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Financial Toxicity Is Associated With Worse Physical and Emotional Long-term Outcomes After Traumatic Injury

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Abstract

Background—Increasing healthcare costs and high deductible insurance plans have shifted more responsibility for medical costs to patients. After serious illnesses, financial responsibilities may result in lost wages, forced unemployment, and other financial burdens, collectively described as financial toxicity. Following cancer treatments, financial toxicity is associated with worse long-term health related quality of life outcomes (HRQOL). The purpose of this study was to determine the incidence of financial toxicity following injury, factors associated with financial toxicity, and the impact of financial toxicity on long-term HRQOL.

Methods—Adult patients with an injury severity score of 10 or greater and without head or spinal cord injury were prospectively followed for 1 year. The Short-Form-36 was used to determine overall quality of life at 1, 2, 4 and 12 months. Screens for depression and post-traumatic stress syndrome (PTSD) were administered. The primary outcome was any financial toxicity. A multivariable generalized estimating equation was used to account for variability over time.

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Results—500 patients were enrolled and 88% suffered financial toxicity during the year following injury (64% reduced income, 58% unemployment, 85% experienced stress due to financial burden). Financial toxicity remained stable over follow-up (80–85%). Factors independently associated with financial toxicity were lower age (OR 0.96 [0.94–0.98]), and lack of health insurance (OR 0.28 [0.14–0.56]) and larger household size (OR 1.37 [1.06–1.77]). After risk adjustment, patients with financial toxicity had worse HRQOL, and more depression and PTSD in a step-wise fashion based on severity of financial toxicity.

Conclusions—Financial toxicity following injury is extremely common and is associated with worse psychological and physical outcomes. Age, lack of insurance, and large household size are associated with financial toxicity. Patients at risk for financial toxicity can be identified and interventions to counteract the negative effects should be developed to improve long-term outcomes.

Level of Evidence—Prognostic/epidemiologic study, level III

Keywords

Trauma; Injury; Financial Toxicity

Background

Every year in the United States, 2 million adults are hospitalized due to injury.[1] The economic impact of injury due to direct patient care costs and the costs associated with disability and lost wages exceeds $400 billon every year.[1] From previous work in the field, we know that outcomes after injury are related to a patient's socioeconomic status (SES). Patients with lower SES are at higher risk of worse outcomes. With rising healthcare costs and a shift towards high deductible insurance plans, there is a chance that more patients will experience increased economic pressure in the post injury period and this increased economic burden could result in worse long-term outcomes.[2]

There is already evidence that increased economic burden on the individual level, in the setting of a cancer diagnosis, may result in financial toxicity. Financial toxicity is defined as the financial hardship the patient experiences as a side-effect of his or her illness.[3] Financial toxicity can manifest in many ways including monetary measures (increased out-of-pocket healthcare payments), objective measures (increasing debt, borrowing money from friends and family, declaring bankruptcy) and subjective measures (perception of financial burden as a result of injury or illness).[3–6]

Financial toxicity in cancer has been well described and is associated with worse outcomes, including a higher incidence of depression and worse overall Health Related Quality of Life (HRQoL). At present, there are no data with respect to financial toxicity among injured patients. We do not know whether financial toxicity exists, what predicts developing financial toxicity and how it relates to HRQoL. The purpose of this study was to determine if financial toxicity (loss of employment, perceived financial stress), exists in injured patients and to identify factors associated with development of financial toxicity in the year after injury. We sought to determine the impact of financial toxicity on long-term HRQoL. We

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hypothesized that patients who experienced financial toxicity in the year after injury would have worse HRQoL outcomes, experience more depression and more post-traumatic stress disorder (PTSD) when compared to patients who did not experience financial toxicity.

Methods

Study Design and Data Collection

This was a retrospective cohort study using a prospectively collected longitudinal database that followed injured patients for one year after injury. Adult patients age 18 years or greater admitted to an academic, Level 1 trauma center in Memphis, Tennessee with an injury severity score (ISS) of at least 10 and no traumatic brain or spinal cord injury were included. Patients admitted between January 2009 and December 2011 were enrolled in the study and all follow-up was complete as of December 2012. Patients admitted more than 24 hours after their traumatic event, those with a length of stay less than 24 hours, those that did not speak English, pregnant women, and currently incarcerated patients were excluded from the study. Patients who were enrolled in the study were administered a baseline survey prior to discharge that included detailed questions regarding demographics, employment, SES and HRQoL, within the past 1–4 weeks. Patients were then administered a follow-up survey at 1, 2, 4, and 12 months after injury.

