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Medical costs of cervical cancer: Experiences in Ecuador

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***Abstract*---**In Ecuador, cervical cancer is among the main causes of death per year and generates a large outlay of resources. The Cancer Society is the governing body in cancer care and treatment, however, the determination of the costs involved in these procedures is not established, in this sense, the objective of the research is to present a cost determination mechanism of the medical procedures associated with the areas of responsibility that deal with cervical cancer. A retrospective-descriptive cross-sectional study was carried out in the year 2020 of the expenses that were generated in all the patients attended. The results show that the outpatient clinic (56%) was the area of responsibility that deals with cervical cancer that generated the most costs, while the clinical laboratory area (0.2%) was the one that did the least. The research reveals the need for a tool that calculates the cost of medical procedures, ensuring that the resources allocated to cervical cancer, the subject of this article, are optimized and serve to improve the quality of life of patients.

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Introduction

Of the twelve million people who are diagnosed with cancer in the world, 7.6 million have cervical cancer. A high incidence of this type of disease is shown in Latin America, representing the second cause of death among women, with those with the lowest resources being more vulnerable (Brito-Álvarez et al., 2021). Cervical cancer, or cancer of the cervix, is a disease in which cancerous (malignant) cells are found in the tissues of the cervix. The most common cause of cervical cancer is the human papillomavirus (HPV), which is transmitted through sexual intercourse. Its development is slow, beginning with a precancerous lesion called dysplasia (Bansil et al., 2014). In Ecuador for some years, it is one of the diseases with the highest cause of death among women. (MSP, 2015, Más López and Aguayo Joza, 2020, Regalado et al., 2021).

This disease, like many others, requires a large outlay of resources by both state and private health authorities. Managing them within the institutions that provide the service, respecting their characteristics, becomes an important challenge. (Más López CJ, 2014, Aguayo Joza et al., 2021)

Most organizations in Ecuador use the cost system by areas of responsibility to allocate resources to cost centers. Therefore, it is a challenge for these institutions to measure the costs of a key factor such as illness. The cost of disease treatment is a partial evaluation within the economic evaluations in health. These types of studies analyze the direct health costs as well as the non-health costs generated by them; as well as the indirect costs associated with it (Más, 2014), (García et al., 2009), (Gálvez et al., 2012), (Conza, Torres, Martín, & Hinostroza, 2020), (Ávila et al., 2021).

After reviewing several studies on the subject, it was possible to determine that there was no standard methodology for the treatment of costs associated with the disease and essentially by classifying them into direct and indirect (Más López C., 2016, Reyes Hernández, 2016, Gómez, Mejía, & Cardona-Arias, 2020).

Added to this, there is no consensus between health economists and accountants on the determination and classification of indirect expenses generated by disease treatments (Más López C., 2016). However, in this article the precepts of management accounting will be used to pay for the areas of responsibility (Lauzán Carnota, 2020, Suarez Lugo & Caro Hernández, 2021, Herrera & Pedroso, 2021).
In addition to these elements, health care today has become a market where various health service providers compete to get more patients. This strategic competency ranges from having better trained human resources, medical procedures with the latest advances in medical sciences, to efficient expense management that provides the objective cost necessary to maintain the expected profit margin (Más López CJ, 2014, Becerra Pérez & Ramos Álvarez, 2020).

The management of costs for many health institutions faces an important challenge within the control of their expenses because it is in their interest to control the areas of responsibility where they are directed. resources and from there to the activities described in each disease treatment protocol. But in turn. There are processes within these areas that need attention to make strategic decisions, in the field of fighting for the patient market. Therefore, the calculation of the medical procedures associated with each area of responsibility plays a fundamental role. (Más, 2016), (Hernández, Bastidas, & Plested, 2020), (Aguayo et al, 2021).

The Society for the Fight against Cancer in Manabí (SOLCA), Portoviejo Nucleus is not oblivious to these realities. Therefore, the objective of the research is to present a procedure that calculates the cost of medical procedures associated with the areas of responsibility that treat cervical cancer.

Starting from the recognition of the areas of responsibility and the associated expenses that intervene in the process, an analysis of the procedure for calculating the costs for the treatment of cervical cancer in SOLCA Manabí-Núcleo de Portoviejo, Ecuador, is carried out, so that provide relevant information for decision making and allow better management of your expenses. For this, the research question is posed: How to calculate the costs of medical procedures associated with the areas of responsibility that attend cervical cancer treatments? with the research objective of determining a mechanism to determine these procedures in this institution.

