The Impact of Cancer Treatment “Out-of-Pocket” Costs on the Mental Health of Chemotherapy Patients: A Comparative Study

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Abstract

Introduction: Anxiety and depression are prevalent comorbidities in cancer patients. Although cancer treatment is funded by the Brazilian Unified Health System (*SUS*), economic burden is also borne by patients through out-of-pocket costs. Our study sought to evaluate the impact of out-of-pocket costs of cancer treatment on depression, anxiety and stress levels in cancer patients.

Methods: Observational, cross-sectional and analytical study conducted in 2021. Patients undergoing chemotherapy were being treated at tertiary hospital affiliated with the *SUS* and enrolled in research protocols at research center. To evaluate out-of-pocket costs, we used a socioeconomic questionnaire to identify costs and time spent by patients. Primary outcomes were prevalence of depression and anxiety, as determined by the *Hospital Anxiety and Depression Scale (HADS)*, and prevalence of stress, as determined using a stress thermometer.

Results: 195 patients were included. Among included patients, 61% were female, and mean age was 57 years. Patients' median overall out-of-pocket costs was R\$ 453.80 (US\$ 78.92). Based on the *HADS*, 62.1% of patients had possible or probable depression/anxiety. There was no correlation between overall out-of-pocket spending and levels of depression/anxiety. However, when stratified by cost-time variables, there was a negative correlation between spending on telephones and *HADS* ($\rho = -0.140$; $P = 0.049$) and positive correlations between spending on medications ($\rho = 0.140$; $P = 0.05$) and time spent purchasing medications ($\rho = 0.157$; $P = 0.029$) with *HADS*.

Conclusion: Although overall spending was not directly correlated with mental health, specific costs impacted levels of anxiety, depression and stress.

Introduction

According to the World Health Organization (WHO), neoplastic diseases will become the leading cause of death in the world, surpassing cardiovascular diseases [1]. This increase is a reflection of socioeconomic development, population growth and aging, among other factors [2]. In addition, there has also been an increase in the cost of cancer, including direct expenditures on prevention, diagnosis, treatment and follow-up.

Currently, cancer is the second most expensive disease in the United States, with an estimated annual cost of 157 billion dollars in 2020 [3]. In Brazil, between 1999 and 2015, the costs related to cancer treatment alone increased from R\$ 470 million (US\$ 81.7 million) to R\$ 3.3 billion (US\$ 573.9 million) [4]. Despite the substantial costs, the Brazilian Unified Health System (*Sistema Único de Saúde – SUS*, acronym in Portuguese), in theory, provides universal financial coverage for all cancer patients [5]. The cost of cancer treatment is included in this coverage, which, along with promotion, prevention, diagnosis and follow-up, constitutes the so-called direct cost of the disease. However, other costs, such as transportation, symptomatic medication and loss of productivity, are, in most cases, not covered by funding institutions or the public system [6, 7].

"Financial toxicity", so-called "out-of-pocket" costs or indirect costs, represents a patient's expenses related to the disease that are not reimbursed in any way, often creating financial difficulty [8]. These out-of-pocket costs may be related to short- and long-term consequences, such as decreased quality of life, treatment abandonment and increased risk of mortality [9–14]. In addition, some studies suggest that financial problems and higher out-of-pocket costs incurred by surviving cancer patients may be related to higher levels of stress, depression and anxiety, conditions already very prevalent in cancer patients, in addition to increased pain, fatigue, and alterations in physical and social functioning [15, 16]. "Financial toxicity" can even be compared to secondary toxic effects of cancer diagnosis and treatment because it can negatively impact the lives of both patients and their relatives [17].

Despite the magnitude of out-of-pocket costs, the composition and impact of these costs on the mental health of patients are still poorly described in the literature. Thus, our study seeks to characterize out-of-pocket costs and investigate their impact on the mental health of the patients by correlating them with the prevalence of depression, anxiety and stress in patients undergoing cancer treatment.

