



The cost of head and neck cancer – Financial toxicity after treatment for head and neck cancer.

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Introduction

Cancer is a global problem, with 17 million cases in 2018, with the number expected to increase in the coming years due to an increasing and aging population (1). Cancer survivorship describes a patient’s experiences after diagnoses and treatment, again with the number of cancer survivors expected to increase due to improvements in early detection and treatment. Head and neck cancer (HNC) is the sixth most common cancer worldwide, with an increasing incidence year on year predominantly due to the HPV virus. Treatment of HNC can involve surgery, radiotherapy, chemotherapy and immunotherapy, with multimodality treatment being common place. Treatment related toxicity and morbidity is a substantial burden for HNC patients, with multidisciplinary rehabilitation including speech, swallowing and nutritional support being fundamental to help improve post treatment quality of life. Improvements in survival mean patients are living longer, with the sequelae of treatment toxicity more apparent than ever. Demands to monitor the disease post treatment require patients to attend regular follow up for at least 5 years, with multiple hospital visits required. Within head and neck cancer this is especially true due to the increasing incidence of HPV positive head and neck cancer, with the excellent survival rates that this disease pertains.

In all health care systems, public and private, there is increasing pressure on budgets, with increasing pressure on patients to make additional out of pocket contributions. Even In countries where there is a universal healthcare system, such as Canada, there are still out of pocket costs that patients experience, such as dental care. The term financial toxicity is used to describe the financial distress or hardship that is associated with cancer and its treatment (2). In a large systematic review, up to 62% of patients reported being in debt due to their cancer treatment, with up to 49% of patients experiencing some form of financial distress (3) Although there are many studies reporting financial toxicity, most studies have not used a validated questionnaire. Furthermore, the impact of treatment for head and neck cancer on financial wellbeing is not well established. In this study we report the financial impact of treatment for head and neck cancer, using the validated financial toxicity questionnaire.

The aim of this research was to identify clinicodemographics factors associated with financial toxicity after treatment for head and neck cancer.

Methods and Materials

All patients were recruited from the Princess Margaret Cancer Centre, Toronto, Canada, recruited between August 2014 and May 2018. Patients were eligible for this study if they had a histological diagnosis of head and neck cancer. All patients were over 18 years old, had any stage head and neck cancer, and were eligible for active treatment. Patients were excluded if they had recurrence or metastasis at presentation. The University Health Network Research Ethics Board approved the study and all patients gave documented informed consent before entry into the study.

We used the newly developed Financial Index of Toxicity (FIT) questionnaire to assess financial toxicity, figure1. It is a 9-item questionnaire assessing three domains of financial distress; satisfaction/worry about finances, ability to pay for regular expenses and financial toxicity incurred due to cancer. Eligible patients completed a FIT questionnaire between 12 and 24 months post-treatment. Baseline household income and lost income due to cancer were binned by increments of \$10,000. Univariable and multivariable linear regression identified clinico-demographic factors associated with financial toxicity. Age, sex, ethnicity, marital status, education, income, living arrangements, stage, disease site, treatment, and lost income due to cancer were included in univariable regression analysis; variables with p<0.2 were included in multivariable analysis. Due to collinearity with treatment modality, disease site was dropped from the multivariable model.

1. During the past year, were you satisfied with your family's financial situation?	☐ Very satisfied (0) ☐ Somewhat satisfied (0.25) ☐ Neutral (0.5) ☐ Somewhat dissatisfied (0.75) ☐ Very dissatisfied (1)
1. During the past year, were you worried about your family's financial situation?	☐ Neutral (0) ☐ Somewhat worried (0.5) ☐ Very worried (1)
1. How did you perceive your family's financial situation compared to others of the same age?	☐ Far Worse (1) ☐ Somewhat worse (0.75) ☐ The same (0.5) ☐ Somewhat better (0.25) ☐ Far better (0)
1. During the past year, were you able to pay for your daily food expenses?	☐ All of the time (0) ☐ Most of the time (0.33) ☐ Some of the time (0.67) ☐ None of the time (1)
1. During the past year, were you able to pay for your daily housing expenses?	☐ All of the time (0) ☐ Most of the time (0.33) ☐ Some of the time (0.67) ☐ None of the time (1)
1. During the past year, were you able to pay for your medications related to your treatment?	☐ All of the time (0) ☐ Most of the time (0.33) ☐ Some of the time (0.67) ☐ None of the time (1)
1. During the past year, did you have to borrow money to help with treatment related expenses from family/friends/financial institutions?	☐ Yes (1) ☐ No (0)
1. Have you had to permanently quit your previous occupation because of your cancer diagnosis and/or treatment?	☐ Yes (1) ☐ No (0)
1. Did any of your family or friends have to permanently quit their job to help with your care needs because of your cancer diagnosis or treatment?	☐ Yes (1) ☐ No (0)

Numeric values assigned for each response are indicated in parentheses.
Total FIT score = mean of all responses*100 (range of possible scores: 0-100)

Figure 1. Financial Index of Toxicity Questionnaire.

