

Factors Associated with Financial Distress In Lower-Income Populations

Maheetha Bharadwaj, MS MPhil¹², Daniel A. Gundersen, Ph.D³, Leah S. Stockman, MA³,
Ludmila Svoboda, MS³, Laura Garber, PA³, Christopher S. Lathan, MD, MS, MPH¹²³

¹Harvard Medical School, 25 Shattuck Street, Boston, MA 02115, USA; ²Brigham and Women's Hospital, Harvard Medical School, 75 Francis Street, Boston, MA 02115; ³Dana-Farber Cancer Institute, 450 Brookline Avenue, Boston, MA 02215.

Corresponding Author:

Christopher Lathan, MD, MS, MPH
Dana-Farber Cancer Institute
450 Brookline Avenue, Boston, MA 02215
(617) 632-3000
christopher_lathan@dfci.harvard.edu

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Abstract:

Introduction: Patients undergoing cancer treatment are adversely impacted financially due to the cost associated with their illness. These costs disproportionately affect patients from lower socio-economic backgrounds. We aimed to evaluate the components most likely to contribute to financial distress in patients at time of presentation to the clinic for any hematologic or cancer-related symptom.

Methods and Materials: Study participants were selected from a clinical outreach program providing cancer-related services at an Federally-Qualified Health Center (FQHC). At the time of service, participants consented to the use of their data for research purposes. Financial distress, quality of life (QOL), mental health, social factors, and comorbidities were extracted from clinical and intake data. We used Fischer's exact test and generalized linear models to estimate the associations between patient characteristics, financial distress, QOL, and mental health. The study protocol was reviewed and received full approval by the DFCI institutional review board (IRB).

Results: Univariable analysis indicates that patients with lower education, Medicare, and Medicaid are associated with greater financial distress. In multivariable analysis, patients with Medicare or Medicaid had greater odds of financial distress. Patients on disability, in retirement, and with financial distress had lower odds of good QOL. Individuals with financial distress had higher odds of mental health disorders.

Conclusion: Prior to cancer diagnosis, financially vulnerable patients had lower QOL and were more likely to have mental health disorders, after controlling for insurance status and other patient characteristics. Our study suggests screening for financial distress at the time of diagnosis can facilitate targeted interventions to those most at-risk for poor outcomes.

Introduction

A substantial body of research has demonstrated that patients who are undergoing treatment for cancer are adversely affected financially due to both the cost of treatment as well as the impact of the illness on their ability to work. As cancer progresses, treatment costs increase, while a patient's household income and assets decrease, thereby contributing to increased financial burden on the patient.¹ Many have termed the financial burden that results from high medical costs of cancer treatment not met by insurance coverage, "financial toxicity." Financial toxicity is due to both the objective and subjective costs of cancer treatment.¹ Objective costs include the direct costs of cancer treatment, such as chemotherapy, radiation, surgery, and immunotherapy.² Subjective costs include the anxiety and discomfort a patient experiences as they encounter this increasing burden, such as worries about the loss of assets and stress due to management of finances.³

Poverty affects the course of a patient's cancer diagnosis, even before embarking on cancer treatment. There is considerable evidence that uninsured patients and individuals from lower-income backgrounds present with cancer at later stages.^{4,5} Subsequently, those with limited financial reserves and a cancer diagnosis are more likely to have a higher symptom burden and decreased quality of life.⁶ While most patients experience increased financial burden during cancer treatment, these costs disproportionately affect vulnerable populations, especially patients from lower socio-economic backgrounds.⁷ In one study, Medicare beneficiaries incurred out-of-pocket expenditures at an average of 23.7% of and as high as 63.1% of their household income.⁸ Another study showed that cancer-related financial burden was associated with lower quality of life and depressed mood.⁹ A recent study showed that the Affordable Care Act (ACA) diminished health care-related financial strain among individuals in the low- and middle-FPL categories.¹⁰ Further, the impact of these forces on patients can interfere with treatment strategies, most importantly medication non-adherence, which ultimately leads to poorer outcomes.¹¹

