

## Development of a cost structure for telemedicine assistance services, palliative care, and home application of medications in an oncological IPS in Bogotá

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**ABSTRACT:** This study illustrates an economic diagnosis of oncological IPS and the establishment of an efficient cost structure, focused on the areas of external consultation, specifically Telemedicine, Palliative Care, and Home Application of Medicines, it is mainly investigated the aspects that generate conflicts economic, where in turn these generate some kind of consequence. The method used for the development of the project is the ABC method (activity-based costing) since it is an orderly assignment to each activity or process so that it understands how the organization works economically in the processes and activities it carries out. Following this, the diagrams are established for the gathering of information required to apply the ABC costing method and implement the new cost structure defined for each of the services in order to obtain, an optimal evaluation and analysis, Finally, all the cost information is obtained in the information gathering format where the results about the total implementation of the service are illustrated and also the value that the patient must pay for taking a service or several in the institution. This resulting information is obtained from true and current information provided by the institution as support to reach the required result.

**KEYWORDS** -Activity, costs, diagnoses, information gathering, healthcare services.

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### I. INTRODUCTION

The oncology institution provides different services to patients with health complications and has specialties focused on treating cancer. This health entity seeks to satisfy all its clients in the best and optimal way; The organization is in the process of implementing three healthcare areas which are telemedicine, palliative care, and home application of medications, in order to improve the activities provided and make the care process more effective and faster, however, to Each of these is essential to establish a cost structure, collecting information on inputs, processes, and everything included within the processes carried out in said services. [1]

For the establishment of the structures, the ABC cost method (Activity-Based Cost) is applied since it allows to include all the costs (direct and indirect) generated during a process; In this stage of application of the method, information is mainly collected in each area so that each of the structures is optimal according to the service provided, this is collected from meetings with medical and administrative personnel, in addition, the process diagrams established by the institution, in order to evaluate each part of the process and analyze the costs and difficulties they may present.

Tables are created so that the information is more clear and concise, in such a way that an optimal structure can be established that includes the activities, processes, supplies, resources, time, among other aspects that are incurred during a whole workday and thus know the costs that are generated when implementing each service and in the same way how they are solved.

### Bogotá Oncological IPS

The IPS understudy has been present for more than 60 years providing services continuously, has a highly complex pharmaceutical service, outpatient consultation, and chemotherapy unit; It has been growing gradually and has great national and international recognition. [2]

Outpatient services, telemedicine, palliative care, and home application of medications are processes that require many inspections at the time of their execution. [3] At the moment telemedicine is working as

dictated by the process diagram and it is an easy method to use for patients who like this modality, on the other hand, palliative care and home application of medications are in a pilot plant. [4][5]

### **Theoretical framework**

The High-Cost Account, that is, the Colombian Fund for High-Cost Diseases (CAC), constitutes a common front where a high cost can be seen as a phenomenon of great impact in the country, it functions as a self-managed fund where it stabilizes the health system; this fund often specializes in chronic kidney disease, HIV treatment, and cancer. [6]

There are more than 200 different types of cancer and according to research and documentation collected, for 2014 in Colombia there was the first report of 139,789 oncological cases, where breast cancer was the highest number 33,095, prostate with 14,350 cases, of the cervix 12,628 cases, colorectal with 8,824 cases, gastric with 4,721; Among other cancers a little less common than those already mentioned, however, it is important to know and take into account that at present, for 2018 the total number of cases was 275,348, being able to observe that breast cancer is still the most frequent, for that year with a figure of 59,837.[7] [8]

According to a study revealed by the ICESI University, the costs of cancer treatment are quite high and vary according to the type of cancer that the person has, this is seen very regularly; the World Health Organization (WHO), [9] [10] recorded treatment costs with chemotherapies, where it is concluded that there must be adequate management according to the resources used so that there is agreement both for the entity as well as for the client when paying for telemedicine assistance services, home application of medications, chemotherapy, and outpatient consultation which on certain occasions is necessary to perform palliative care. [11] [12]

Costing based on ABC activities, [13] seeks to improve the allocation of resources, be it products, services, customer, market, supplier, etc., measuring the performance of the processes carried out in the entity, to allocate costs more accurately, taking into account the future vision of the company. This methodology is one of the most used for its wide acceptance and credibility of costing, financial management, and strategic direction for better decision making. [14]

The ABC model begins mainly with identifying the activities that take place within the company and they are classified as follows: [15]

1. Main activities where a direct relationship with the company made.
2. Secondary activities where benefit is implemented from customers.