Patient and Outcome Variables

Baseline and follow-up surveys included demographic information, comorbidities, markers of socioeconomic status, hospital charge data, and measures of HRQoL including the PTSD Checklist, Civilian Version (PCL-C), the Center for Epidemiologic Studies Depression Scale (CES-D), the Medical Outcomes Study 36-Item Short Form (SF-36), and the Multidimensional Scale of Perceived Social Support (MSPSS). Patients were defined as having PTSD at a time point if they met DSM-IV criteria based on the PCL-C. Depression was defined as a CES-D score ≤ 16. Both the physical composite score (PCS) and mental composite score (MCS) are continuous measures that were calculated using the SF-36 questionnaire, which has been validated as a tool to assess mental and physical outcomes over time in injured patients.[7,8] The burden of comorbid disease was assessed using the Charlson Comorbidity Index (CCI) which has been previously validated in multiple studies.[9,10]

In order to determine socioeconomic status and define financial toxicity, patients were asked for their employment status and approximate monthly income at baseline and each follow up encounter. Patients were specifically asked whether they 1) had become unemployed as a result of their accident, 2) had to change jobs as a result of their accident, or 3) suffered financial problems as a result of their accident. Patients who answered “Yes” to any of these questions, or indicated a decrease in their monthly income at any time during the follow-up period, were defined as having experienced financial toxicity. We then further graded financial toxicity at each follow up encounter by awarding 1 point each for a drop in income, new unemployment, new job change, and new financial problems as a result of trauma for a total possible score of 0 (no financial toxicity) to 4 (most severe financial toxicity).

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Computation of SES Index—We computed a socioeconomic status (SES) index using publicly available census tract level data from the U.S. Census Bureau 2016 data for the following parameters; standardized median household income, standardized median value of owner-occupied homes as a proxy to property values, percent of households with one or more persons per room, percent below the federal poverty line, percentages with high education (≥ 4 years of college) and low education (< 12 grade), and percent of persons 16 years and older who are unemployed but actively seeking work in the labor market. The Agency for Healthcare Research and Quality (AHRQ) algorithm was then used to create a composite SES index. AHRQ developed this SES index using principal component analysis where the factor loadings for different constructs of SES were regarded as the weights measuring correlations of those variables with the index. This index has been both calculated and validated in multiple patient populations.[11,12]

Statistical Analysis

Predictors of Financial Toxicity—Patients were first grouped based on whether or not they ever experienced any financial toxicity. Demographic data, injury characteristics, and details of SES were compared between groups using the two-sample t-test with equal variances and Chi-square test. For variables with cell counts less than five, exact tests were used. This served as the bivariate analysis for predictive factors associated with developing financial toxicity within 12 months of injury. All covariates found to be associated with development of financial toxicity with a p-value ≤ 0.20 were then entered into model selection in order to build a multivariable logistic regression model aimed at predicting any financial toxicity within 12 months of injury. Control variables included age, race, type of injury, baseline education level, health insurance status, relationship status, and CCI, home type, home ownership, and household size. Based on previous literature, patient gender was included in the model.[13] Hospital length of stay and need for laparotomy were included as proxies for hospital cost, and baseline MSPSS was included given that it represents a much broader measure of the immediate social network available to a patient when compared to relationship status alone. We also accounted for the correlation of patients coming from the same census tract using clustered standard error. Patients were then further subdivided by severity (0 to 4) of financial toxicity, and characteristics were compared across these groups in an unadjusted analysis using analysis of variance (ANOVA) followed by pairwise comparisons using Tukey's method.

Outcomes—A multivariable generalized estimating equation (GEE) was used for generalized logistic (with logit link function) and linear (with identity link function) regression controlling for the variables discussed above. Exchangeable correlation structure was used to control for the correlation between repeated measures on a single patient over time. Robust standard error was used in the analysis. Given the ability of both the independent (financial toxicity and social support) and dependent (PCS, MCS, PTSD, and depression status) variables to change over time, a mixed effects model was used. This model was then repeated using any financial toxicity to predict all outcome variables. In order to assess the effect of changing severity of financial toxicity, a subset of patients that experienced at least grade 1 financial toxicity was created.