Recently, DeSouza et al. developed the Comprehensive Score for financial Toxicity (COST), an 11-question survey about patient-reported outcome measures on monthly spending, savings, and anxiety over cost of care to ascertain a financial distress score.¹² A subsequent study evaluated the association between the COST score and various socio-demographic factors in patients with The American Joint Committee on Cancer (AJCC) Stage IV solid tumors receiving chemotherapy for at least 2 months. They found that lower COST scores (greater financial toxicity) had a stepwise association with unemployment, African American race, lower household income, and psychological distress.¹² Another study using COST scores in 105 advanced cancer patients who had participated in a phase 1 clinical trial for at least one month found that over three quarters of patients who reported high financial toxicity had incomes under \$60,000. In addition, significantly more patients with financial toxicity were unemployed or working from home compared with those without financial toxicity (54% vs 12%, respectively).¹³

While a wealth of literature has been published on the relationship between financial toxicity after a cancer diagnosis, during cancer treatment, and after cancer therapies.¹⁴⁻²⁰ However, very little exploratory research has been published on the association between financial distress and various social factors present before a patient receives a cancer diagnosis.¹⁹⁻²² In 2017, Khera et al. makes clear the need for a financial distress screening similar to that for psychological distress prior to cancer diagnosis.²¹ In our study, we focus on

underrepresented minority patients (i.e. patients who self-identify as African-American and/or Hispanic) who were seen in a Federally Qualified Health Center (FQHC) internal medicine clinic in an underserved community in Boston, Massachusetts referred for hematology or oncology related issues. Our program utilized a co-location nurse navigation model connected to an NCI-designated cancer center, to provide screening, diagnostics and survivorship services, in addition to didactic lectures and educational programs at the FQHC.²³⁻²⁴

Using data from a patient intake questionnaire specifically developed for the program and longitudinal medical record abstraction, we sought to examine the relationship between social factors and financial distress at presentation, with the purpose of describing financial distress in an already vulnerable patient population presenting for diagnosis or evaluation for cancer treatment.

Methods

Participants

Study participants were selected from the clinical outreach program at the FQHC. Of the 593 patients seen for cancer-related services between January 2012- March 2020, 489 (82%) were eligible and approached for participation and 440 (90%) consented to their intake data being used for research. The intake data was collected through a questionnaire administered at presentation. Of the consented patients, 409 patients had complete information on the financial distress index question, described under ‘Variable Definition’. The study protocol was submitted to the Dana-Farber Cancer Institute (DFCI) Office for Human Research Studies (OHRS), was reviewed and received full approval by the DFCI institutional review board (IRB).

Database

Individuals’ responses to financial distress and overall quality of life (QOL) were derived from the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-C30 (EORTC QLQ-C30).²⁵ Data was stored under a project within the Research Electronic Data Capture (REDCap) Database.²⁶ The program nurse navigator entered responses directly into the REDcap database during patients’ initial intake visits. Data were reviewed quarterly by the nurse navigator and a project manager for quality assurance.

Variable Definition

Financial distress was measured via a closed- ended self-report, “how difficult is it for you or your family to meet monthly payment of your/your family bills?”, with response options “Extremely Difficult,” “Very Difficult,” “Somewhat Difficult,” and “Not At All Difficult”. For analyses, these were further categorized into “very or extremely difficult,” “somewhat difficult,” or “not at all difficult.” This definition was adapted and has been cited in the literature.⁶

Quality of Life was measured on a self-interpreted scale of 1 (very poor) to 7 (excellent). Those who answered 1, 2, or 3 on the scale were grouped together as a reference category for face validity and based on prior work, and those who answered 4 through 7 on the scale remained as separate non-reference groups.⁶

History of Mental Health was derived from structured and unstructured fields of the EMR. Specifically, we searched for a diagnosis of mental health disorder in a structured field or a non-case sensitive mention of Depression, Anxiety, Bipolar, Mental Health, PTSD, Delusion, Psychiatry, Mood, Panic, and/or Schizophrenia in unstructured fields. Additional explanation of this classification approach is presented in Appendix 1.

All comorbidities including history of mental health were classified based on structured and unstructured fields in patient medical records (Supplementary Table 1). A classification algorithm was written for each comorbidity based on key words from unstructured fields along with structured fields, as applicable. Twenty percent of samples were coded by two independent human coders and compared with the classification algorithm. Agreement was 93.2% to 100%.

