusion criteria, this material had more than one means of acquisition and, consequently, in the construction of the flow, its process became more complex than the expectation of the other MR used in the operating rooms.

The sterile compressive material was considered within the gradual critical scale, because it is vital and irreplaceable in the provision of operating room services. It is worth mentioning that its lack can lead to interruption in the service delivery, since it is a basic input for specific operative procedures, such as skin preparation, hemostasis, and fundamental transoperative phases.^{4,11}

It was observed that the amount of compresses bidded in the temporal cut of the research and in the two previous biddings was six thousand units. When considering the monthly consumption of 3,325 units for the average surgical service, that amount would be suitable for 45 days, thus covering only 25% of the material required for the period, i.e., 180 days. This fact implies the formulation of a new bidding process and/or exemption from bidding due to the lack of the material. It should be emphasized that the bidding of the compresses demonstrated a failure in the management system, because the demand for a vital MR in the operative room was not taken into consideration.

In the second stage of the research, we observed that understanding the flow of compresses, as well as the identification of failures, noise, barriers, access, and fluidity present in the planning and management process was an important health management tool. The flowchart was prepared as an analysis tool, demonstrating the path of the materials until their use in the operating

rooms, and ratifying the different stages of the administrative and structural processes.¹³

It should be noted that, in the institution, there was not a pre-established design of the administrative and managerial procedure for acquisition of MR through bidding or financial allocation. Complex organizational activities can be observed in the flowchart, since it involved 44 steps to obtain the result, with 10 departments, 15 documentary processes mapped through the active search, and three macro administrative decisions.

It is worth mentioning that, in case of documentary errors, or noncompliance with the requirements set forth in bidding documents, the purchase process can be interrupted at any moment before the effective delivery of the MR. Consequently, the warehouse needs to start from a new initial request for purchasing.

Among the departments, the central warehouse of the institution supplied the materials so that the production of care could take place. Its main functions were to plan the average biannual consumption of MR in the hospital, and initiate a new request for purchase of inputs by sending a document to the financial sector.⁴

When there is a reduction of stocks in the warehouse, the stock is stored and controlled, distributing the materials to the sectors. To that end, the data is fed into a virtual stock in addition to the physical stock. However, if there are data errors in the virtual stock, due to false amount feedback, the flow can be hindered. This fact increases the stress in the team for the formulation of an emergency process, and this increases the risk of surgical cancellation, according to the result pointed out in the present study.¹¹⁻⁶

After the entire planning process carried out by the supply sector, the next step is the purchase of the material. This process differs from the private to the public sector, because, in public institutions, the purchase of compresses is made through bidding based on more bureaucratic rules.⁴

In case of emergency or if the value is less than ten percent of the estimated value for the contract, i.e., 17,600.00 reais, the material can be purchased without bidding or financial allocation granted to the departments. This modality of contracting goods and services also respects the principle of isonomy, but its process is more flexible and fast.⁵⁻¹¹

The purchasing sector is responsible for price quotation in the bidding processes of consumable materials within the public database. In addition, the total purchase is

made in cases of exemption from the bidding process, and the structuring of purchase contracts is performed.⁴

For an institution, material and purchasing management areas, as well as departments connected to them, become essential, given that they are the most challenging processes within a public institution due to the complex, bureaucratic, and sometimes time-consuming procedures that involve the purchase of any MR.¹¹

Based on the public management model in force at the institution, it was noticed that there was no intercommunication between the sectors at the time of planning for the acquisition of the product or to determine the ideal amount to be requested in the bidding process.

The flowchart indicated that the warehouse was solely responsible for issuing the purchase order of the product through a bidding process when the amount in the stock was minimal or zero. The quality of the product and the suitability for which it was proposed at the final destination of use, i.e., the operating room, were not mentioned.

In health, the provision of care by heterogeneous groups of professionals, with distinct educational backgrounds, makes it difficult to work as a team. It is understood that communication within management is the key to success in developing structural processes in an institution; however, in surgical services, its lack becomes a serious problem that prevents the improvement of the services, as pointed out in the present study.¹⁴⁻⁵

Requesting MR used in the operating room should involve joint action of the team, given that the evaluation stages and the requisition and management process of these materials are linked to administrative and technical functions, with different responsibilities from its stage of evaluation, selection, stock control, and distribution.⁴

Firstly, for a purchase to be requested in the institution, it is necessary that the MR are requested by a sector. In the case of the SC, the request for the purchase of the compresses is started by nursing, which makes the prior planning of human and material resources for the surgical procedure. It was observed that the involvement of nursing management was more evident in planning the MR at the beginning of the flowchart by requesting, virtually, the amount of compresses required weekly for the operating rooms.

It is necessary to know the administrative reality of the institution to build a

management plan. The main reason is the participation of nurses of the SC in the preparation of a purchase notice, technical specifications, and product conformity, as well as in the establishment of conditions that ensure the quality of the product to be acquired through tests performed with samples.¹⁴

These health professionals should be able to evaluate the necessary amount of MR, based on the planning of the average expenditure calculation according to the surgical specialties. They should also critically analyze the costs aiming at the safety of professionals and patients. It is also necessary to share these tasks with the service of the warehouse led by personnel with specific technical ability.¹⁴⁻⁶

The support provided by nurses in the management of MR can contribute to the cost and flow within the institution, for the improvement of the nursing team performance in the development of the productive process and assistance in the operating room. To that end, it is necessary to share knowledge and experience about MR management with the professionals who cooperate, and promote and handle the materials, in order to ensure product safety, cost-effectiveness, and the care process.¹⁴⁻⁷

It is necessary to propose strategies aimed at stimulating managerial changes, because the failures related to MR in the institution were affected by structural and logistical problems, and, substantially, by the planning of these resources. Such changes would help in solving the problems observed, given that changes are successful when the teams that directly deal with MR participate in planning, implementation, and decision-making.^{12,14-6}

It is suggested that, in order to aid in the identification and elimination of structural obstacles, and in the improvement of processes in health services, the application of the Lean methodology, in association with Six Sigma, is a viable model, given that they are frequently used to analyze, measure, and improve strategic management performance. It assists in the standardization of institutional workflows based on objective data for the description of the processes and ensuring that the existing barriers are not only linked to the interpretations of managers.¹⁵

CONCLUSION

The analysis of the flow of the main MR used in the operating rooms indicated that compresses were considerably critical. Its absence at the institution resulted in

emergency purchases in order to minimize the occurrence of surgical cancellations.

In addition, it was observed that the institutional administrative structure for acquisition of materials was complex, bureaucratic, and time-consuming. This way, a more evident insertion of nurses in MR planning could minimize the lack of these materials in the operating rooms.

A limitation of the present study was that the organizational characterization of the institution may have undergone changes subsequent to our analysis. In addition, according to the reports made by the professionals in the instrument of MR consumption in the operating room, there were registration failures, thus implying the possibility of a non-reliable quantitative result in phase 1.

From this perspective, this research will encourage the conduction of further studies and possible organizational interventions that will improve both MR planning and surgical patient care.

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