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Sensitivity Analysis—The same GEE logistic and linear models described above were repeated again now assessing differences in outcome variable across grades of financial toxicity. Quasilikelihood under the independence model criterion (QIC) was used to compare models maintaining all grades of financial toxicity versus those collapsing severity grades in order to determine the best fit model.[14] We also performed a sensitivity analysis of only patients employed at baseline to determine the impact of joblessness of our baseline population on our restuls. All significance was assessed at the 0.05 level. Statistical analysis was completed using SAS 9.4 (Cary, NC) and Stata/SE14.2.

Results

Predicting Financial Toxicity

Of the included patients, 440 (88%) had some element of financial toxicity (Table 1 and Table 2), 64% reported a decrease in monthly income, 58% reported unemployment as a result of their injuries, 30% reported a job change related to their injury, and 85% reported financial problems as a direct result of their injury. On bivariate analysis, patients with any financial toxicity were younger, more likely to be male, unmarried and uninsured. Further, patients with financial toxicity had higher unemployment, were less likely to own their home prior to injury, had significantly larger household size, and lower area SES index values (Table 1 and Table 2). There was no difference in hospital charges between those with and without financial toxicity. On multivariable analysis, longer hospital lengths of stay, larger household size, younger age, and lack of insurance were associated with development of financial toxicity. Race, gender, relationship status, baseline comorbidities, MSPSS, and mechanism of injury were not significantly associated with development of financial toxicity (Table 3). When financial toxicity was analyzed by severity, younger age, lack of insurance, unemployment, larger household size, and lower MSPSS all remained significantly associated with financial toxicity. However, pairwise comparisons only showed a statistically significant difference in age between each grade of financial toxicity and lack of financial toxicity, but did not demonstrate a difference between grades of financial toxicity.

Financial Toxicity as a Predictor of HRQoL Outcomes

Any experience of financial toxicity was associated with worse mental and physical outcomes. Patients with financial toxicity had higher prevalence of depression (76% v. 30%, $p< 0.0001$) and PTSD (50% v. 13%, $p < 0.0001$) over the 12 month follow-up. Similarly, on the SF-36, patients with financial toxicity had worse physical and mental component scores compared to patients without financial toxicity at 4 and 12 months (Table 4). On multivariate analysis financial toxicity had a coefficient of −5.2 (95% CI −7.0 to −3.5) and −5.8 (95% CI −7.5 to −4.2) for PCS and MCS respectively indicating worse outcomes with increasing financial toxicity. Odds of developing PTSD and depression were also significantly higher in patients with financial toxicity, OR 2.3 (95% CI 1.6 to 3.2) and OR 2.0 (95%CI 1.5 to 2.8), respectively. Higher grades of financial toxicity were associated with worse physical and emotional health as well as PTSD and depression. Grade 2 financial toxicity was associated with a lower SF36-PCS score compared to grade 1 (−2.3, 95%CI −3.4 to −0.9) as was grade 3 (−3.2, 95%CI −4.7 to −1.8) and grade 4 (−3.1, 95%CI −5.4 to −0.8). Similar for SF36-MCS higher grades of financial toxicity were associated with lower overall scores, grade 2

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(−3.1, 95%CI −4.7 to −1.5), grade 3 (−5.3, 95%CI −7.1 to −3.5) and grade 4 (−6.0, 95%CI −9.2 to −2.9). For PTSD and depression, a similar step-wise relationship was found. Grade 2, 3 and 4 financial toxicity were associated with higher odds of PTSD (Gr2: OR 1.7, 95%CI 1.3 to 2.4; Gr3: OR 2.1, 95%CI 1.4 to 3.0; Gr4: OR 2.0, 95%CI 1.1 to 3.9) and depression (Gr2: OR 1.3, 95%CI 1.0 to 1.8; Gr3: OR 1.7, 95%CI 1.2 to 2.3; Gr4: OR 4.0, 95%CI 2.1 to 7.6).

Financial Toxicity Over Time

While 95% of our patient population had at least one follow up visit and were therefore included in the longitudinal analysis above, each follow-up time point did have progressively fewer patients (467 at 1 month, 406 at 2 months, 348 at 4 months, and 300 at 12 months). Looking at unadjusted raw data, the proportion of our patient population reporting financial toxicity at each time point remained stable, 84% at 1 month, 85% at 2 months, 85% at 4 months and 80% at 12 months following injury.

