Cogitare Enfermagem

ORIGINAL ARTICLE

Financial toxicity among people with cancer undergoing systemic therapy: a cross-sectional study

HIGHLIGHTS

1. Financial toxicity is a reality for cancer patients.
2. Patients earning no income present greater financial toxicity.
3. Age group and income affect financial toxicity.
4. Treatment costs affect social relations and well-being.

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ABSTRACT

Objective: To analyze the relationship between financial toxicity and the sociodemographic/clinical characteristics of people with cancer undergoing systemic antineoplastic therapy. **Method:** A cross-sectional study conducted between May and October 2023 at a hospital that is a reference for cancer treatments in southern Brazil. The sample was comprised by 100 participants and the data were collected from clinical records and interviews, using the *COmprehensive Score for Financial Toxicity* instrument. Data analysis included descriptive statistics, Student's t test, Pearson's correlation and Multiple linear regression. **Results:** A mild impact was mostly identified for financial toxicity (66%), noticing that the patients' income represented a predictor of financial toxicity (β=0.253; $p<0.05$). **Conclusion:** The importance of evaluating this factor in cancer care is noted, aiming at better treatment adherence and well-being in the patients.

DESCRIPTORS: Oncology Nursing; Financial Resources in Health; Financial Stress, Neoplasms, Antineoplastic Agents.

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INTRODUCTION

The term "toxicity" is defined as a substance's ability to trigger harms in the body. In the Oncology context, toxicity refers to the adverse events resulting from antineoplastic treatments such as systemic therapy, radiotherapy and surgery. Consequently, it can directly interfere in cancer patients' well-being[1].

These effects can impair different body systems (such the gastrointestinal, hematological and renal ones, among others) and culminate in diverse symptoms like nausea, diarrhea, mucositis and thrombocytopenia. These types of toxicity can be monitored and classified as per their severity, a factor that assists in defining proper clinical management strategies[2]. Therefore, toxicity is variable and can represent a challenge for treatment continuity and prognoses.

In this sense, it is understood that all types of toxicity go beyond clinical issues and permeate socioeconomic aspects. Thus, the concept of "financial toxicity" emerges. It refers to the treatment-associated costs that can exert negative effects not only on financial health but also on social relations and well-being[3]. It can manifest itself in several ways, such as high treatment costs, unexpected medical expenses, insufficient coverage offered by health plans, expensive medications and income losses due to the disease[4].

When understanding the types of toxicity in this way, it is acknowledged that financial health in the case of those affected by the disease can be just as important as their physical and emotional health during their treatment. Thus, the term was created to emphasize the need to consider and address the significant financial impacts that the patients may have to face when dealing with challenging health conditions[3]. Consequently, financial toxicity is an important aspect to be assessed in the care provided to cancer patients, mainly in terms of treatment non-adherence and discontinuity, also considering the impact it can exert on the patients' well-being and on their support network[3].

The validation study corresponding to *COmprehensive Score for Financial Toxicity* (COST) for the Brazilian culture found that the mean score in the financial toxicity evaluation was 16.33 (±6.57) in the sample served by the Unified Health System and 24.02 (±9.78) in the one from the institution where the patients were treated following private health plans or as independent clients. The authors concluded that, regardless of income, both samples presented a considerable financial toxicity degree, which was higher in the participants from the public institution[5]. Therefore, it is essential to consider financial toxicity assessments during the treatments provided to people with cancer.

In order to provide support and suitable interventions, Nursing plays a fundamental role in evaluating financial toxicity in the Oncology context, as it contributes to promoting the patients' well-being for offering educational and emotional support during the treatments. In addition to that, it is important to develop and implement interventions to help the patients deal with the financial burden inherent to their cancer treatments and improve their well-being[6]. Therefore, the objective is to analyze the relationship between financial toxicity and the sociodemographic/clinical characteristics of people with cancer undergoing systemic antineoplastic therapy.

METHOD

This was an analytical and observational study of the cross-sectional type[7], developed from May to October 2023 at a hospital that is a reference for cancer

treatments in southern Brazil. The study sampling process was of the accessibility non-probability type[8]; therefore, the research population was comprised by people with cancer undergoing outpatient systemic antineoplastic treatments or in a hospitalization regime, provided that they met the following eligibility criteria: individuals with a cancer diagnosis that had undergone at least one systemic antineoplastic cycle, as these participants already had minimum experience in the cancer therapeutic path; being at least 18 years old; and having been treated in the outpatient service or hospitalization unit of the research *locus*. A total of 103 individuals were approached, excluding three because they only knew how to answer three questions from an instrument to assess time/space and self-psychological orientation[9-10]. This instrument was used during the selection process, recording two refusals. Consequently, the sample was comprised by 100 participants.