Comorbidities with initially low agreement (<90%) were reviewed for source of disagreement. In all cases, revisions were made to human coders classification. Our validation study found this to be a highly accurate classification. Additional explanation of this classification approach is presented in Appendix 1.

Socio-demographics included age (18 -29, 30- 65 and over 65); employment (unemployed, disabled, retired, home-maker, part-time employment, full-time employment); education (less than high school, high school graduate, some college, vocational school, and a bachelor's or higher); and health insurance source (commercial insurance, other public health insurance, Medicare, Medicaid).

Statistical Analysis

The sociodemographic and medical summaries of the sample are presented with standard summary statistics: percent, count, and medians or means and standard deviations depending on measurement level. Bivariate associations were tested for independence using Fisher's exact test with simulated p-values and its confidence intervals using Monte Carlo estimation in SPSS (10000 replicates).

In addition to univariate analyses, we conducted three separate multivariate analyses. We fit a proportional odds model with quality of life (five levels, with higher levels indicating better quality of life) as a dependent variable. We fit another proportional odds model with financial distress (three levels, with higher levels indicating less problem paying bills) as the outcome variable. Finally, we fit a logistic regression with a history of mental health disorders (no diagnosis vs. diagnosis) as an outcome variable. All outcome variables were included as independent variables in the models in which they were not an dependent variable. The proportional odds assumption was verified using the "nominal test" function from the "ordinal" package in R²⁷. The p-values were adjusted with the Benjamin-Yekutieli procedure ($\alpha = 0.05$).

Results

Demographics

For each demographic or social variable, patients were separated by their responses to the financial distress index question, with “very difficult” and “extremely difficult” combined into one category (Table 1).

Fifty-eight patients (14.1%) reported either “very difficult” or “extremely difficult” to pay their monthly bills, 221 (54.0%) reporting it being “somewhat difficult” to pay their monthly bills, and 125 (31.7%) feeling paying monthly bills was “not at all difficult”. The median age, mean age, and standard deviation of patient sample was 54.4, 51.4 and 13.9, respectively. Women made up 60%; 88.9% self-identified as Black or Hispanic; 50.0% had a high school degree or less; and 30.0% were either retired or disabled; 79.7% of patients are enrolled in Medicaid or Medicare; 15.1% had a history of cancer; and 31.5% reported a history of a mental health diagnosis.

Univariable Analysis

Table 1 presents the sample description overall and by financial distress. We found associations between financial distress and various social demographics categories such as age ($p=0.0004$), race ($p=0.056$), education level ($p = 0.002$), and insurance status ($p = 0.0001$). No significant association was found between financial distress and patients with and without cancer history ($p = 0.271$). A significant association was found between quality of life/health and financial distress ($p<0.01$). We notice that a higher percentage of individuals in the most severe financial distress category (“Very Very Difficult/Extremely Difficult”) also report the lowest QOL/QOH category, while a higher percentage of individuals in the least severe financial distress category (“Not At All Difficult”) also report the highest QOL/QOH category.

Table 2 presents all tested comorbidities across financial distress categories. Among various comorbidities tested, a statistically significant association was found between history of mental health across the financial distress groups ($p<0.01$).

Multivariable Analysis with Financial Distress, Mental Health, and Quality of Life as separate outcomes

Table 3 presents the relationship between the demographic and comorbidity variables to the three response variables. Patients who reported that paying bills was “Not At All Difficult” were more than twice as likely as patients in the reference category to have a higher quality of life (OR = 2.43 ; 95% CI = 1.27-4.63) and more than two times as likely to have no history of mental health (OR = 2.61; 95% CI = 1.08-6.28). Individuals between the ages of 18 and 30 had three and a half times higher odds as those between the ages of 30 and 65 to have less difficulty paying bills (OR = 3.64 ; 95% CI = 1.67-7.92). Individuals reporting a quality of life of 6 or 7 were more than 3 times as likely as individuals reporting a quality of life less than or equal to 3 to have less difficulty paying their bills (OR = 3.72 (95% CI = 1.45-9.55) and OR = 4.19 (95% CI = 1.60-10.98), respectively).