Sensitivity Analysis

Models containing graded severity of financial toxicity collapsed into all possible groupings were assessed and compared and the model producing the minimum QIC was the model that maintained all separate grades 1 through 4 for PCS (QIC = 92124), MCS (QIC = 176579), depression (QIC = 1649), and PTSD (QIC = 1501). When this model was used to compare the risk of each outcome across grades of financial toxicity, depression and MCS demonstrated the most apparent dependence on severity grade of financial toxicity. There was a significant increase in the risk of depression between grades 1 and 2 and again between grades 3 and 4. The risk of MCS increased significantly between grades 1 and 2 and between grades 2 and 3 (Table 5). Both PCS and PTSD were significantly increased with any grade higher than grade 1, but there are no further differences between higher grades (Table 5).

A total of 64% of patients stated they were employed prior to their trauma. Overall, “jobless as a result of injury” was the second most common reason for a patient to be classified as financially toxic. A sensitivity analysis on just these patients demonstrated similar results as our main analysis. On multivariate analysis financial toxicity had a coefficient of −7.3 (95% CI −9.8 to −4.9) and −5.8 (95% CI −7.9 to −3.7) for PCS and MCS respectively indicating worse outcomes with increasing financial toxicity. Odds of developing PTSD and depression were also significantly higher in patients with financial toxicity, OR 1.9 (95% CI 1.1 to 3.4) and OR 2.5 (95%CI 1.7 to 3.8), respectively.

Follow-Up

Overall 474 (95%) had a least one follow-up visit, 427 (86%) had two visits, 360 (72%) had three and 264 (53%) of patients attended all four possible visits. Patients lost to follow-up were more likely to be male and have penetrating trauma.

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Discussion

In this study we found that financial toxicity is very common following injury. Nearly 90% of patients developed some degree of financial toxicity within the first year following injury, perception of financial toxicity and decreased monthly income were the most common contributors to financial toxicity. Insurance status and older age were protective against financial toxicity while long hospital stays and large household size was associated with development of financial toxicity. Financial toxicity was associated with worse HRQoL outcomes and a higher proportion of PTSD (50%) and depression (76%) at one year. There was step-wise association with higher grades of financial toxicity and worse emotional and physical outcomes. We also found that financial toxicity is present by 1-month following injury and the proportion of patients with financial toxicity remains stable over time. These changes in the severity of financial toxicity are important because we also found that there is a dose response between the grade of financial toxicity and worse HRQoL outcomes.

One of the challenges with framing financial toxicity among injured patients is the lack of an accepted definition for financial toxicity in any population. In oncology research, financial toxicity generally encompasses both objective (out-of pocket expenses, percentage of income on medical care, loss of job/reduced income) and subjective measures (perceptions of financial stress and psychological impact). We selected questions to define financial toxicity that were reflective of the numerous oncological studies.[5, 13,15] We sought to capture both subjective and objective measures. In the recently published COST study the investigators developed and validated an 11-item questionnaire[6,13] which largely captures a patient's perception of financial stress and relationship to his or her cancer diagnosis/ treatment. Our survey was used post-hoc to capture financial toxicity but the questions are remarkably similar to the COST study and present a starting point for validating a similar score in injured patients.

Subjective financial toxicity in oncology patients has been reported between 16–73%[3], significantly lower than our population. It is challenging to directly compare the two populations owing to the heterogeneity of cancer diagnoses and difficulties comparing a patient population more likely to be older and insured compared to injured patients. Further, unlike injured patients, oncology patients often have time to prepare financially in relation to the diagnosis (ie job planning, fund-raising etc.). Despite these differences, risk factors related to financial toxicity are remarkably similar. Zafar et al.[5] demonstrated older age (OR 0.26 for ≥ 65y) and smaller household size (OR 0.31 for household size ≤ 2) were associated with less financial toxicity in multivariate analysis among cancer patients.

