Ann Surg Oncol (2019) 26:936–944
https://doi.org/10.1245/s10434-018-07136-3

Annals of
SURGICAL ONCOLOGY
OFFICIAL JOURNAL OF THE SOCIETY OF SURGICAL ONCOLOGY

ORIGINAL ARTICLE – HEALTH SERVICES RESEARCH AND GLOBAL ONCOLOGY

Psychosocial Risks are Independently Associated with Cancer Surgery Outcomes in Medically Comorbid Patients

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ABSTRACT

Background. The specific effect of psychosocial risk factors on surgical outcomes in cancer patients remains unexplored. The purpose of this prospective observational study was to assess the association of preoperative psychosocial risk factors and 30-day complications following cancer surgery.

Methods. Psychosocial risks among elective gastrointestinal cancer surgery patients were ascertained through structured interviews using well-established screening forms. We then collected postoperative course by chart review. Multivariable analysis of short-term surgical outcomes was performed in those with a low versus high number of psychosocial risks.

Results. Overall, 142 patients had a median age of 65 years (interquartile range 55–71), 55.9% were male, and 23.1% were non-White. More than half (58.2%) of the study population underwent a resection for a hepato-pancreato-biliary primary tumor, and 31.9% had a colorectal primary tumor. High-risk biomedical comorbidities were present in 43.5% of patients, and three-quarters of patients (73.4%) had at least one psychosocial risk. Complication rates in patients with at least one psychosocial risk were 28.0 absolute percentage points higher than those with no psychosocial risks (54.4% vs. 26.2%, $p = 0.039$). Multiple psychosocial risk factors in medically comorbid patients independently conferred an increase in the odds of a complication by 3.37-fold (95% CI 1.08–10.48, $p = 0.036$) compared with those who had one or no psychosocial risks.

Conclusions. We demonstrated a more than threefold odds of a complication in medically comorbid patients with multiple psychosocial risks. These findings support the use of psychosocial risks in preoperative assessment and consideration for inclusion in preoperative optimization efforts.

Gastrointestinal cancer patients undergoing elective surgery are known to possess an increased risk for short-term postoperative morbidity and mortality.[1,2] To ameliorate the effect of these risk factors for elective surgical patients, surgeons have designed bundled preoperative interventions targeting these risks.[3–6] These approaches have been found to decrease and improve postoperative outcomes by holistically addressing a patient's modifiable risk profile at the time of surgery.[7–9]

While these approaches have been found to be effective for patients, there remains ambiguity in the best approach, as well as what components play the largest role in outcomes.[6,10,11] Even less understood is the contributing effect of less apparent risk factors, such as psychological and social conditions, on short-term surgical outcomes. Factors such as behavioral traits, mental illness, resilience, resourcefulness, and social support may impair a patient's ability to effectively self-manage their postoperative care and increase the risk and magnitude of complications. Non-oncological surgical disciplines have begun highlighting the effect of these psychosocial risk factors on postoperative outcomes.[12–15] We believe that these psychosocial risk factors are proxy measures for one's ability to cope with the stress of unplanned postoperative events and to comply

Electronic supplementary material The online version of this article (https://doi.org/10.1245/s10434-018-07136-3) contains supplementary material, which is available to authorized users.

First Received: 25 September 2018;
Published Online: 7 January 2019

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with appropriate postoperative follow-up. Thus, we hypothesize that worse psychosocial well-being would lead to a greater number and severity of postoperative complications.

As an increasing emphasis is placed on the modification or optimization of a patient's preoperative risk factors, the importance of identifying an association between elective cancer surgery and psychosocial risks grows. Although broad consensus exists that psychosocial risk factors are relevant for an operative consultation, psychosocial risk assessment is conventionally performed with a surgeon's *gestalt* rather than a formal evidence-based approach. The lack of formal evidence associating psychosocial risk factors with clinically meaningful postoperative outcomes may be limiting greater attention on this aspect of patient care. The purpose of this prospective observational study was to assess the association between preoperative psychosocial risk factors and 30-day complications following cancer surgery. We hypothesized that psychosocial risk burden, if captured accurately, would be an independent predictor of worse postoperative outcomes.