Method

A retrospective-descriptive cross-sectional study was developed in the Society for the Fight Against Cancer (SOLCA), located in the province of Manabí in its Nucleus of Portoviejo. The analysis period was the year 2020 to a total of 115 patients at the “Dr. Julio Villacreses Colmont” that handles cases in the provinces of Manabí and Esmeraldas.

To calculate the costs of medical procedures associated with cervical cancer, an institutional approach was applied based on the incidence of expenses in the areas of responsibility. It was calculated according to the number of resources used and their value. This indicator was determined considering the expense item and its direct and indirect classification associated with medical procedures. The results were expressed in US dollars at current prices in the year 2020. They are not updated because they are calculated based on only one year.

The techniques and procedures were developed considering the cost allocation structure established in SOLCA by its areas of responsibility and from them to the medical procedures that attend to cervical cancer treatments. For this purpose, a review of the primary documentation generated both in the clinical records of the patients and by the financial statements of the institution was carried out. Once the information had been compiled, work was done on recording expenses by area of responsibility, carrying out the following tasks:

1. The areas of responsibility involved in cervical cancer treatment were selected.
2. Expenses involved in treatment (direct/indirect) were classified. The investigation considered all of them as indirect, because according to the SOLCA standards they cannot be measured directly from the treatment.
3. A secondary distribution of the indirect expenses of the service areas towards the direct ones in the application of the treatment was carried out. In the case of SOLCA, there is only one (other expenses) so the direct method of distribution was applied.
4. Indirect costs were distributed among the medical procedures identified in each area, considering their percentage of participation compared to the total.
5. The unit cost of each procedure was determined by area of responsibility.

The approval of the SOLCA authorities was obtained for the investigation, guaranteeing the anonymity of the collection of information from both officials and patients.

Discussion

In SOLCA Manabí-Núcleo de Portoviejo, the areas of responsibility play a fundamental role for the control of expenses since the resources for the provision of health services are directed there.

Areas of Responsibility

First, the areas of responsibility and their key sub-areas are reviewed with the associated expenses that intervene in the treatment of cervical cancer in SOLCA Manabí-Núcleo de Portoviejo.
As discussed above, the expenses in each associated area are considered indirect since SOLCA does not have applied standards to be able to measure them associated with any disease. The secondary distribution of indirect expenses was carried out from the area of responsibility of other expenses to the areas considered as direct in the provision of medical services. For this, the direct method was used since there is only one support area. In addition, the hours to work were selected as the basis of distribution since it is the only element present in all areas. Their results are shown below in table 1.

Table 1. Areas of responsibility and their key sub-areas with their associated indirect costs

Areas of Responsibility	Sub-areas Key	Costs
Hospitalization	Hospitalization clinical	2,043,218.55
	pediatric oncology	1,190,654.65
	Hospitalization surgery	1,697,826.11
	Hospitalization chemotherapy	1,032,250.07
	Hospitalization emergency	1,657,149.35
Operating room	Operating room	2,331,979.35
Laboratories	Clinical	1,784,461.59

	Pathology	1,735,952.46
	gastroenterology Interventionism	930,560.93
	Image	1,873,127.36
	Transfusion Medicine	867,206.80
	MRI	606,827.13
Surgeries	Outpatient	7,602,396.17
	Radiotherapy	1,966,549.71
Special care	ICU	1,460,728.42
	Ambulance	44,664.05
Cancer centers	Esmeraldas	428,728.82
	Manta	433,488.00
	Jipijapa	323,584.31
	Chone Cancer Center	225,454.63
Totals		30,236,808.48

Costs of medical procedures for cervical cancer treatments

The rates generated by each area of responsibility and key sub-area were calculated, taking their indirect expenses, and dividing them by their cost generator. It is important to highlight that the investigation only took the medical procedures that suffered incidents in the treatment of cervical cancer. With these elements, the unit costs are calculated considering the number of interventions associated with the areas of responsibility or key sub-area as shown in table 2.