Financial toxicity is clearly associated with worse HRQoL and physical and emotional distress. We showed a significant, sustained, and step-wise association of severity of financial toxicity and SF36-PCS, SF36-MCS, depression and PTSD. Understanding long-term patient reported outcomes in trauma has been increasingly recognized.[16] Numerous questions remain including whether existing financial stress predisposes injured patients to developing financial toxicity and whether intervening upon patients at risk of, or who develop financial toxicity will be effective. According to the results of this study, loss of employment is a major driver of financial toxicity in the post-injury period. Healthcare costs

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associated with the injury also likely contribute to financial toxicity. Having health insurance may ameliorate some of the financial hardship associated with injury, but having insurance is unlikely to influence income losses due to disruption of work.[10] We found that patients with longer lengths of stay, thus unable to work or produce income, were more likely to suffer financial toxicity. Similar associations have been demonstrated following traumatic brain injury with clear deficits in SF36-MCS and PCS over time however it is unclear how financial toxicity is related to these outcomes.[17] Our study specifically excluded TBI and spinal cord injuries and went further to demonstrate a clear financial strain despite a lack of head and spinal cord injuries. Clearly, more information regarding the causes and consequences of financial toxicity in the setting of injury are needed in order to develop process and policies to mitigate the effects of financial toxicity in injured patients. For now, acknowledging the potential risk and screening for financial toxicity may help direct resources to patients in need.[18–20]

Our work is not without limitations, including those inherent to the retrospective nature of the study. Our study is single center and financial toxicity has been shown to vary with geography. Our study also took place around the economic recession of 2008–2009 and there is a clear association with economic recession and health decline.[21–23] Due to a lack of a comparative group, it is difficult to determine how much the financial downturn contributed to the economic hardship suffered by the patients compared to the injury they suffered.

We believe our population to be reflective of modern urban trauma centers and it is possible suburban populations may have different factors related to financial toxicity and resilience to depression and PTSD. Further, there may be a ceiling effect related to financial toxicity given the majority of patients had some element of financial toxicity. We attempted to mitigate this limitation by grading financial toxicity and while we showed a step-wise effect, it is clear that any financial toxicity is detrimental. We also included change in employment related to the injury as one of the questions to determine if a patient suffered financial toxicity. Inclusion of this question is consistent with the existing literature on financial toxicity in the cancer literature. However, the change in employment could have resulted in an increase, decrease, or no change in income and this could influence the responses to other questions. This could lead to some amount of misclassification regarding suffering or not suffering financial toxicity. Finally, we cannot comment on causality in this study. It remains unclear whether patients at risk of trauma are uniquely at risk of financial toxicity and/or have existing poor physical and mental health. The population studied in general had low insurance coverage and it is possible that any health-related event would lead to financial toxicity. However, given we have shown a temporal trend and graduated response there is evidence of a possible causal relationship between injury, financial hardship, and HRQoL outcomes.

Conclusion

Based on our data we estimate nearly 500,000 patients in the United States experience moderate to severe financial toxicity following trauma. Young, uninsured patients with lengthy hospital stays are at the highest risk for financial toxicity. Financial toxicity is

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associated with depression, PTSD and worse HRQoL up to 1-year following trauma. Our results advocate for identifying patients at risk of developing financial toxicity and developing interventions to mitigate the associated poor mental and physical health outcomes.

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Table 1:

Baseline demographics of study population by financial toxicity

Variable	Total	No Financial Toxicity	Any Financial Toxicity	p-value
n	500	60	440	-
Age, year (SE)	38 (0.6)	48 (2)	36 (0.6)	< **0.001**
Male, n (%)	324 (65)	42 (70)	282 (64)	0.369
Insurance, n (%)	288 (58)	49 (82)	239 (54)	**<0.001**
White, n (%)	253 (51)	35 (58)	218 (50)	0.202
Education, n (%)				0.481
< High School	292 (59)	31 (52)	261 (59)	
High School/Some College	189 (38)	27 (45)	162 (37)	
College	19 (4)	2 (3)	17 (4)	
Employed, n (%)	322 (64)	33 (55)	289 (66)	**0.021**
Relationship, n (%)				0.067
Married	199 (40)	31 (52)	168 (38)	
Single/Divorced/Widow	112 (22)	29 (48)	272 (62)	
Charleson Comorbidity Index, n (%)				0.100
0	299 (60)	29 (48)	270 (62)	
1	149 (30)	22 (37)	127 (29)	
2 or more	48 (10)	9 (15)	39 (9)	
Drug Abuse, n (%)	58 (12)	6 (10)	52 (12)	0.680
Own Home, n (%)	309 (62)	46 (77)	263 (60)	**0.012**
Single Family House, n (%)	383 (77)	53 (88)	330 (75)	**0.041**
Household size (SE)	3.3 (1.7)	2.6 (0.2)	3.4 (0.1)	**0.0003**
Socioeconomic Index (SE)	50 (0.2)	51 (0.8)	50 (0.2)	**0.018**
Perceived Social Support (SE)	5.8 (0.04)	5.8 (0.1)	5.8 (0.05)	0.997
Blunt, n (%)	381 (79)	49 (88)	332 (78)	0.088
ISS, (SD)	20 (0.5)	21 (1)	21 (0.5)	0.110
Required Laparotomy, n (%)	40 (8)	2 (4)	38 (9)	0.297
Home after Discharge, n (%)	401 (83)	42 (75)	359 (84)	0.097

