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Impact of stoma site marking on healthcare costs in patient care

Patricia Rosa da Silva[1,*], Márcia Mascarenhas Alemão[2], Meiriele Tavares Araújo[3], Claudiomiro da Silva Alonso[3], Eline Lima Borges[3]

ABSTRACT

Objective: To analyze the impact of stoma site marking on healthcare costs for patients who underwent marking and those who did not, as well as the subsequent outcomes. **Method:** We conducted an economic evaluation in healthcare based on retrospective primary data. We obtained the data from the medical records of patients treated at the Health Care Service for Ostomy Patients in Belo Horizonte, Minas Gerais, Brazil, between 2015 and 2021. The sample consisted of 40 patients, with 20 who underwent stoma site marking and 20 who did not. We applied the Mann-Whitney test for independent samples and analyzed the effect size, which was adjusted using Hedge's g test, considering the risk of low sample power. **Results:** The study identified an average cost of R$5,201.47 (US$938.19) for the group of patients who did not undergo stoma site marking, which was 23.88% higher than the cost of R$3,959.27 (US$938.19) for the group who did. Most patients were female, with an average age of 60.7 years, married, and of mixed race. Colorectal cancer was the most common cause of stoma creation, while dermatitis was the most frequent complication. We observed that complications led to increased costs. **Conclusion:** Stoma site marking significantly affects the healthcare costs for individuals with elimination stomas.

DESCRIPTORS: Costs and cost analysis. Economic evaluation in health. Nursing care. Enterostomal therapy.

Impacto da demarcação da estomia de eliminação nos custos assistenciais do cuidado ao paciente

RESUMO

Objetivo: Analisar o impacto da demarcação da estomia de eliminação nos custos assistenciais do cuidado aos pacientes demarcados e não demarcados e seus desdobramentos. **Método:** Pesquisa de avaliação econômica em saúde baseada em dados primários retrospectivos. Os dados foram obtidos dos prontuários de pacientes do Serviço de Atenção à Saúde da Pessoa Ostomizada, em Belo Horizonte (MG), atendidos entre 2015 e 2021. A amostra foi composta de 40 pacientes, sendo 20 demarcado e 20 não demarcado. Foi aplicado o teste de Mann-Whitney para amostras independentes e analisado o tamanho do efeito, que foi corrigido com o uso do teste g de Hedge, considerando o risco de baixo poder amostral. **Resultados:** Identificou-se o custo médio de R$ 5.201.47 para o grupo dos pacientes não demarcados, que foi 23,88% maior que o custo de R$ 3.959,27 para o grupo dos demarcados. A maioria dos pacientes eram do sexo feminino, com idade média de 60,7 anos,

[1]Prefeitura Municipal de Belo Horizonte – Belo Horizonte (MG), Brasil.
[2]Pontifícia Universidade Católica de Minas Gerais, Instituto de Educação Continuada – Belo Horizonte (MG), Brasil.
[3]Universidade Federal de Minas Gerais, Escola de Enfermagem – Belo Horizonte (MG), Brasil.
*Corresponding author: patriciarosasilva3@gmail.com

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casados e pardos. O câncer colorretal foi a causa mais comum em estomias, enquanto a dermatite foi a complicação mais frequente. Observou-se que as complicações implicaram o aumento dos custos. **Conclusão:** A demarcação impacta os custos dos cuidados de saúde das pessoas com estomia de eliminação.

DESCRITORES: Custos e análise de custos. Avaliação econômica em saúde. Cuidados de enfermagem. Estomaterapia.

