

Financial toxicity in survivors of childhood cancer and their siblings: A proposal to include a financial toxicity instrument in the Follow-Up 6 survey

Working Group: Cancer control

Study team:

Paul Nathan	paul.nathan@sickkids.ca
Rena Conti	rconti@uchicago.edu
Tara Henderson	thenderson@peds.bsd.uchicago.edu
Robin Yabroff	robin.yabroff@hhs.gov
I-Chan Huang	i-chan.huang@stjude.org
Elyse Park	epark@mgh.harvard.edu
Kevin Krull	kevin.krull@stjude.org
Anne Kirchhoff	anne.Kirchhoff@hci.utah.edu
Todd Gibson	todd.gibson@stjude.org
Les Robison	les.robison@stjude.org
Greg Armstrong	greg.armstrong@stjude.org
Wendy Leisenring	wleisenr@fredhutch.org

Background:

The impact of diagnosis and treatment of childhood or adolescent cancer on long-term physical and psychological health of survivors has been described extensively. Less well understood is the financial hardship that can arise from childhood cancer, for both the survivor and their family members. Neoclassical economic theory suggests that financial difficulties may exacerbate or cause physical and psychological harms and in turn, physical, neurocognitive and psychological late effects may lead to financial difficulties. Indeed, data from the National Health Interview Survey (NHIS) have shown that in the general population, financial burden is correlated with poor physical and mental health, reduced satisfaction with social activities and relationships, and poorer quality of life.¹

Among adults with a current or prior cancer, studies have demonstrated that individuals with cancer face more financial difficulties than those without a cancer history.²⁻⁵ Adult cancer survivors have higher out-of-pocket medical costs, in part due to late effects of their cancer therapy,⁵⁻⁷ and are more likely to be unable to work because of poor health and functional limitations.⁵⁻⁷ This may limit their access to employment-based health insurance, their income and asset accumulation and, consequently, their ability to pay for needed health care.⁸

Such financial difficulty has been labeled by researchers as *financial toxicity*, which has been demonstrated to manifest itself among adult cancer patients and survivors in several ways, including:

1. High out of pocket medical costs that impact household income and assets
2. Inability to pay for medical care or deferral of needed care or testing
3. Asset depletion, general/medical debt or declaration of bankruptcy
4. Housing and food insecurity
5. Elevated stress, distress or worry about current/future financial situation

6. Inability to actively engage in productive work for pay due to lasting effects of cancer, causing individuals to be unemployed, underemployed, uninsured or underinsured
7. Job lock, or the inability of individuals to freely engage in extra work activities to earn a promotion, reduce work hours to attend to household needs including but not limited to health needs, or to leave a job to pursue other activities because doing so will result in the loss of employee benefits, most notably health insurance

Only a handful of studies in the child and young adult cancer population have examined aspects of financial toxicity. Among adults with cancer, several studies have demonstrated an association between younger age at initial cancer diagnosis and risk for financial hardships^{12,13} such as higher rates of debt and bankruptcies.⁹ Lack of savings, competing financial obligations (e.g. children) and absence of access to comprehensive insurance coverage including catastrophic limits on out of pocket spending are particular challenges in this demographic.¹⁰ Whether similar factors contribute to hardship in adult survivors of childhood cancers is unknown. Using items measuring ability to pay monthly bills and financial worries, a recent St. Jude Lifetime Cohort Study (SJLIFE) identified that 49%, 37%, and 14% of adult survivors of childhood cancer (N=2,811) experienced low, moderate, and high level of financial hardship, respectively. Survivors with moderate and high financial hardship had an increased risk of suicidal ideation by 2.1- and 2.9-fold, respectively, compared to survivors with low financial hardship after adjusting for the influence of sociodemographic factors (e.g., age, sex, marital status, income, and education) and the presence of 15 chronic health conditions (e.g., cardiac disorders, respiratory disorders, etc.) categorized by CTCAE grades 3-4 vs. 0-1 (Huang et al. Pending submission).