Patients identifying as retired or disabled were 0.15 and 0.30 times as likely as unemployed individuals to report a higher quality of life (95% CI disability = 0.07-0.31; 95% CI retired = 0.12-0.76). As expected, patients on Medicare or Medicaid were 0.40 and 0.38 times as likely as those on private insurance to have less difficulty paying their bills, respectively (95% CI disability = 0.19-0.84; 95% CI retired = 0.15-0.92). Those without a history of substance use disorder were greater than 11 times as likely to have no history of mental health than those with a history of substance use disorder (OR = 11.35; 95% CI = 2.99-43.08). Gender was heavily associated with mental health, with females twice as likely as men to have a mental health diagnosis (OR = 1.87; 95% CI = 1.03-3.39). Non-smokers were 1.6 times as likely to enjoy a higher quality of life (OR = 1.62; 95% CI = 1.05-2.49). Individuals who did not report a history of mental health were about twice as likely to have less difficulty paying bills (OR = 1.92; 95% CI = 1.20-3.09). Individuals without a history of cancer (current or previous) were, interestingly, 0.40 times as likely to report a history of mental health (in other words, were more likely to report a lack of mental health diagnoses) compared to individuals with a history of cancer (OR = 0.40; 95% CI = 0.19-0.84).

Discussion

Based on our previous work and the work of others, we aimed to evaluate the components most likely to contribute to financial distress in patients at presentation.^{6,19,28} Not surprisingly, age and work status were protective factors for financial distress, with younger patients and those employed full-time experiencing considerably less financial distress. The patterns of insurance and financial distress are also consistent with the existing literature on the association between socio-economic status (SES) and Medicare or Medicaid health care coverage.^{29,30} Mental health diagnosis had a clear association with financial distress. Furthermore, those who had difficulty paying bills had a large negative effect on both quality of life and mental health. Thus, it holds, at least hypothetically, that a mental health diagnosis is associated with the ability of patients to work, and this may contribute to financial distress. While we are not able to comment on directionality in this study, it is not surprising that these elements could contribute to financial distress in a patient population that has historically been adversely affected by structural inequality.

A cancer diagnosis is stressful under any circumstances, however the financial distress caused by a comorbid mental health diagnosis and other factors prevalent in patients from lower socio-economic backgrounds can complicate care along the entire spectrum of cancer. This is important as evidence suggests that higher income patients may be better able to mobilize their financial and social resources, while lower income patients may not be able to do so, regardless of survival or toxicity.³¹ All of these factors converge, with finances and insurance, to create barriers for clinical trial enrollment for underserved patient populations.³² Thus being aware of these elements at the outset of cancer care is important in order to target resources for vulnerable patients.

The findings of this paper could have implications for diseases beyond cancer. Data has shown that the COVID-19 pandemic disproportionately affects individuals from lower socio-economic backgrounds, and thereby a significantly higher proportion of Black and Hispanic communities, in line with historical patterns.^{33,34} Thus, those with less financial distress are most likely to stay at home and avoid infection without losing employment or access to basic needs.³⁵ Importantly, medicine *still* maintains structures and practices that serve as barriers to quality care for Black and Hispanic communities.³⁶ Therefore, the importance of understanding financial distress, its causes, and its influence on marginalized communities' willingness to seek and adhere to proper healthcare cannot be understated.

There are a number of limitations to our intervention: this is a single program intervention, and thus our findings may not extrapolate to other experiences. Our analysis of an observational clinical dataset is consistent with what has been seen in the medical literature, but as with all observational analyses, causality cannot be inferred. In addition, we are unable to evaluate dual-eligible patients (patients who have both Medicaid and Medicare).

Our paper highlights the importance of understanding the underlying sociodemographic factors that affect impoverished communities prior to a cancer diagnosis. Enhancing our engagement

with these populations will help us target programs and interventions to relieve their financial burden before, during, and after cancer treatment.

Appendix 1: Classification of Comorbidities

Comorbidities were generated from both structured and unstructured fields in the patient intake questionnaire which asked about the patient's medical and surgical history.

Structured comorbidity classification

Cardiovascular disease, Diabetes, GI disease, and respiratory disorders were classified from dichotomous (yes/no) questions which asked about these conditions specifically in the questionnaire. A list of these categories and search terms is included below:

History of Cardiovascular Disease included any of: heart attack, heart failure, bypass, stroke, angina, or high blood pressure from structured fields, and the phrase "HTN" or "hypertension" in unstructured fields.

