Gynecologic Oncology 154 (2019) 8–12

Contents lists available at ScienceDirect

Gynecologic Oncology

journal homepage: www.elsevier.com/locate/ygyno

Financial toxicity in gynecologic oncology

Sara Bouberhan [a,b], Meghan Shea [a,b], Alice Kennedy [c], Adrienne Erlinger [c], Hannah Stack-Dunnbier [c], Mary K. Buss [a,b], Laureen Moss [a], Kathleen Nolan [c], Christopher Awtrey [b,c], John L. Dalrymple [b,c], Leslie Garrett [b,c], Fong W. Liu [b,c], Michele R. Hacker [b,c,d], Katharine M. Esselen [b,c,*]

[a] Department of Medicine, Beth Israel Deaconess Medical Center, Boston, MA 02215, United States of America
[b] Harvard Medical School, Boston, MA 02215, United States of America
[c] Department of Obstetrics and Gynecology, Beth Israel Deaconess Medical Center, Boston, MA 02115
[d] Harvard T.H. Chan School of Public Health, Boston, MA 02115, United States of America

HIGHLIGHTS

- This is the first study that examines financial toxicity in the general gynecologic oncology clinic population.
- Despite excellent insurance coverage and high reported incomes, many respondents reported high levels of financial toxicity.
- High financial toxicity scores are correlated with self-reported overall health.
- Patients with high financial toxicity are 7 times more likely to delay or avoid care than those with low financial toxicity.

ARTICLE INFO

Article history:
Received 22 February 2019
Received in revised form 26 March 2019
Accepted 2 April 2019
Available online 30 April 2019

Keywords:
Financial toxicity
Financial burden
Gynecology oncology patients
Costs of cancer care
Patient reported outcomes

ABSTRACT

Objectives. Financial toxicity is increasingly recognized as an adverse outcome of cancer treatment. Our objective was to measure financial toxicity among gynecologic oncology patients and its association with demographic and disease-related characteristics; self-reported overall health; and cost-coping strategies.

Methods. Follow-up patients at a gynecologic oncology practice completed a survey including the COmprehensive Score for Financial Toxicity (COST) tool and a self-reported overall health assessment, the EQ-VAS. We abstracted disease and treatment characteristics from medical records. We dichotomized COST scores into low and high financial toxicity and assessed the correlation (r) between COST scores and self-reported health. We calculated risk ratios (RR) and 95% confidence intervals (CI) for the associations of demographic and disease-related characteristics with high financial toxicity, as well as the associations between high financial toxicity and cost-coping strategies.

Results. Among 240 respondents, median COST score was 29. Greater financial toxicity was correlated with worse self-reported health ($r = 0.47$; $p < 0.001$). In the crude analysis, Black or Hispanic race/ethnicity, government-sponsored health insurance, lower income, unemployment, cervical cancer and treatment with chemotherapy were associated with high financial toxicity. In the multivariable analysis, only government-sponsored health insurance, lower income, and treatment with chemotherapy were significantly associated with high financial toxicity. High financial toxicity was significantly associated with all cost-coping strategies, including delaying or avoiding care (RR: 7.3; 95% CI: 2.8–19.1).

Conclusions. Among highly-insured gynecologic oncology patients, many respondents reported high levels of financial toxicity. High financial toxicity was significantly associated with worse self-reported overall health and cost-coping strategies, including delaying or avoiding care.

1. Introduction

"Financial toxicity" is increasingly recognized as an adverse outcome of cancer care. It is defined as the economic impact that is experienced by patients as a result of a disease and its related treatments. Financial toxicity encompasses the objective financial hardship and subjective financial concerns related to cancer care [1,2]. A study linking data from

* Corresponding author at: Division of Gynecologic Oncology, Department of Obstetrics and Gynecology, Beth Israel Deaconess Medical Center, 330 Brookline Avenue, Boston, MA 02215, United States of America.
E-mail address: kesselen@bidmc.harvard.edu (K.M. Esselen).

https://doi.org/10.1016/j.ygyno.2019.04.003
0090-8258/

the Surveillance, Epidemiology and End Results (SEER) Program and federal bankruptcy records showed the rate of bankruptcy was 2.65 times higher for individuals with cancer than for those without [3]. Furthermore, another SEER database study demonstrated that patients with cancer who filed for bankruptcy were approximately 80% more likely to die within the study period than cancer patients who did not file for bankruptcy [4].