METHODS

Study Design

We performed a prospective observational cohort study to assess the association between preoperative psychosocial risks and 30-day postoperative outcomes in patients undergoing gastrointestinal cancer surgery. We ascertained psychosocial risks through researcher-administered surveys, and then directly reviewed patient medical records for short-term surgical outcomes. This study was approved by the Johns Hopkins Medicine Institutional Review Board.

Study Population

We included all adult patients, from 1 March 2017 to 18 October 2017, with suspected or proven gastrointestinal malignancy seeking surgical resection and presenting to surgeons at an academic medical center with a high volume of gastrointestinal cancer surgery. Patients were invited to participate by convenience sampling based on the availability of study staff. Exclusion criteria included patients who had undergone prior major thoracic or abdominal surgery (excluding laparoscopic cholecystectomy, appendectomy, cesarean delivery, or hysterectomy for benign disease). We also excluded patients who had been historically treated with chemotherapy or external beam radiation therapy for a prior malignancy. In pilot testing with non-study patients from the same surgical clinics, the questionnaires took, on average, 10 min to complete, and mid-study time trials averaged 3–6 min. We further excluded any patients who ultimately had an aborted surgical resection or no abdominal incision as part of the index procedure.

Psychosocial Risk Factor Ascertainment

A member of the study staff ascertained psychological and social risks via structured interviewing following the initial surgeon consultation or on the day of surgery. We designed a researcher-administered survey using previously validated risk-specific instruments and standardized risk assessment questions.

We first identified psychosocial risk factors that have been proposed or demonstrated to affect surgical or oncologic outcomes in prior literature: resilience, resourcefulness, high-risk for depression, smoking history, addiction history, and high-risk alcohol use.[12,16–21] Appendix A provides comprehensive definitions for each of these terms and the literature supporting their use. We intentionally included both acute monitors of distress (e.g. depression) and indicators of chronic psychosocial risk (e.g. resourcefulness, addiction history). Within these risk factors, two authors (ILL and FMJ) then assessed previously validated screening instruments for the identified risk factors, balancing the need for minimal disruption of clinic workflows with a preference for high-sensitivity instruments. Appendix B provides the complete researcher-administered survey.

Clinical Risk Factor and Outcomes Ascertainment

Each patient's electronic medical record was reviewed for potential preoperative clinical risk factors, the specific surgery obtained, and 30-day postoperative morbidity and mortality. One author (PMM) reviewed all charts, with 15% of the sample confirmed for accuracy by two additional authors (ILL and ZOE). Risk factors identified in this process were consistent with the definitions used in the American College of Surgeons National Surgical Quality Improvement Program (NSQIP) and have been previously well-described.[22–24] We elected to use these definitions for cross-comparability with other studies. We further defined a composite 'high-risk biomedical comorbidity' dichotomous variable that was positive if a patient had any of the following preoperative comorbidities: diabetes, chronic obstructive pulmonary disease, heart failure, esophageal varices, ascites, disseminated cancer, chronic corticosteroid use, weight loss, bleeding disorder, preoperative sepsis, renal failure, dialysis, or preoperative blood transfusions. Complications were assessed in a similar fashion using the

definitions employed in the NSQIP Participant Use Data File.[24]

