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Missed psychosocial risk factors during routine preoperative evaluations are associated with increased complications after elective cancer surgery

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ABSTRACT

Background: Certain behavioral traits and inadequate social support are known risk factors for complications after cancer surgery. Despite their importance, it is unclear whether conventional patient preoperative evaluation captures them. This study was conducted to assess concordance between documentation and patient survey of selected risk factors and to determine whether failure to document affected postoperative outcomes.

Methods: Adult patients at a tertiary academic medical center were surveyed before abdominal cancer surgery to assess 6 psychosocial risk factors. Risk factors were also assessed by retrospective chart review and compared with survey results through concordance measures. Thirty-day postoperative complications were abstracted by chart review. Rates of major complications for those with and without clinically missed risk factors were compared.

Results: Comparisons between chart review and screening survey revealed poor-to-moderate positive agreement (0%–47%) for 5 risk factors and strong negative agreement (82%–99%) among all risk factors. Kappa analysis demonstrated poor-to-fair agreement among 5 risk factors ($\kappa = 0.112–0.423$). The overall complication rate was 36%. The complication rate for patients with at least 1 clinically missed risk factor was 49% vs 24% in those without ($P = .021$), with a similar effect replicated for each individual risk factor.

Conclusion: This study shows a high level of discordance between formal screening and routine clinician documentation in a preoperative setting for psychosocial risk factors. There is a significant association between missing these risk factors and worse postoperative outcomes. Future work should examine whether structured screening of psychosocial risk factors may improve preoperative risk stratification through proactive interventions.

Introduction

Surgical treatment of solid organ malignancies is increasingly utilized as a potential definitive therapy.[1] With an increase in operative intervention for cancer patients comes a concomitant overall increased prevalence of complications. Cancer patients typically carry higher surgical risk than similarly matched patients,[2,3] but the reasons for these differences remain largely unknown. Although biomedical risk factors have been considered to explain this disparity, one potentially underrecognized source is the influence of psychosocial factors.[4,5] To this effect, a number of studies have demonstrated a negative association between postoperative psychosocial risks and outcomes after cancer surgery, with a 3-fold increase in the odds of a surgical complication.[6–8]

Patrick M. Meyers, Ira L. Leeds, Zachary O. Enumah, Elliott R. Haut, and Fabian M. Johnston are responsible for the study design. Patrick M. Meyers, Ira L. Leeds, Zachary O. Enumah, and Fabian M. Johnston are responsible for data acquisition and analysis. Patrick M. Meyers, Ira L. Leeds, and Fabian M. Johnston are responsible for interpretation of the data and drafting work. Critical revision was performed by Zachary O. Enumah, Richard A. Burkhart, Jin He, Elliott R. Haut, and Jonathan E. Efron. Patrick M. Meyers, Ira L. Leeds, Zachary O. Enumah, Richard A. Burkhart, Jin He, Elliott R. Haut, Jonathan E. Efron, and Fabian M. Johnston gave final approval and accountability for the manuscript.

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Evidence from other elective surgical populations also suggests social factors contribute to postoperative outcomes.[9–13]

Despite the increasing emphasis of psychosocial risk factors in cancer care, it is unclear if these risk factors are consistently recognized by surgeons and addressed preoperatively when appropriate. A commonly cited proxy for evidence of clinician behaviors is documentation in the medical record.[14,15] However, medical record quality often lacks completeness and accuracy,[16–19] with biomedical information more often documented than psychosocial.[20–22] Furthermore, psychosocial data in the medical record is often inconsistently reported when compared with patient self-reported questionnaires,[23,24] and discrepancies in a patient's data over time are a routine occurrence.[25,26] Unfortunately, despite the growing importance of psychosocial risk factors, there is little known regarding the impact of inadequate documentation, particularly within the surgical subspecialties.

The purpose of this study was to ascertain whether certain psychosocial and behavioral risk factors were being captured in the medical record via usual documentation of care and to determine whether the failure to document psychosocial risk affected postoperative outcomes. We hypothesized that there would be poor concordance between patient self-reported survey responses and physician documentation with an increase in 30-day postoperative complication rates when psychosocial risks were missing from the medical record.