Methods

Study Design

This was a cross-sectional study that evaluated the influence of out-of-pocket costs of cancer treatment on the mental health of patients. We created a database based on questionnaires answered by patients between November 2020 and February 2021. The study was conducted at the Clinical Hospital of São Bernardo do Campo and at the Center for Studies and Research in Hematology and Oncology (*Centro de Estudos e Pesquisas em Hematologia e Oncologia – CEPHO*, acronym in Portuguese), both associated with the University Center of the School of Medicine of the ABC (*FMABC*, acronym in Portuguese), Santo André - SP, Brazil.

Participants

Nonselected patients older than 18 years with a confirmed diagnosis of malignant neoplasia who were undergoing active cancer treatment (chemotherapy only, or chemotherapy and radiotherapy), adequately completed the questionnaires, and agreed to participate in the study (signed an informed consent form) were included. Patients recruited from 2 locations were included in the study:

- Patients treated through the SUS at the Clinical Hospital of São Bernardo do Campo; and
- Patients enrolled in research protocols at CEPHO.

If the patients met the inclusion criteria, no exclusion criteria were applied.

Questionnaires and Study Variables

This cross-sectional study was based on the application of 3 questionnaires. The epidemiological characteristics (sex, age, race, marital status, education, employment status, origin, comorbidities,

medications, and socioeconomic issues such as type of occupation, monthly income, housing and transportation) of the patients were obtained from the first questionnaire administered.

A cost-time questionnaire was the second applied instrument, which included an evaluation of the amounts spent on transportation, medications, food and supplies and the minutes or hours spent on activities related to cancer treatment not covered by the SUS. Through this questionnaire, we calculated the costs not covered by the SUS or by research protocols (also known as out-of-pocket costs) that cancer patients incurred with their treatment. The currency used for data collection was Brazilian reais, and for the minimum wage, that in Brazil in 2021 was used. Furthermore, for this article, the values in Brazilian reais were converted into US dollars based on the final value of the month of February 2021 (R \$5.75 = US \$1.00), the final date of data collection.

The following descriptions explain how the variables were calculated in reais:

- Time: Time was converted into money by calculating the average hourly wage based on the average number of minimum wages received by patients, the number of days per month and the working hours per month. We assumed that a work week had a maximum of 40 hours per week and that a month contained 4 weeks. This conversion of hours into reais was performed to include hours spent as part of the total additional costs.
- Transportation: For patients who used a car, transportation was converted into money by calculating the product of the distance (in kilometers) from their residence to locations (hospitals, pharmacy and health center) and the value of fuel used in 2021. For patients who used public transportation (bus and alternative transport), the value considered was the transportation fare multiplied by the number of trips; for patients who used taxis, the value considered was the amount charged for each trip; and for cyclists or for those who walked, no expense was computed.
- Medications: Only the costs of the medications acquired by patients was included; medication obtained from health units were not counted. For the calculation, each patient provided the drug name, dosage and amount used per month. For supplies, each patient provided the supply name and the amount spent in the last month related to treatment.

To evaluate the mental health of patients, a third questionnaire was applied to assess the prevalence of major depressive disorder (MDD) and generalized anxiety disorder (GAD): the Hospital Anxiety and Depression Scale (HADS). The HADS, applied to all study participants, consists of 14 items, of which half evaluate anxiety (odd items) and half evaluate depression (even items). The score for each item ranges from 0 to 3; therefore, the maximum score for the scale is 21 points. The following cutoff points were used: depression or anxiety unlikely, 0 to 7 points; depression or anxiety possible, 8 to 11 points; and depression or anxiety probable, 12 to 21 points. To individually evaluate the variables, the following cutoff points were used: no anxiety, 0 to 8 points, and anxiety, ≥ 9 points; and no depression, 0 to 8 points, and depression, ≥ 9 points. These cutoff points were indicated by Zigmond and Snaith based on theoretical and empirical criteria derived from clinical samples (Zigmond & Snaith, 1983). In addition to

the HADS, a stress thermometer was applied to assess the stress of the interviewees at that time; the score ranged from 0 to 10, with 0 being not at all stressed and 10 being extremely stressed.

