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Factors Affecting Hospital Length of Stay Following Pelvic Exenteration Surgery

Ying Guo, M.D.[1], **Eugene Chang, M.D.**[2], **Mehtap Bozkurt, M.D.**[3], **Minjeong Park, Ph.D.**[4], **Diane Liu, M.S.**[4], and **Jack B. Fu, M.D.**[1]

[1]Department of Palliative, Rehabilitation, and Integrative Medicine, The University of Texas MD Anderson Cancer Center, Houston, Texas

[2]Department of Medicine, Division of Physical Medicine and Rehabilitation, Toronto Rehabilitation Institute, Toronto, Canada

[3]Department of Physical Medicine and Rehabilitation, Dicle University Faculty of Medicine, Diyarbakir, Turkey

[4]Department of Biostatistics, The University of Texas MD Anderson Cancer Center, Houston, Texas

Abstract

Background and Objectives—Total pelvic exenteration are performed in patients with locally advanced or recurrent pelvic malignances. Many patients have prolong hospital length of stay (LOS), but risk factors are not clearly identified.

Methods—From 2002 through 2012, 100 consecutive patients undergoing pelvic exenteration were retrospectively reviewed. A general linear model was used to examine risk factors for prolonged hospital LOS.

Results—Among the 100 patients, 51 had gastrointestinal cancer, 14 had genitourinary cancer, 31 had gynecologic cancer, and 4 had sarcoma. Perioperative complications included infection (n=44), anastomotic leak/fistula (n=6), wound or flap dehiscence (n=11), and ileus or bowel obstruction (n=30). The median (Interquartile range (IQR)) hospital LOS was 15 days (10–21.5 days). On multivariate regression analysis, hospital LOS was significantly prolonged by underweight status, genitourinary cancer or sarcoma diagnosis, ≥2 infections, anastomotic leak/fistula, requiring rehabilitation consult and admission, and ≥2 consultations (p<0.05).

Conclusion—In patients undergoing pelvic exenteration, prolonged hospital LOS is associated with underweight status, genitourinary cancer or sarcoma diagnosis, more than one infection, anastomotic leak/fistula, requiring rehabilitation consult and admission, and more than one consultation. Further study is needed to assess whether minimizing these risk factors can improve hospital LOS in these patients.

Corresponding author: Ying Guo, M.D., 1515 Holcombe Blvd., Unit 1414, Houston, TX 77030, phone: (713)-745-2327; fax: (713)-792-6092; yguo@mdanderson.org.

Keywords

pelvic exenteration; hospital length of stay; cancer

INTRODUCTION

Pelvic exenteration surgery, used to treat advanced gastrointestinal,[1,2] gynecologic,[3] and urologic malignancy,[4] is an extensive surgery that involves en bloc removal of the pelvic viscera. A total pelvic exenteration in a male includes removal of the rectum, bladder and prostate/seminal vesicles if present. In a female patient, a total pelvic exenteration includes removal of the bladder, vagina (part or complete), uterus if present, and rectum. [5,6] Although pelvic exenteration has significant advantages for longer disease-free and overall survival, its associated perioperative complications, including hemorrhage and infections, can negatively impact a patient's postoperative course.[7,8]

Wound infection is one of the most common postoperative complications. In patients who underwent pelvic exenteration, estimated infection rates were up to 30%–43%,[7,9–13] and the rate of pelvic abscess was reported to be 6%–20%.[14–16] These complications can affect quality of life, impact recovery, prolong hospital length of stay (LOS), and increase the readmission rate. Prolonged hospitalization and readmissions also can increase overall healthcare costs.[17] However, few studies have assessed the risk factors for prolonged LOS in patients who undergo pelvic exenteration. We know of only such one study, which showed that longer hospital LOS after pelvic exenteration was associated with lower body mass index (BMI).[18]

The primary aim of the current study was to identify risk factors associated with longer hospital LOS following pelvic exenteration surgery. To this end, we retrospectively reviewed a large single-institution series of patients who underwent pelvic exenteration for gynecologic, gastrointestinal, urologic, and other cancers.

MATERIALS AND METHODS

This study was conducted after approval by the Institutional Review Board. A waiver of informed consent was granted by the Institutional Review Board. We reviewed all medical records of the 100 consecutive patients who underwent pelvic exenteration surgery for gynecologic, gastrointestinal, urologic, or other cancers in a National Cancer Institute–designated Comprehensive Cancer Center from January 2002 through January 2012.