Impacto de la demarcación de la ostomía de eliminación en los costos de atención al paciente

RESUMEN

Objetivo: Analizar el impacto de la demarcación de la ostomía de eliminación en los costos asistenciales del cuidado a los pacientes demarcados y no demarcados y sus desdoblamientos. **Método:** Investigación de evaluación económica en salud basada en datos primarios retrospectivos. Los datos fueron obtenidos de los prontuarios de pacientes del Servicio de Atención a la Salud de Personas Ostomizadas, en Belo Horizonte (Minas Gerais – MG), Brasil, atendidos entre 2015 y 2021. La muestra estuvo compuesta por 40 pacientes, 20 demarcados y 20 no demarcados. Se realizó la prueba de Mann-Whitney para muestras independientes y el análisis del tamaño del efecto corregido se realizó mediante la prueba de Hedge g considerando el riesgo de bajo poder muestral. **Resultados:** Se identificó un costo promedio de R$ 5.201,47 para el grupo de pacientes no demarcados, que fue un 23,88% superior al costo de R$ 3.959,27 en el grupo de pacientes demarcados. La mayoría de los pacientes eran mujeres, con una edad media de 60,7 años, casadas y de raza mixta. El cáncer colorrectal fue la causa más común de estomías, mientras que la dermatitis fue la complicación más frecuente. Se observó que las complicaciones resultaron en un aumento de los costos. **Conclusión:** La demarcación tiene un impacto en los costos de atención de la salud de las personas con estomía de eliminación.

DESCRIPTORES: Costos y análisis de costos. Evaluación económica en salud. Atención de enfermería. Estomaterapia.

INTRODUCTION

Healthcare costs are increasing due to various factors, including the progression and technological-scientific innovations in the healthcare field and the relationship between the demand for and supply of healthcare services. These costs encompass those arising from medical interventions, such as diagnostic tests and procedures, medications, consultations, and hospitalizations, as well as non-medical expenses, such as facilities and equipment, in addition to other indirect costs[1].

The care of individuals with ostomies stands out regarding specific health conditions and treatments that require care. An *ostomy* is an assistive technology involving the surgical creation of an opening that allows an internal organ to connect to the skin's surface. Care must be provided before, during, and after its creation, which requires the management of healthcare networks and the resources utilized throughout the care process. Ostomies typically result from chronic intestinal and urinary diseases, abdominal traumas, or congenital conditions[2]. They can be classified as intestinal (colostomy and ileostomy), urinary (urostomy), feeding (gastrostomy and jejunostomy), or respiratory (tracheostomy). Ostomies can further be categorized as temporary or permanent, depending on their duration[3].

Regardless of the type of ostomy, its presence leads to a drastic change in the patient's life, with physical and psychosocial repercussions. Therefore, immediately after identifying the need to create an ostomy, the patient and their family must receive information about the procedure and its implications, as well as the need for prior marking of the stoma site and its importance for the patient[2].

The most frequent complications of ostomies include dermatitis, stenosis, hernia, fistula, infection, retraction, and prolapse[4]. The absence of prior marking of the stoma site can increase these complications' severity and duration.

Furthermore, it complicates the learning of self-care, interferes with the adhesion of ostomy appliances, increases the risk of effluent leakage, surgical wound infection, and skin lesions, delays the return to daily activities, and consequently hinders patient rehabilitation[4]. As a result, additional costs rise, negatively affecting the patient's quality of life.

After ostomy surgery, patients in the late postoperative period are referred for nursing evaluation, consultations, and the provision of necessary materials and supplies at a specialized unit. In Belo Horizonte, Brazil, the Health Care Service for Ostomy Patients of Belo Horizonte (SASPO BH), affiliated with the Municipal Health Department, provides care for these patients.

The costs of these supplies are significant and can be identified by the volume of expenditures incurred at the Ostomy Health Care Service unit, which serves 1,500 registered users. In 2020, the requests for ostomy appliances and accessories submitted to the Minas Gerais State Health Department (SESMG) totaled an annual cost of R$5,504,812.21 (US$992,899.57), representing a monthly cost of R$458,734.35 (US$82,741.63) and an average cost of R$305.82 (US$55.16) per patient[5]. Given this scenario, evaluating the factors that influence these healthcare costs is important.

This study aims to evaluate the impact of preoperative stoma site marking on patients' healthcare costs in the postoperative phase.

METHOD

We conducted an economic evaluation in healthcare, focusing on events that require in-depth knowledge to enhance the understanding of factors influencing the costs for patients with ostomies, the shortcomings in care provided, and the identification of strategies to mitigate these issues[6]. Additionally, we identified the sociodemographic and clinical profiles of patients with ostomies.