Definition of Study Outcomes

The primary outcome was the prevalence of anxiety/depression based on the HADS score punctuation, which was characterized as a continuous variable. The secondary analysis included stratified cost-time variables, comparing those values with the HADS score and the stress thermometer score.

Ethics Committee Approval

The study was conducted in accordance with the principles of the Declaration of Helsinki [18]. The study protocol was approved by the Research Ethics Committee of the FMABC University Center (approval number: 30524420.3.0000.0082).

We adhered to the STROBE guidelines for observational studies (Supplementary Table 1) [19].

Statistical Analysis

The answers were collected and tabulated in an anonymous format in Excel (Microsoft) to create a database for subsequent statistical analysis. Categorical variables are presented as numbers and percentages (frequencies) and were analyzed using Fisher's exact test. Continuous variables are presented as means and standard deviations or as medians and interquartile ranges depending on normality, as assessed by the Shapiro-Wilk test. Normal continuous variables were analyzed using Student's t-test. Nonnormally distributed continuous variables were analyzed using the Mann-Whitney test. Correlations were performed using the Spearman correlation test.

The level of significance was set at 95% ($P < 0.05$). Statistical analyses were performed using the software R, R Core Team (2020 - R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL <https://www.R-project.org/>).

Results

Sociodemographic Characteristics of the Study Population

Between November 2020 and February 2021, 195 participants were included in the study (Table 1). Among the 195 patients, the mean overall age was 57 years (± 12); additionally, 119 (61%) were female, and 76 (38.9%) were male. Systemic arterial hypertension and diabetes mellitus were the most prevalent comorbidities, with prevalences of 33.8% and 13.8%, respectively. In addition, 3.6% of patients reported having a previous diagnosis of depression.

In relation to cancer treatment, neoplasms of the breast were the most frequent, present in 49 patients (25.1%), followed by neoplasms of the gastrointestinal tract (large intestine), present in 28 patients

(14.4%). Most participants had been diagnosed with cancer within less than 1 year of the study (54.3%) and did not need to undergo radiotherapy as a treatment (73.8%).

Table 1

Sociodemographic and clinical characteristics of the 195 patients undergoing cancer treatment

Variable	Patients n = 195	%
Sex		
Female	119	61%
Male	76	38.9%
Ethnicity		
Non-white	78	40%
White	117	60%
Marital status		
Single	38	19.5%
Married	110	56.4%
Divorced	24	12.3%
Widowed	23	11.8%
Education		
Illiterate	9	4.6%
Incomplete elementary school	71	36.4%
Complete elementary school	18	9.2%
Incomplete high school	13	6.7%
Complete high school	58	29.7%
Incomplete higher education	7	3.6%
Complete higher education	19	9.8%
Employment status		
Employee	68	34.9%
Unemployed	67	33.8%
Retired	60	30.8%
Alcohol consumption		
Yes	15	7.7%
Smoking		

Variable	Patients n = 195	%
Smoker	16	8.2%
Former smoker	78	40%
Medications used (not counting cancer treatment medications)		
1 medication	49	25.1%
2 medications	40	20.5%
≥ 3 medications	45	23.1%
Comorbidities		
SAH	66	33.8%
DM	27	13.8%
DLP	7	3.6%
Depression	7	3.6%
Home		
Own	140	71.8%
Rented	41	21%
Financed	14	7.2%
Center		
SUS	165	84.6%
Research protocols	30	15.7%
Primary organ		
Large Intestine	28	14.4%
Breast	49	25.1%
Prostate	7	3.6%
Cervix	4	2.1%
Liver	8	4.1%
Lung	4	2.1%
Other	29	14.9%
Time since diagnosis		

Variable	Patients n = 195	%
< 6 m	48	24.6%
6–12 m	58	29.7%
> 12 m	83	42.6%
Radiotherapy		
Yes	51	26.2%
No	144	73.8%
Variable	Mean	Standard deviation
Age	57	± 12
Variable	Median	Interquartile range
BMI	26.45	23.18–30.47
SUS: Brazilian Unified Health System; BMI = body mass index.		