The data were collected by checking clinical records and by interviewing the participants. The information for the Instrument to gather the sociodemographic and clinical data was collected from the medical records. The *COmprehensive Score for Financial Toxicity* (COST) instrument was applied in the interviews. Data collection lasted approximately 15 minutes.

The following variables were collected in the instrument used to obtain the sociodemographic and clinical data: "age group", "gender at birth", "years of study", "has a partner", "earns some income", "mean monthly income", "number of people depending on income", "has a share in family income", "municipality of origin", "tumor group" (solid or non-solid) and "number of cycles undergone".

In order to assess the financial toxicity related to cancer treatments, the *COmprehensive Score for Financial Toxicity* (COST) instrument[5] was used, which considers the last seven days prior to the interview. This tool consists of 12 items with assertions related to the patients' financial knowledge regarding their treatment. It is to be noted that item 12 is not included in the score and that questions 2, 3, 4, 5, 8, 9 and 10 are reversely scored. The assertions in the instrument are answered in a five-point *Likert*-type scale, namely: Not even a little (0), A little (1), More or less (2), Very much (3) and A lot (4).

The values given in each answer are added up and the total can vary between 0 and 44 points, corresponding to the impact degree for financial toxicity; the lower the score, the higher the financial toxicity. The scoring results in this study were classified as follows: Degree 0 (No impact) = At least 26 points, Degree 1 (Little impact) = From 14 to 25, Degree 2 (Moderate impact) = From 1 to 13 and Degree 3 (High impact) = 0[11].

The data collected were tabulated and evaluated by pairs to correct any typing errors and then analyzed in the *Statistical Package for the Social Sciences* (SPSS) software, version 26.0. In this study, the "response" and "explanatory" variables were analyzed as follows: "financial toxicity" as response variable and "sociodemographic and clinical characteristics" as explanatory variables.

Descriptive statistics was employed in the data analysis to characterize the participants, using central tendency (mean and standard deviation) measures for the numerical variables and absolute frequencies and percentages for the categorical ones.

After verifying normality of the sample with the *Shapiro-Wilk* test, the following parametric tests were employed: *Student*'s t test for independent samples and *Pearson*'s correlation test. For this analysis group, the variables that presented $p \leq 0.20$ were selected for the linear regression following the stepwise method. For the evaluation regarding multicollinearity of the linear regression model, the Variance Inflation

Factor (VIF) (1>VIF<2: there is no multicollinearity) was assessed; in turn, the *Durbin-Watson* (DW) test was performed to evaluate the autocorrelation of the model residuals (DW<2: there is no autocorrelation of the residuals); finally, R^2 was used to select the regression model, with the values obtained considered adequate for the regression model proposed[12].

In the multiple linear regression model prepared to incorporate the variables, those with p-values≤0.20 in the association and correlation tests performed were selected. "Financial toxicity" (COST) was considered as the response variable; in turn, "age group", "has a share in family income" and "earns some income" were the explanatory variables. When the stepwise method was employed, the "age group" and "has a share in family income" were excluded, R^2=0.064. p≤0.05 and CI=95% were considered for the regression model analysis.

In relation to the ethical aspects, the study was approved by the Committee of Ethics in Research with Human Beings (*Comitê de Ética em Pesquisa com Seres Humanos*, CEPSH) of *Universidade Federal da Fronteira Sul* (UFFS), under Opinion number 5,983,226. It is to be noted that the participants expressed their interest in this research and confirmed such interest by recording their agreement in a Free and Informed Consent Form.

RESULTS

Table 1 presents the sociodemographic and clinical characterization corresponding to the people with cancer undergoing systemic antineoplastic treatments distributed into the following variables: "age group", "years of study", "gender at birth", "has a partner", "earns some income", "mean monthly income", "number of people depending on income" and "municipality of origin".