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Variable	Total	No Financial Toxicity	Any Financial Toxicity	p-value
Length of Stay, days (SE)	12.6 (0.4)	11.8 (1.2)	12.7 (0.4)	0.469

SE = Standard Error

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Table 2:

Baseline demographics of study population by grade of financial toxicity.

Variable	Total	Financial Toxicity					p-value
		None	Grade 1	Grade 2	Grade 3	Grade 4	
n	500	60	147	157	109	27	-
Age, year (SE)	38 (0.6)	48 (2)	37 (1)	35 (1)	36 (1)	34 (3)	**<0.001**
Male, n (%)	324 (65)	42 (70)	86 (59)	107 (68)	71 (65)	18 (67)	0.394
Insurance, n (%)	288 (58)	49 (82)	84 (57)	90 (57)	52 (48)	13 (48)	**0.001**
White, n (%)	253 (51)	35 (58)	77 (52)	82 (52)	47 (43)	12 (44)	0.326
Education, n (%)							0.565
< High School	292 (59)	31 (52)	91 (62)	91 (58)	67 (62)	12 (44)	
High School/Some College	189 (38)	27 (45)	49 (33)	61 (39)	39 (36)	13 (48)	
College	19 (4)	2 (3)	7 (5)	5 (3)	3 (3)	2 (7)	
Employed, n (%)	322 (64)	33 (55)	63 (43)	120 (76)	87 (80)	19 (70)	**0.023**
Relationship, n (%)							0.077
Married	199 (40)	31 (52)	54 (37)	62 (40)	37 (34)	15 (56)	
Single/Divorced/Widow	112 (22)	29 (48)	34 (23)	29 (19)	31 (28)	4 (15)	
Charleson Comorbidity Index, n (%)							0.088
0	299 (60)	29 (48)	83 (57)	101 (65)	67 (62)	19 (70)	
1	149 (30)	22 (37)	44 (30)	44 (28)	33 (31)	6 (22)	
2 or more	48 (10)	9 (15)	11 (7)	7 (7)	7 (7)	2 (7)	
Drug Abuse, n (%)	58 (12)	6 (10)	22 (15)	17 (11)	11 (10)	2 (7)	0.707
Own Home, n (%)	309 (62)	46 (77)	91 (62)	99 (63)	58 (53)	15 (56)	**0.048**
Single Family House, n (%)	383 (77)	53 (88)	109 (74)	121 (77)	79 (72)	21 (78)	0.099
Household size (SE)	3.3 (1.7)	2.6 (0.2)	3.3 (0.2)	3.3 (0.1)	3.6 (0.2)	3.6 (0.2)	**0.004**
Socioeconomic Index (SE)	50 (0.2)	51 (0.8)	49 (0.5)	50 (0.4)	49 (0.5)	48 (0.9)	**0.043**
Perceived Social Support (SE)	5.8 (0.04)	5.8 (0.1)	5.6 (0.1)	6 (0.06)	5.8 (0.09)	5.7 (0.2)	**0.019**
Blunt, n (%)	381 (79)	49 (88)	109 (77)	122 (80)	85 (79)	16 (62)	0.103
ISS, (SD)	20 (0.5)	21 (1)	20 (1)	20 (0.7)	22 (1)	21 (2)	0.727
Required Laparotomy, n (%)	40 (8)	2 (4)	16 (11)	8 (5)	10 (9)	4 (15)	0.118