Cost-time Questionnaire and Socioeconomic Characteristics

The median monthly income (in number of minimum wages) of patients was 1 minimum wage, with an interquartile range of 1-2.5 minimum wages (Table 2). The highest monthly expenditure reported by patients was in relation to transportation (median, R\$ 100.00/US\$ 17.39; interquartile range, R \$17.00–225.00/US\$ 2.96 – US\$ 39.13), with a median of 7 trips/commutes related to treatment in 1 month. Another important expense was telephone calls related to cancer treatment, with a median of R\$ 57.00 (US\$ 9.91) per month.

The time patients spent in consultations, in hours, ranged from 2.0 to 4.0 (IQR) hours per month. The most significant amount of time per month was spent by patients in chemotherapy or radiotherapy, with a median of 8 hours (interquartile range, 5.0 hours – 12.0 hours).

The overall monthly expenditure by patients ranged (IQR) from R\$ 243.50–952.20 (US\$ 42.35 - US\$ 165.6), with a median of R\$ 453.8 (US\$ 78.92).

Table 2

Cost-time questionnaire: impact of monthly costs on patients undergoing cancer treatment

Variable (in 1 month)	Patients n = 195	%
Means of transportation		
Own car	163	83.6%
Public	32	16.4%
Variable	Median	Interquartile range
Monthly Income (n of minimum wages)	1.0	1.0–2.5
Number of trips	7.0	4.0–10.0
Transportation expenses (US \$)	17.39	2.96–39.13
General food expenses (US \$)	0.0	0.0–5.57
Hotel stay (US \$)	0	0.0–0.0
Phone expenses (US \$)	9.91	4.78–14.43
Private medication expenses (US \$)	0.52	0.0–17.39
Alternative therapy expenses (US \$)	0	0.0–0.0
Time in consultations (hours)	1.0	2.0–4.0
Time in CT/RT (hours)	8.0	5.0–12.0
Time for medication purchases (minutes)	15.0	0.0–30.0
Time for other activities (hours)	0.0	0.0–1.0
Hourly value per individual (US \$)	1.20	1.20–2.99
Time spent in consultations (US \$)	2.99	0.61–9.57
Time spent in CT or RT (US \$)	14.35	3.59–29.59
Time spent purchasing medication (US \$)	0.40	0.0–0.90
Time spent in other activities (US \$)	0	0.0–0.0
“Out-of-Pocket” Global spending (US \$)	78.92	42.35–165.60
Numerical data are presented as the median and interquartile range (non-parametric distribution). The values were converted from reais to dollars, as explained in the methods section. SUS = Unified Health System; CT = chemotherapy; RT = radiotherapy.		

Primary Outcome: Hospital Anxiety and Depression Scale

For the total HADS score, the median was 9.0 points (IQR 6.0–14.5), and 74 patients (37.9%) were classified as unlikely to have depression or anxiety; 43 patients (22.1%) were classified as having possible depression or anxiety; and 78 patients (40%) were classified as having probable depression or anxiety.

In addition to the HADS, a stress thermometer was also applied. The median stress thermometer score was 6.0 (IQR 3.0–8.0).

Based on the statistical analysis, there was no correlation between overall out-of-pocket spending and levels of depression and anxiety (Fig. 1). However, when cost-time variables were analyzed individually, there was a negative correlation between telephone expenses and the HADS score ($\rho = -0.140$; $P = 0.049$) and positive correlations between expenditure on medications ($\rho = 0.140$; $P = 0.05$) and time spent purchasing medication ($\rho = 0.157$; $P = 0.029$) with the HADS score. In addition, there was a positive correlation between the time spent purchasing medications and the stress thermometer score ($\rho = 0.155$; $P = 0.032$). The results of the statistical correlation analysis are provided in Table 3 and Fig. 1.