Statistical Analysis

The primary outcome measure was any 30-day complication as defined in the NSQIP literature and risk calculator.[23] Secondary outcomes of interest included readmission and length of stay. We first performed univariable analysis of outcome measures with or without a psychosocial risk. An *a priori* hypothesis that psychosocial risks were cumulative led to a preplanned analysis of the effect of multiple psychosocial risks on outcomes measures (Appendix C). Defining two or more psychosocial risks as 'high risk', we then performed a bivariate analysis of short-term surgical outcomes in those subjects with a low versus high number of psychosocial risks. We also anticipated complication rates and age having a non-linear relationship, and assessed for a potential dichotomous effect (Appendix C). Finally, we performed propensity score matching (Appendix D for specific methods) followed by multivariable regression of the composite primary outcome by psychosocial risk, controlling for other clinical surgical risk factors, primary tumor site, and psychosocial risk-related demographics that were included, based on associations with psychosocial risk factors.[25,26] We also tested for random effects by surgeon-specific clustering using a random-intercept logistic model (likelihood ratio test threshold for inclusion: $p < 0.05$).[27] Given the small anticipated sample size and a preference for a simpler model if statistically supported, we elected to use the entire sample rather than the propensity score-matched sample as long as conclusions from both the matched sample and the whole study population were statistically similar. Finally, we decided to perform a *post hoc* stratified analysis by the presence or absence of a high-risk biomedical comorbidity after identifying the substantial difference in comorbidities present in exposure groups reported in the results below. All statistical analysis was performed in Stata/IC 15.1 (StataCorp LLC, College Station, TX, USA).

RESULTS

We interviewed 142 patients undergoing gastrointestinal cancer surgery. Patients had a median age of 65 years (interquartile range 55–71), 55.9% were male, and 23.1% were non-White. More than half (58.2%) of the study population underwent a resection for a hepato-pancreato-biliary primary tumor, and 31.9% had a colorectal primary tumor. High-risk biomedical comorbidities were present in 43.5% of patients. Three-quarters of patients (73.4%) had at least one psychosocial risk, with the greatest contributions coming from those who had ever used an inhaled tobacco product (43.0%) and those concerning limited resourcefulness (29.4%). Table 1 summarizes the study population characteristics and highlights the differences in characteristics and postoperative outcomes by exposure groups. Complications for all patients were not statistically significantly different by exposure group ($p = 0.103$); major contributors to the complication rate were wound infection (23.1%), other sepsis (16.1%), and ileus (14.0%).

Among patients with comorbidities, complication rates in patients with at least one psychosocial risk were 28.0 absolute percentage points higher than those with no psychosocial risks (54.4% vs. 26.2%, $p = 0.039$). The heterogeneity of this association by individual psychosocial risk is presented in Table 2. The table also illustrates a similar phenomenon, with a significant difference in unplanned readmission for two or more psychosocial risks (27.6% vs. 5.6%, $p = 0.014$). There was no significant difference for mean length of stay, and substantial qualitative variation in association with length of stay was observed for each individual psychosocial risk (Table 2).

We then performed multivariable logistic regression of complication rates on the presence of two or more psychosocial risks and stratified by high-risk biomedical comorbidity due to the comorbidity differences in the exposure groups observed in Table 1 (Appendix C, Table C2) and the biological rationale of a potential interaction between biomedical risk and psychosocial risk. When controlling for other variables in patients who also had a high-risk biomedical comorbidity, the presence of two or more psychosocial risk factors conferred an increase in the odds of a complication by 3.37-fold (95% CI 1.08–10.48, $p = 0.036$) compared with those who had one or no psychosocial risks (Table 3a). In contrast, the presence of additional psychosocial risk conferred no independent risk in patients lacking a high-risk biomedical comorbidity, although this study was not adequately powered to definitively confirm this subanalysis finding ($p = 0.623$) [Table 3b]. Similarly, two or more psychosocial risks conferred a more than sixfold increase in the risk of unplanned readmissions within 30 days of surgery (odds ratio 6.26, $p = 0.035$) [Table 4a] within the biomedically comorbid group, with no observed statistical difference in the non-comorbid group ($p = 0.286$) [Table 4b]. Logistic regression of complication rates on a single psychosocial risk, and ordinal logistic regression of complication rates and readmission on each additional psychosocial risk, all demonstrated similar directional effects but were not statistically significant (results not shown). Further subanalysis with a propensity score-matched subset of the population found no differences in statistical conclusions

TABLE 1 Demographics, baseline characteristics, and postoperative outcomes for those undergoing curative cancer surgery, by psychosocial risk density