History of Diabetes included either diabetes from the structured field or any of "diabetes" and "DM" from unstructured fields.

History of GI Disorders included any of GERD, Barretts esophagus, stomach ulcers, or cirrhosis from structured fields, or any of "hepatitis, pancreatitis, endometriosis, cirrhosis, pylori, gastritis, helicobacter, or gastroenteritis from unstructured fields.

History of Respiratory Disease was classified using either asthma or emphysema from structured fields, or any of asthma, chronic bronchitis, or COPD from unstructured fields.

Unstructured comorbidity classification

It was discovered during analysis that the majority of patients (n=88%) had additional comorbidities documented in the patient intake questionnaire under the question "*Have you had any other illnesses or surgeries.*" A list of relevant terms was generated in consultation with the research team based on manual coding of a sample (n=50) of these comorbidities and the clinical terms most often used to describe them. A 5% threshold for distinct classification was decided upon as clinically meaningful in consultation with the team. Machine coding was then conducted in R™, resulting in the additional categories. To ensure intercoder reliability, a random sample of cases (n=75) was selected and the nurse and project manager coded them independently and compared the results. In cases where a discrepancy in categorization arose or where no category could be identified, the nurse and project manager discussed the case and agreed upon an appropriate categorization, making any necessary changes to the coding approach and re-running the analysis. A list of these categories and search terms is included below.

History of Mental Health comprised depression, anxiety, PTSD, bipolar, delusional disorder, or the phrase "mental health" all from unstructured fields.

History of Substance Use Disorder includes heroin, opioid, cocaine, or any mention of "substance" from unstructured fields.

History of Alcohol Use Disorder was classified with the phrase “alcohol” from unstructured fields.

History of Tobacco Use Disorder included everyday smoking from structured fields, and tobacco, cigar, nicotine, or the phrase “smoke” from unstructured fields.

History of Hematologic Disorders included any of macrocytic anemia, polycythemia, spherocytosis, leukocytosis, leukopenia, neutropenia, thrombocytopenia, pancytopenia, gammopathy, and lymphocytosis from unstructured fields.

History of Thyroid Disease incorporated any of hypothyroidism, thyroid nodule, thyroid disorder, thyromegaly, or graves from unstructured fields.

History of Inflammatory Disease incorporated any of arthritis, osteoarthritis, degenerative joint disease, polyarthritis, or rheumatoid arthritis from unstructured fields.

Other Diseases encompassed connective tissue disorders, neuropathies, and metabolic disorders all from unstructured fields.

Table 1. Demographics and Financial Distress

	Total N=409 n (%col)	Extremely / Very Very Difficult N=58 n (% row)	Somewhat Difficult N=221 n (% row)	Not At All Difficult N=130 n (% row)	Fisher Exact Test P-Value (95% CI)
Age					
<i>18-30</i>	41 (10.0)	3 (7.3)	13 (31.7)	25 (61)	
<i>31-64</i>	298 (72.8)	48 (16.1)	172 (57.7)	78 (26.2)	0.0004 (0.00008-0.0007)
<i>65 and older</i>	70 (17.1)	7 (10)	36 (51.4)	27 (38.6)	
Gender					
<i>Female</i>	248 (60.0)	34 (13.7)	142 (57.3)	72 (29.0)	0.25 (0.242-0.259)
<i>Male</i>	161 (39.0)	24 (14.9)	79 (49.1)	58 (36.0)	
Race / Ethnicity					
<i>Black Hispanic</i>	111 (27.1)	10 (9.0)	73 (65.8)	28 (25.2)	
<i>Black Non-Hispanic Non White</i>	162 (39.6)	26 (16.0)	81 (49.7)	55 (33.9)	
<i>White Hispanic</i>	64 (15.6)	8 (12.5)	36 (56.3)	20 (31.3)	0.056 (0.052-0.061)
<i>Non White Hispanic</i>	27 (6.6)	4 (14.8)	16 (59.3)	7 (25.9)	
<i>White Non Hispanic</i>	34 (8.3)	8 (23.5)	12 (35.3)	14 (41.2)	
<i>Other</i>	11 (2.7)	2 (18.1)	3 (27.2)	6 (54.5)	
Education					
<i>Less Than High School</i>	98 (23.9)	17 (17.3)	59 (60.2)	22 (22.4)	
<i>Secondary or high school graduate or GED equivalent</i>	107 (26.1)	14 (13.1)	69 (64.5)	24 (22.4)	
<i>Some University, but did not graduate</i>	91 (22.2)	10 (11.0)	48 (52.7)	33 (36.3)	0.002 (0.001-0.003)
<i>Vocational/technical school graduate</i>	25 (6.1)	3 (12.0)	13 (52.0)	9 (36.0)	
<i>Bachelor's Degree or Higher</i>	81 (19.8)	12 (14.8)	29 (35.8)	40 (49.4)	
Employment					
<i>Student or Unemployed</i>	64 (15.6)	14 (21.9)	35 (54.7)	15 (23.4)	
<i>Disability</i>	66 (16.1)	14 (21.2)	40 (60.6)	12 (18.2)	0.006 (0.004-0.007)
<i>Retired</i>	57 (13.9)	5 (8.8)	33 (57.9)	19 (33.3)	