When comparing the HADS scores with the stress thermometer scores, there was a strongly significant correlation ($\rho = 0.452$; $P \leq 0.001$).

Table 3
Correlation between patient spending and levels of anxiety, depression and stress

	Total HADS		Stress thermometer	
	ρ	P-value	ρ	P-value
Transportation expenses	-0.005	0.933	0.025	0.725
General food expenses	0.035	0.625	0.019	0.791
Phone expenses	-0.140	0.049	-0.101	0.157
Private medication expenses	0.140	0.050	0.138	0.053
Time in consultations	0.048	0.504	-0.028	0.697
Time in CT/RT	-0.016	0.822	-0.132	0.067
Time spent purchasing medication	0.157	0.029	0.155	0.032
Time spent in other activities	-0.127	0.076	-0.138	0.056
“Out-of-Pocket” Global spending	-0.034	0.635	-0.061	0.396

Discussion

In this cross-sectional study, we sought to determine the correlation between out-of-pocket costs of cancer treatment and the mental health of patients (Fig. 2). Despite the significant prevalence of

depression and anxiety in our patients undergoing cancer treatment, we found no correlation between overall out-of-pocket expenditures and mental health. However, when analyzed by individual variables, specific spending seems to impact the levels of anxiety, depression and stress in cancer patients.

Our study population was mostly female (61%), with a mean age greater than 50 years, findings that are consistent with those reported by other studies involving cancer patients [13, 20–28]. There was greater participation by people who claimed to be white (60%), and most of the study population was married [28]. According to the literature, the main comorbidities of cancer patients are systemic arterial hypertension, diabetes mellitus and dyslipidemia, observations that were confirmed in our study [22]. Most of the patients included in our study were employed and received approximately 1 to 2 times the minimum wage, results that are similar to those in another Brazilian study [27]. However, unlike other studies, in which most of the population received health care through a private health network [13, 16, 22], our study evaluated the out-of-pocket financial impact of cancer treatment on patients who received health care through the public network. Another study evaluated this same impact, concluding that the majority of the affected population was elderly, female, and unemployed or retired and lacked medical insurance [24].

Regarding the characteristics of neoplasms, the most prevalent primary cancer site was the breast, followed by the gastrointestinal tract; these findings are similar to those in other studies, in which the main site was the breast, followed by the gastrointestinal tract, prostate and lung [13, 16, 24–26].

Our study found important prevalence rates for depression and anxiety in cancer patients, and although overall out-of-pocket spending was not directly correlated with mental health, when analyzed individually, specific spending impacted the levels of anxiety, depression and stress in cancer patients. Previous North American studies have shown that most cancer survivors report financial concerns associated with greater chances of psychological distress [20], which is considered a risk factor for mortality [21]. Higher financial toxicity was also associated with higher levels of depressive and anxiety symptoms, greater concern and distress, lower self-efficacy in coping with cancer, and poorer health-related quality of life [13, 22]. In addition, financial toxicity was also considered a significant predictor of patient-reported anxiety, fatigue, and physical and social dysfunction [16]. A systematic review published in 2019, which included 9 studies involving 11,544 cancer survivors, reported that the relationship between financial toxicity and psychological symptoms was examined in 8 studies, 6 of which reported a positive relationship between financial toxicity and depression and 3 of which found a positive association between financial toxicity and anxiety. Limited evidence was found for an association between financial toxicity and stress, fear of recurrence, spiritual suffering, pain and general symptom load [23].

In our study, there were positive correlations between expenditure on medications and time purchasing medications and the HADS score and a positive correlation between time purchasing medications and stress thermometer score. Thus, we can hypothesize that the extra expenditure on medication, not provided by the SUS, and the time spent acquiring those medications are factors directly or indirectly related to higher levels of anxiety, depression and stress. On the other hand, a negative correlation was

found between telephone costs and the HADS score, which may suggest that speaking on the phone may be a protective factor against anxiety and depression in our study population. The strongly significant correlation between the HADS score and stress thermometer score also indicates that anxiety, depression and stress tend to manifest in a concomitant and interconnected manner.

