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Original Article

Tools for inventory control of dental supplies of a municipal health department: a case study

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Aim: Carry out a descriptive and organizational analysis of the Oral Health warehouse of the Municipal Health Department in a city in the South of Brazil in order to assist in its management. **Methods:** This case study is a descriptive and organizational analysis of the Oral Health warehouse of the Municipal Health Department. The Always Better Control (ABC) curve, and Vital Essential Desirable (VED) analysis and ABC-VED matrix was performed, in order to assist the warehouse's management. The first stage was a descriptive situational analysis. In the second stage, the supplies were classified by the ABC curve and the VED analysis. Subsequently, the ABC-VED matrix was carried out. **Results:** Changes were made together with the local manager, such as organizing the products, labeling the items in the proper places and, carrying out the inventory more frequently (monthly). Furthermore, the method the first in, first out (FIFO) was applied. Of the 120 inputs, 13% corresponded to 65% of the expenditures (class A). In class B, close to 26% of the items accounted for 25% of the expenditures. Class C accounted for 10% of the costs and 61% of total materials. In the VED analysis, 19.2% of the items were classified as vital, and 62% and 19% as essential and desirable, respectively. In ABC-VED matrix, 23.3% (72%) belonged to category I, while 63% (25.6%) and 13% (2%) were classified in categories II and III, respectively. **Conclusion:** The use of inventory control tools granted a better storage of products and made it easier to find the items. The ABC curve, VED analysis and ABC-VED analysis allowed greater control, considering both cost and importance of supplies.

Keywords: Organizational case studies. Health Management. Cost control.

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Introduction

Oral health is part of the general health and is essential for collective health programs[1]. Among the stages of public administration in the health area, there is the proper inventory of supplies. The warehouse is responsible for the correct control of stock and storage of the product for further distribution[2]. Regarding the management of this department, a transitory organization should be maintained, considering the entries and outs of stored products, as well as relevant characteristics such as expiration dates and enough stock to address consumption needs[3].

Public department warehouses can be quite complex and diversified, whereby it is essential to define the tasks to be carried out by the personnel in charge in the department[4]. According to Mota and Cancio[5], issues related to inventory control are intensely discussed in public administration, aiming to identify actions and practices to be applied, thus reducing costs and, consequently, improving the use of public funds.

For the Oral Health warehouse of the Municipal Health Department of Pelotas (SMS-Pelotas), this control is of great importance, since it currently provides materials for 45 Basic Health Units (UBS) that have dental care, in addition to three dental offices from the Center of Dental Specialties (CEO)[6], being a service that demands a great amount of material, emphasizing the importance of an adequate management.

The Always Better Control (ABC) curve is an important tool for inventory control and management strategy[7]. In 1987, Vilfredo Pareto, an economist and sociologist, designed this method, through his statistical analysis about people's income in different countries. The economist observed that a small part of the population (about 20%), had most of the wealth (about 80%). He also noted that the income distribution in these countries did not depend on the specific characteristics of these nations, such as the prevalence of capitalism or feudal relations[8]. Thus, *General Electric Company*, an American multinational conglomerate, used the Pareto principle to manage their supplies, naming the tool the ABC curve[3]. The tool allows the identification of materials considering their consumption value (class A, B or C), being widely used in the management of medicines in the hospital context[9-12].

Similarly the ABC curve, the Vital, Essential, and Desirable (VED) analysis is a widely used management tool for inventory control[13]. The analysis classifies supplies based on their criticality. According to the author, the ABC and VED analyzes are frequently used. From these, it is possible to consider costs and criticality, combining the results of the ABC curve and VED analysis, through the ABC-VED matrix, since an analysis based on costs alone may not be enough for an adequate inventory control[14]. To date, no study using these management techniques (ABC curve, VED analysis and ABC-VED matrix) for dental supplies inventories in public departments has been found.

The aim of this paper was to carry out a descriptive and organizational analysis of the Oral Health warehouse of the Municipal Health Department in a city in the south of Brazil, and to apply the ABC curve, the VED analysis and the ABC-VED matrix, in dental supplies, in order to assist in its management.

Materials and Methods

The first stage of the study consisted of a situational and descriptive analysis based on the observation of the local conditions, in addition to an organizational analysis.

During the second stage, data was collected for the application of three management tools: 1 – ABC curve, which considers the value of the supplies, being a tool for inventory control and management strategy; 2 – VED analysis, which considers the criticality of the items and, 3 – ABC-VED matrix, which combines the results of the ABC curve and the VED analysis, allowing the study of the supplies according to cost and criticality.

Data was collected from the Computerized Health Information System (SIS), used by the Pelotas City Hall. Retrospective data was used, corresponding to the total demand of dental supplies from the Basic Health Units (UBS) and Dental Specialty Center (CEO) from May to December 2016 (eight months).