<i>Homemaker</i>	19 (4.6)	2 (10.5)	10 (52.6)	7 (36.8)	
<i>Part-Time</i>	60 (14.6)	11 (18.3)	34 (56.7)	15 (25.0)	
<i>Full-Time</i>	143 (34.9)	12 (8.4)	69 (48.3)	62 (43.4)	
Insurance					
<i>Commercial Insurance</i>	46 (11.2)	1 (2.2)	17 (37.0)	28 (60.9)	
<i>Other Public Health Insurances</i>	36 (8.8)	6 (16.7)	14 (38.9)	16 (44.4)	0.0001 (0-0.0002)
<i>Medicaid</i>	222 (54.3)	36 (16.2)	130 (58.6)	56 (25.2)	
<i>Medicare</i>	104 (25.4)	15 (14.4)	60 (57.7)	29 (27.9)	
Current Cancer Diagnosis					
<i>No</i>	375 (91.6)	50 (13.3)	205 (54.7)	120 (32.0)	0.271 (0.262-0.279)
<i>Yes</i>	34 (8.3)	8 (23.5)	16 (47.1)	10 (29.4)	
History of Cancer					
<i>No</i>	346 (84.6)	44 (12.7)	190 (54.9)	112 (32.4)	0.134 (0.127-0.140)
<i>Yes</i>	62 (15.2)	14 (22.6)	30 (48.4)	18 (29.0)	
Quality Of Life					
1-3	24 (5.9)	7 (29.2)	16 (66.7)	1 (4.2)	
4	44 (10.8)	10 (22.7)	24 (54.5)	10 (22.7)	
5	114 (27.9)	18 (15.8)	66 (57.9)	30 (26.3)	0.0006 (0.0001-0.001)
6	113 (27.6)	9 (8.0)	62 (54.9)	42 (37.2)	
7	108 (26.4)	13 (12.0)	49 (45.4)	46 (42.6)	
Quality of Health					
1-3	21 (5.1)	6 (28.6)	14 (66.7)	1 (4.8)	
4	44 (10.7)	9 (20.5)	25 (56.8)	10 (22.7)	
5	122 (29.8)	19 (15.6)	71 (58.2)	32 (26.2)	0.001 (0.003-0.002)
6	110 (26.9)	12 (10.9)	62 (56.4)	36 (32.7)	
7	109 (26.7)	12 (11.0)	47 (43.1)	50 (45.9)	