Our study allowed us to establish a more intimate relationship between the variables and depression and anxiety levels. By analyzing “financial toxicity” by its components, such as transportation, food, telephone and medication costs, we were able to identify the areas in which patients were most affected and in which more investment and research are needed.

Recent studies on the subject have evaluated financial toxicity using various tools. The Comprehensive Score for Financial Toxicity (COST) [16, 22] subjectively evaluates patient expenses through a series of questions regarding the patient's financial situation. Other studies address the subject by grading (from 1 to 10) the financial situation of patients [26] or asking questions similar to those on the COST [20, 26]. Some studies opt for more objective approaches regarding patients' financial situation. Data on bankruptcy from national banks [21] and calculations of the percentage of a family's average income spent on health services [28] are examples of more pragmatic approaches.

Analogous to these studies, we chose to adopt a more objective approach, allowing a more robust evaluation and the establishment of comparisons between the expenses of patients. Additionally, we removed the perception of patients regarding their expenses, allowing a more accurate assessment of their feelings.

We chose to include components related to the time spent by individuals in activities related to treatment. The reason for this approach was that cancer is a condition that also affects the so-called economically active population, a fact confirmed by the median age of our study population, 57 years. In a dynamic and capitalist world, time is increasingly linked to money, thus being an indispensable component in the evaluation of financial toxicity. However, in other studies evaluated, we found no such factor.

Regarding the results, the higher were the telephone expenses, the lower was the HADS score. In turn, the cost of medications and the time spent purchasing medications were positively correlated with the HADS score. This finding can be explained by the use of the telephone as a leisure tool, helping to combat mental illnesses. Regarding medications, the amounts charged for medications for cancer treatment and/or support may affect the financial situation of patients, resulting in behavioral changes such as depression and anxiety.

Given this, it is evident that the availability of medications for the treatment of cancer through the SUS and for the health of the Brazilian population in general still requires adjustments. Despite improvements in recent years regarding the range of medications offered by the SUS, the topic still requires substantial attention from the responsible agencies.

Our study has some limitations. First, because of the observational nature of our study, it is impossible to establish cause and effect relationships and to exclude the possible presence of biases and confounding factors. Our questionnaires, mainly related to cost-time, demand that patients remember various expenses and situations, which may be a source of recall bias. Additionally, the context of the COVID-19 pandemic imposed 2 challenges that affected our study: the proportion of patients provided health care through the SUS and research protocols because due to the pandemic, several patients missed their follow-up, especially in the research protocol group; furthermore, it is uncertain how restrictive measures and the pandemic environment itself may have influenced the mental health of patients. Finally, our population of patients represents only a portion of patients undergoing cancer treatment, which includes patients from several other health centers that may have their own protocols for providing assistance to patients.

Conclusion

The overall out-of-pocket costs of cancer treatment were not correlated with levels of depression, anxiety or stress in cancer patients. However, when analyzed individually, specific expenses seemed to impact the levels of anxiety, depression and stress and should be used as factors when determining specific strategies to improve the psychological symptoms of cancer patients.

Declarations

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Authors Contribution

All authors were part in the designing, data collection, data analysis and writing of this article, and all have approved the final version for publication.

Conflicts of Interest

The authors have no relevant financial or non-financial interests to disclose related to this work.

Availability of Data and Material

Every available data and material is declared in the manuscript text.

Ethics Approval

The study was conducted in accordance with the principles of the Declaration of Helsinki [10]. The study protocol was approved by the Research Ethics Committee of FMABC University Center (approval number: 30524420.3.0000.0082).

Consent to Participate

Written informed consent was obtained from all individual participants included in the study.

Consent for Publication

Not applicable.