After collection, the data was organized into spreadsheets using Microsoft Office Excel® version 2013, containing the name of each supply and the individual quantity, as well as the total products leaving the warehouse during the time of study and the amounts of each item.

In the third stage, the ABC and VED curves and the ABC-VED matrix were constructed. Accordingly, the purchase amounts were obtained from the invoices and supply allocations filed by the department of each consumable for the preparation of the ABC curve, according to the Martins method[3]. Finally, the items were allocated according to class, where class A represents around 20% of the products, being the items with higher costs and those that must be dealt with greater attention by the manager. Class B comprises about 30% of the items and has an intermediary cost and, in class C, there are those less important supplies due to their low cost, corresponding to approximately 50% of the total supplies[14].

For the VED analysis, all the supplies present in the general spreadsheet were classified as Vital, Essential, and Desirable by the Dental Surgeon (CD)/public manager in charge of the inventory of the dental supplies. The items belonging to the Vital class are considered critical and necessary for the functioning of the proper logistics, as well as for the patient's well-being. The Essential class corresponds to less critical supplies, which may be scarce or lacking for a short time. The remaining supplies (not classified as Vital or Essential) are part of the Desirable class, and their lack is not harmful to logistics or the health of the users of the service, even if the scarcity or lack is long lasting.

In the ABC-VED matrix (Figure 1), the classes are subdivided into three groups: AV, AE, AD, BV, and CV (I); BE, CE, and BD (II); CD (III), according to the Vaz et al.[13].

Categories	Vital (V)	Essential (E)	Desirable (D)	Class
Always (A)	AV	AE	AD	Class 1
Better (B)	BV	BE	BD	Class 2
Control (C)	CV	CE	CD	Class 3

Figure 1. ABC-VED Matrix.

This study is part of the actions planned by the Educational Program for Work 2016 (PET-Health/GraduaSUS) with the Federal University of Pelotas, which contemplates the implementation of the ABC curve and other management techniques in the inventory of the Oral Health warehouse of the Pelotas Municipality.

Results

Descriptive and Organizational Analysis

The Oral Health warehouse is located in the Health Department of Pelotas, comprising of a room with dimensions 2.60 x 4.90 m and three places for the storage of dental supplies. Some changes were made together with the local manager, such as organizing the products, labeling the items in the proper places and, carrying out the inventory more frequently (monthly). The warehouse has a large diversity of supplies such as equipment, instruments and consumable materials. The monthly consumption is approximately 13 thousand Brazilian Real. Items were organized by expiration date, using the first in, first out (FIFO) method, which considers the chronological inputs of itens[3], this stage lasted 1 month.

ABC Curve

One hundred and twenty dental supplies were handled during the period between May to December 2016 (eight months), classified using the ABC curve (Figure 2).

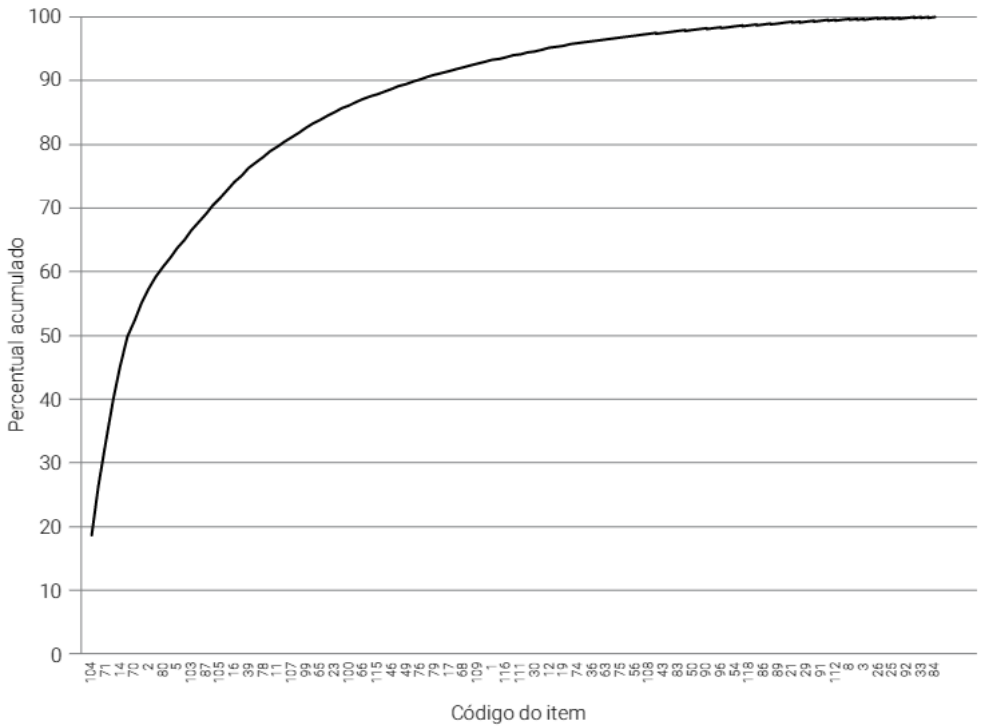

Figure 2. ABC curve of the stock movement of the Pelotas Oral Health Warehouse, between May to December 2016.