Characteristic	Total [$n = 142$]	< 2 psychosocial risks [$n = 86$]	≥ 2 psychosocial risks [$n = 56$]	p Value
Age, years [median (IQR)]	65.0 (55–71)	62.0 (54–68)	69.5 (56–74)	0.037
Male sex	55.9	52.9	60.7	0.357
White race	76.9	73.6	82.1	0.235
Minimally invasive approach	42.0	40.2	44.6	0.602
Primary tumor site				0.281
Hepato-pancreato-biliary	58.2	62.4	51.8	
Colorectal	31.9	30.6	33.9	
Other	9.9	7.1	14.3	
Biomedical comorbidities	45.5	41.4	51.8	0.223
Diabetes	23.2	19.8	28.6	0.225
COPD	2.1	0	5.4	0.030
Heart failure	1.4	1.2	1.8	0.758
Liver disease[a]	2.1	2.3	1.8	0.835
Disseminated cancer	14.9	18.6	9.1	0.122
Chronic corticosteroid use	2.1	2.3	1.8	0.839
Weight loss	5.7	5.9	5.4	0.895
Bleeding disorder	11.3	5.9	14.3	0.359
Preoperative sepsis	0.7	0.0	1.8	0.214
Any psychosocial risk	73.4	56.3	100.0	< 0.001
Depression	13.5	3.5	28.6	< 0.001
Ever smoked	43.0	20.9	76.8	< 0.001
High-risk alcohol use	26.3	14.5	44.4	< 0.001
History of addiction	10.6	1.2	25.0	< 0.001
Low resourcefulness	29.4	14.9	52.8	< 0.001
Low resilience	9.2	2.3	20.0	< 0.001
Any complication	43.4	37.9	51.8	0.103
Wound infection, superficial	2.1	3.5	0	0.160
Wound infection, deep	2.1	1.2	3.6	0.324
Wound infection, organ space	18.2	16.1	21.4	0.419
Wound infection, dehiscence	0.7	0.0	1.8	0.392
Sepsis	13.3	13.8	12.5	1.000
Septic shock	2.8	2.3	3.6	0.645
Ileus/obstruction	14.0	8.1	23.2	0.011
Bleeding	8.4	8.1	8.9	1.000
Reintubation	0.7	1.2	0.0	0.421
Prolonged ventilation	0.0	0.0	0.0	–
Pulmonary embolism	1.4	2.3	0.0	0.520
Deep venous thrombosis	4.2	4.6	3.6	1.000
Pneumonia	0.0	0.0	0.0	–
Renal insufficiency	0.7	0.0	1.8	0.392
Renal failure	0.0	0.0	0.0	–
Urinary tract infection	5.6	5.8	5.4	1.000
Stroke	0.7	0.0	1.8	0.392
Nerve injury	0.7	0.0	1.8	0.211
Cardiac arrest	0.0	0.0	0.0	–
Myocardial infarction	0.0	0.0	0.0	–

Data are expressed as percentages unless otherwise stated

No patients seen had documented chronic renal failure, dialysis, required preoperative transfusions, or had preoperative wound infections

COPD chronic obstructive pulmonary disease, *IQR* interquartile range

[a]Liver disease includes esophageal varices and ascites

TABLE 2 Thirty-day postoperative outcome differences by the presence of psychosocial risk in patients with an underlying major comorbidity [$n = 63$]

Characteristic	Complication rate difference	p Value	Difference in re-admission rate	p Value	Mean difference in length of stay	p Value
Depression	14.2	0.344	18.4	0.083	0.9	0.790
Ever smoked	11.3	0.369	7.7	0.381	3.4	0.897
High-risk alcohol use	18.0	0.296	18.0	0.146	3.1	0.369
History of addiction	− 1.9	0.918	− 3.7	0.769	− 0.24	0.304
Low resourcefulness	29.5	0.023	9.8	0.293	− 3.4	0.159
Low resilience	4.5	0.791	5.4	0.660	2.2	0.510
Any psychosocial risk	28.0	0.039	14.3	0.146	− 0.23	0.171
≥ 2 psychosocial risks	22.5	0.070	22.0	0.014	3.9	0.367

Data are expressed as percentages

(Appendix D), and the additional explanatory value of a surgeon-specific random-intercept multilevel model was not supported ($p = 1.000$).