References

1. World Health Organization. Global health observatory data repository. 2011. Number of deaths (World) by cause. Available from: <http://apps.who.int/gho/data/node.main.CODWORLD?lang=en>. Last accessed 30 January 2020.
2. World Health Organization. Latest Global Cancer Data. 2018. International Agency for Research on Cancer. Available from: <https://www.who.int/cancer/PRGlobocanFinal.pdf>. Last accessed 2 February 2020.
3. Lentz R, Benson AB, Kircher S. Financial toxicity in cancer care: Prevalence, causes, consequences, and reduction strategies. *J Surg Oncol*. 2019;120(1):85-92.
4. Setor Saúde. O custo de tratamento de câncer no Brasil. 2018. Estatísticas e Análises. Disponível em: <https://setorsaude.com.br/o-custo-do-tratamento-do-cancer-no-brasil/>. Acessado em: 2 de fevereiro de 2020.
5. Paim J, Travassos C, Almeida C, Bahia L, Macinko J. The Brazilian health system: history, advances, and challenges. *Lancet*. 2011 May 21;377(9779):1778–97.
6. Sharp L, Timmons A. The financial impact of a cancer diagnosis. *hse.openrepository.com*, 2010, Available from: <http://hse.openrepository.com/hse/handle/10147/188292>. Last accessed: 2 de fevereiro de 2020.
7. Houts PS, Lipton A, Harvey HA, Martin B, Simmonds MA, Dixon RH, et al. Nonmedical costs to patients and their families associated with outpatient chemotherapy. *Cancer*. 1984 Jun 1;53(11):2388–92.
8. National Cancer Institute. NCI Dictionary of Cancer Terms - Out-of-pocket costs. Available from: <https://www.cancer.gov/publications/dictionaries/cancer-terms/def/out-of-pocket-cost>. Last Accessed: 2 February 2020.
9. Goulart BHL, Unger JM, Chennupati S, Egan K, Fedorenko CR, Ramsey SD. Effect of high patient out-of-pocket (OOP) cost for oral tyrosine kinase inhibitors (TKIs) on survival in EGFR and ALK positive stage IV non-small cell lung cancer (NSCLC). *JCO*. 20 de setembro de 2019;37(27_suppl):3–3.
10. Harrison P. “Real Crisis”: Ruinous Out-of-Pocket Costs for Blood Cancers. *Medscape Medical News – Oncology News*. Nov 05, 2019. Available from: <https://www.medscape.com/viewarticle/920836>. Last Accessed: 30 January 2020.