Methods

Study population with inclusion and exclusion criteria

The study was performed at an 800-bed tertiary care academic medical center designated as a National Cancer Institute Comprehensive Care Center where >400 complex hepatopancreatobiliary and high-risk colorectal cancer operations are performed yearly. All patients with known or suspected gastrointestinal malignancies seeking curative surgical resection between March 1, 2017, and February 28, 2018, presenting to the center's gastrointestinal surgical oncology clinics were included in this study as a convenience sample. These types of elective cancer surgery cases were selected owing to the high volume at the study center and the well-recognized high morbidity in the literature.[2] Study staff identified potential candidates for the study survey and medical record review before their visits and obtained consent immediately after the clinic visit or during preoperative assessment. Exclusion criteria included patients <18 years of age and any prior cancer operation requiring hospitalization, recurrent cancer diagnoses, or palliative or aborted operations. Emergent surgical candidates were not automatically excluded if other inclusion criteria were met. There were no sex or gender exclusions. We also excluded any patients with a history of chemotherapy or radiation therapy for any other malignancy. The Johns Hopkins Medicine Institutional Review Board approved this study design.

Study design and clinical documentation review

We obtained consent from study candidates and assisted them through the completion of a structured electronic survey to ascertain psychologic and social risk factors. We designed the survey using previously validated instruments for psychosocial risk assessment and designated high risk of a particular risk factor as a positive score on individual risk assessment tools (Appendix A), with the survey format representing successive administration of validated instruments (Appendix B). The complete methodology for survey ascertainment of psychosocial risks has been previously reported.[27–29]

After completion of each patient's surgical care, P.M.M. performed a manual chart review for documentation of the same psychosocial risk factors, comorbid disease states, and patient characteristics within the electronic medical record (Epic Systems, Verona, WI). Chart abstraction included all relevant data 6 months before surgery using medical record notes from any clinician within the medical record contained in the institution's network, including primary care if accessible. Neither physician specialty nor quantity of notes accessed was recorded. We audited chart abstracting for accuracy with 10% of cases randomly selected by a second reviewer (Z.O.E.) and comparison of abstracted data to institutionally abstracted National Surgical Quality Improvement Program case entries.

An effort was made to define all psychosocial risk factors by chart abstraction criteria similar to those factors collected by survey instruments. Notably, high risk for depression was defined as any documented history of depressive disorder or treatment within the abstraction window, and high-risk alcohol use was defined as >7 standard drinks per week for female participants and >14 standard drinks per week for male participants. Similarly, "ever smoked" was defined as >1 pack-year documented smoking history and history of addiction was defined as documentation of prior illicit substance use. Low resilience was recorded as any prior physician concern about stress management or coping with diagnosis or treatment. Finally, low resourcefulness was defined as any physician concern within the domains of patient optimism, perceived social support, and perceived financial status. Specific psychiatric diagnoses outside of depressive disorders, substances used (illicit or prescribed), or the reason for substance use were not recorded. Furthermore, no effort was made to modify individual risk factors before abstraction and survey. All medical comorbidities and postoperative complications were captured in a manner similar to those defined by the American College of Surgeons' National Surgical Quality Improvement Program occurrence-based scheme in the participant use data file and reported for clinically missed and without-risk groups, given their associated value in judging postoperative complication rates.[30] Similarly, a major postoperative complication was defined as any serious complication defined within the American College of Surgeons' National Surgical Quality Improvement Program Surgical Risk Calculator (American College of Surgeons, Chicago, IL).

Statistical analysis

We compared patient survey responses for each psychosocial risk factor to chart abstraction results and assessed concordance by positive, negative, and overall agreement in addition to Cohen's Kappa. Cohen's Kappa can be used to compare interrater reliability and has been utilized in the literature for the assessment of concordance between manual chart review and structured survey results.[31–33] We termed patients with high risk of a psychosocial risk factor as "captured" by the patient-reported survey but not by the chart review as "clinically missed" (Fig 1). The rate of clinically missed patients was compared with those without evidence of psychosocial risk in either the survey or the chart review combined, termed *without risk*, using Fisher exact test or χ^2 test as appropriate. We reported major complication rates for those with psychosocial risks captured by both the survey and the chart review, termed *clinically captured*, and those found by the chart review but not the survey, termed *survey missed*. We managed all survey data using the Qualtrics database and survey web platform (Qualtrics, Provo, UT) and exported it to Microsoft Excel 2016 (Microsoft Corporation, Redmond, WA) for data merge of survey and chart abstract data before analysis. All statistical analyses were performed in Stata/IC 15.1 (StataCorp, College Station, TX). We powered the study (power