	Medical procedures	Costs	Determinations/bed days/consultation days	%	Unit cost
Laboratory Clinical	Clinical chemistry	1,784,461.59	236,436	32.6	0.80
	Hematology		350,993	48.4	1.19
	Typification's		1,797	0.3	0.01
	Immunological		530	0.1	0.00
	Hormones		29,261	4.0	0.10
	HCG quantitative		395	0.1	0.00
	Tumor markers		11,131	1.5	0.04
	Serological		1,639	0.2	0.01
	E.M. urine		8,216	1.1	0.03
	Coproprietors		3,406	0.5	0.01
	Microbiology		6,022	0.8	0.02
	Blood gases		7,412	1.0	0.03
	Coagulation		22,910	3.2	0.08
	Electrolytes		45,249	6.2	0.15
	Total		725,397	100.0	2.46
Imaging exam	Radiographs	1,873,127.36	9,793	22.9	10.04
	Resonance		6,298	14.7	6.46
	Scans		11,342	26.5	11.63
	Mammograms		2,778	6.5	2.85

	Ultrasound		7,464	17.5	7.65
	ECO-mx		3,878	9.1	3.98
	ECO Doppler		321	0.8	0.33
	Interventionism's		866	2.0	0.89
	Total		**42,740**	**100.0**	**43.83**
Pathology Surgical	Surgical pathology	1,564,300.29	9,312	15.5	4.03
	Trans operative by freezing		175	0.3	0.08
	Special cytologist		1,067	1.8	0.46
	Inmunohistoquímica		1,961	3.3	0.85
	Cervicovaginal cytology		47,614	79.2	20.60
	Total		**60,129**	**100.0**	**26.02**
Hospitalization	Hospitalización clínica	2,043,218.55	6,826		299.33
	Pediatric oncological hospitalization	1,190,654.65	3,090		385.33
	Hospitalization surgery	1,869,478.28	4,917		380.21
	Hospitalization chemotherapy	1,032,250.07	2,011		513.30
	Emergency hospitalization	1,657,149.35	1,569		1056.18
	Total	**7,792,750.90**	**18,413**		**423.22**

Table 2. Costs of medical procedures associated with cervical cancer

In the case of hospitalization and outpatient, can calculate its easier unit costs such as the accumulation of their expenses coincided with the key sub-area.
A first analysis of the results details that the outpatient clinic (56%) was the area of responsibility that deals with cervical cancer that generated the most costs, while the clinical laboratory area (0.2%) was the one that generated the least, as shown by figure 2.

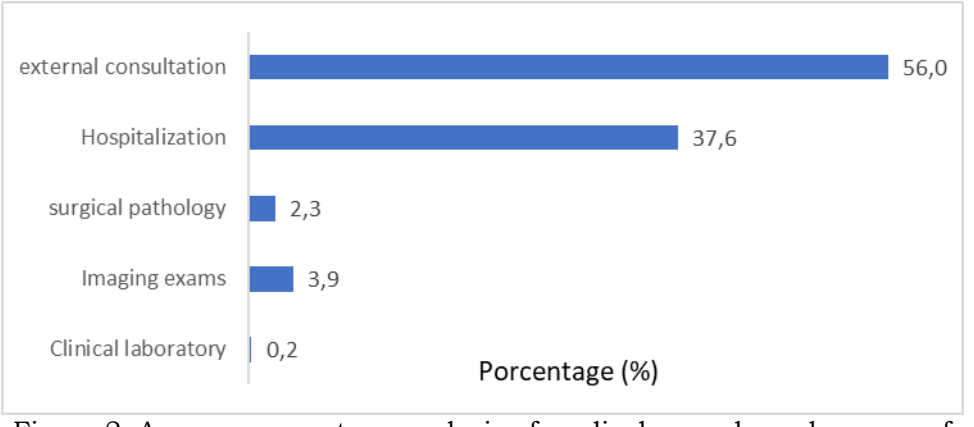

Figure 2. Average percentage analysis of medical procedures by areas of responsibility in SOLCA Manabí-Núcleo de Portoviejo

While, when the costs of procedures in the outpatient area are observed, the office procedure represented 67% of the same. The calculation of medical procedures for many health institutions is a difficult problem to solve because it goes from an effective internal organization, allocation of expenses to the areas involved, excellent statistical analysis generated from the areas and compiled uniformly by

the area in charge of its processing. (Neriz, Cruz-Fernández et al., 2020, Leira & Montañez-Santiago, 2021, Agudelo et al., 2021, González & González, 2020, Christian von Mühlenbrock et al., 2020, Jiménez et al., 2021), however, the determination of the unit costs of each medical procedure or service is essential (Macías et al, 2022) for the budget allocated to oncological interventions and treatments.

Health is not alien to the realities of the treatments of the expenses of many sectors of the economy and on the calculation of the costs of their productions or services. Traditional cost systems tend to overestimate or underestimate the costs of their productions or services by having a defective treatment of the indirect expenses associated with them.