DISCUSSION

This prospective study involving complex gastrointestinal cancer patients identified at least one of six psychosocial risk factors in nearly three-quarters (73.4%) of patients undergoing elective surgery. Complication rates in patients with at least one psychosocial risk were 28 percentage points higher than those with no psychosocial risks. The presence of two or more psychosocial risk factors conferred an increase in the odds of a complication more than threefold that of those who had one or no psychosocial risks when controlling for other variables.

We often discuss a patient's 'social situation' or 'home support' in initial surgical decision making and postoperative planning. Conventional wisdom suggests that individuals with more psychosocial stressors may be less able to care for themselves postoperatively, less effective at responding to postoperative unplanned events (e.g. early management of uncontrolled postoperative pain), and less able to seek appropriate postoperative care. However, there is limited historical evidence that such concerns about psychosocial stress are predictive of meaningful operative recovery. Low socioeconomic status and government assistance have been historically associated with worse surgical outcomes;[28–30] however, focused procedure-specific studies with more granular measures of psychosocial risks have reported contradictory findings for their association with functional recovery in bariatric and transplant surgical patients.[14,15,31–34]

At the same time that the association of psychosocial risk factors with operative outcomes has been challenged, the surgical community has steadily increased its focus on optimizing overall wellness prior to elective surgery.[6,35,36] The least well-established precepts included in these programs is psychosocial wellness. In cancer surgery, studies have demonstrated that surgery can have a detrimental effect on overall psychosocial wellness, but a clear association with clinical outcomes has not been established.[18–21,37] Furthermore, the need for cancer surgery has been demonstrated to be associated with increased levels of psychological distress.[38]

With the increasing attention being paid to address psychosocial risk factors preoperatively, the need for further data assessing the associative basis of these interventions is paramount. Furthermore, gastrointestinal cancer patients represent an ideal group for such preoperative interventions due to the increasing use of prolonged neoadjuvant regimens providing an optimization window.[9] No previous literature has identified how psychosocial risks in a cancer surgery population are associated with postoperative outcomes. In this study, we aimed to prospectively assess the association between psychosocial risks and postoperative outcomes of cancer surgery to address these gaps. Clinically meaningful differences were found in four of six psychosocial risks that we assessed. The association between psychosocial risks and high-risk biomedical comorbidities appeared more substantial in the comorbid subpopulation. We then identified an independent and potentially additive effect by the number of psychosocial risks. Biomedically comorbid patients with two or more psychosocial risks had a threefold greater odds of a complication and a sixfold greater odds of a readmission following cancer surgery.

This study represents an important contribution to the surgical risk assessment and preoperative optimization literature. Contemporary surgical oncology risk assessment tools such as the NSQIP Surgical Risk Calculator or tumor-specific predictive nomograms do not currently factor-in psychosocial risk.[39–42] Given the independent effect size of these risks demonstrated in this study, revision of current

TABLE 3 Multivariable logistic regression of having at least one postoperative complication on high psychosocial risk, and potential covariates in patients (**a**) with ($n = 59$) or (**b**) without ($n = 77$) a high-risk biomedical comorbidity

