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Predictors of Hospital Readmission in Patients Undergoing Creation of an Intestinal Ostomy

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VIDEO ABSTRACT

ABSTRACT

PURPOSE: The purpose of this study was to identify predictors of 30- and 60-day hospital readmission in patients undergoing ileostomy or colostomy creation.

DESIGN: A retrospective, cohort study.

SAMPLE AND SETTING: The study sample comprised 258 patients who underwent ileostomy or colostomy creation from 2018 to 2021 in a suburban teaching hospital in the northeastern United States. The mean age of participants was 62.8 (SD 15.8) years; half were female and half were male. Slightly more than half 50.3% (n = 130) and 49.2% (n =127) underwent ileostomy surgery.

METHODS: Data were abstracted from the electronic medical record and included the following variable categories: demographic factors, ostomy- and surgical-related factors, and ostomy- and surgical-related complications. Study outcome measures were readmission within 30 and 60 days from the index hospital admission discharge date. Predictors of hospital readmission were analyzed using bivariate testing, followed by multivariate analysis.

RESULTS: Within 30 days of the index hospitalization, 49 patients were readmitted (19%), and 17 patients were readmitted (6.6%) within 60 days. For readmissions within 30 days, anatomical location of the stoma in the ileum and transverse colon as compared to descending/sigmoid colon stomas emerged as significant predictors (odds ratio [OR] 2.2; P = .036; confidence interval [CI] 1.05-4.85; OR 4.5; P = .036; CI 1.17-18.53, respectively). Within 60 days, length of the index hospitalization from 15 to 21 days as compared to shorter lengths of hospitalization emerged as the only significant predictor at this timeframe (OR 6.62; P = .018, CI 1.37-31.84).

CONCLUSIONS: These factors provide a basis for identifying patients at higher risk for hospital readmission following ileostomy or colostomy surgery. For patients at higher risk for readmission following ostomy surgery, heightened surveillance and management in the immediate postoperative period may be necessary to avert potential complications.

KEY WORDS: Colostomy, Complications, Hospital readmission, Ileostomy, Ostomy, Risk factors.

INTRODUCTION

A large archive of data from approximately 25% of all hospital admissions in the United States suggests that more than 110,000 new ostomies are created annually.[1] For patients undergoing ostomy surgery, the risk for hospital readmission is high. In studies that have examined readmissions following colostomy or ileostomy creation, rates are reported in the range of 15% by 30 days, with 28% to 42% of readmissions occurring in the first 12 days following surgery.[2,3] Reasons for readmission are multifactorial. Factors cited in the literature include dehydration from a high-output ileostomy, surgical site infection, anastomotic leaks, the presence of multiple comorbidities, inflammatory bowel disease, discharge disposition to subacute rehabilitation facility, and lack of commercial insurance.[2-6]

Currently, there is insufficient evidence closely examining the contributing factors to hospital readmission. Identifying and understanding these risk factors is the first step to determining strategies in which to decrease these rates. WOC nurses in the acute care and postacute care settings are also poised to play a key role in mitigating these rates. The purpose of this study was to examine predictors of hospital readmission within 30 and 60 days of the index hospitalization in patients undergoing ileostomy or colostomy creation.

METHODS

This study used a retrospective cohort design. The setting was a 500-bed Magnet teaching hospital located in the Northeast United States. The target population was patients undergoing intestinal ostomy surgery during the years 2018-2021. Inclusion criteria were: (1) 18 years or older and (2) creation of new intestinal ostomy during the index hospitalization. Patients younger than 18 years or with a preexisting ileostomy/colostomy were excluded.

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Data Collection

Medical records were drawn from archived lists created by the hospital's WOC nursing service. Data for descriptive and analytic purposes were abstracted from the electronic medical record and recorded on a data collection record developed for this study. All data recorded were devoid of any patient identifiers. Medical/surgical staff nurses were recruited and trained to assist with data abstraction.