In this study, we compared the costs of caring for patients who underwent preoperative stoma site marking with those who did not. We calculated the direct care costs resulting from complications and the increased use of ostomy appliances and accessories.

The study occurred at the SASPO BH, one of the reference units for ostomy patient care within the Municipal Government of Belo Horizonte's healthcare services. The unit operates Monday through Friday, from 7 AM to 6 PM, and serves an average of 12 patients per day through scheduled appointments.

We utilized data from users treated at the service between 2015 and 2021. The inclusion criteria were users registered with the service, aged 18 years or older, with intestinal and/or urinary elimination ostomies (colostomy, ileostomy, and urostomies) treated at the unit, whose medical records and service forms provided sufficient information to complete the data collection form for this research. The exclusion criterion was users with high-output intestinal fistulas.

Initially, during the specified period, we identified 20 patients who had undergone stoma site marking and were then included in the study. Subsequently, we randomly selected a non-marked elimination ostomy patient for each marked patient, thus maintaining a 1:1 ratio and resulting in a total sample of 40 participants.

We collected data from patient records and assessment forms at SASPO BH. The assessment form included information on diagnosis, surgical procedure performed, and type and location of the stoma. During the consultation, a physical examination was conducted, including an assessment of the stoma and the surrounding skin. All collected data were organized into an Excel spreadsheet.

The study variables included sociodemographic and clinical profiles: age, sex, education level, race/color, stoma marking, stoma location and type, effluent characteristics, dermatitis on the skin surrounding the stoma, and complications (edema, necrosis, prolapse, hernia, and retraction). We also included variables related to the ostomy appliance and the use of accessories. The dependent variable was the cost of the ostomy appliance and accessories used.

Regarding supplies, we gathered the costs of ostomy appliances and accessories used by the patients in the sample using the micro-costing methodology[6,7]. The data were sourced from the Transparency Portal of the State of Minas Gerais, which provides access to data and information on purchases, acquisitions, and contracts made by the state government to any interested citizen.

We listed the ostomy appliances used by the marked and non-marked participants according to the characteristics of each item. These characteristics included verifying whether the appliance was for intestinal or urinary use, flat or convex plate, and one-piece or two-piece design. We also considered the diameter size, the presence or absence of microporous adhesive and charcoal filter. For urinary appliances, we noted the presence of an anti-reflux valve and a jet regulator valve. A single user may utilize more than one type of appliance.

We imported the database constructed in Microsoft Excel© into the JASP analytical software[8]. Sociodemographic and clinical variables were described using measures of central tendency (frequencies, mean, and median) and variability (standard deviation, range, and coefficient of variation). We applied the Shapiro-Wilk test to verify data normality and used the Mann-Whitney test to compare costs between the groups, as outliers were present in the sample. The statistical significance was set at $p<0.05$.

We used Hedge's g test to estimate the effect size of the results and mitigate the potential low statistical power[9]. To interpret the results, Cohen[10] suggested cut-off points for classifying the effect size, where values less than 0.2 are considered small; values greater than 0.2 and less than 0.8 are considered medium; and values greater than or equal to 0.8 are considered large. Additionally, he recommended comparing these results with other studies. However, such a comparison was impossible due to the lack of studies on this topic that reported the effect size of the results[10].

The costs analyzed referred to the ostomy appliances and accessories used by the study participants: synthetic resin powder, skin barrier in paste form with and without alcohol, synthetic resin plate (hydrocolloid) 20 cm × 20 cm, skin protective spray solution, and skin protective wipes.

We compared the groups of marked and non-marked patients by identifying the complications presented, including their types and frequency. Additionally, we examined the use of ostomy appliances and accessories, focusing on the frequency of appliance changes, the types of appliances used, and the quantity of supplies consumed.

We adhered to the ethical principles outlined in Resolution No. 466/2012[11] and Resolution No. 580/2018[12]. The educational institution's Research Ethics Committee (REC) and the municipal body approved the research project under Opinion No. 5.523.922/2022. We prepared and used the Informed Consent Form (ICF) at the REC's request to obtain consent from the participants for accessing and using the data and information in the medical records and service forms. We used the Data Usage Commitment Form (TCUD) for those individuals who could not be contacted.