Financial toxicity has been associated with a worse quality of life in multiple studies [2,5–7], and high financial burden has been associated with low patient satisfaction [8]. Financial strain also has the potential to interfere with cancer treatment, and several small studies have shown that financial strain may be associated with poor adherence to medication regimens [9–12]. Risk factors for financial toxicity are still being explored, though large studies have demonstrated that significant predictors in cancer survivors include younger age at diagnosis and being female [3,13].

Given that financial toxicity is a recently recognized significant adverse outcome of cancer care, there is limited understanding of its burden among patients with gynecologic cancer. Thus, we aimed to measure the financial toxicity experienced by patients with gynecologic cancer, identify risk factors for financial toxicity and assess its association with self-reported overall health and cost-coping strategies.

2. Methods

Patients presenting for return outpatient follow-up appointments at medical and surgical gynecologic oncology practices within a large, urban, tertiary academic medical center were invited to complete a five-minute survey from October 2017 to March 2018. Completed paper surveys were collected in a designated locked box in each clinic. Participants also had the option to complete the survey online via REDCap [14] or to take a stamped envelope to complete the survey at home and mail it back.

2.1. Survey design

This cross-sectional survey (Appendix A) included two validated survey tools, as well as questions regarding sociodemographic characteristics and patient-reported outcomes. The primary measure of financial toxicity was based on a validated survey instrument, the COmprehensive Score for Financial Toxicity (COST) tool [1,2]. The COST tool uses responses to 11 items to generate a composite measure of financial burden ranging from 0 to 44, with 0 representing high financial toxicity. Examples of participant concerns identified by the COST tool include self-report of financial stress, inability to meet monthly expenses, higher than expected out-of-pocket costs, and worry about future financial problems as a result of their illness [1,2]. We also asked participants to assess their overall health using the EQ-VAS, which is part of the EQ-5D-5L tool and asks respondents to rate their overall health on a scale from 0 to 100, with 0 being the worst health imaginable [15]. The 16 questions following these validated tools asked participants to report sociodemographic information, treatment experience, and cost-coping strategies used to manage the costs of cancer treatment. We pilot tested the survey and revised it as needed based on feedback. The survey was available in 4 additional languages—Spanish, Chinese, Haitian Creole, and Portuguese.

We included data from incomplete surveys if at least 6 of the 11 COST tool items were complete. In these instances, as validated previously, participants' scores were divided by the number of questions answered and scaled accordingly. We reviewed medical records to collect data regarding health insurance, diagnoses, treatments, and comorbidities and linked this information to the survey responses.

The Institutional Review Board at Beth Israel Deaconess Medical Center approved this study.

2.2. Statistical analysis

We created tertiles of COST scores and defined high financial toxicity as the bottom tertile and low financial toxicity as the top two tertiles. Data were stratified by high and low financial toxicity, and descriptive statistics were reported as median (interquartile range) or frequencies with percentages. We calculated the Spearman correlation coefficient to quantify the association between COST score and self-reported overall health.

We used log-binomial regression to calculate crude and adjusted risk ratios (RRs) and 95% confidence intervals (CIs) for the association of demographic characteristics and variables related to diagnosis and treatment with the outcome of high financial toxicity. We determined which variables maintained an association with financial toxicity in multivariable models. Consequently, all models were adjusted for income and insurance. In addition, we used log-binomial regression to quantify the association between high financial toxicity as the exposure and each cost-coping strategy as an outcome. *P* values <0.05 were considered to be statistically significant. We used SAS 9.4 (SAS Institute, Cary, North Carolina) for the analysis.

3. Results

We collected 268 surveys from eligible respondents. We excluded 23 surveys that were incomplete and 5 from respondents who completed the survey twice, leaving 240 surveys in the analysis. We were unable to track the survey response rate over the entire study period. However, over the course of several intermittent days, the response rate was 75%. The median age of respondents was 56 (44–66) years. Most respondents (86%) identified as white, and all but one reported having insurance coverage. Nearly two-thirds of respondents reported an annual income ≥$50,000 or more, with 36% reporting an annual income of ≥$100,000. Most respondents were employed full time (35%) or retired (31%). Primary diagnoses included ovarian cancer (35%), uterine cancer (34%), cervical cancer (9%), other cancer (3%), and precancer/benign/unknown (20%). Approximately half of respondents were treated with surgery alone, while nearly all of the rest had multimodality treatment with surgery and radiation and/or chemotherapy (Table 1).