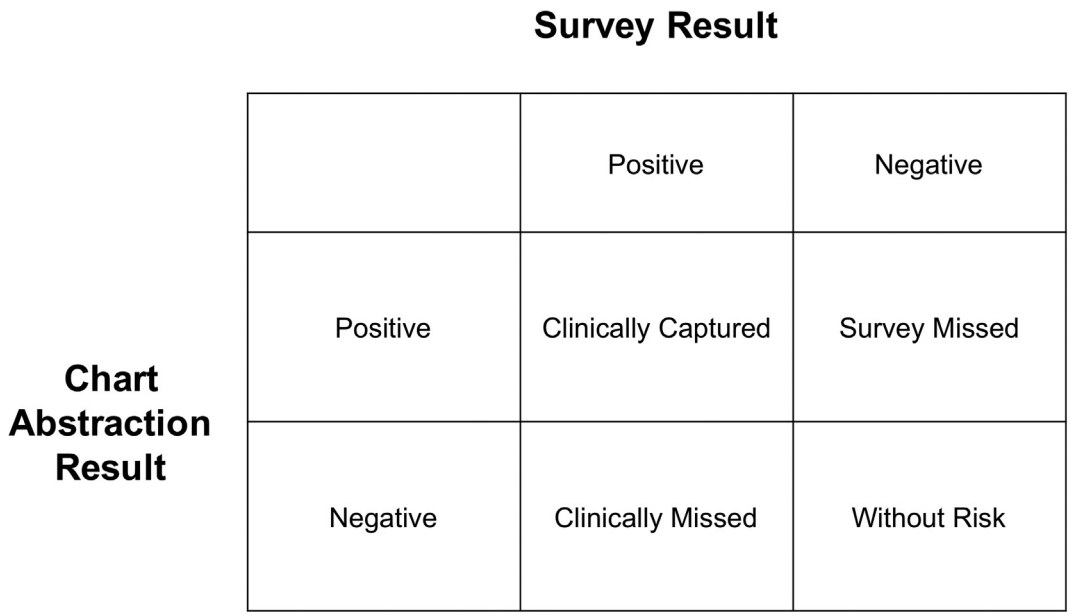

Fig 1. Explanatory variables of interest. Chart demonstrates the logic underpinning the study design. We collected data from both patient survey and chart review of the electronic medical record for each of 6 risk factors, providing a result of either positive or negative for each specific risk factor indicating captured evidence of each risk factor, respectively. This dichotomy for both patient survey and chart review generates 4 possible groups, of which 2 were of particular importance to this study: clinically missed and without risk.

0.8, α 0.05) to identify a 15% difference in short-term complications between those with psychosocial risks and those without and met recruitment goals.

Results

We identified 143 eligible patients who met the inclusion criteria. The study population was majority white (77%) and male (56%), with a median age of 65 years (interquartile range 55–71) and with predominantly pancreatobiliary (58%) and colorectal (32%) primary tumor sites. The overall rate of biomedical comorbidities was 46%. Baseline characteristics for the patient population, in addition to patients stratified by clinically missed and without risk groups, are included in Table I. In total, 73% of patients were found to have at least 1 psychosocial risk factor by study survey compared with 51% by chart review. The clinically missed group was significantly older (67.0 years compared wtih 60.0 years, $P = .004$), but otherwise statistically similar to the without risk group by all other patient characteristics and biomedical comorbidities.

Measures of concordance between chart review and study survey are included in Table II. Agreement tests revealed poor-to-moderate positive agreement (0%–47%) among all risk factors except smoking (92%) and strong negative agreement (82%–99%) and moderate-to-strong overall agreement (63%–95%) among all risk factors, demonstrating a high level of discordance between survey and chart review risk-identification strategies. Kappa analysis demonstrated poor-to-fair agreement among 5 of 6 risk factors ($\kappa = 0.112–0.431$). The highest levels of concordance according to Kappa analysis were found for smoking risk ($\kappa = 0.903$), depression risk ($\kappa = 0.426$), and alcohol abuse risk ($\kappa = 0.431$), whereas the highest levels of discordance existed for low resilience ($\kappa = 0.112$) and low resourcefulness ($\kappa = 0.167$).