The following data were collected for each patient:

1. Demographic characteristics: date of birth, date of death if applicable, sex, race/ethnicity, age, and marital status.
2. Diagnosis and preoperative treatment: tumor type and initial stage, histology results, primary or recurrent status, types of comorbidities, preoperative therapy given (including radiation and chemotherapy), whether the patient was admitted emergently prior to the scheduled surgery date, BMI, and preoperative laboratory

data including complete blood count, creatinine level, bilirubin level, and albumin level.

3. Surgery details: prophylactic use of antibiotics, type of pelvic exenteration, operative time, estimated blood loss (ml), units of packed red blood cells transfused, number and types of disciplines of involved in the operation, surgical margin, whether a myocutaneous flap was used, whether a new ileal conduit was created, whether colostomy/ileostomy was performed, and whether intraoperative radiation was given.

4. Postoperative complications: intensive care unit stay, number of consulted services, whether the physical medicine and rehabilitation (PMR) service was consulted, whether the patient required inpatient rehabilitation admission, number of documented infections, pulmonary embolism, renal insufficiency, ileus or bowel obstruction, anastomotic leak or fistula, and wound or flap dehiscence.

5. Hospitalization data: LOS after pelvic exenteration (including days in inpatient rehabilitation), rate of readmission within 3 months.

For the data analyses, we summarized the patients' characteristics using standard descriptive statistics including median, IQR, frequency, and percentage. We then examined potential risk factors for longer hospital LOS using a general linear model. Covariates from univariate analyses with a significance level of <0.1 were considered in a multicovariate model. The final model for multicovariate analysis was determined by stepwise selection based on the Schwarz-Bayesian information criterion with a significance level of 0.15. All computations were carried out using SAS 9.3 (SAS Institute, Cary, NC). A p value of 0.05 was considered statistically significant.

Results

Demographic data

Patient demographic characteristics, preoperative comorbidities, cancer diagnoses, and preoperative cancer treatments for all 100 patients are listed in Table 1. Most patients were white (n=71), and more than half of patients were either overweight or obese (n=64). Cardiovascular disease was the most common preoperative comorbid disease (n=49), followed by diabetes mellitus (n=24). About half of patients were diagnosed with gastrointestinal cancer (n=51), and gynecologic cancer was the second most frequent cancer (n=31). Sixty-eight patients had a cancer recurrence at the time of surgery. Of the preoperative treatments given before pelvic exenteration surgery, the most frequent was chemotherapy (n=60), followed by radiation therapy (n=46).

Intraoperative data and perioperative complications

In this study, all cases were total pelvic exenterations, and 100% of patients received prophylactic antibiotics. Sixty patients had ≥3 surgical disciplines involved in their surgery. The most frequent discipline involved in the surgery was urology (n=73), followed by gastrointestinal surgery (n=60) and plastic surgery (n=60). Most patients had myocutaneous

flap use (n=83). Ninety-nine patients had new ileal conduit formation, 66 had a new colostomy, and six had a new ileostomy. Postoperatively, 62 patients had an intensive care unit stay. Perioperative complications included infection (n=44), ileus or bowel obstruction (n=30), wound or flap dehiscence (n=11), and anastomotic leak/fistula (n=6). Forty-four patients were readmitted within 3 months of surgery. Seventy-five percent of patients had negative surgical margin. Twenty-three patients required PMR consult, and nine patients required admission to an inpatient rehabilitation unit (Table 2).