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Results

The FIT questionnaire was administered to 495 patients. Mean age was 61 years (SD 10.6). 59% of patients had and ECOG score of 0 at diagnosis. Oropharyngeal HPV positive cancer was the most common subsite at 48%, followed by oral cavity at 23%. The most common treatment modality was chemoradiotherapy in 42.6% of patients. The majority of patients (86%) did not live alone, had post-secondary education (61%) and were employed (52%). In univariable analysis, nasopharynx patients had the highest financial toxicity (mean FIT score=23/100), followed by HPV-negative oropharynx (mean FIT=18.9/100) and larynx (mean FIT=14.4; p=0.0311). Median reported lost income due to cancer post-treatment was \$10,000-20,000 CAD (range \$0-30,000). 20% of patients reported borrowing money or seeking financial assistance for treatment expenses at 12 months post-treatment; 7% permanently quit their job because of cancer.

Financial Toxicity Index Scores

The overall median FIT score was 1.25 (0-11.5). The FIT score increased from 1.25 12 months after treatment to 1.42 24 months after treatment, see table 2. Patients treated by surgery as the primary modality had a lower FIT score than those treated with radiotherapy/chemoradiotherapy, see table 2. There were 13% of patients that had to borrow money to help with treatment related expenses, with 17% having to permanently reduce working hours because of their cancer, see table 1.

Multivariable analysis demonstrated younger patients (p<0.001) and patients with lower baseline income (p<0.001) had higher financial toxicity. There was a significant association with financial toxicity and anxiety and depression (p<0.001). Lost income was collected on a subset of patients (n=289); when added to the multivariable model, greater lost income was significantly associated with increased financial toxicity (p=0.012).

Table 1. Patients answers to Financial Index of Toxicity.

Question	Yes %
Did you have to borrow money to help with treatment related expenses?	13%
Have you had to seek financial assistance because of costs related to your cancer treatment?	11%
Have you had to change your place of living to accommodate expenses related to your cancer?	4%
Have you had to permanently reduce work hours because of your cancer?	17%
Have you had to permanently quit work because of your cancer?	11%
Did any of your family or friends have to permanently quit their job to help with your care needs?	3%

Table 2. Adjusted analysis for the Financial Toxicity Index.

	Beta Coefficient	95% Confidence Interval	P-value
Age at Diagnosis (10-year increments)	-0.5775	(-0.761,-0.394)	<0.001
Treatment = Surgery +/- (C)RT	-0.4591	(-0.923,0.005)	0.053
Treatment = Other/Unknown/No Tx	-0.5716	(-4.407,3.264)	0.770
Living Arrangement = Alone	-0.9833	(-1.717,-0.25)	0.009
Living Arrangement = Unknown	-0.0818	(-0.547,0.384)	0.731
Highest education = Post-secondary	-0.2964	(-0.735,0.143)	0.187
Highest education = Unknown	-0.3521	(-1.068,0.363)	0.335
Baseline Household Income (thousands)	-0.0105	(-0.014,-0.007)	<0.001

Discussion and Conclusions

It is well established that there is a financial toxicity associated with cancer treatment. Head and neck cancers are similarly associated with significant financial toxicities. The Financial Index of Toxicity is novel tool for measuring patient-reported financial toxicity outcomes. The use of patient reported outcomes (PROMs) has been shown to aid in clinical decision making and early detection of symptoms.

The Financial Index of Toxicity is a reliable and valid instrument for measuring patient reported financial toxicity in patients with HNC.

This study presents clinico-demographic factors most associated with financial toxicity in HNC. Patients with highest financial toxicity were younger, had increased lost income and a lower baseline income. Identifying patient groups at risk of financial toxicity is critical to both cancer care-related policy-making and individual patient care.

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