This classification allows to know the number of resources that each activity or task uses and to carry out an analysis of the products or services, in addition to the fact that the ABC method [16] helps to broaden the conception of the management, control, and analysis of costs where the planning and design of the product or service are essential; This system offers quality measures and delivery, innovation and sales times to later achieve a more detailed and detailed analysis of the resources used. [17] [18]

## **II. METHODOLOGY**

The research methodology used is mixed because qualitative and quantitative aspects are analyzed, in order to implement and develop the cost structure for the IPS, specifically in telemedicine assistance services, palliative care, and home application of medications.

It takes into account various activities that are carried out in a given time, which are grouped according to specific objectives and there is talk of a methodology according to these processes taking into account data collection mechanisms such as meetings, interviews, observation, documents, among others that favor the matter.

When mention is made of the personnel or population within this project, 100% of the workers who work in the institution are taken into account, that is, the 54 employees assigned to the area of telemedicine, palliative care, and home application of drugs organized within 10 areas involved.

For the analysis and understanding of the information, the ABC cost method (Activity-Based Cost) [19] is used, which integrates the costs generated according to the company's activities, all the requirements, and procedures, in order to obtain an analysis structured cost where the general and specific financing are known for proper management of it and decision-making.

### **System characterization**

The characterization of this entity is focused on planning in a coordinated, controlled and timely manner all the activities, procedures, and interventions of a technical, scientific, and administrative nature, related to each of the external consultation services of this report; telemedicine, palliative care and home application of medications to optimize processes and ensure optimal execution. [20]

Basically, the services were established in order to provide greater coverage to the needs of the clients, where the IPS provides support through data collection and correct directing of the patient to the most suitable external consultation service; Subsequently, a process of making appointments begins where the patient attends

them according to their need and in each one, different equipment, supplies, resources and times are used, this is why it is important to take into account all the appropriate information to arrive at decision making and to be able to obtain more truthful results digitized in the structure. [21] [22]

## Structures

To obtain the corresponding information on each of the healthcare services, the institution provided documentation regarding the issue to complement missing data, mainly this is segmented and to which section it belongs is defined speaking of supplies, personnel, cost, infrastructure, technology, or services. and the established structures are completed to be able to carry out concrete analyzes under organized and truthful data, in table one an example of the formats used for the indicated follow-up is observed where the process diagrams of each one of the areas and accordingly the activities carried out and their price defined for a set time, the missing data after a rigorous review are investigated with the institution's health professionals to confirm missing values and obtain the best results.

**Table 1.** Gathering information

cost segmentation	QTY	DESCRIPTION OF THE COST FACTOR OF THE HEALTH SERVICE	MEDICINES	MEDICAL SUPPLY	SERVICES	HEALTH PROFESSIONAL	ADMINISTRATIVE	INFRASTRUCTURE	COST PER HOUR OR JOB	REAL TIME IN HOURS / QUANTITIES	COST PER PATIENT	FINAL COST
PERSONAL												
TECHNOLOGY												
SUPPLIES												
MEDICINES												
INFRASTRUCTURE												
SERVICES												

Source: Authors & LCCC, 2020

## Data collection

The oncology institution provided much of the required information, and the rest taken from the internet under 2020 and 2021 updates, this process was carried out through interviews with the accounting area.

## III. RESULTS

The process is developed through the ABC method because it is more in line with the situation to be analyzed taking this into account, a segmentation carried out into cost groups that are described as follows:

**Personnel:** This group includes IPS personnel who interfere in telemedicine assistance services, palliative care, and home application of medications, in one or more of its procedures. In this segment, the types of contract, the remuneration of the personnel, the values of the benefit load, and social security contributions are taken into account. [23]

**Technology:** For this segment, those costs where a technological device interferes (be it equipment, machines, or software licenses), necessary to carry out each of the activities of the process, are taken into account. [24]