Hospital LOS

The median (IQR) hospital LOS was 15 days (10 to 21.5 days) (Table 2), the mean (±standard deviation) hospital LOS was 18 (±11) days. Multicovariate regression analysis showed that the factors associated with prolonged hospital LOS were low BMI, genitourinary cancer and sarcoma, ≥2 infections during the hospital stay, anastomotic leak/fistula during the hospital stay, physical medicine and rehabilitation consult, inpatient rehabilitation admission during the hospital stay, ≥2 services consulted during the hospital stay, and absence of gastrointestinal surgery discipline involvement during surgery (Table 3). When other variables in Table 3 were fixed, obesity increased the mean hospital LOS by 3 days while underweight status increased the LOS by almost 12 days compared with patients who were in a normal weight range (p=0.004). Compared with patients with gastrointestinal cancer, patients with sarcoma had a longer hospital LOS by 12.9 days (p<0.001), patients with genitourinary cancer had a longer hospital LOS by 2.5 days, and patients with gynecologic cancer had a shorter hospital LOS by 3.1 days. The number of units of packed red blood cells received during surgery did not have a significant effect on hospital LOS. Compared with patients who did not have any infections during their hospital stay, a single infection had little effect on hospital LOS, but two infections increased the hospital LOS by 10 days, while three infections increased the LOS by 32 days (p<0.001). The presence of an anastomotic leak/fistula dramatically increased the hospital LOS, by 19 days (p<0.001). A PMR consult and admission to inpatient rehabilitation increased the LOS by 4 and 6 days, respectively (p=0.015 and p=0.005, respectively). Patients who used two or more consult services had longer LOS by 5 days compared with patients who used one or none (p<0.001). Involvement of the gastrointestinal surgical team in the surgery decreased hospital LOS by 6 days (p=0.011).

Discussion

Pelvic exenteration for curative treatment of advanced malignancies in the pelvic area is known to have significant advantages in terms of overall survival as well as disadvantages such as high rates of complications, from 32% to 84%.[19–21] These complications can affect quality of life, impact recovery, and increase overall healthcare costs.[17] In this study, we identified multiple risk factors that were associated with increased hospital LOS in patients undergoing pelvic exenteration: underweight status, sarcoma or genitourinary cancer diagnosis, ≥2 infections, anastomotic leak/fistula, rehabilitation consult and inpatient rehabilitation admission, and ≥2 consultation services used.

Hospital LOS was significantly prolonged in underweight patients by 12 days (p=0.004). This result is consistent with prior studies, which showed that hospital LOS in underweight patients increased significantly after they underwent pelvic exenteration.[18] Underweight cancer patients may have malnutrition or cancer-induced cachexia, which is the result of both decreased food intake and increased energy expenditure. Cancer-related cachexia has been defined as a BMI of <20 or weight loss and sarcopenia in cancer patients.[22] Cachexia has a negative effect on the immune system, which leads to reduced lymphocyte function, impaired cellular immunity, reduced phagocyte function, and reduced killer T-cell activity. These effects may in turn be associated with postoperative complications and poorer prognosis.[7] Malnutrition in particular has been associated with a higher rate of postoperative complications [23]. Some studies have shown the usefulness of nutritional therapy to reduce healthcare costs. Although BMI is not an ideal measurement of nutritional status, it has been shown to correlate with nutritional assessments.[24] While the gold standard for nutritional assessment is still being developed, surgical teams could use BMI as a guide by aggressively applying nutritional therapy to increase patient BMI in underweight patients before surgery.

No increase in hospital LOS was observed in the overweight patients (BMI 25.0–29.9). Similar results were seen in a large study of 2,258 patients who underwent major intra-abdominal surgery, 811 (35.9%) of whom were overweight; overweight status did not increase hospital LOS or increase mobility and mortality postoperatively in that study.[25]

The current study showed that hospital LOS was prolonged slightly, by 3 days, in obese (BMI >30) patients (p=0.004). Although a previous study did not show obesity was associated with hospital LOS,[26] studies did show that obesity was associated with increased operative time, superficial wound separation, and surgical site infection.[7,26] Our study showed that obesity and a higher number of infections were both independent risk factors for prolonged hospital LOS.

Our study is the first to compare hospital LOS after pelvic exenteration between patients with different cancer diagnoses. We showed that compared with gastrointestinal cancer, sarcoma and genitourinary cancer were associated with prolonged hospital LOS by 12.9 days and 2.5 days, respectively, whereas gynecologic cancer was associated with shorter LOS by 3.1 days (p<0.001). These results are consistent with previous, non-comparison reports, where mean hospital LOS after pelvic exenteration was 21 days for rectal cancer patients[18] and 19–23 days for gynecologic cancer patients.[16,27] Since studies focusing on hospital LOS after pelvic exenteration in genitourinary cancer or sarcoma populations are scarce, further study with a larger sample size is needed to confirm our finding.

Infection is reportedly the most common postoperative morbidity after pelvic exenteration.[27] Our study is the first to show that while a single postoperative infection had little effect on the hospital LOS, two and three infections prolonged hospital LOS by 10 and 32 days, respectively. This result suggests that if infections not directly related to surgery, such as urinary tract infections or pneumonias, are prevented, the hospital LOS may be shortened.