The median COST score in the population was 29 (22–36) with a range of 2–44. The scores in the bottom tertile ranged from 2 to 23 with a median of 16 (11−22), while scores in the top two tertiles combined ranged from 24 to 44 with a median of 33 (29–38). As measured on the EQ-VAS, respondents with high financial toxicity rated their overall health as significantly worse [median: 70 (50–80)] than those with low financial toxicity [median: 85 (75–90); $p < 0.001$]. We observed significant moderate correlations between the COST score and the EQ-VAS ($r = 0.47$; $p < 0.001$).

In the unadjusted analyses, respondents were more likely to report high financial toxicity if they were Black, Hispanic or other race/ethnicity; had MassHealth or Medicare without supplement; had annual income <$100,000; or were unemployed. High financial toxicity also was associated with cervical cancer and treatment that included chemotherapy regardless of diagnosis (Table 2). In the multivariable analysis, only income, insurance and initial treatment after diagnosis were associated with high financial toxicity. Respondents were more likely to report high financial toxicity if they had Medicare only (RR: 1.6; 95% CI: 1.02–2.5) or MassHealth (RR: 1.7; 95% CI: 1.1–2.5) compared to private insurance, annual income <$50,000 (RR: 2.9; 95% CI: 1.6–5.5) or $50,000 to <$100,000 (RR: 2.3; 95% CI: 1.3–4.3) compared to ≥$100,000, and if they received chemotherapy as part of their initial treatment (RR: 1.7; 95% CI: 1.1–2.6) compared to surgery only. Crude and adjusted results are shown in Table 2.

High financial toxicity was significantly associated with delaying or avoiding medical care, and with all of the cost-coping strategies included in the survey (Fig. 1). Among those with high financial toxicity,

Table 1
Respondent and disease characteristics stratified by high and low financial toxicity.

	All respondents $n = 240$	High financial toxicity $n = 76$	Low financial toxicity $n = 164$
COST score	29 (22–36)	16 (11–22)	33 (29–38)
Age (years)	56 (44–66)	53 (43–65)	57 (45–67)
Race			
White	206 (86)	54 (71)	152 (93)
Hispanic/Latina	9 (4)	6 (8)	3 (2)
Black	11 (5)	9 (12)	2 (1)
Asian	10 (4)	4 (5)	6 (4)
Other	4 (2)	3 (4)	1 (1)
Health insurance			
Private	133 (55)	35 (46)	98 (60)
Medicare with supplement	49 (20)	6 (8)	43 (26)
Medicare	29 (12)	15 (20)	14 (9)
MassHealth	28 (12)	19 (25)	9 (5)
No insurance	1 (0)	1 (1)	0 (0)
Marital status			
Married/partnered	142 (59)	40 (53)	102 (62)
Single	47 (20)	20 (26)	27 (16)
Divorced	29 (12)	11 (14)	18 (11)
Widowed	15 (6)	3 (4)	12 (7)
Unreported	7 (3)	2 (3)	5 (3)
Annual income			
<$50,000	63 (26)	36 (47)	27 (16)
$50,000–$99,999	68 (28)	24 (32)	44 (27)
≥$100,000	87 (36)	12 (16)	75 (46)
Unreported	22 (9)	4 (5)	18 (11)
Household size			
One person	64 (27)	24 (32)	40 (24)
Two people	99 (41)	27 (36)	72 (44)
Three or more people	60 (25)	24 (32)	36 (22)
Unreported	17 (7)	1 (1)	16 (10)
Employment status			
Full-time	85 (35)	21 (28)	64 (39)
Part-time	34 (14)	14 (18)	20 (12)
Retired	75 (31)	17 (22)	58 (35)
Unemployed	35 (15)	22 (29)	13 (8)
Unreported	11 (5)	2 (3)	9 (5)
Diagnosis			
Ovarian cancer	83 (35)	27 (36)	56 (34)
Uterine cancer	81 (34)	25 (33)	56 (34)
Cervical cancer	22 (9)	11 (14)	11 (7)
Vaginal/vulvar/other cancer	6 (3)	1 (1)	5 (3)
Pre-cancer/benign/unknown	48 (20)	12 (16)	36 (22)
Extent of disease			
Pre-cancer or benign	48 (20)	12 (16)	36 (22)
Stage 1 or 2	121 (50)	33 (43)	88 (54)
Stage 3 or 4	57 (24)	25 (33)	32 (20)
Unknown	14 (6)	6 (8)	8 (5)
Initial treatment after diagnosis			
Surgery only	115 (48)	25 (33)	90 (55)
Surgery and radiation	18 (8)	5 (7)	13 (8)
Chemotherapy only or with surgery and/or radiation	94 (39)	42 (55)	52 (32)
Hormonal therapy alone	8 (3)	2 (3)	6 (4)
No treatment	5 (2)	2 (3)	3 (2)
Recurrent malignancy (Among respondents with cancer)	47 (24)	20 (31)	27 (21)
Years since diagnosis	2 (1–5)	2 (1–4)	3 (1–6)