RESULTS

The participants were predominantly female (52.5%), with an average age of 60.7 years, married (45%), had completed elementary education (42.5%), and were of mixed race (62.5%) (Table 1). We verified the normality of the continuous variable "age" distribution using the Shapiro-Wilk test across the groups.

The primary cause of the ostomies was a diagnosis of colorectal cancer (67.5%). Most ostomies had been in place for less than five years (95%) and were performed in public hospitals (90%). At admission to SASPO BH, 67.5% of the patients were not undergoing oncological treatment. Additionally, 60% of the patients retained the ability to perform self-care (Table 2).

The majority of participants had a colostomy (50%), and most ostomies were terminal (62.5%), temporary (77.5%), flat (40%), irregular (60%), located in the lower left quadrant (50%), with dermatitis (50%), pasty effluent (65%), and a flaccid abdomen (50%) (Table 3).

Among the 20 patients who developed dermatitis, 13 were from the non-marked group, and seven were from the marked group. Moreover, in the non-marked group, there was a higher occurrence of dermatitis along with other complications (five patients), while in the marked group, this was observed in three patients.

Graph 1 presents the individual costs for each group, which we distributed in ascending order and allocated into 20 points of comparability. We identified cost convergence at point 17 for the marked and non-marked groups.

Analyzing the cost data in ascending order on the graph, we observed higher costs in the non-marked group at 19 points of comparability. At point 17, we identified cost convergence caused by a complication identified as intestinal loop prolapse, increasing costs in a marked patient.

Table 1. Sociodemographic characteristics of participants (n=40). Belo Horizonte (MG), 2022

Variable	Mean	AF (%)	Range	Standard deviation	Shapiro-Wilk
Age	60.7		27–87	11.9	0,983
Sex					
Female		21 (52.5)			
Male		19 (47.5)			
Marital status					
Married		18 (45)			
Divorced		7 (18)			
Single		11 (28)			
Widowed		4 (10)			
Education level					
Illiterate		4 (10)			
Completed elementary		17 (42.5)			
Incomplete elementary		6 (15)			
Completed high school		8 (20)			
Completed higher education		5 (12.5)			
Race					
White		12 (30)			
Black		3 (7.5)			
Mixed (Pardo)		25 (62,5)			

Source: Prepared by the authors, 2023.
AF: Absolute frequency.

Table 2. Clinical and historical characterization of ostomies (n=40). Belo Horizonte (MG), 2022

Variable	AF (%)
Primary diagnosis	
Anal abscess	1 (2.5)
Colorectal cancer	27 (67.5)
Cervical cancer	1 (2.5)
Bladder cancer	2 (5)
Ovarian cancer	1 (2.5)
Deep infiltrative endometriosis	1 (2.5)
Stenosing colon lesion	1 (2.5)
Pelvic intra-abdominal mass	1 (2.5)
Intestinal obstruction	1 (2.5)
High rectal perforation	1 (2.5)
Sigmoid volvulus	2 (5)
Other specific anal diseases	1 (2.5)
Oncological therapy	
No	27 (67.5)
Chemotherapy	13 (32.5)
Time since ostomy creation (years)	
<5	38 (95)
5-10	1 (2.5)
>20	1 (2.5)
Hospital where ostomy was created	
Private	4 (10)
Public	36 (90)
Ability for self-care	
Able	24 (60)
Partially dependent	15 (37.5)
Totally dependent	1 (2.5)

Source: Prepared by the authors, 2023.
AF: Absolute frequency.