The overall complication rate regardless of risk stratification was 36%. Rates of major 30-day postoperative complications are included in Table III stratified by psychosocial risk factor and the level of risk determined by both chart review and study survey. All 6 risk factors demonstrated a consistent pattern of higher rates of complications among clinically missed patients than among patients without risk (Fig 2). The complication rate for patients with at least one clinically missed risk factor was 49% vs 24% in those without ($P = .021$).

Discussion

The study was designed to judge the effectiveness of the medical record in capturing 6 psychosocial risk factors when compared with a structured survey and to determine whether the failure to document had an impact on postsurgical outcomes. For 5 of 6 risk factors, this resulted in both poor positive agreement (0%–47%) and poor-to-fair interrater agreement ($\kappa = 0.112$ to 0.431), suggesting that standardized interviewing techniques are superior for capturing psychosocial data versus subjective documentation alone. In comparing the major complication rates, the rate for patients with at least 1 clinically missed risk factor was 49% vs 24% in those without risk ($P = .021$), whereas all risk factors demonstrated a higher complication rate among those clinically missed.

Although this latter trend of higher complication rates for individual factors is nonsignificant, Bayesian approaches to statistical reference would support that the consistent pattern observed between missed risk factors and higher complication rates is independently concerning.[34] This trend also emphasizes the critical notion that what is documented about a patient may affect or inform that patient's extended medical care and suggests that the way this data is collected may benefit from standardization like other biomedical markers of surgical fitness (eg, cardiac perioperative risk factors, surgical readiness scores).

There is an emerging consensus across the surgical literature that nontraditional factors are relevant for preoperative consideration.[35,36] Notably, psychologic and social factors have been shown to affect outcomes, surgical success, and postoperative pain intensity.[9–13] However, there is comparatively little written in the surgical literature about the use of these factors in preoperative decision making. For psychosocial risk factors to be addressed before surgery, the clinical team must be able to accurately and efficiently identify them. Although a number of tools exist to capture psychosocial risk in addition to direct questioning, it is unclear

Table I
Patient demographics and baseline characteristics undergoing curative cancer surgery by psychosocial risk category

Characteristic, %	Total N = 143	Without risk n = 38	Clinically missed n = 41	*P* value
Age (y, median, IQR)	65.0 (55–71)	60.0 (53–67)	67.0 (58–72)	.004
Male	55.9	55.3	56.2	.921
White race	76.9	73.7	78.1	.580
Primary tumor site				.276
Pancreatobiliary	58.2	57.9	70.7	
Colorectal	31.9	26.3	24.4	
Other	9.9	15.8	4.9	
Biomedical Comorbidities				
Diabetes	23.2	21.1	34.2	.195
COPD	2.1	0.0	4.9	.168
Heart failure	1.4	0.0	2.4	.333
Liver disease*	2.1	0.0	2.4	.333
Disseminated cancer	14.9	26.3	10.0	.061
Chronic steroid use	2.1	2.6	2.5	.971
Weight loss	5.7	7.9	7.3	.923
Bleeding disorder	11.3	7.9	17.1	.220
Preoperative sepsis	0.7	0.0	0.0	—
Any psychosocial risk	73.4	0.0	100.0	—
Depression	13.5	0.0	24.4	—
Ever smoked	38.9	0.0	2.4	—
High-risk alcohol Use	26.3	0.0	46.3	—
History of Addiction	10.6	0.0	29.3	—
Low Resourcefulness	29.4	0.0	68.3	—
Low resilience	9.2	0.0	29.3	—

COPD, chronic obstructive pulmonary disease.
No participants with documented chronic renal failure, dialysis, requiring preoperative transfusions, or preoperative wound infections.
* Liver disease includes esophageal varices and ascites.