In the particular case of health services in cervical cancer treatment in SOLCA Manabí-Núcleo de Portoviejo, Ecuador, they have a particular treatment since it is a non-profit service provider. This does not mean that you do not need to earn profits to invest in maintaining and increasing the quality of the services you provide. To do this, it charges the various insurances established in the Ecuadorian financial system the corresponding amounts according to the Rate of Benefits for the National Health System approved by the Ministry of Public Health of Ecuador (Ministry of Public Health, 2014) for which, For SOLCA, by not fixing the prices of its services, the control of its costs will be objective (target) to obtain the utility it requires.

It is relevant to clarify that, although the purpose of the research is not to design a tool to achieve an objective cost, it can serve as a basis to achieve it, adapting to the realities of the SOLCA Manabí-Núcleo de Portoviejo environment in setting the necessary utility. to maintain or improve the quality of the services it provides. Hence, the authors agree with Capasso (2015) where he refers that the objective cost "It is not a costing methodology, it is a management tool that allows ordering, adapting and assembling the activities of the organization and their consequent costs to achieve a level of utility in accordance with the objectives set by the Management" (Lara et al., 2020).

In the same way, this procedure would serve as the basis for the control of the resources involved in any illness that is treated in SOLCA, detecting deviations both in the cost of materials, staff salaries and others directly or indirectly involved in its plan – a result that paid for the investigation – and the actual registration in subsequent periods. The causes of these deviations must be detected and corrected to help achieve the goals of the organization. However, if the relationship between the tariff, the costs of SOLCA Manabí, Núcleo de Portoviejo and the profit/loss that should be associated with cervical cancer treatments is observed, the authors detect a general loss for the entity, as can be seen in figure 3.

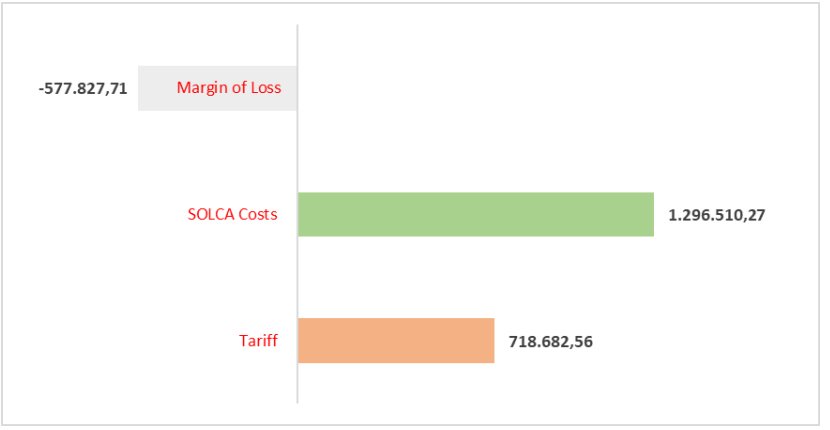

Figure 3. Relationship between Tariff, SOLCA Costs and Loss Margin

There are few references to studies on the costs of medical procedures that are not associated in one way or another with the tariff in Ecuador, however, sustained increases are reported in prices drastically due to the health situation in the country due to the Covid-19 pandemic and the collapse of care in both public and private hospitals. Pichincha (2022) refers "according to the consumer price bulletin for the year 2020, issued by the National Institute of Statistics and Censuses (INEC), the products with the highest incidence of the monthly variation of inflation in the health division are: expenses in hospitalization with 0.53%; consultation with a specialist doctor 0.11%; medications for the nervous system 0.73% and consultation with the general practitioner 0.38%. It should be noted that the health division is made up of 26 products and currently represents 7.34% of the weight of the consumer price index (CPI) basket. If we add to this that the cost of the Basic Family Basket (CFB) was $716.14, while the monthly family income of a household was $746.67, it means that the person who does not have insurance of health, you will automatically have to find yourself in a situation of indebtedness to be able to pay for the expenses of medical attention and medicines".

These data reinforce the idea that entities that provide public, private or non-profit health services, as is the case of SOLCA Manabí-Núcleo de Portoviejo, should have an inward look in relation to their expenses that makes it possible a control of its processes for a better positioning in the assistance markets and in one way or another make its services accessible to the population in general.

Conclusion

It can be concluded that outpatient costs are the most significant in cervical cancer treatment, so control of resources in this area is essential. The research reveals the need for the calculation and control of medical procedures in SOLCA Manabí-Núcleo de Portoviejo, since doing so encourages the resources allocated -especially- to cervical cancer, object of this article, to be optimized and serve to improve the quality of life of patients.

With the present investigation, it is possible to calculate the costs of the medical procedures that intervene in the treatment of cervical cancer by area of responsibility, providing SOLCA with an effective tool for the control of its resources.

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