Table 2. Co-morbidities and Financial Distress

	Total N=409 n(%col)	Extremely / Very Very Difficult N=58 n (%row)	Somewhat Difficult N=221 n (%row)	Not At All Difficult N=130 n (%row)	Fisher-Exact Test (95 CI)
History of Mental Health					
<i>Yes</i>	138 (33.7)	25 (18.1)	89 (64.4)	24 (17.4)	0.00001 (0-0.0003)
<i>No</i>	271 (66.3)	33 (12.1)	132 (48.7)	106 (39.1)	
History of GI Diagnoses					
<i>Yes</i>	102 (24.9)	10 (9.8)	71 (6.9)	21 (20.5)	0.002 (0.001-0.003)
<i>No</i>	307 (75.0)	48 (15.6)	150 (48.9)	109 (35.5)	
History of Substance Use Disorder					
<i>Yes</i>	21 (5.1)	5 (23.8)	12 (57.1)	4 (19.0)	0.247 (0.238 - 0.255)
<i>No</i>	388 (94.8)	53 (13.7)	209 (53.9)	126 (32.5)	
History of Tobacco Use Disorder					
<i>Yes</i>	207 (50.6)	32 (15.5)	120 (57.9)	55 (26.6)	0.069 (0.065-0.075)
<i>No</i>	202 (49.4)	26 (12.9)	101 (50.0)	75 (37.1)	
History of Alcohol Use Disorder					
<i>Yes</i>	22 (5.4)	3 (13.6)	15 (68.1)	4 (18.1)	0.343 (0.333-0.352)
<i>No</i>	387 (94.6)	55 (14.2)	206 (53.2)	126 (32.5)	
History of Cardiac Diagnoses					
<i>Yes</i>	209 (51.1)	29 (13.8)	113 (54.1)	67 (32.1)	0.982 (0.980-0.985)
<i>No</i>	200 (48.9)	29 (14.5)	108 (54.0)	63 (31.5)	
History of Diabetes					
<i>Yes</i>	127 (31.1)	13 (10.2)	74 (58.2)	40 (31.5)	0.267 (0.258 - 0.275)
<i>No</i>	282 (68.9)	45 (15.9)	147 (52.1)	90 (31.9)	
History of Inflammatory Diagnoses					
<i>Yes</i>	35 (8.5)	3 (8.6)	22 (62.9)	10 (28.6)	0.535 (0.525-0.545)
<i>No</i>	374 (91.4)	55 (14.7)	199 (53.2)	120 (32.1)	
History of Respiratory Diagnoses					
<i>Yes</i>	73 (17.8)	9 (12.3)	42 (57.5)	22 (30.1)	0.833 (0.826-0.840)
<i>No</i>	336 (82.1)	49 (14.6)	179 (53.2)	108 (32.1)	
History of Thyroid Diagnoses					

<i>Yes</i>	30 (7.3)	8 (26.7)	12 (40.0)	10 (33.3)	0.095
<i>No</i>	379 (92.7)	50 (13.2)	209 (55.1)	120 (31.7)	(0.089 - 0.101)
History of Hematological Diagnoses					
<i>Yes</i>	35 (8.6)	4 (11.4)	19 (54.2)	12 (34.3)	0.882
<i>No</i>	374 (91.4)	54 (14.5)	202 (54.3)	118 (31.7)	(0.876-0.889)

Table 3. Adjusted Analysis of Financial Distress, Quality of Life, and Mental Health by Patient's Demographics and Comorbidities ⁺

	Financial Distress		Quality Of Life		Mental Health	
	OR	95% CI	OR	95% CI	OR	95% CI
Race / Ethnicity						
<i>Black Hispanic</i>	0.87	0.36-2.11	1.54	0.71-3.36	0.91	0.31-2.61
<i>Black Non-Hispanic Non White</i>	0.77	0.34-1.78	2.09	1.01-4.32	1.69	0.61-4.70
<i>White Hispanic</i>	0.81	0.31-2.09	2.28	1.00-5.19	0.97	0.32-2.98
<i>Non-White Hispanic</i>	1.01	0.33-3.11	0.88	0.31-2.48	0.63	0.16-2.44
<i>Other</i>	1.16	0.24-5.02	4.20	1.12-15.72	1.38	0.21-9.15
Age						
<i>18-30</i>	3.64	1.67-7.92	1.55	0.80-3.01	0.58	0.24-1.39
<i>65+</i>	2.11	0.99-4.47	1.67	0.81-3.44	1.79	0.66-4.88
Gender						
<i>Female</i>	0.96	0.60-1.54	1.21	0.80-1.84	1.87	1.03-3.39
Employment						
<i>Disability</i>	1.79	0.81-3.94	0.15	0.07-0.31**	0.31	0.12-0.78
<i>Retired</i>	1.75	0.69-4.43	0.30	0.12-0.76	0.76	0.23-2.53
<i>HomeMaker</i>	2.50	0.81-7.70	1.20	0.42-3.4	0.76	0.21-2.81
<i>Part-Time</i>	1.08	0.50-2.33	0.79	0.39-1.6	1.84	0.75-4.54
<i>Full-Time</i>	2.15	1.10-4.19	0.79	0.42-1.46	1.87	0.84-4.17
Education						
<i>HS/GED</i>	1.29	0.70-2.38	1.67	0.95-2.92	0.54	0.26-1.15
<i>Some College</i>	1.83	0.97-3.50	0.88	0.49-1.60	0.51	0.23-1.14
<i>Vocational</i>	1.89	0.71-5.01	1.04	0.42-2.57	1.00	0.29-3.40
<i>College Degree / PhD</i>	2.00	0.99-4.05	1.10	0.56-2.16	0.72	0.29-1.77
Insurance						
<i>Other Public</i>	0.63	0.23-1.71	1.17	0.48-2.82	1.63	0.44-6.10
<i>Medicaid</i>	0.40	0.19-0.84	1.18	0.61-2.30	0.98	0.36-2.69
<i>Medicare</i>	0.38	0.15-0.92	1.26	0.56-2.84	0.67	0.21-2.20
Financial Toxicity						
<i>Somewhat Difficult</i>	NA	NA	1.50	0.83-2.71	1.20	0.56-2.58
<i>Not At All Difficult</i>	NA	NA	2.43	1.27-4.63	2.61	1.08-6.28