11. Carrera P, Yousuf Zafar S. Financial toxicity. In: Olver I, ed. The MASCC Textbook of Cancer Supportive Care and Survivorship. Springer, 2018.
12. Neugut AI, Subar M, Wilde ET, et al. Association between prescription co-payment amount and compliance with adjuvant hormonal therapy in women with early-stage breast cancer. *J Clin Oncol*. 2011;29(18):2534-2542. doi:10. 1200/JCO.2010.33.3179
13. Zafar SY, McNeil RB, Thomas CM, Lathan CS, Ayanian JZ, Provenzale D. Population-based assessment of cancer survivors' financial burden and quality of life: a prospective cohort study. *J Oncol Pract*. 2015;11(2):145-150. doi:10. 1200/JOP.2014.001542
14. Zafar SY. Financial toxicity of cancer care: it's time to intervene. *J Natl Cancer Inst*. 2015;108(5):djv370. doi:10. 1093/jnci/djv370
15. Jones SMW, Nguyen T, Chennupati S. Association of financial burden with self-rated and mental health in older adults with cancer. *J Aging Health*. 2020;32(5-6):394-400. doi:10.1177/0898264319826428.
16. Ver Hoeve E.S., Ali-Akbarian L., Price S.N., Lothfi N.M., Hamann H.A. Patient-reported financial toxicity, quality of life, and health behaviors in insured US cancer survivors. *Support. Care Cancer*. 2020 doi: 10.1007/s00520-020-05468-z.
17. Rosenzweig M, West M, Matthews J, Stokan M, Yoojin YK, Gallups S, et al. Financial Toxicity Among Women With Metastatic Breast Cancer. *Oncology Nursing Forum*. 2019, 13,46(1):83-91
18. World Medical Association (2013) World Medical Association Declaration of Helsinki. *JAMA* 310(20):2191.
19. von Elm E, Altman DG, Egger M, et al. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *Lancet*. 2007;370(9596):1453-7.
20. Dee EC, Nipp RD, Muralidhar V, Yu Z, Butler SS, Mahal BA, et al. Financial worry and psychological distress among cancer survivors in the United States, 2013-2018. *Support Care Cancer*. 2021 Sep;29(9):5523–35.
21. Ramsey SD, Bansal A, Fedorenko CR, Blough DK, Overstreet KA, Shankaran V, et al. Financial Insolvency as a Risk Factor for Early Mortality Among Patients With Cancer. *JCO*. 2016 Mar 20;34(9):980–6.
22. Thom B, Benedict C. The Impact of Financial Toxicity on Psychological Well-Being, Coping Self-Efficacy, and Cost-Coping Behaviors in Young Adults with Cancer. *J Adolesc Young Adult Oncol*. 2019 Jun;8(3):236–42.
23. Chan RJ, Gordon LG, Tan CJ, Chan A, Bradford NK, Yates P, et al. Relationships Between Financial Toxicity and Symptom Burden in Cancer Survivors: A Systematic Review. *J Pain Symptom Manage*. 2019 Mar;57(3):646-660.e1.
24. Arastu A, Patel A, Mohile SG, Ciminelli J, Kaushik R, Wells M, et al. Assessment of Financial Toxicity Among Older Adults With Advanced Cancer. *JAMA Netw Open*. 2020 Dec 1;3(12):e2025810.

25. Mercadante S, Aielli F, Adile C, Bonanno G, Casuccio A. Financial distress and its impact on symptom expression in advanced cancer patients. *Support Care Cancer*. 2021 Jan,29(1):485–90.
26. Barbaret C, Brosse C, Rhondali W, Ruer M, Monsarrat L, Michaud P, et al. Financial distress in patients with advanced cancer. *PLoS One*. 2017,12(5):e0176470.
27. Teston EF, Fukumori EFC, Benedetti GM dos S, Spigolon DN, Costa MAR, Marcon SS. Feelings and difficulties experienced by cancer patients along the diagnostic and therapeutic itineraries. *Esc Anna Nery* [Internet]. 2018 Aug 27 [cited 2021 Jul 25],22(4). Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1414-81452018000400214&lng=en&tlng=en
28. Park J, Look KA. Relationship Between Objective Financial Burden and the Health-Related Quality of Life and Mental Health of Patients With Cancer. *J Oncol Pract*. 2018 Feb,14(2):e113–21.

Figures

Figure 1

Correlation between HADS Total Punctuation and Stress Thermometer with the "out-of-pocket" Global Spending of the patients. Global Spending is represented in Brazilian Reais (R\$).

Patients undergoing active Cancer treatment

High prevalence of mental health disorders: Depression, Anxiety and Stress

Increasingly need for financial support and public health strategies

Mental Health VS. “Out-of-Pocket” Costs

Depression / Anxiety

Prevalence

62.1%

Median Stress

Punctuation

6.0

Monthly Costs

Phone expenses – **US\$ 9.91**

Private medication – **US\$ 0.52**

Global spending – **US\$ 78.92**

Methodology

195 patients

Cross-Sectional Study

O: HADS score and Stress Thermometer

Patients from SUS Brazilian Tertiary
Hospital and from Research Protocols

Figure 2

Graphical Abstract – In patients undergoing active cancer treatment, we found no correlation between global spending and prevalence of Depression/Anxiety or Stress. O: Outcomes.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [supplementarytable1outofpocketdepression.docx](#)