Table 3. Characterization of ostomies (n=40). Belo Horizonte (MG), 2022

Variable	FA (%)
Types of ostomy	
Bricker	01 (2,5)
Colostomy	20 (50)
Ileostomy	12 (30)
Colostomy + Bricker	04 (10)
Ileostomy + Bricker	02 (5)
Ileostomy + mucous fistula*	01 (2,5)
Form of exteriorization	
Terminal	25 (62,5)
Double-barreled	02 (5)
Loop	13 (32,5)
Temporality of intestinal ostomies	
Permanent	09 (22,5)
Temporary	31 (77,5)
Temporality of urinary ostomies	
Permanent	05 (83)
Temporary	01 (17)
Protrusion	
Retracted	06 (15)
Flat	16 (40)
Up to 10 mm	04 (10)
11-20 mm	08 (20)
21-30 mm	02 (5)
31-50 mm	03 (5)
>50 mm	04 (5)
Shape	
Regular	16 (40)
Irregular	24 (60)
Location of intestinal ostomies	
Lower right quadrant	15 (37.5)
Lower left quadrant	20 (50)
Upper left quadrant	04 (10)
Waistline	01 (2.5)
Location of urinary ostomies	
Lower right quadrant	05 (83.3)
Lower left quadrant	01 (16.7)
Complications	
Dermatitis	20 (50)
Dermatitis + hernia	01 (2.5)
Dermatitis + edema	01 (2.5)
Dermatitis + prolapse	01 (2.5)
Dermatitis + retraction	05 (12.5)
Necrosis	01 (2.5)
Absent	11 (27.5)
Abdomen	
Flaccid	20 (50)
Globular	08 (20)
Flat	12 (30)
Consistency of intestinal effluent	
Liquid	14 (35)
Pasty	26 (65)

Source: Prepared by the authors, 2023.
* Included due to the release of ostomy appliances.
AF: Absolute frequency

In the descriptive analysis of costs for each study group, the overall average of the sample was R$4,580.37 (US$826.16) (Table 4). Based on the results of the Shapiro-Wilk test, evidence allows concluding that the cost data did not follow a normal distribution.

We analyzed the distribution's dispersion using the standard deviation and coefficient of variation, demonstrating data heterogeneity. There was a 42% variation in the non-marked group and 63.7% in the marked group.

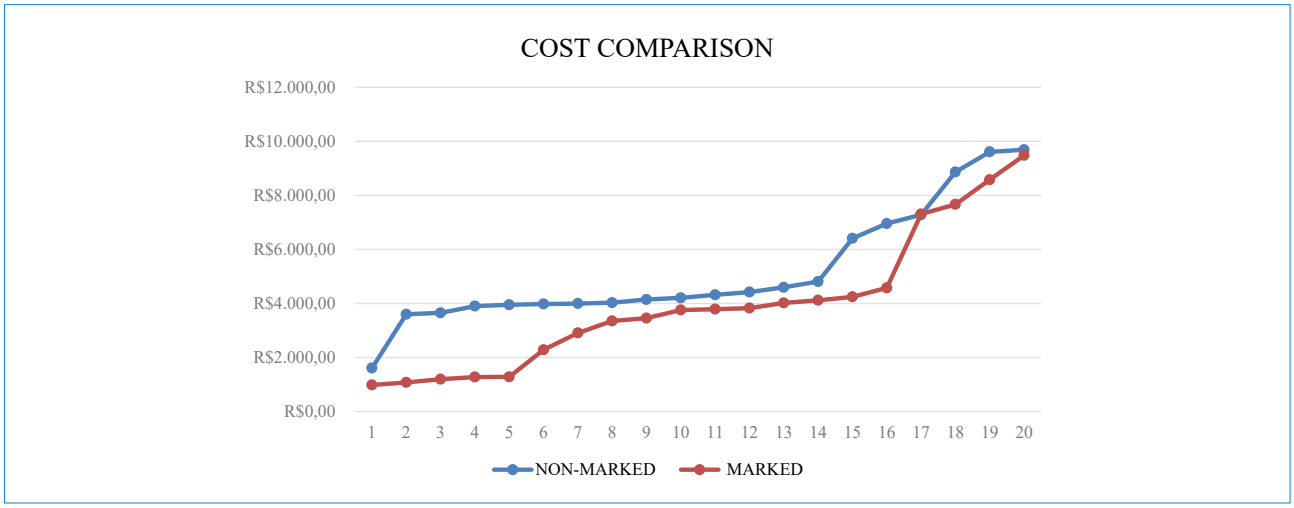
Given the risk of low statistical power, we analyzed the effect size, which was adjusted using Hedge's g test. The result was a value of W=281.000, p=0.028, and Hedges' g=0.515.