Variable	Unadjusted OR (95% CI)	*p* Value	Adjusted OR (95% CI)	*p* Value
(a)				
≥ 2 psychosocial risks	2.51 (0.91–6.84)	0.073	3.37 (1.08–10.48)	0.036
Age >75 years	1.19 (0.22–6.36)	0.843	0.88 (0.14–5.46)	0.891
Male sex	0.90 (0.33–2.50)	0.841	1.16 (0.37–3.61)	0.803
White race	1.31 (0.43–4.03)	0.632	0.88 (0.23–3.36)	0.853
Minimally invasive approach	0.96 (0.34–2.69)	0.936	0.80 (0.20–3.23)	0.750
Primary tumor site				
Colorectal	Ref			
Hepato-pancreato-biliary	1.52 (0.50–4.6)	0.457	1.75 (0.41–7.44)	0.451
Other	–	–	–	–
(b)				
≥ 2 psychosocial risks	1.24 (0.48–3.19)	0.655	1.31 (0.45–3.82)	0.622
Age >75 years	1.89 (0.52–6.84)	0.330	1.33 (0.30–5.97)	0.710
Male sex	1.09 (0.44–2.69)	0.850	1.30 (0.43–3.99)	0.643
White race	0.33 (0.11–1.03)	0.056	0.29 (0.08–0.98)	0.047
Minimally invasive approach	0.88 (0.36–2.18)	0.786	1.07 (0.36–3.21)	0.900
Primary tumor site				
Colorectal	Ref		Ref	
Hepato-pancreato-biliary	2.05 (0.73–5.73)	0.173	2.50 (0.67–9.28)	0.172
Other	1.80 (0.38–8.53)	0.459	1.66 (0.25–11.11)	0.602

OR odds ratio, *CI* confidence interval

TABLE 4 Multivariable logistic regression of unplanned readmission on high psychosocial risk, and potential covariates in patients (**a**) with ($n = 64$) or (**b**) without ($n = 68$) a high-risk biomedical comorbidity

Variable	Unadjusted OR (95% CI)	*p* Value	Adjusted OR (95% CI)	*p* Value
(a)				
≥ 2 psychosocial risks	6.48 (1.25–33.46)	0.026	6.25 (1.13–34.58)	0.035
Age >75 years	1.11 (0.12–10.66)	0.927	0.84 (0.06–10.69)	0.891
Male sex	0.79 (0.20–3.15)	0.740	0.59 (0.12–2.89)	0.515
White race	1.50 (0.29–7.88)	0.632	1.39 (0.20–9.92)	0.740
Minimally invasive approach	2.24 (0.57–8.75)	0.248	3.40 (0.50–22.99)	0.210
Primary tumor site				
Colorectal	Ref		Ref	
Hepato-pancreato-biliary	0.94 (0.21–4.25)	0.937	2.35 (0.32–17.00)	0.398
Other	1.33 (0.11–16.48)	0.823	6.52 (0.21–198.21)	0.282
(b)				
≥ 2 psychosocial risks	0.60 (0.11–3.20)	0.550	0.33 (0.04–2.56)	0.286
Age > 75 years	4.65 (0.93–23.25)	0.061	9.01 (0.94–86.69)	0.057
Male sex	1.87 (0.41–8.43)	0.416	1.38 (0.22–8.45)	0.730
White race	1.91 (0.22–16.75)	0.559	1.49 (0.16–14.28)	0.728
Minimally invasive approach	1.87 (0.41–8.43)	0.416	1.80 (0.30–10.79)	0.521
Primary tumor site				
Colorectal	Ref		Ref	
Hepato-pancreato-biliary	1.04 (0.23–4.75)	0.964	0.83 (0.11–6.45)	0.855
Other	–	–	–	–

OR odds ratio, *CI* confidence interval

risk assessment efforts would likely benefit from further inclusion of psychosocial factors. Since many risk tools are based on outcomes reporting quality databases, an important consideration is whether additional mental health information and socioeconomic data may need to be collected as part of case abstracting. The contributory risk due

to the psychosocial risks highlighted in this study, in combination with the substantial psychosocial risk burden in the surgical oncology population, suggest a large aggregate effect on overall cancer care outcomes.[18,19] Importantly, the survey format employed here can be implemented in a resource-limited manner through self-completion prior to clinic appointments, ultimately having minimal time and resource costs compared with other risk assessment efforts. All instruments used in this study are available in the public domain and were originally validated as self-completed questionnaires. For our study, information technology and workflow limitations at our institution led to researcher-administered surveys being paradoxically easier to complete than an automated process, but we would not anticipate an impact on usability given the original validation efforts of these instruments.[12,43–45]