Quality Of Life

	4	2.52	0.90-7.17	NA	NA	1.89	0.53-6.80
	5	2.58	1.01-6.58	NA	NA	1.72	0.53-5.55
	6	3.72	1.45-9.55	NA	NA	2.48	0.75-8.26
	7	4.19	1.60-10.98	NA	NA	2.05	0.60-6.98
History of Substance Use Disorder	0.92	0.35-2.49	1.90	0.75-4.84	11.35	2.99-43.08*	
History of Alcohol Use Disorder	1.03	0.42-2.57	0.51	0.21-1.22	2.42	0.72-8.08	
History of Tobacco Use Disorder	1.11	0.69-1.77	1.62	1.05-2.49	0.98	0.54-1.75	
History of Cardiovascular Disease	0.84	0.53-1.34	0.82	0.53-1.27	1.39	0.78-2.50	
History of Diabetes	0.79	0.48-1.30	1.42	0.89-2.27	0.66	0.35-1.23	
History of Cancer	1.43	0.82-2.48	1.46	0.89-2.39	0.40	0.19-0.84	
History of Mental Health	1.92	1.20-3.09	1.34	0.86-2.11	NA	NA	

*Significant at $p < 0.1$ **Significant at $p < 0.05$ ***Significant at $p < 0.01$ after Benjamin-Yeukatali adjustment of pvalues

Reference categories for the variables in order of the table: "White Only", "30-64", "Male", "Unemployed", "Less Than High School", "Private Insurance", "Very Very / Extremely Difficult", "1-3"

Supplementary Table 1. Structured and Unstructured Fields

Comorbidity	Structured Fields	Unstructured Fields
Mental Health	NA	Depression Anxiety Bipolar Mental Health PTSD Delusion Psychiatry Mood Panic Schizophrenia
Substance Use	NA	Opioid Heroin Cocaine Substance
Alcohol	NA	Alcohol
Tobacco	Cigarettes Regularly	Cigar Tobacco Smoke Nicotine
Diabetes Mellitus	Diabetes	Diabetes DM
Heart Disease	Heart Attack Heart Failure Coronary Bypass Stroke Angina High Blood Pressure	Hypertension HTN
Hematological Disease	NA	Macrocytic Anemia Polycythemia Spherocytosis Leukocytosis Leukopenia Neutropenia Thrombocytopenia Pancytopenia Gammopathy Lymphocytosis

GI Disease	GERD Barretts Esophagus Stomach Ulcers Liver Cirrhosis	Hepatitis Pancreatitis Endometriosis Cirrhosis Pylori Gastritis Helicobacter Gastroenteritis
Respiratory Disease	Asthma Emphysema	Asthma Chronic Bronchitis COPD
Thyroid Disease	NA	Hypothyroidism Thyroid Nodule Thyroid Disorder Thyromegaly Graves
Inflammatory Disease	NA	Arthritis Osteoarthritis Degenerative Joint Disease Polyarthritis Rheumatoid Arthritis
Other Disease	NA	Connective Tissue Neuropathies Metabolic Disorders

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