DISCUSSION

Regarding the sociodemographic profile observed in this study, most participants were female, of mixed race, with an average age of 60.7 years, married, and had completed elementary education. On the one hand, similar findings were reported in a study conducted in Recife, Pernambuco, with patients enrolled in the Ostomy Care Program at a reference service. In that study, the sample consisted of 852 individuals with intestinal and urinary ostomies, of whom the majority (52.5%) were female, and most (62.4%) were aged between 19 and 64 years[13].

On the other hand, divergent data were identified in a study with a sample of 123 ostomy patients treated at a specialized outpatient clinic of Santa Casa de Misericórdia in Goiânia. In this case, most participants (51.2%) were male, and 46% were between 60 and 80 years old[14].

Another study that analyzed 252 medical records of ostomy patients treated at a Reference Center for Ostomy Care in Porto Alegre observed that 50.4% were female, which does not represent a significant difference between genders[15]. These demographic and clinical data suggest that the findings are related to the specific service where the study was



Source: Prepared by the authors, 2023.

Graph 1. Cost comparison of the groups

Table 4. Descriptive analysis of costs (n=40). Belo Horizonte (MG), 2022

Participant	$\bar{x}$	Md	S	CV	W	P-W	Min.	Max.
Non-marked	R$5,201.47 (US$938.19)	R$4,263.10 (US$768,93)	R$2,192.00 (US$395.37)	0.42	0.841	0.004	R$2,909.47 (US$524.78)	R$9,638.40 (US$1,738.47)
Marked	R$3,959.27 (US$714.13)	R$3,773.30 (US$680.59)	R$2,523.34 (US$455.13)	0.63	0.885	0.022	R$984.00 (US$177.48)	R$9,478.80 (US$1,709.69)

Source: Research data, 2023.

$\bar{x}$: sample mean; Md: median; S: sample standard deviation; CV: coefficient of variation; W: Shapiro-Wilk test; P-W: p-value for the Shapiro-Wilk test; min.: minimum; max.: maximum.

conducted. The epidemiological profile of ostomy patients varies in different regions of the country; therefore, care should be planned according to the specific sociodemographic characteristics of the service where the study is conducted.

Regarding the use of ostomy appliances, this research revealed that some patients, fearing the shortage of appliances provided by SUS, resort to stockpiling supplies at home. This behavior was also identified in a study conducted in Portugal, confirming that this concern may be universal[16]. The researchers applied a questionnaire to 412 participants, clients of a pharmaceutical supply store in Portugal. Of these, 61.6% were male, averaging 68.1 years; 81.7% had permanent ostomies, and 78.3% had colostomies. In that study, 72.3% of the respondents reported keeping a stock of ostomy care products at home[16].

Marking the stoma on the abdominal wall involves identifying the ideal region for the surgeon to position the stoma. This allows for the optimal adhesion of ostomy appliances, thereby maximizing patient comfort[17]. Studies cite this procedure as a significant factor in the patient's physical and emotional rehabilitation, as well as contributing to the resumption of social life, as many complications can be avoided[18-22]. Thus, proper stoma location is crucial for preventing complications in the stoma and surrounding skin.

Regarding the percentage of stoma site markings, the study indicated that, despite being recommended by national[18] and international guidelines[19,20], it remains an intervention in the implementation process in various healthcare services nationally and internationally.

A study involving 71 patients who underwent stoma creation, with 52% being male and an average age of 57 years, found that despite 64% of the surgeries being elective, the preoperative stoma site marking occurred in 54% of cases. The researchers identified complications in 84% of the evaluated patients, with the most common being effluent leakage (59%), peristomal irritant dermatitis (50%), pain (42%), retraction (39%), and bleeding (32%)[21]. Some of these complications may be related to the absence of marking, considering that this procedure reduces postoperative complications and improves the quality of life; therefore, a specialized nurse or surgeon should preferably perform it[18-20].