Table II
Concordance measures comparing captured high risk between chart review and structured survey results for individual psychosocial risk factors

	Depression N = 139	Ever smoked N = 131	Alcohol abuse N = 133	Addiction history N = 140	Resilience N = 141	Resource-fulness N = 143
Concordance						
Positive agreement (%)	47.4	92.2	47.2	2.0	7.7	33.3
Negative agreement (%)	93.3	97.5	91.8	99.2	99.2	82.2
Overall agreement (%)	87.1	95.4	79.7	90.7	90.8	67.8
Cohen's Kappa (*P* value)	0.426 (< .001)	0.903 (< .001)	0.431 (< .001)	0.284 (< .001)	0.112 (.022)	0.167 (.021)

Table III
Rates of major complications stratified by concordance groups for all individual psychosocial risk factors

Major complication (%)	Depression N = 139	Ever smoked N = 131	Alcohol abuse N = 133	Addiction history N = 140	Resilience N = 141	Resource-fulness N = 143
Clinically Captured	55.6	40.4	41.2	— (0.0)	— (0.0)	35.7
Clinically missed	50.0	50.0	36.8	41.7	50.0	50.0
Survey missed	12.5	— (0.0)	25.0	— (0.0)	100.0	38.9
Without risk	35.7	33.3	36.0	37.1	34.7	31.3
P value	.370	.493	.942	.755	.289	.075

whether psychosocial risk factors are being captured in the preoperative period. Although an outside observer cannot know the totality of a clinician's judgements in decision making, evidence supports that the content of the medical record correlates with the quality of care.[37] Careful and accurate documentation in the medical record improves clinical decision making and patient care while also serving an important medicolegal function.[38] Therefore, the efficacy of clinician documentation of potentially impactful psychosocial data before cancer surgery may impact the postoperative outcomes.

There have been several initiatives to improve patient care through improved documentation with varying degrees of success. Notably, proforma notes have been used with great success in the intake process and throughout ward rounding to ensure proper documentation of key data at the point of collection.[38,39] Furthermore, intake tools including patient surveys have been shown to increase the quality of history taking while also improving physician and patient satisfaction.[40] Nevertheless, a gap remains for effectively collecting key psychosocial data into the medical record ultimately to help influence decision making and coordination of care.

Our results suggest a trend of poor documentation for psychosocial risk factors, particularly of certain characteristics that may affect a patient's capability to successfully undergo or recover from a major abdominal cancer surgery, such as the capacity for resourcefulness and resilience.[27] Resourcefulness and resilience,

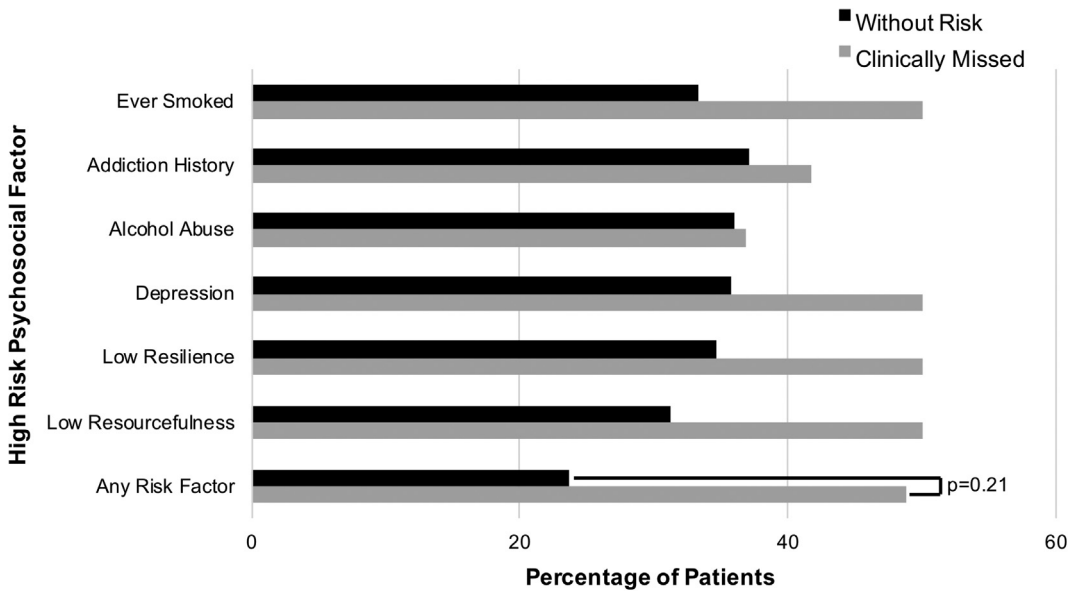

Fig 2. Percentage of patients with a major 30-day postoperative complication stratified by psychosocial risk factor.

respectively, offer critical information regarding a patient's perception of their physical environment and emotional capacity for healing. Only patients are aware of the intricacies of their own lives and are cognizant of whether they will be entering a postoperative environment that is fit for surgical recovery. Although our study is predicated on the notion that patients are able to provide this critical information when specifically prompted, our results suggest that formalized interviewing and assessment of these factors is superior to capturing this information compared to conventional charting.