Data presented as median (interquartile range) or n (%).

Table 2
Association of respondent and disease characteristics with financial toxicity.

	Crude risk ratio 95% (CI)	Adjusted risk ratio* 95% (CI)
Age (per 10-year increase)	0.94 (0.81–1.1)	0.97 (0.84–1.13)
Race/ethnicity		
White	Ref	Ref
Asian	1.5 (0.69–3.4)	1.6 (0.73–3.6)
Black	3.1 (2.2–4.5)	1.3 (0.77–2.3)
Hispanic/Latina	2.5 (1.5–4.3)	1.5 (0.81–2.7)
Other	2.9 (1.6–5.3)	–
Insurance		
Private	Ref	Ref
Medicare with supplement	0.47 (0.21–1.04)	0.44 (0.20–0.96)
Medicare only	2.0 (1.3–3.1)	1.6 (1.02–2.5)
MassHealth	2.6 (1.8–3.8)	1.7 (1.1–2.5)
No insurance	–	–
Marital status		
Married or partnered	Ref	Ref
Single	1.5 (0.99–2.3)	0.74 (0.51–1.1)
Divorced	1.3 (0.79–2.3)	0.90 (0.57–1.4)
Widowed	0.71 (0.25–2.0)	0.36 (0.09–1.3)
Unreported	–	–
Annual income		
<$50,000	4.1 (2.3–7.3)	2.9 (1.6–5.5)
$50,000–$99,999	2.6 (1.4–4.7)	2.3 (1.3–4.3)
≥$100,000	Ref	Ref
Unreported	1.3 (0.47–3.7)	1.1 (0.38–3.0)
Employment status		
Full-time	Ref	Ref
Part-time	1.7 (0.96–2.9)	1.2 (0.78–2.0)
Retired	0.92 (0.52–1.6)	0.84 (0.51–1.4)
Unemployed	2.5 (1.6–4.0)	1.5 (0.89–2.4)
Unreported	–	–
Household Size		
One person	Ref	Ref
Two people	0.73 (0.46–1.1)	1.2 (0.78–1.7)
Three or more people	1.1 (0.69–1.7)	1.4 (0.96–2.2)
Unreported	–	–
Diagnosis		
Ovarian cancer	1.3 (0.73–2.3)	1.2 (0.78–1.7)
Uterine cancer	1.2 (0.69–2.2)	1.2 (0.79–1.7)
Cervical cancer	2.0 (1.1–3.8)	1.5 (0.85–2.7)
Vaginal/vulvar/other cancer	0.67 (0.10–4.3)	0.83 (0.30–2.3)
Precancer/benign/unknown	Ref	Ref
Extent of disease		
Pre-cancer or benign	Ref	Ref
Stage 1 or 2	1.1 (0.62–1.9)	1.2 (0.73–2.1)
Stage 3 or 4	1.8 (0.99–3.1)	1.6 (0.94–2.6)
Unknown	2.0 (0.46–8.7)	6.4 (0.85–47.9)
Initial treatment after diagnosis		
Surgery only	Ref	Ref
Surgery and radiation	1.3 (0.56–2.9)	1.7 (0.69–4.1)
Chemotherapy only or with surgery and/or radiation	2.1 (1.4–3.1)	1.7 (1.1–2.6)
Hormonal therapy alone	1.2 (0.33–4.0)	0.81 (0.25–2.6)
No treatment	1.8 (0.60–5.7)	1.5 (0.29–7.3)
Recurrent malignancy (among respondents with cancer)		
Yes	1.4 (0.91–2.1)	1.0 (0.71–1.4)
No	Ref	Ref
Years since diagnosis		
≤1 year	1.7 (0.98–2.9)	1.6 (0.91–2.8)
>1–3 years	1.3 (0.76–2.4)	1.4 (0.81–2.5)
>3–5 years	1.2 (0.61–2.4)	1.1 (0.64–1.9)
>5 years	Ref	Ref

CI: Confidence interval.
*Adjusted for insurance and income.