The main outcome measures for this study were readmission within 30 and 60 days from the index hospital admission discharge date. The following independent variables were abstracted: demographic and pertinent clinical data including age, sex, race, insurance source, hospital length of stay, admitting diagnosis, gastrointestinal (GI) diagnosis at admission, and body mass index. We also collected data on comorbid conditions including diabetes mellitus, peripheral vascular disease, active oncology diagnosis, cardiovascular disease, end-stage renal disease, pulmonary disease, liver disease, and history of ostomy. Additional data were collected on neoadjuvant treatments (chemotherapy and radiotherapy), immunosuppressive therapy, steroid therapy, smoking status, disposition at discharge, and patient mortality (during the admission and within 30 or 60 days post-discharge).

Ostomy- and surgical-related data collected included type of ostomy (colostomy, ileostomy, and jejunostomy); anatomic location of the ostomy (jejunum, ileum, transverse colon, and descending/sigmoid colon); type of stoma (end vs loop); ostomy status (permanent vs temporary); preoperative stoma site marking; and other surgical procedures performed during ostomy creation. Perioperative-related data collection also included American Society of Anesthesiology (ASA) score[7]; surgical approach (robotic, open, and laparoscopic); case type (elective vs emergent); and duration of surgical procedure (measured in hours).

Data were collected related to complications during the index hospitalization. These data included ostomy-related (leakage-appliance failure, mucocutaneous separation, peristomal irritation, stoma retraction, stoma ischemia, and high output) and surgical-related complications (surgical site infection, dehiscence, anastomotic leak, abdominal abscess, ileus, or other).

Data Analysis

Data were analyzed using R Version 4.2.2 (R Core Team and the R Foundation for Statistical Computing, Indianapolis, Indiana). Descriptive statistics including frequency distributions for all study variables were analyzed. Correlations between each study variable and the dependent variables were analyzed using pairwise χ^2 tests of independence. All study variables significantly associated with the dependent variables in the correlational analyses with a P value of $\leq .100$ were entered into the multivariable analyses. Multivariable analyses were conducted using multiple binary logistic regression to determine the variables that significantly predicted readmission within 30 and 60 days. To assess the predictive performance of the statistical models, Tjur's pseudo-R^2 and the area under the curve based on the receiver operating characteristic were calculated. In addition, the percentage of correction predictions was assessed, which is the sum of predicted probabilities where a patient was readmitted, plus the sum of (1 – predicted probabilities) where a patient was not readmitted, divided by the total number of observations. Study procedures were reviewed by the Englewood Health Institutional Review Board and deemed to be exempt from individual informed consent.

RESULTS

Demographic and sample characteristics are summarized in Table 1. The sample comprised 258 patients, evenly split between males and females. Their mean age was 62.8 years (SD 15.8). A majority 61.6% (n = 159) were White, followed by Hispanic at 12.4% (n = 32). Length of index hospitalization was analyzed categorically, with the majority of patients discharged within the first week (1-7 days) following surgery (48.6%; n = 125). The 2 most frequent reported comorbid conditions were active oncology diagnosis (n = 114; 44.2%) and cardiovascular disease (n = 100; 38.8%). The most common admitting hospital diagnosis was medical or surgical GI-related issue (n = 217; 84%). The most common GI-related diagnoses reported related to cancer (n = 88; 34.1%). Most patients were discharged to home with home health care services (n = 153; 59.3%) and the majority were insured (96%; n = 248). Fifteen patients died during the index hospitalization, 3 died within 30 days post-admission, and 4 died within 60 days.