**Inputs:** In this group, it can be used as a synonym for raw material or production factor; In the case that corresponds to us, the supplies are all the tools used by the health specialist or the medical assistant, to carry out their activity in telemedicine procedures, palliative care or home application of medications. [25]

**Medications:** Within this segment, all medications that may be used, required, or recommended in the study procedures of patients described within any of the telemedicine, palliative care, and home application of medications assistance services. [26]

**Infrastructure:** In this group, there are several factors such as offices, clinics, and vehicles (for the home application of medications or for some emergency). It is also necessary to address all the documentation that provides information to know all the costs generated so that the institution functions normally and is in order with the authorities. [27]

**Public services:** Within this segment are the costs corresponding to the public services that intervene in the institution's processes such as electricity, water, and internet, among others.

Taking into account the above information, a segmentation obtained where the description of the cost factor of the health service, in the three health services are different because in each service they use different inputs, there is a variety of personnel and they are different from each other. In addition, the time worked or used is included in order to obtain the most exact costs.).

### 3.1 Palliative care

In palliative care, professionals who will carry out their work in this area are taken into account, because it requires dedication and all the time available for the people who request it, therefore, salary expenses

are incurred, time extras and occupations that must be done in order for the patient to be satisfied and in the best conditions with a good quality of life.

### **3.2 Telemedicine:**

For the costs incurred in the area of telemedicine, which is already operating, the implementation of more technology is observed, expanding the network or intranet of the institution, increasing the speed of the internet of the medical oncologist, among others such as electricity and salary of the professional which is not different from the one that has been accruing.

### **3.3 Home application of medications:**

For the implementation of the home application service of medicines in terms of cost structuring, it has been thought about how much the staff costs, their time and in extending their contract so as not to hire other people, the transport of ambulances and medical personnel to the application of these, take into account the elements of personal protection because they have a single-use per patient and then it is discarded, the medicines to be supplied, the duration of the application of the medicine that can take between 10 minutes to 4.5 hours by levels of toxicity depending on the case.

### **Improvement proposal**

The improvement proposal for the IPS is to create a cost structure for telemedicine services, palliative care, and home application of medications; to apply the ABC methodology and to be able to break down the activities carried out and in each of these tasks the costs that are need to complete the process successfully. [28] [29]

For this reason, the improvement aspects and their impacts on the generation of a cost structure for the services under study mentioned:

- Initial investment value for the execution of home application services for medicines and palliative care
- Cost of the service per patient
- Percentages of utility for the IPS
- Cost per patient when executing a telemedicine service, home application of medicines, and palliative care
- Segmentation of the costs of each of the services
- A modifiable cost structure for the use of the institution
- Cost-benefit of the treatments to determine the costs and the most favorable treatment for both the institution and the patient
- Resource Optimization
- Helps the institution to generate more clarity when making decisions about the expenses that are made

On the other hand, the positive impacts generated from the cost structure will be shown:

- A description of the activities made in the telemedicine services, home application of medications, and palliative care.
- An operations flow diagram was document for the services under study.

At the time of hiring the assistance services under study, there may be a great impact on the client who acquires it; the oncological IPS, being a non-profit institution, should not expose all its clients due to the high cost of its services. When talking about the percentage of utility that the IPS have in 2021, 28% is established in category 4; For this project, a percentage lower than the established data is provided to demonstrate that the institution can have a fair and comforting price in front of its clients. [30]

After completing the cost structure, the IPS must seek improvement strategies to reduce costs; how to create alliances, contract outsourcing services, search for new suppliers; which will contribute to the reduction of values in economic activity. This can translate to higher planned revenues as you look for ways to lower costs. In addition, the people who interfere in the process can help reduce expenses and better manage resources.

It must be borne in mind that when applying the ABC method, each of the activities that interfere in the processes can be detailed, which contributes to improving the management of these activities. Alternatives for improvement are mentioned below:

- Staff Participation Events to reduce costs.
- Trained personnel who have the necessary information and tools to carry out their functions.
- HR management to hire the most suitable personnel.
- Analyze the process diagram of each service, to determine if there are unnecessary activities.
- Apply Benchmarking

Another way to reduce costs in the company is through the systematic detection, prevention, and elimination of excessive use of resources. To reduce costs, seven activities must be executed simultaneously, of which quality improvement occupies the most important place and the other six activities must be considered as part of the quality of the process. The activities mentioned are:

1. Quality improvement
2. Improved productivity
3. Inventory reduction
4. Shortening of production lines
5. Reduction of idle time of machines and equipment
6. Reduction of used space
7. Reduction of total cycle time

#### **IV. DISCUSSION**

The study that considered more in line with the institution under study is "Proposal of an ABC cost system for the IPS Confamiliar" which is similar to the subject by referring to a cost structure that will be carried out through the ABC methodology.