22% reported delaying or avoiding care, 29% borrowed money or applied for financial assistance, 51% used savings to meet the costs of care, 32% reduced spending on necessities, and 43% reduced spending on leisure activities. Compared to those with low financial toxicity, respondents who reported high financial toxicity were 7.3 (95%: CI 2.8–19.1) times more likely to report that they delayed or avoided care due to finances. Additionally, those with high financial toxicity were 11.9 (95% CI: 4.2–33.2) times more likely to have borrowed money or applied for financial assistance, 2.2 (95% CI: 1.5–3.1) times more likely to have used savings to meet the costs of care, 5.2 (95% CI: 2.6–10.3) times more likely to have reduced spending on necessities and 3.1 (95% CI: 2.0–4.9) times more likely to have reduced spending on leisure activities. Respondents with high financial toxicity also were more likely to express interest in discussing the cost of care with their providers (RR 2.0; 95% CI: 1.5–2.7).

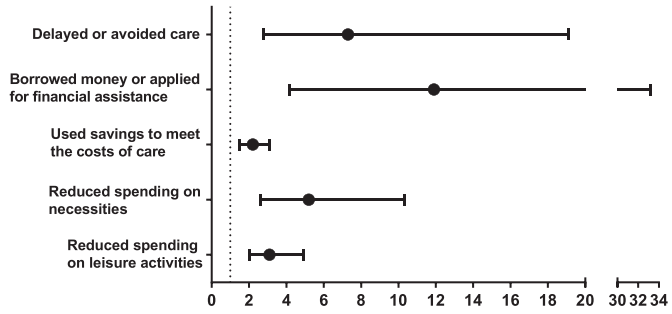

Fig. 1. Risk of using cost-coping strategies among respondents with high financial toxicity compared to low financial toxicity. Plotted on the x-axis are the risk ratio and 95% confidence interval.

4. Discussion

This study is novel in that it examined financial toxicity among the general gynecologic oncology clinic population. Despite all but one respondent having insurance coverage and relatively high annual income in this Massachusetts-based population, many respondents reported high levels of financial toxicity, and high financial toxicity was significantly associated with cost-coping strategies, such as delaying or avoiding medical care. Specifically, one-third of respondents had a COST score < 23 (indicating higher financial toxicity), which was the median score in the cohort of stage IV cancer patients in active treatment used to validate the COST tool [2] and the mean score in a study of multiple myeloma patients in active treatment [10]. Unlike these two prior studies, the population we surveyed was clinically heterogeneous; all follow-up patients were eligible, including those with precancerous conditions and those with cancer on active treatment or in surveillance. Additionally, approximately half of respondents were treated with surgery alone. This may, in part, explain why the median COST score among our respondents (29) was higher than that in prior studies.

Our survey was conducted at a tertiary academic center in the metro area of Boston, Massachusetts. In 2006, legislation was passed in Massachusetts to mandate insurance coverage for all citizens. Over 99% of respondents in this study had insurance and 36% reported annual income >$100,000. It is notable that 12 respondents (16%) in the high financial toxicity group reported annual income >$100,000, suggesting that income alone is an insufficient screening tool. Prior studies have demonstrated that financial strain related to cancer care extends to patients with health insurance [9,10]. Our data support the finding that insured patients with cancer remain at risk of experiencing financial toxicity.