In this study, dermatitis was the most frequent complication in both groups (marked and non-marked). In the marked group, 50% experienced this complication, which in 30% of cases was associated with stoma retraction. However, this complication affected 95% of the patients in the non-marked group. It is important to note that 68.4% exclusively had dermatitis. Only 10.5% of the patients had dermatitis with retraction, and 5.2% with parastomal hernia or edema, prolapse, or necrosis. These findings suggest a relationship between the absence of marking and the occurrence of complications, especially dermatitis, related to difficulties in adapting the ostomy appliance to the area around the stoma. It is worth noting that other factors may contribute to dermatitis unrelated to marking, such as traumatic removal of the adhesive appliance or an allergic reaction to some appliance component.

The research evidence corroborated the finding that dermatitis was also the most frequent complication in a Brazilian study conducted with 15 individuals with intestinal ostomies who underwent preoperative marking and were actively registered with an association in the interior of São Paulo. The complications related to patients who underwent marking were dermatitis and intestinal loop prolapse[22]. Although marking does not guarantee the absence of postoperative complications, it can help reduce the risk of these. Our findings were similar to those of the São Paulo study.

In the marked group, one patient had increased costs due to prolapse. This complication involves the externalization of the intestinal loop segment through the stoma and is generally associated with parastomal hernia. It stands out as a late complication that may be related to the inadequate stoma location due to the absence of marking.

However, other factors may also pose a risk for its occurrence, such as the surgical technique employed, excessive mobilization of the intestinal loop, obesity, and elevated intra-abdominal pressure[23]. Although the literature highlights stoma site marking as an important preventive measure against prolapse, this complication is known to be associated with various factors beyond the control of nursing and surgical management[24].

The increased cost of managing prolapse results from the need for a specific type of ostomy appliance[22]. Preferably, this is a two-piece system with a flexible base, larger cut-out area, and fixation area than usual, along with the use of an adhesive paste to protect the skin, and a belt to support the appliance. The findings of this study led to reflections on adopting stoma site marking in hospital services across Brazil.

We observed that certain ostomy appliances and accessories significantly affected cost increases in the sample. The most impactful were appliances with a convex adhesive base and those with a flange larger than 100 mm. The literature recommends[18] stoma protrusion to reduce complications such as peristomal dermatitis, a feature absent in the study sample. The protrusion is one factor to be considered when choosing an ostomy appliance, especially in ileostomies, which should protrude between 2.5 cm and 3 cm.

Complications in the stoma or surrounding skin increase costs for healthcare services and users. Among the most frequent complications, dermatitis stands out. Depending on the severity, they can substantially increase care costs. A study in France established five diagnostic categories for dermatitis and their corresponding cost variations for mild to severe cases, considering seven weeks of treatment. Treatment with topical corticosteroids costs €2.57, and a visit from an ostomy nurse costs €15. The additional costs obtained ranged from €20.86 to €152.19 for treating irritant contact dermatitis, from €46.92 to €106.23 for allergic reactions, from €18.63 to €113.93 for mechanical trauma, from €40.45 to €195.82 for dermatitis related to underlying diseases, and from €35.39 to €167.69 for infection cases.

Severe cases had an estimated cost 6.1 times higher than mild cases and 4.5 times higher than moderate ones. The average cost of treatment over the seven-week period was €263 per patient who developed complications, compared to €215 per patient without such complications, representing a difference of 22.32%[25].

This research highlighted that stoma site marking allows for the appropriate location of the stoma and, consequently, may reduce the need for higher-cost accessories or even ostomy appliances. This was confirmed as the average cost of materials for marked patients was lower, with an average of R$3,959.28 (US$714.13) compared to R$5,201.47 (US$938.19) for the group of patients not marked preoperatively. The average difference between the two groups was R$1,242.20 (US$224.05). The exception was a marked patient with costs similar to those of an unmarked patient due to the complication of loop prolapse. This result reinforces the statement that complications tend to increase healthcare costs.

It is important to emphasize that beyond the significance found in this study, which confirms lower costs in the marked patient group, extrapolating the results found to the state of Minas Gerais, considering the 11,896 individuals with ostomies registered in specialized services, would produce an annual savings of R$14,777,211.20 (US$2,665,356.42) for the state. This value is based on the average cost difference of R$1,242.20 (US$224.05) in a single specialized service with around 1,500 users where we conducted the study, extended to the perspective of the other 52 services in the state, totaling 11,109 users. The amount of R$14,777,211.20 (US$2,665,356.42) is significant and could be invested in acquiring other technologies to ensure early rehabilitation for ostomy patients and reduce their suffering.