In class A, 16 items (13.3% of the total) were identified as being the most important due to their high cost for the Oral Health warehouse, which corresponds to supplies such as A2 resins, scalpel blades, and P-size gloves. Class B contemplates the intermediary items such as gauze, toothbrushes for adults and instrument brushes, corresponding to 25% of the total inventory movement and to 25% of the total quantity of materials during the study period, totaling 31 supplies. Class C items, on the other hand, are considered to be less important due to their low cost, for example, articulating paper and amalgam capsules, which are equivalent to 10% of the number of movements and represent 60.9% of the total materials.

Figure 3 indicates the movement of financial amounts according to the ABC curve for the period studied. It is important to mention that, from a total equivalent to R$ 114,596.20, class A handled R$ 74,487.50, class B R$ 28,076.00, and class C R$ 12,032.60.

VED Analysis

Table 1 shows the VED analysis results. For the Vital class 19.2% of the items were classified, 61.6% were classified as Essential and the remaining (19.2%) were classified as Desirable.

ABC-VED Analysis

Table 2 indicates the ABC-VED analysis matrix. This matrix contains nine subcategories which were then grouped into three main categories (I, II and III).

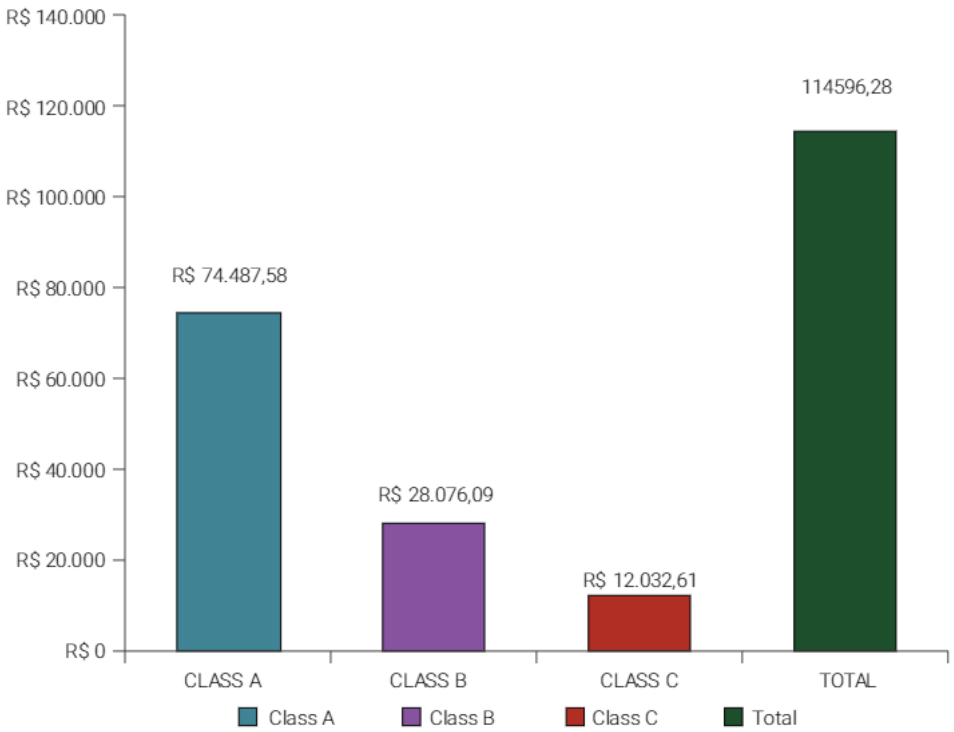

Figure 3. Movement of financial amounts according to the ABC classes, from May to December 2016.

Table 1. VED analysis and ABC-VED matrix of the supplies from May to December 2016

	n of items	Percentage of Items	Percentage of Expenditures in the Period
VED Category			
V	23.0	19.2	58.0
E	74.0	61.6	34.0
D	23.0	19.2	8.0
Total	120.0	100.0	100.0
Category ABC-VED			
I	28.0	23.3	72.3
II	76.0	63.4	25.7
III	16.0	13.3	2.0
Total	120.0	100.0	100.0

V: Vital supplies; E: Essential supplies; D: Desirable supplies
I: AV, AE, AD, BV, and CV; II: BE, CE, and BD; III: CD
ABC-VED matrix combines the results of the ABC curve and the VED analysis.
Pelotas, Rio Grande do Sul, Brazil.