Table 1. Sociodemographic and clinical characterization of the people with cancer undergoing systemic antineoplastic treatments (N=100). Chapecó, SC, Brazil, 2025

(continue)

Variable	N / μ	% / SD
Age group		
<60 years old	43	43
≥60 years old	57	57
Years of study [μ(SD)]*	7.7	4.4
Gender at birth		
Male	48	48
Female	52	52
Has a partner		
Yes	76	76
No	24	24
Earns some income		
Yes	90	90
No	10	10

Table 1. Sociodemographic and clinical characterization of the people with cancer undergoing systemic antineoplastic treatments (N=100). Chapecó, SC, Brazil, 2025

(conclusion)

Variable	N / μ	% / SD
Mean monthly income		
None	2	2
Less than 1 MW**	7	7
1-2 MWs	65	65
3-4 MWS	22	22
5+MWs	4	4
Number of people depending on income		
1	13	13
2	47	47
3	21	21
≥ 4	19	19
Municipality of origin		
Chapecó	36	36
Others	64	64
Tumor group		
Solid	94	94
Non-solid	6	6

*μ(SD): Mean (Standard Deviation). **MW: Minimum Wage. MW value for 2023 = R$ 1,320.00.
Source: The authors (2025).

Table 1 allows noticing quasi-equivalence in relation to the participants' gender at birth, with a small difference in favor of females (52%). In relation to marital status, most of the participants had a partner at the time of the research (76%), earned some income (90%) (with the category "from one to five minimum wages" standing out [65%]) and with two people depending on their income (47%). As for the municipalities where the participants lived, most of them came from cities other than the study *locus* (64%), with distances between approximately 10 and 200 kilometers. In relation to tumor group, the subjects have mostly solid tumors (94%).

Table 2 shows the scores obtained in the COST instrument according to the study originating the tool.

Table 2. Financial toxicity characterization among the people with cancer undergoing systemic antineoplastic treatments (N=100). Chapecó, SC, Brazil, 2025

Variable	N / μ	% / SD
COST		
No impact (>25 points)	16	16
Mild impact (14-25 points)	66	66
Moderate impact (14-25 points)	18	18
High impact (0 points)	0	0
Total score [μ(SD)]*	19.1	6.5

*μ(SD): Mean (Standard Deviation).
Source: The authors (2025).

Table 2 shows that the participants mainly presented a mild impact for financial toxicity (COST) (66%). In order to confirm the association between financial toxicity and the participants' sociodemographic/clinical variables, the financial toxicity mean values were compared across the categories established for each variable. The results are presented in Table 3.

Table 3. Association between the COST total score and the clinical/sociodemographic variables in cancer patients undergoing systemic antineoplastic treatments (N=100). Chapecó, SC, Brazil, 2025

Variable	Financial toxicity		
	μ	SD	*p*-value
Age group			0.026
<60 years old (n=43)	17.4	7.2	
≥60 years old (n=57)	20.3	5.5	
Gender at birth			0.651
Male (n=48)	19.4	6.3	
Female (n=52)	18.8	6.7	
Has a partner			0.384
Yes (n=76)	19.4	6.2	
No (n=24)	18.1	7.2	
Has a share in family income			0.197
Yes (n=92)	19.3	6.4	
No (n=8)	16.2	6.9	
Municipality of origin			0.232
Chapecó (n=36)	18.1	6.9	
Others (n=64)	19.2	6.2	
Earns some income			0.011
Yes (n=90)	19.6	6.2	
No (n=10)	14.2	6.7	
Number of cycles undergone			0.726
Up to 5 (n=48)	18.8	5.9	
6+ (n=52)	19.3	7.0	

Student's t test for independent samples.
Source: The authors (2025).

In the case of the association test presented in Table 3, an association with statistical evidence (p≤0.05) was observed between financial toxicity and two variables. For "age group", the ≥60 years old category presented a higher financial toxicity score mean, which represents a lower financial impact on the aged group from the sample. The second variable associated with statistical significance was "earns some income" and it can be observed that the score mean was higher in the "yes" category, which represents a lower financial impact for the group with an income, when compared to the opposite one.

Although lacking statistical significance (p=0.362), a strong correlation (r=-0.092) was detected in Pearson's correlation test, performed with the "years of study" and "financial toxicity" variables.

Table 4. Multiple linear regression corresponding to the cancer patients' financial toxicity and sociodemographic data (N=100). Chapecó, SC, Brazil, 2025

Variable	Coefficient		CI=95%		p-value
	Unstandardized	Standardized	Lower Limit	Upper Limit	
Constant					
Earns some income	5.433	0.253	1.275	9.592	0.011

Source: The authors (2025).