Our study showed that anastomotic leak prolonged hospital LOS by 19 days. Anastomotic leak is inevitably associated with infection, but in this study it was an independent risk factor

for LOS. In a previous study by Teixeira et al., anastomotic leak prolonged hospital LOS even more profoundly, by a mean of 36 days.[28] Many patients with anastomotic leak require pelvic drain placement and intravenous antibiotic use.[29]

Our results also showed that gastrointestinal surgical team involvement in the pelvic exenteration surgery decreased the hospital LOS by 5 days. Although multiple teams were involved in the surgeries and 99% of the patients had gastrointestinal tract surgical manipulation, only 60% of patients had gastrointestinal surgical team involvement. The gastrointestinal surgical team may have had a special technique when approaching these surgical cases that may have contributed to the shorter hospital LOS. Further study is needed to confirm this finding and delineate the reason for it.

A consult with PMR specialists and admission to the inpatient rehabilitation unit were associated with prolonged LOS by 4 days and 6 days, respectively. The likely reason for this association is that PMR consults were requested for a deconditioned patient population. When patients develop multiple complications after pelvic exenteration, their symptoms and medical condition may lead to prolonged rest, malnutrition, and significant functional decline, which may trigger a PMR consult (23% in the current study), and if they are significantly debilitated, they may require inpatient rehabilitation admission (9% in the current study) for intense rehabilitation. The utilization of at least two consult services, another indicator for complexity of the patients' medical/surgical illness, was also associated with longer hospital LOS.

CONCLUSIONS

In patients who underwent pelvic exenteration for pelvic malignancies, post-operative infections (namely ≥2 infections) prolonged hospital LOS despite routine of use of prophylactic antibiotics. Underweight status and anastomotic leak/fistula were also associated with prolonged hospitalization. However, involvement of a gastrointestinal surgical team during surgery was associated with shorter LOS. Further study is warranted to assess whether pre-operative correction of nutritional status, prevention of postoperative infections, and involvement of the gastrointestinal surgical team improve hospital LOS.

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References

1. Kusters M, Austin KK, Solomon MJ, Lee PJ, Nieuwenhuijzen GA, Rutten HJ. Survival after pelvic exenteration for T4 rectal cancer. Br J Surg. 2015; 102(1):125–131. [PubMed: 25451182]
2. Quyn AJ, Austin KK, Young JM, et al. Outcomes of pelvic exenteration for locally advanced primary rectal cancer: Overall survival and quality of life. Eur J Surg Oncol. 2016
3. Kehoe S. Treatments for gynaecological cancers. Best Pract Res Clin Obstet Gynaecol. 2006; 20(6): 985–1000. [PubMed: 16895764]
4. Lopez MJ, Barrios L. Evolution of pelvic exenteration. Surg Oncol Clin N Am. 2005; 14(3):587–606. vii. [PubMed: 15978431]