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Variable	Total	Financial Toxicity					p-value
		None	Grade 1	Grade 2	Grade 3	Grade 4	
Home after Discharge, n (%)	401 (83)	42 (75)	114 (80)	131 (86)	92 (85)	22 (84)	0.321
Length of Stay, days (SE)	12.6 (0.4)	11.8 (1.2)	11.9 (0.7)	13.2 (0.7)	13.4 (0.9)	11.3 (1.6)	0.475

SE = Standard Error

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Table 3:

Results of the multivariable model to identify predictors of experiencing any financial toxicity during the 12 months after injury

Variable	Odds Ratio	Lower 95% CI	Upper 95% CI
Age (by year)	0.96	0.94	0.98
Education [Ref = < High School]			
High School/Some College	1.17	0.60	2.25
College	4.04	0.69	23.5
SES Index	0.99	0.93	1.05
Insurance	0.28	0.14	0.56
White Race	1.57	0.76	3.24
Relationship Status [Ref = Married]			
Previously Married (Divorced/Widow)	1.30	0.57	2.99
Never Married	0.78	0.37	1.62
Blunt Mechanism	0.97	0.32	2.96
Discharge Disposition	1.29	0.62	2.69
Charlson Comorbity Index [Ref = 0]			
CCI = 1	0.91	0.47	1.75
CCI = 2 or more	1.13	0.44	2.89
Home Type (Ref = Single Family House)			
Apartment	4.02	0.64	25.3
Other	1.21	0.40	3.72
Own Home	0.91	0.41	2.03
Household size (OR for 1 person increase)	1.37	1.06	1.77
Gender [Ref = Female]	0.73	0.37	1.44
MSPSS [Ref = Low]			
Medium	0.88	0.43	1.82
High	0.76	0.34	1.70
Hospital Length of Stay [Ref = Low]			
Medium	1.65	0.81	3.37
High	2.04	1.02	4.06

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Variable	Odds Ratio	Lower 95% CI	Upper 95% CI
Laparotomy	1.45	0.31	6.93

MSPSS Tertiles: Low (1–5.6), Medium (5.6–6), and High (6–7)

Hospital Length of Stay Tertiles: Low (1–7 days), Medium (8–14 days), and High (15–47 days)

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Table 4:

Bivariate analysis of outcomes at 4 and 12 months.

Outcome	No Financial Toxicity	Financial Toxicity	p-value
	N=60	N=440	
SF-36 Physical Component Score – 4 months	44.2 ± 12.9	36.2 ± 11.5	0.0015
SF-36 Mental Component Score – 4 months	50.4 ± 10.1	43.7 ± 10.8	0.0040
SF-36 Physical Component Score – 12 months	46.3 ± 13.7	41.0 ± 12.5	0.0839
SF-36 Mental Component Score – 12 months	55.6 ± 6.9	45.1 ± 11.1	<0.0001
Depression (Any)	30%	76%	<0.0001
PTSD (Any)	13.3%	50%	<0.0001

PTSD = Post-traumatic stress disorder

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Table 5.

Effect of financial toxicity grade on outcomes assessed overtime by the multivariate model.

	Odds Ratio	p-value		Estimate	p-value
Depression			**SF-36 PCS**		
1 vs. 2	0.75	**0.049**	1 vs. 2	−2.30	**<0.001**
1 vs. 3	0.61	**0.003**	1 vs. 3	−3.22	**<0.001**
1 vs. 4	0.25	**<0.001**	1 vs. 4	−3.12	**0.005**
2 vs. 3	0.80	0.117	2 vs. 3	−0.92	0.116
2 vs. 4	0.33	**<0.001**	2 vs. 4	−0.82	0.427
3 vs. 4	0.41	**0.003**	3 vs. 4	0.10	0.926
PTSD			**SF-36 MCS**		
1 vs. 2	0.58	**0.001**	1 vs. 2	−3.11	**<0.001**
1 vs. 3	0.49	**<0.001**	1 vs. 3	−5.32	**<0.001**
1 vs. 4	0.50	**0.033**	1 vs. 4	−6.00	**<0.001**
2 vs. 3	0.84	0.252	2 vs. 3	−2.21	**0.002**
2 vs. 4	0.86	0.618	2 vs. 4	−2.89	**0.0235**
3 vs. 4	0.99	0.966	3 vs. 4	−0.68	0.604

PTSD = Post-traumatic stress disorder; PCS = Physical Component Score; MCS = Mental Component Score