Based on Table 4, the multiple linear regression analysis showed that the "earns some income" variable is a statistical evidence predictor (p=0.011) for financial toxicity. The standardized coefficient (β=0.253) indicates that, when all other variables remain constant, the financial toxicity score increases by a mean of 0.253 points for each one-unit increase in "earns some income". It is worth recalling that higher scores mean lower toxicity in the COST instrument; therefore, earning some income reduces financial toxicity. The statistical evidence of this finding is corroborated by the 95% Confidence Interval (CI=1.275-9.592), which (for not including the zero value) reinforces the validity of that correlation.

DISCUSSION

The current laws related to funding cancer treatments vary from one country to another. Brazil witnesses a remarkable increase in the number of law bills addressing cancer treatments, with a focus on strategies such as primary prevention, expanding access to health services and financial incentives[13]. Nevertheless, there are worldwide challenges due to the increase in treatment costs, leading to concerns as for the stability of the existing reimbursement policies and about access to new therapies against cancer[14]. These legislative efforts and challenges emphasize the complexity inherent to funding cancer treatments at the global level, underscoring the need for long-lasting solutions to ensure access to good-quality care. In addition, the costs for cancer treatments go beyond the pharmacological and care-related expenses, with a need to consider transportation, food and lodging costs for these cancer patients and their companions, who are sometimes not granted sufficient financial aids to continue their treatments.

In this sense, the association between income and financial toxicity is well documented in the literature. A study shows that lower income levels are strongly correlated with higher financial toxicity, leading to adverse effects in health and well-being outcomes[15]. People with low family incomes experience more significant financial toxicity, leading to challenges in access to health care, in the possibility of paying for medications and in overall well-being. In addition to that, the patients with lower incomes were more prone to reporting difficulties paying medical bills, to delaying or waiving their own care due to the costs related and to experiencing higher healthcare-related financial pressure[16]. In the scenario of this study, although the participants undergo their treatments free of charge in a Public Health service, the exceeding costs end up creating financial pressure, as already mentioned.

Likewise, financial toxicity represents a significant concern in cancer patients belonging to different age groups. Older adults (≥60 years old) with cancer are at an increased risk of financial toxicity, with 18.3% presenting this toxicity and showing associations with higher depression, anxiety and distress levels and with lower health-related quality of life[17]. Similarly, young adults (18-39 years old) are also vulnerable to

the insecurity related to the disease, including material difficulties and psychological burden; therefore, they are more prone to experiencing financial toxicity indicators such as health insurance policies, charity care and difficulties paying bills, when compared to longer-lived adults[18].

The patients earning lower incomes present higher financial toxicity levels, leading to reduced quality of life and to increased anxiety and depression[19]. In addition to that, financial toxicity is linked to concerns about how to pay medical bills or buy prescription drugs and regarding progression of the disease, with the patients resorting to reducing their non-medical expenses or even abandoning their treatments to deal with financial pressure[20].

Therefore, a person's income plays a crucial role in determining the financial toxicity extent; the important impact of income disparities is also evidenced in financial toxicity, highlighting the need for specific interventions to support individuals at a higher risk of presenting financial problems. It also becomes important to address financial toxicity in different age groups to ensure fair access to care and reduce the negative impacts on the patients' well-being.

CONCLUSION

This study revealed that financial toxicity is a reality for people with cancer undergoing systemic antineoplastic therapy, especially in the case of patients earning lower incomes. Financial toxicity was associated with the "age group" and "earns some income" variables. In addition, not earning any income proved to be a predictor of higher financial toxicity.

The limitation to be noted about this study refers to the fact that the participants were not subjected to longitudinal monitoring, which precluded evaluating financial toxicity progression throughout the treatments with each new antineoplastic therapy cycle. Despite this limitation, the current study offers important contributions because it deepens on the discussion of the data with statistical significance, enabling producing diverse evidence that may support new research studies.

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Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work - **Carmo RL, Zamarioli CM, da Conceição VM.** Drafting the work or revising it critically for important intellectual content - **Carmo RL, Batista RF, Lorentz W, Araújo JS, da Conceição VM.** Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved - **Carmo RL, da Conceição VM.** All authors approved the final version of the text.

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