5. Pawlik TM, Skibber JM, Rodriguez-Bigas MA. Pelvic exenteration for advanced pelvic malignancies. Annals of surgical oncology. 2006; 13(5):612–623. [PubMed: 16538402]
6. Rodriguwz-Bigas MA, Petrelli NJ. Pelvic exenteration and its modifications. Am J Surg. 1996; 171(2):293–298. [PubMed: 8619471]
7. Moghadamyeghaneh Z, Hwang GS, Hanna MH, et al. Surgical site infection impact of pelvic exenteration procedure. J Surg Oncol. 2015; 112(5):533–537. [PubMed: 26310696]
8. Speicher PJ, Turley RS, Sloane JL, Mantyh CR, Migaly J. Pelvic exenteration for the treatment of locally advanced colorectal and bladder malignancies in the modern era. J Gastrointest Surg. 2014; 18(4):782–788. [PubMed: 24203585]
9. De Wever I. Pelvic exenteration: surgical aspects and analysis of early and late morbidity in a series of 106 patients. Acta Chir Belg. 2011; 111(5):273–281. [PubMed: 22191127]
10. Ferenschild FT, Vermaas M, Verhoef C, et al. Total pelvic exenteration for primary and recurrent malignancies. World J Surg. 2009; 33(7):1502–1508. [PubMed: 19421811]
11. Gannon CJ, Zager JS, Chang GJ, et al. Pelvic exenteration affords safe and durable treatment for locally advanced rectal carcinoma. Ann Surg Oncol. 2007; 14(6):1870–1877. [PubMed: 17406945]
12. Hockel M, Dornhofer N. Pelvic exenteration for gynaecological tumours: achievements and unanswered questions. Lancet Oncol. 2006; 7(10):837–847. [PubMed: 17012046]
13. Zoucas E, Frederiksen S, Lydrup ML, Mansson W, Gustafson P, Alberius P. Pelvic exenteration for advanced and recurrent malignancy. World J Surg. 2010; 34(9):2177–2184. [PubMed: 20512493]
14. Jurado M, Bazan A, Alcazar JL, Garcia-Tutor E. Primary vaginal reconstruction at the time of pelvic exenteration for gynecologic cancer: morbidity revisited. Ann Surg Oncol. 2009; 16(1): 121–127. [PubMed: 18941843]
15. Fotopoulou C, Neumann U, Kraetschell R, et al. Long-term clinical outcome of pelvic exenteration in patients with advanced gynecological malignancies. J Surg Oncol. 2010; 101(6):507–512. [PubMed: 20401918]
16. Huang M, Iglesias DA, Westin SN, et al. Pelvic exenteration: impact of age on surgical and oncologic outcomes. Gynecol Oncol. 2014; 132(1):114–118. [PubMed: 24262877]
17. Gadducci A, Tana R, Cosio S, Cionini L. Treatment options in recurrent cervical cancer (Review). Oncol Lett. 2010; 1(1):3–11. [PubMed: 22966247]
18. Beaton J, Carey S, Solomon MJ, Tan KK, Young J. Preoperative body mass index, 30-day postoperative morbidity, length of stay and quality of life in patients undergoing pelvic exenteration surgery for recurrent and locally-advanced rectal cancer. Ann Coloproctol. 2014; 30(2):83–87. [PubMed: 24851218]
19. Sharma S, Odunsi K, Driscoll D, Lele S. Pelvic exenterations for gynecological malignancies: twenty-year experience at Roswell Park Cancer Institute. Int J Gynecol Cancer. 2005; 15(3):475–482. [PubMed: 15882172]
20. Pawlik TM, Skibber JM, Rodriguez-Bigas MA. Pelvic exenteration for advanced pelvic malignancies. Ann Surg Oncol. 2006; 13(5):612–623. [PubMed: 16538402]
21. Maggioni A, Roviglione G, Landoni F, et al. Pelvic exenteration: ten-year experience at the European Institute of Oncology in Milan. Gynecol Oncol. 2009; 114(1):64–68. [PubMed: 19411097]
22. Fearon K, Strasser F, Anker SD, et al. Definition and classification of cancer cachexia: an international consensus. Lancet Oncol. 2011; 12(5):489–495. [PubMed: 21296615]
23. Fry DE, Pine M, Jones BL, Meimban RJ. Patient characteristics and the occurrence of never events. Arch Surg. 2010; 145(2):148–151. [PubMed: 20157082]
24. Jagielak D, Wernio E, Kozaryn R, et al. The impact of nutritional status and appetite on the hospital length of stay and postoperative complications in elderly patients with severe aortic stenosis before aortic valve replacement. Kardiochir Torakochirurgia Pol. 2016; 13(2):105–112. [PubMed: 27516781]
25. Mullen JT, Davenport DL, Hutter MM, et al. Impact of body mass index on perioperative outcomes in patients undergoing major intra-abdominal cancer surgery. Ann Surg Oncol. 2008; 15(8):2164–2172. [PubMed: 18548313]

26. Iglesias DA, Westin SN, Rallapalli V, et al. The effect of body mass index on surgical outcomes and survival following pelvic exenteration. Gynecol Oncol. 2012; 125(2):336–342. [PubMed: 22261299]

27. Berek JS, Howe C, Lagasse LD, Hacker NF. Pelvic exenteration for recurrent gynecologic malignancy: survival and morbidity analysis of the 45-year experience at UCLA. Gynecol Oncol. 2005; 99(1):153–159. [PubMed: 16054678]

28. Teixeira SC, Ferenschild FT, Solomon MJ, et al. Urological leaks after pelvic exenterations comparing formation of colonic and ileal conduits. Eur J Surg Oncol. 2012; 38(4):361–366. [PubMed: 22265840]