If one accepts that what is not written in the medical record is a reflection of what is not under clinical consideration, our results are acutely concerning as they suggest that physicians may be missing important psychosocial risk factors in a patient population that is particularly vulnerable to such risks. Perhaps more concerning is the notion that clinically missing these risk factors is associated with a 3-fold increase in the rate of major complications when compared with those in whom these factors are not missed.[27] Although these risk factors are only as useful as their capacity for both risk stratification and modification, and thus for the surgeon to alter surgical practice with knowledge of them, it remains possible that capturing these missed factors might lead to the potential for earlier interventions or risk stratification to aid in the reduction of preventable complications.

Limitations

There are limitations to this study that may affect the interpretation of our results. Foremost, the 6 risk factors were presumed to be static patient characteristics throughout the study period. Although unaccounted for in our final assessment, the chart abstraction lead time ensures that changes in risk factor status are more likely to result in false assignment of high risk and would therefore more likely have underestimated the effect of missing a risk factor. Our study is also limited by size and scope, in patient availability, the limited single-institution environment, and in the chosen psychosocial factors. It is possible that our results reflect a site-specific phenomenon inherent to the institution rather than a greater healthcare trend. The former is unlikely given the nature of the institution involved—as a tertiary care center with extensive experience in cancer care and with social and occupational health services devoted to addressing patient's social and psychologic needs. However, further studies should demonstrate this phenomenon in other settings. It is also conceivable for further psychosocial risk factors to be studied, including additional psychiatric diagnoses, because another study of chart abstraction data after common abdominal surgeries demonstrated that specific psychiatric comorbidities are broadly associated with increased postoperative morbidity.[41] Furthermore, although our results suggest a trend of higher complication rates among those with clinically missed individual risk factors, our study lacks statistical power to evaluate the combined effect of multiple risk factors and is unable to demonstrate causal effect.

Finally, our interpretation is predicated on the assumption that documentation serves as a surrogate for the clinical reasoning of the documenting physician. It is conceivable that clinical decision making exists beyond what is captured in the medical record, including for our risk factors. Importantly, there is substantial literature concerning the impact of poor documentation,[37,42] and our results seem to suggest the impact is strong in cancer surgery.

Next steps

Our study has demonstrated a high rate of discordance between medical record documentation and survey identification of important, potentially modifiable psychosocial risk factors for cancer surgery. This finding has implications for patients and the financial burden of care because postoperative complications represent a major component of the total costs of care for these patients. A recent study found that the median cost for patients with at least one complication after gastrointestinal surgery was >$13,345 in those without complications.[8] Thus, efforts to mitigate risk factors carry the potential to afford substantial cost savings to the healthcare system. These findings also represent an important consideration in the discussion of psychosocial risk on cancer surgery outcomes, and further suggest social history as an important determinant of postsurgical recovery. Checklists and ward round proforma notes have been implemented across surgical practice to

enhance the quality of patient care and documentation.[39,43,44] This model may represent an opportunity to enhance clinical practice through the implementation of structured psychosocial assessments at the outset of surgical clinic visits. Important institutional steps may include embedding structured surveys into the EMR and structuring documentation to include psychosocial data[38] so that the long-term impact on decision making and surgical complications can be better assessed.

In conclusion, we know that psychosocial risks negatively affect postoperative outcomes from elective surgery, but anecdotally little attention is applied to these risks in clinical practice. By screening cancer patients for risk factors before surgery and comparing those results with their medical records, we demonstrated poor documentation patterns for captured risk in conjunction with a 2-fold increase in short-term postoperative complications when these risks were clinically missed. These findings suggest that cancer surgery patients may need further preoperative investigation of their psychosocial risks. Further investigation is needed to elucidate the impact of successfully capturing psychosocial risk and whether this represents an opportunity for risk modification and improved postoperative outcomes.

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Conflict of interest

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at https://doi.org/10.1016/j.surg.2019.04.015.

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