CCSS has previously investigated some elements of financial toxicity in a sub-set of survivors in the original (1970-86) cohort, providing proof of concept for this proposal. Elyse Park and colleagues conducted an ancillary study entitled: “*Are adult survivors of childhood cancer underinsured?*” This study generated several publications addressing insurance and underinsurance in a randomly chosen subset of 698 survivors and 210 siblings, as well as a sample of 39 survivors who underwent in-depth interviews.¹¹⁻¹⁴ These analyses demonstrated similar rates of insurance in survivors and siblings, but survivors were more likely to report having been denied insurance, be publically insured, and reported out-of-pocket health care costs relative to income that were 50% higher than their siblings (Park et al. Pending submission). In addition, almost one quarter of survivors have skipped or deferred medical care or testing or have had difficulty paying medical bills, and 10% reported substantial out-of-pocket medical costs (>10% of their income) (Nipp et al. under review).

A particular advantage of studying financial toxicity in the CCSS is the capacity to link financial outcomes to diagnosis and prior cancer treatment as well as measures of current (and past) chronic illness and health status. Thus, characterizing the financial status of the CCSS cohort will provide data about an important (and previously poorly characterized) mediator of survivor outcomes. A limitation of the previous work in CCSS is the absence of general population data for comparison – little is known about financial outcomes in siblings of cancer survivors so that using siblings as a control group may underestimate the financial impact of childhood cancer. Future work assessing financial toxicity in the CCSS cohort could be enhanced by:

1. Obtaining data from both the original and expanded cohorts, allowing evaluation of a more recently treated survivor population

2. Improved statistical power by surveying the entire cohort (along with siblings) rather than a randomly chosen subset
3. Assessing previously unstudied elements of financial toxicity (e.g. housing and food security)
4. Choosing questionnaire items for which general population data exists, allowing for direct comparison of financial outcomes (and assessment of the impact on siblings). These population-based nationally representative surveys are:
 - a. National Health Interview Survey (NHIS; www.cdc.gov/nchs/nhis/)
 - b. Medical Expenditure Panel Survey (MEPS; www.healthcaredelivery.cancer.gov/meps/)
 - c. Behavioral Risk Factor Surveillance System (BRFSS; www.cdc.gov/brfss/)

This concept proposes to distribute a two-page financial toxicity instrument as part of the upcoming follow-up #6 questionnaire; this would be the first large-scale analysis of the financial impact of a childhood cancer diagnosis on both survivors and their siblings. The general conceptual framework of the survey is consistent with economic models of financial distress and its moderators among adults with cancer and survivors recently published by the NCI on their PDQ website (www.cancer.gov/about-cancer/managing-care/financial-toxicity-hp-pdq). The questions are consistent with recommendations by the NCI PDQ working group regarding future studies of financial toxicity authored by the economic leads of this proposal (Rena Conti and Robin Yabroff). They are also consistent with a current study led by Rena Conti as part of a larger effort to assess financial burden among adult cancer patients nationwide funded by the NCI and patient advocacy groups and supported by the NCORP Cancer Care Delivery Research Steering Committee.

Methods/Analysis:

Due to a need to keep follow-up #6 as short as possible, CCSS leadership has requested that the current financial toxicity questionnaire be restricted to 2 pages. The questionnaire consists of 27 questions divided into 6 sections covering the following topics:

- A. Household structure
- B. Assets, debt and bankruptcy
- C. Impact of cancer survivorship/late effects on work
- D. Health insurance
- E. Access to medical care
- F. Housing and food insecurity, and other financial distress/worries

Since no single, previously validated instrument covers all of these topic areas, the questions have been selected from three validated population-based surveys: NHIS, MEPS and BRFSS. This approach has several advantages:

1. Question domains and specific questions have been confirmed to have content validity by survey experts and using standard methods. We plan to confirm content validity in the CCSS cohort by conducting a series of pre-tests using a cognitive debriefing methodology. We plan to recruit 32 adult survivors of childhood cancer via telephone interview to test: 1) whether survivors are able to interpret the content of the financial questions correctly; 2) whether the financial questions capture important financial issues related to their cancer experience; and 3) whether the instructions and format of the

financial survey are easy to follow. We will recruit survivors who were diagnosed with leukemia (N=8), lymphoma (N=8), brain tumors (N=8), and solid tumors (N=8) for interview. Each interview will take approximately 30-40 minutes to complete. Debriefing interviews will be audio-recorded and transcribed for analysis using standard qualitative methods. This pilot testing will be conducted at St Jude under the supervision of I-Chan Huang.

2. Comparative data will be available for responses to all questions. However, since the questions are drawn from three different surveys, the comparison population will not be the same for all questions.
3. We will reduce survey burden by allowing inference of financial details that would otherwise require additional survey questions, and assess the generalizability of the respondent population to local area populations, using national data from the American Community Survey (ACS). The ACS is available for download through the American FactFinder website maintained by the U.S Census Bureau from 2004 onwards. These data are nationally representative and provide local area estimates of mean and median household income, employment rates, uninsured rates, population size and age distribution, and medical care supply. Local area is defined by ZIP Code Tabulation Areas (zCTAs) for a given time period. zCTAs are generalized areal representations of United States Postal Service ZIP Code service areas. We plan to use the 2016 DP03 and DP06 files to complete this linkage and will link CCSS respondents by zip code, city and state of residence to the Census Bureau data using the 2016 zCTA-zip code crosswalk.

We will define the following financial outcomes variables based on the survey responses from survivors and siblings:

- “Financial distress” due to medical bills defined by answers to questions in Section E of the survey.
- “Financial worry” defined by answers to questions in Section F of the survey.
- “Job lock” defined by answers to questions in Section C of the survey.

We hypothesize these outcomes will be moderated by CCSS cohort responses to questions in sections 1, 2, 4 and local area socioeconomic circumstances captured by linkage to the ACS defined above.

Furthermore, we hypothesize these outcomes will be associated with or moderated by CCSS cohort responses to the F/U #5 questionnaire:

- Sociodemographic variables: (current age, gender, race/ethnicity, education, employment status, marital status)
- Disease/treatment variables (diagnosis, age at diagnosis, treatment modalities, cyclophosphamide-equivalent dose, doxorubicin-equivalent dose)
- Health status (general health, mental health, functional impairment, activity limitations, pain/anxiety due to prior cancer)
- Chronic health conditions (by organ system and severity)
- SMN
- Psychological distress (BSI-18)
- Neurocognitive outcomes (CCSS-NCQ)
- Health Related Quality of Life (SF-36)

We plan to conduct descriptive and multivariate regression-based analyses of each of these outcomes to evaluate their moderators in survivors. Appropriate models will be utilized based on the type of outcome being examined (log binomial, logistic, linear), but all will examine the cross-sectional outcome data from the proposed survey. We further plan to conduct analyses of these outcomes and their moderators comparing survivors vs. siblings vs. population controls. We anticipate that this will lead to several high-impact papers. In addition, it will provide a novel set of data elements that can be used in multiple future analyses across CCSS working groups. Specifically, we expect the products of these efforts will include (but not be limited to) the following analyses:

1. The prevalence of financial distress and worry.

We hypothesize that survivors will more commonly report financial distress and worry compared to siblings and the general population, and that siblings will demonstrate higher levels of distress and worry than the general population.

2. The prevalence of job lock in childhood cancer survivors.

We hypothesize that survivors will more commonly report job lock compared to siblings and the general population.

3. Self-report of financial distress, worry, job lock and delayed or deferred medical care in cancer survivors will be moderated by socioeconomic characteristics of the survivor and local area conditions.