29. Brown KG, Koh CE, Vasilaras A, Eisinger D, Solomon MJ. Clinical algorithms for the diagnosis and management of urological leaks following pelvic exenteration. Eur J Surg Oncol. 2014; 40(6): 775–781. [PubMed: 24144833]

Table 1

Patient Characteristics (N=100)

Characteristic	Value
Age, mean±SD	57.9±13.0 years
Sex: Female	42
Body mass index	
Underweight	3
Normal	31
Overweight	40
Obese	26
Race/ethnicity	
White	71
Hispanic	20
Black	6
Other	3
Marital status	
Married	74
Divorced/widowed	15
Single	11
Preoperative comorbid disease	
Cardiovascular disease	49
Respiratory disease	11
Hepatic failure (bilirubin >2 mg/dl)	15
Renal failure (creatinine >2 mg/dl)	15
Diabetes mellitus	24
Cancer diagnosis	
Gastrointestinal	51
Genitourinary	14
Gynecologic	31
Sarcoma	4
Tumor stage	
0	4
I	18
II	32
III	32
IV	14
Histology	
Adenocarcinoma	67

Characteristic	Value
Squamous cell carcinoma	16
Sarcoma	4
Melanoma	4
Other	9
Recurrence	68
Preoperative treatment	
Chemotherapy	60
Radiation therapy	46
Admission prior to scheduled surgery date	25

SD=standard deviation; Values are number of patients unless otherwise indicated

Table 2

Intraoperative and Perioperative Data (n=100)

Risk Factor	Value
Prophylactic use of antibiotics	100
Total pelvic exenteration	100
Operation time, median (IQR)	10.7 hours (9.2 to 12.2 hours)
Blood loss, median (IQR)	1950 ml (1200 to 3000 ml)
pRBC transfused, median (IQR)	4 units (3 to 7 units)
Myocutaneous flap	83
Negative margin	75
Number of disciplines involved in the surgery	
1	25
2	15
3	39
4	21
Disciplines involved in the surgery	
Gastrointestinal surgery	60
Urology	73
Gynecology	31
Plastic surgery	60
Other	31
Ileal conduit creation	99
Colostomy/Ileostomy	66/6
Intraoperative radiation	15
Intensive care unit stay	62
Post-operative complications	
Infection	44
Pulmonary emboli	3
Renal insufficiency	2
Ileus or bowel obstruction	30
Anastomotic leak/fistula	6
Wound/flap dehiscence	11
PMR consult	23
Inpatient rehabilitation stay	9

Risk Factor	Value
Hospital length of stay, median (IQR)	15 days (10 to 21.5 days)
Readmission within 3 months	44

pRBC=packed red blood cells; IQR=interquartile range; PMR=physical medicine and rehabilitation

Values are number of patients unless otherwise indicated.

Table 3

Multicovariate Regression Analysis on Hospital Length of Stay

Risk factors	Level	Estimate (95% confidence intervals)	*p* value
BMI	Obese vs normal	3.059 (−0.061 – 6.179)	0.004
	Overweight vs normal	0.701 (−2.119 – 3.521)	
	Underweight vs normal	11.888 (5.199 – 18.577)	
Cancer type	GU vs GI	2.467 (−1.063 – 5.997)	<.001
	Gyne vs GI	−3.091 (−8.028 – 1.846)	
	Sarcoma vs GI	12.889 (6.468 – 19.31)	
Units of pRBC transfused during surgery		0.262 (−0.032 – 0.556)	0.083
Number of infections	3 vs 0	31.793 (20.899 – 42.687)	<.001
	2 vs 0	10.066 (5.958 – 14.174)	
	1 vs 0	1.216 (−1.536 – 3.968)	
Anastomotic leak	Yes vs no	19.071 (12.562 – 25.58)	<.001
Rehabilitation admission	Yes vs no	6.491 (2.075 – 10.907)	0.005
PM&R consult	Yes vs no	4.375 (0.923 – 7.827)	0.015
Number of consultations	2–7 vs 0–1	5.111 (2.489 – 7.733)	<.001
GI surgical team involvement in the surgery	Yes vs no	−5.842 (−10.281 – 1.403)	0.011

BMI=body mass index; GU=genitourinary cancer; GI=gastrointestinal cancer; Gyne=gynecologic cancer; pRBC=packed red blood cells; PM&R=physical medicine and rehabilitation