##### **PROPOSAL FOR AN ABC COST SYSTEM FOR THE CONFAMILIARY IPS**

This research shows that the IPS in question faces financial problems due to inadequate decision-making, which leads to more serious dilemmas for the directors of the institution. The main objective of the two companies evaluated is to generate the cost structure to see in detail the expenses generated by each activity carried out in a process, without considering its application in decision making inappropriate; The cost structure is a tool that helps to improve processes, to evaluate the cost-benefit, to improve the quality of the service, etc.; In addition, it is observed that the method implemented for the two institutions is a methodology that helps to enhance the activities of control, evaluation of results, and decision-making.

Both projects reflect the need to implement a cost system such as the ABC methodology for companies; once the non-evaluation of expenses and the lack of monitoring of the different costs incurred by the processes of each company are identified.

The need for the cost structure is because organizations have not identified most of the activities and procedures within their institution, therefore, they should not be clear about the costs that are needed to fulfill each one of them.

The IPS carried out its study in a general way, investigating deeply throughout its institution and detecting each of its processes and procedures to identify the activities carried out, on the other hand, the research carried out in this work was carried out specifically to three healthcare services external consultation, which one of them is already working and the others are in a pilot plan; The identification of steps for these services was carried out through procedures already documented and delivered by the organization, allowing them to be improved as the project progressed.

The study carried out in this work was gradual, making a financial diagnosis of the evaluated services until reaching the gathering of information on each of the costs that describe the activities carried out in one, it is highlighted that the two projects have to define a cost structure for the economic determination of the services provided and the evaluation of the conditions required for efficient resource management. [31]

The IPS CONFAMILIAR project classified each of the functional units by cost centers, which were characterized by containing measurable resources and functions in a homogeneous way, similar to this research, which was segmented by healthcare activity to attend and describe the prices in detail, the resources used being different between one activity and another.

The study by G. Murillo took into account the structure of income, expenses and management of accounting accounts of the institution before carrying out the research, unlike this study that was based on the procedures for the creation of expenses by activity, without taking into account the accounting methodology previously used in the institution. The justification may be given to the complexity and robustness of the data in the first study, since it had to establish the costs of all the services executed.

The value generated by the use of public services in the IPS was calculated by the consumption of these services in each cost center, while for this research said information was obtained from the average consumption per person working in the institution, being the personnel the determining criterion in the consumption of these.

The author Julián García in the execution of his project on the ABC cost system in the IPS CONFAMILIAR carried out his cost structure, collecting and gathering information in a more general way provided by the different areas, while the one presented by the authors of the article, carried out a more detailed and specific analysis and execution. [32]



## V. CONCLUSIONS

Establishing a cost structure for any activity, a company's process facilitates the analysis for the optimization of resources, decision-making, and economic monitoring in each of its activities. On the other hand, the ABC methodology allows analyzing each aspect that interferes with the activities carried out in a process. The description of activities allows the approach to the daily tasks performed by each professional and in this way see what inputs are necessary to complete the service successfully.

During the development of the project, several findings were found, two of the three services mentioned were not working, therefore it was more difficult to extract the information since only the documented process was had. The institution provided all the necessary information for the development of the structure with the accompaniment of the different actors that interfered as the project progressed, which was very positive.

In the investigation carried out and through the information gathering format provided by the institution, we refer that the costs that only interfere in the process should be included and that is not used by all the people who intercept since this cost will still be higher and the price that can be charged per patient will be higher and cannot be favorable for the institution; It is worth mentioning that when analyzing professional, the value will decrease but not all professionals will handle the same inputs, it is highlighted that the IPS by having several professionals with the same position but with different salary ranges makes that at the moment to execute the format, all professionals have to go with the same position and this causes their cost to increase per service executed.

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