Table 2. ABC-VED analysis of the supplies from May to December 2016

ABC-VED Categories	Vital		Essential		Desirable	
	N	%*	N	%*	N	%*
A	11.0	9.1	3.0	2.5	1	0.8
B	8.0	6.6	18.0	15.0	6	5.0
C	4.0	4.1	53.0	44.1	16	13.3
Total	23	19.8	74	61.6	23	19.1

*% indicates the percentage in relation to the total supplies (n=120)
A: items with higher costs; B: Items with intermediary cost; C: Items with low cost

In relation to the ABC-VED matrix (Table 1), category II contains the highest quantity of items and category I accumulates the highest percentage of expenditures.

Discussion

In this work, a classification analysis was carried out on the dental supplies corresponding to the oral health department of a city, using management tools broadly utilized in the hospital scope[14-17] and in other departments, such as the general inventory for a health research centre[12].

In relation to the descriptive and organizational analysis, the oral health warehouse was organized to facilitate the manager's work. The identification of items using labels and the use of FIFO method contributed to the preparation of periodic inventories because warehouses in public departments have a rather diversified character[3]. For Arnold[18], the physical arrangement of the inventory must be adequate for a specific situation when there is no standard system to be used; therefore, the items were organized according to the needs of the local manager, in alphabetical order and by type of consumable (equipment, instrument and consumable material).

A study using these analyses of inventory control was found in a private hospital providing dental services in the city of Bangalore, in India[9], where the period of study was 12 months, using data from 2011 to 2012. The study consisted of 215 items, but it

cannot be compared with this work due to the type of material (hospital dental supplies), which the author himself cites as a study limitation, because the consumption in a hospital environment is different from the consumption of public departments, like Primary Attention. The Primary Attention is focused on health support, promotion and prevention, with actions at individual or collective level[1]. The inventory control at this level of attention is important, as it represents the individual's first contact with the Health System and maintaining this adequate control, assists in the good attendance and costs control[1].Regarding the warehouses for medicines in public hospitals, more studies involving these techniques were found[9-17]. Shah *et al.* (2015) applied both methods, ABC curve and VED method, in order to minimize the drug inventory investment from a Community Health Centre in Singarva, India. After the study, they strongly recommend a guideline for inventory control, including ABC and VED methods, and both methods should be done with more frequency (approximately 15 days). Furthermore, the authors suggest the use of computerized software so that by entering the item it is possible to directly do the categorization in ABC and VED.

From the ABC-VED matrix it is possible to classify the items evenly, considering both the criticality (VED analysis) and the cost of the supplies (ABC curve), thus, being adequate for inventory control[16]. From the 120 supplies identified, 23.3% of the total was classified through the ABC-VED matrix as belonging to category I, consisting of items that are both vital and of higher cost. The supplies of this class should receive special attention from the perspective of management by exception[16] and it is important to keep constant monitoring of them.

The supplies belonging to class II correspond to those classified as essential by the VED analysis and median price by the ABC curve. They must have less priority when compared to class I; however, their consumption should be properly controlled[16], as this class corresponds to the majority of the items, thus a lower frequency acquisition of these supplies is recommended[17]. Regarding the supplies belonging to class III, they are the smallest in the scale of priorities and need simple management, allowing the acquisition of these materials to be done less frequently compared with other classes.

According to Martins[3], the tool must be used in a certain space of time (usually six months or one year), and is one of the most usual ways to verify inventories, enabling proper control, determination of priorities, definition of policies, and identification of problems within companies[11].The period chosen for this study can be considered a limitation, since, given the availability of the records used, it was possible to carry out an analysis using eigth months, although the ideal period to offer an overall view of the supplies to the manager would be 12 months. Another possible limitation is that the VED analysis was carried out in general, not stratifying the items in relation to their use according to the level of attention (Primary or Secondary Attention), as the Secondary Attention deals more with specific procedures, which on the other hand, use supplies of higher cost.

In conclusion, the ABC-VED analysis can be useful to assist in the management of public inventories because it considers both the cost of the supplies and their importance. The data of this work will be able to be used for a longer analysis (12 months), as well as to be stratified according to the need of the level of care to be given, pro-

viding more control of the management of dental supplies in the different levels of Health Care. Therefore, these inventory control tools can be used broadly, with the possibility of use in several public and private sectors where the inventory control is required, aiming to improve results and reduce the costs in inventories linked to the management of materials.

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