We hypothesize survivors who have fewer household assets, have less generous insurance coverage and live in areas with lower median and mean house income, higher unemployment rates and less access to medical providers will be more likely to report financial distress, worry and job lock compared to others that do not exhibit these characteristics, siblings, and the general population.

4. Self-report of financial distress, worry and job lock in cancer survivors will be moderated by chronic physical/psychological morbidity and neurocognitive impairment/functional outcomes of the survivor.

We hypothesize survivors who more likely report chronic physical/psychological morbidity and/or neurocognitive impairment/impaired functional outcomes will be more likely to report financial distress, worry and job lock compared to others that do not exhibit these characteristics, siblings, and the general population.

Finally, the data collected here will provide excellent opportunities for future studies to link data collected from multiple surveys (e.g., baseline, F/U #2, F/U #4, etc.) to investigate the relationship between changes in risk factors over time (e.g., change of income, health status, etc.) and the financial impact at F/U #6 using a longitudinal framework.

References

1. Fenn KM, Evans SB, McCorkle R, et al: Impact of financial burden of cancer on survivors' quality of life. *J Oncol Pract* 10:332-8, 2014
2. Soni A: Trends in the Five Most Costly Conditions among the U.S. Civilian Institutionalized Population, 2002 and 2012. , Statistical Brief 470, Agency for Healthcare Research and Quality., 2015
3. Bradley CJ, Yabroff KR, Warren JL, et al: Trends in the Treatment of Metastatic Colon and Rectal Cancer in Elderly Patients. *Med Care* 54:490-7, 2016
4. Yabroff KR, Dowling EC, Guy GP, Jr., et al: Financial Hardship Associated With Cancer in the United States: Findings From a Population-Based Sample of Adult Cancer Survivors. *J Clin Oncol* 34:259-67, 2016
5. Ekwueme DU, Yabroff KR, Guy GP, Jr., et al: Medical costs and productivity losses of cancer survivors--United States, 2008-2011. *MMWR Morb Mortal Wkly Rep* 63:505-10, 2014
6. Guy GP, Jr., Ekwueme DU, Yabroff KR, et al: Economic burden of cancer survivorship among adults in the United States. *J Clin Oncol* 31:3749-57, 2013
7. Guy GP, Jr., Yabroff KR, Ekwueme DU, et al: Healthcare Expenditure Burden Among Non-elderly Cancer Survivors, 2008-2012. *Am J Prev Med* 49:S489-97, 2015
8. Harila-Saari AH, Paakko EL, Vainionpaa LK, et al: A longitudinal magnetic resonance imaging study of the brain in survivors in childhood acute lymphoblastic leukemia. *Cancer* 83:2608-2617, 1998
9. Banegas MP, Guy GP, Jr., de Moor JS, et al: For Working-Age Cancer Survivors, Medical Debt And Bankruptcy Create Financial Hardships. *Health Aff (Millwood)* 35:54-61, 2016
10. PDQ Financial Toxicity and Cancer Treatment. Bethesda, MD, National Cancer Institute, 2016
11. Kirchhoff AC, Parsons HM, Kuhlthau KA, et al: Supplemental security income and social security disability insurance coverage among long-term childhood cancer survivors. *J Natl Cancer Inst* 107:djv057, 2015

12. Kirchhoff AC, Kuhlthau K, Pajolek H, et al: Employer-sponsored health insurance coverage limitations: results from the Childhood Cancer Survivor Study. *Support Care Cancer* 21:377-83, 2013

13. Park ER, Kirchhoff AC, Zallen JP, et al: Childhood Cancer Survivor Study participants' perceptions and knowledge of health insurance coverage: implications for the Affordable Care Act. *J Cancer Surviv* 6:251-9, 2012

14. Park ER, Kirchhoff AC, Perez GK, et al: Childhood Cancer Survivor Study Participants' Perceptions and Understanding of the Affordable Care Act. *J Clin Oncol*, 2015