A Brazilian cross-sectional study analyzed the costs of ostomy patients treated in a specialized service and found that temporary colostomy, the use of a two-piece ostomy appliance, the use of accessories, and the presence of complications such as retraction and stenosis were significantly associated with higher costs[26].

Regarding accessories, they may be necessary to improve the fit, adjustment, and security of the ostomy appliance[18]. Ostomy patients experiencing repeated leakage may benefit from switching from a flat appliance to a soft convex appliance to reduce effluent leakage, preserve peristomal skin health, and enhance stoma protrusion[27].

In this research, we found that using accessories significantly influenced the cost increase in the non-marked group. Accessories are products recommended for security and protection and should be used judiciously[18]. In this study, we identified flaws in the recommendations for ostomy appliances and accessories, which led to suboptimal resource use, causing waste and increasing the cost of care[26].

As for the requirement for specialized ostomy care nurses, in Brazil, Ordinance MS 400/20093 guarantees SUS users access to specialized care and ostomy appliances. However, it is observed that despite the recommendation for specialized care, the ordinance does not mandate the presence of an ostomy care nurse in these services. However, with specific knowledge, this professional possesses more strategies to help reduce costs, whether through the correct recommendation of ostomy appliances or skilled management of complications. Unlike in Brazil, in other countries, there is no guarantee of care or supplies for ostomy patients. A Canadian study with 463 participants found that ostomy patients spend more than US$1,000 annually on ostomy appliances and accessories, and many bear these costs themselves due to the lack of government financial support[28].

Regarding self-care findings, we observed that many patients in the study had difficulties related to various aspects, such as using ostomy appliances and inappropriate safety and protection accessories. We also identified that the improper placement of the stoma and surgical complications interfered with self-care. The ability to perform self-care was more common among marked patients, while partial dependence on self-care was more prevalent among non-marked patients.

A study involving 107 individuals from the Ostomy Program of Teresina (PI) supports the finding that self-care is easier for marked patients than non-marked ones. It also emphasizes the importance of learning self-care for ostomy patients, as it directly affects their ability to carry out daily activities, fostering their autonomy and social participation[2].

Concerning the care provided to patients at their first evaluation, which occurred in the immediate postoperative period, we found that they continued using the initially prescribed appliances due to the lack of reevaluation and adjustment to more appropriate devices for their current condition. Notably, these patients' difficulties using the appliances and accessories also stemmed from improper selection and recommendations. Effective recommendations require professional knowledge, and when this is lacking, these difficulties can be exacerbated, leading to increased costs due to waste and improper use of these resources, affecting both the care unit and the patient's quality of life.

It is important to highlight that the costs incurred in caring for ostomy patients increase when care needs are not correctly identified, which affects the quality of care provided, leads to material waste, and generates additional work. Material costs can be elevated if not controlled in services that care for many ostomy patients, leading to restrictions in care provision. It is also crucial to emphasize that stoma site marking is a right guaranteed to ostomy patients. In practice, it has been proven that, despite its potential to reduce costs, this procedure is still not widely adopted, as evidenced by the low number of marked participants identified as eligible to participate in this study.

CONCLUSION

We identified the impact of preoperative stoma site marking in reducing direct costs associated with ostomy appliances and accessories at the Health Care Service for Ostomy Patients (SASPO).

We found that patients who were not marked experienced more complications, particularly dermatitis caused by effluent contact (intestinal secretion) with the skin around the stoma. Another significant complication was prolapse. Managing these complications requires using accessories and specific ostomy appliances, which increases the overall cost.

The main limitation of this study is that the data were derived from a single specialized service. Moreover, the underutilization of preoperative stoma site marking for ostomy patients resulted in a small and limited sample, which restricts the comparability and generalization of the results, as well as the ability to assess the quality of the procedure. Therefore, we recommend future studies that include a larger number of patients and other locations to enable the generalization of the findings.

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