Finally, these findings not only challenge the comprehensiveness of risk assessment but also provide supporting evidence for many recent preoperative optimization efforts. These preoperative optimization programs share a common objective of optimizing or eliminating modifiable risk factors prior to elective surgery through targeted interventions. Due to limited evidence supporting one bundled preoperative optimization intervention versus another,[9] existing programs are often site-specific, and many of these programs utilize existing institutional resources that can be readily mobilized.[6] Very few preoperative optimization programs currently incorporate psychosocial assessments or holistic wellness, with some notable exceptions.[35,36,46] If psychosocial stress leads to less-effective postoperative recovery, then addressing these risks preoperatively supports further psychosocial risk assessment and interventions as part of increasing psychosocial well-being in support of preoperative optimization efforts.

We must also acknowledge the limitations of the current study, which was performed at a single institution with a relatively homogenous cancer patient population. Further generalizability requires validating these findings in other settings and patient groups. For example, it is important to identify if being in a less cancer-focused surgical environment than a comprehensive cancer center may even further exacerbate the effects of psychosocial well-being on operative outcomes. Similarly, our patient population has historically had limited socioeconomic diversity. Critical access hospitals, and surgeons who work with a larger proportion of patients from priority populations, may be either more experienced at mitigating psychosocial risks, or, conversely, more resource-limited, with even more of an effect on outcomes with possible interventions.

Additionally, in the population *without* an overlapping biomedical comorbidity, we were not adequately powered to accurately describe the effect of psychosocial risk factors. This limitation does not restrict the conclusions that we were are able to make about the biomedically comorbid group with and without psychosocial risks. Moreover, future prospective work that accrues a larger sample size of patients may be able to demonstrate similar findings. Answering this question is an important consideration since it will determine if practical risk stratification based on psychosocial risks should be extended to all patients versus only those already being managed for major biomedical comorbidities. Similarly, as seen in Table 2, we were not powered to break down individual risk contributions, although no single risk factor appeared to dominate the effect of psychosocial risk on outcomes. While future studies should investigate which particular risks offer the best yield for modifying surgical outcomes, we believe the combination of risks and distress included here accurately capture the psychosocial milieu of the patient and are informative in the aggregate as reported.

Finally, this study did not formally assess socioeconomic status as a discrete entity separate from one's perceived socioeconomic stress (i.e. resourcefulness). Prior studies have described the difficulties and biases with capturing objective socioeconomic status. For example, easily obtainable measures of socioeconomic status such as zip code or insurance status have been found to be unreliable.[47,48] Formal structured interview methods exist to assess socioeconomic status,[49] but these were impractical in the workflow environment in which this study was conducted. Given these practical limitations, we assumed subjective reporting of one's resourcefulness as a proxy for socioeconomic status in this analysis, based on previous survey usage.[12]

CONCLUSIONS

Through psychosocial screening of cancer surgery patients, we demonstrated a more than threefold odds of a complication in medically comorbid patients with multiple psychosocial risks. Further investigation is required to identify the modifiability of this risk with ongoing preoperative optimization efforts, and also whether a similar but attenuated effect is present in those without comorbidities.

FUNDING ILL received salary support from a National Cancer Institute T32 Institutional Training Grant (5T32CA126607) and a Research Foundation of the American Society of Colon and Rectal Surgeons Resident Research Initiation Grant (GSRRIG-031) for the preparation of this manuscript. FMJ received salary support as the primary investigator of an Agency for Healthcare Research and Quality grant (1K08HS024736-01).

DISCLOSURE Ira L. Leeds, Patrick M. Meyers, Zachary O. Enumah, Jin He, Richard A. Burkhart, Elliott R. Haut, Jonathan E. Efron, and Fabian M. Johnston have no conflicts of interest to declare.

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