Multiple predictors of financial toxicity have been proposed. Prior studies have consistently identified younger age and lower household income as significant predictors [6,10,16]. Other risk factors include non-white race [16], female sex [6], non-married status [10] and longer duration since diagnosis [10], but these findings have varied across studies. Although several variables, such as race/ethnicity, income and employment status, were associated with financial toxicity in the crude analyses, in the adjusted models, the only factors that remained significantly associated with high financial toxicity were insurance coverage by MassHealth (i.e. Medicaid) or Medicare, annual income <$100,000 and initial treatment that included chemotherapy. However, our study population represents a more heterogeneous group of patients with regard to diagnosis and treatment compared to prior studies. Nonetheless, it is interesting that our results suggest that patients who receive chemotherapy, who presumably have more advanced or high-risk diseases, reported higher financial toxicity. Further, although the results were attenuated in the adjusted analysis, in the crude model, respondents with cervical cancer, a disease seen more often in patients with poor access to healthcare and screening, also reported high financial toxicity. These groups of patients will be important to target in future studies of the financial impact of cancer care in gynecologic oncology.

Importantly, we found that respondents with high financial toxicity were seven times more likely to report delaying or avoiding care due to finances. Given this, it is important to know if patients want to talk to their health care providers about financial strain. In our study, respondents with high financial toxicity were twice as likely to want to discuss finances with their providers. Considerable prior research has addressed this issue. A study by Zafar et al. found that patients who had communicated with their physicians about costs were more likely to report greater financial burden [9], and another prior study by Shankaran et al. found that 81% of patients with economically motivated treatment nonadherence discussed treatment related expenses with their physicians [16]. Bullock et al. found that 76% of surveyed oncology patients felt comfortable discussing costs with their physicians [17]. Similarly, Bestvina et al. found that 52% of patients with cancer wanted to discuss out-of-pocket costs of care with their oncologists and that patients who discussed cost of care with their doctors were more likely to report nonadherence to therapy [12]. Further investigation is needed in this area; clinicians should be aware that patients who raise concerns about costs may be at increased risk for financial toxicity and its associated consequences.

The strengths of this study include its novelty in surveying the general gynecologic oncology patient population and the relatively large number of respondents compared to prior studies using the COST tool. In addition, we had the ability to link surveys with medical record data rather than relying on self-reported data for variables such as diagnosis and treatment. While the study benefited from covering a broad array of diagnoses, this yielded limited power to measure the effect of disease- or treatment-specific variables. Although we were unable to determine the response rate for the entire study period, the response rate was relatively high on the days that we were able to track it. Additionally, our findings may have limited generalizability due to the fact that respondents were from a single institution and had nearly universal insurance coverage.

In conclusion, our findings contribute to the growing body of knowledge regarding financial toxicity in patients with cancer. In spite of relatively high incomes and excellent insurance coverage, we demonstrated that many patients with gynecologic oncology diagnoses are still at risk for significant financial toxicity. We confirmed that income and type of health insurance coverage are significantly associated with financial toxicity. Our most concerning finding is that patients with high financial toxicity were 7.3 times more likely to report avoiding or delaying care than those with less financial toxicity. Further studies will need to identify the specific components of care that are delayed and the potential disparities in clinical outcomes that may result from these delays. Future studies should also examine disease- and treatment-specific factors that may contribute to financial toxicity. As costly, novel therapeutic treatments emerge and become more common, the financial burden associated with gynecologic cancer care will grow and financial toxicity may exacerbate health care disparities. Therefore, we need to develop tools to screen all patients for financial toxicity, examine ways in which gynecologic cancers and associated treatments worsen financial strain, and develop interventions to mitigate the adverse impact on patient outcomes.

Author contribution

Sara Bouberhan: Study design; data interpretation; drafting the manuscript; approval of final manuscript. Meghan Shea: Study design; critically revising the manuscript; approval of final manuscript. Alice Kennedy: Study design; data acquisition; critically revising the manuscript; approval of final manuscript. Adrienne Erlinger: Data analysis; critically revising the manuscript; approval of final manuscript. Hannah Stack-Dunnbier: Data acquisition; critically revising the manuscript; approval of final manuscript. Mary K. Buss: Data acquisition; critically

revising the manuscript; approval of final manuscript. Laureen Moss: Data acquisition; critically revising the manuscript; approval of final manuscript. Kathleen Nolan: Data acquisition; critically revising the manuscript; approval of final manuscript. Christopher Awtrey: Study design; critically revising the manuscript; approval of final manuscript. John L. Dalrymple: Study design; critically revising the manuscript; approval of final manuscript. Leslie Garrett: Study design; critically revising the manuscript; approval of final manuscript. Fong W Liu: Study design; critically revising the manuscript; approval of final manuscript. Michele R Hacker: Study design; data analysis and interpretation; drafting the manuscript; approval of final manuscript. Katharine M Esselen: Study conception and design; data interpretation; drafting the manuscript; approval of final manuscript.

Conflict of interest

The following authors have confirmed that there are no potential conflicts of interest or disclosures to report pertaining to this submission: Sara Bouberhan, Meghan Shea, Alice Kennedy, Adrienne Erlinger, Hannah Stack-Dunnbier, Mary K. Buss, Laureen Moss, Kathleen Nolan, Christopher Awtrey, John L. Dalrymple, Leslie Garrett, Fong W Liu, Michele R Hacker, Katharine M Esselen.

Funding

This work was supported by the Eleanor and Miles Shore 50th Anniversary Fellowship Program and Harvard Catalyst | The Harvard Clinical and Translational Science Center (National Center for Advancing Translational Sciences, National Institutes of Health Award UL 1TR002541) and financial contributions from Harvard University and its affiliated academic healthcare centers. The funding organizations had no role in the preparation, review, or approval of the manuscript.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ygyno.2019.04.003.

References

[1] J.A. de Souza, et al., The development of a financial toxicity patient-reported outcome in cancer: The COST measure, Cancer 120 (20) (2014) 3245–3253.
[2] J.A. de Souza, et al., Measuring financial toxicity as a clinically relevant patient-reported outcome: The validation of the COmprehensive Score for financial Toxicity (COST), Cancer 123 (3) (2017) 476–484.
[3] S. Ramsey, et al., Washington State cancer patients found to be at greater risk for bankruptcy than people without a cancer diagnosis, Health Aff (Millwood) 32 (6) (2013) 1143–1152.
[4] S.D. Ramsey, et al., Financial insolvency as a risk factor for early mortality among patients with cancer, J. Clin. Oncol. 34 (9) (2016) 980–986.
[5] S.Y. Zafar, et al., Population-based assessment of cancer survivors' financial burden and quality of life: a prospective cohort study, J Oncol Pract 11 (2) (2015) 145–150.
[6] K.M. Fenn, et al., Impact of financial burden of cancer on survivors' quality of life, J Oncol Pract 10 (5) (2014) 332–338.
[7] C.S. Lathan, et al., Association of financial strain with symptom burden and quality of life for patients with lung or colorectal cancer, J. Clin. Oncol. 34 (15) (2016) 1732–1740.
[8] F. Chino, et al., Self-reported financial burden and satisfaction with care among patients with cancer, Oncologist 19 (4) (2014) 414–420.
[9] S.Y. Zafar, et al., The financial toxicity of cancer treatment: a pilot study assessing out-of-pocket expenses and the insured cancer patient's experience, Oncologist 18 (4) (2013) 381–390.
[10] S.F. Huntington, et al., Financial toxicity in insured patients with multiple myeloma: a cross-sectional pilot study, Lancet Haematol 2 (10) (2015) e408-16.
[11] A.N. Winn, N.L. Keating, S.B. Dusetzina, Factors associated with tyrosine kinase inhibitor initiation and adherence among medicare beneficiaries with chronic myeloid leukemia, J. Clin. Oncol. 34 (36) (2016) 4323–4328.
[12] C.M. Bestvina, et al., Patient-oncologist cost communication, financial distress, and medication adherence, J Oncol Pract 10 (3) (2014) 162–167.
[13] H.P. Kale, N.V. Carroll, Self-reported financial burden of cancer care and its effect on physical and mental health-related quality of life among US cancer survivors, Cancer 122 (8) (2016) 283–289.
[14] P.A. Harris, et al., Research electronic data capture (REDCap)–a metadata-driven methodology and workflow process for providing translational research informatics support, J. Biomed. Inform. 42 (2) (2009) 377–381.
[15] M. Herdman, et al., Development and preliminary testing of the new five-level version of EQ-5D (EQ-5D-5L), Qual. Life Res. 20 (10) (2011) 1727–1736.
[16] V. Shankaran, et al., Risk factors for financial hardship in patients receiving adjuvant chemotherapy for colon cancer: a population-based exploratory analysis, J. Clin. Oncol. 30 (14) (2012) 1608–1614.
[17] A.J. Bullock, et al., Understanding patients' attitudes toward communication about the cost of cancer care, J Oncol Pract 8 (4) (2012) e50-8.