Ostomy- and surgery-related factors are summarized in Table 2. Slightly more than half of participants (n = 130, 50.3%) underwent ileostomy surgery, 49.2% (n = 127) had colostomy surgery, and one (0.4%) underwent jejunostomy creation. As noted earlier, 50.3% (n = 130) had an ostomy located in the ileum, while 44.2% had an ostomy of the descending or sigmoid colon (n = 114), and 5% (n = 13) had a transverse colostomy. One patient had a jejunal ostomy. End stomas were created in 165 (65.5%) patients and loop stomas in 89 (35.5%). The most common surgical procedure performed was Hartmann's procedure (n = 53; 20.5%), followed by colon resection with ostomy creation (n = 47; 18.2%). Most had a robotic-assisted laparoscopic procedure (n = 96; 36.8%) or open approach (n = 92; 36%). Most cases (65%; n = 168) were performed under elective status. The mean intraoperative length of surgery was 3.7 hours (SD 2.1) and the mean ASA score was 2.7 (SD 0.71), equating to a risk score that leans toward category III. A category III has severe systemic disease with functional limitations and one or more moderate to severe comorbid diseases.[7] Fifty-one percent of patients (n = 131) had a stoma marking done preoperatively. A majority of ostomies were temporary (56.6%; n = 146).

Ostomy- and surgical-related complications are summarized in Table 3. The highest reported ostomy-related complication was high-output stomas (n = 28; 10.9%) followed by peristomal skin irritation at 9.7% (n = 25). Upon closer examination of ostomy complications and ostomy type, having an ileostomy was significantly associated with leakage from the pouching system ($\chi^2 = 17.1$; $P < .001$), high-output ostomy ($\chi^2 = 32.7$; $P < .001$), and peristomal skin damage ($\chi^2 = 10.9$; $P = .012$). Patients with loop ostomies were more likely to have a high-output ostomy ($\chi^2 = 9.5$; $P = .002$). Abdominal abscess was the most frequent surgical complication (n = 30; 11.6%).

The number of patients readmitted within 30 or 60 days of discharge was 66, including 6 patients who were admitted at both time points. Forty-nine (19%) were readmitted within 30 days and 17 (6.6%) were readmitted within 60 days. At 30 days, the most frequently reported reason for hospital readmission was infection/sepsis (n = 18; 7%). At 60 days,

TABLE 1.
Demographic and Pertinent Clinical Characteristics (n = 258)

Variable	n (%)[a]
Age, mean (SD), range, y	62.8 (15.8), 19-97
Gender	
Male	129 (50)
Female	129 (50)
Race	
White	159 (61.6)
Hispanic	32 (12.4)
Asian/Pacific Islander	30 (11.6)
Black/African American	22 (8.5)
Other	14 (5.4)
Native American	1 (0.4)
Length of admission	
1-7 d	125 (48.4)
8-14 d	75 (29.1)
15-21 d	28 (10.9)
>21 d	29 (11.2)
BMI, mean (SD), range	27.4 (7.4), 12-74
Admitting diagnosis	
GI medicine	115 (44.6)
Elective GI (surgery)	102 (39.5)
Oncology	15 (5.8)
Infection/sepsis	12 (4.7)
Other	13 (5.0)
Cardiopulmonary	1 (0.4)
GI condition at admission	
Cancer (colon, rectal, other)	90 (34.1)
Diverticulitis (with/without perforation)	46 (17.9)
Inflammatory bowel disease	43 (16.7)
Bowel obstruction	27 (10.5)
Bowel perforation	26 (10.1)
Other	25 (9.7)
Fistula	2 (0.8)
Clostridium difficile infection	1 (0.4)
Comorbidities	
Active oncology diagnosis	114 (44.2)
Cardiovascular disease	100 (38.8)
Diabetes mellitus	48 (18.6)
History of ostomy (closed at the time of surgery)	41 (15.9)
Pulmonary disease	25 (9.7)
Peripheral vascular disease	20 (7.8)
End-stage renal disease	18 (7)
Liver disease	11 (4.3)
Neoadjuvant chemotherapy	56 (21.7)
Neoadjuvant radiation	32 (12.4)
Immunosuppressant therapy	12 (4.7)
Steroids preoperatively	25 (9.7)
Smoking status	
Never	175 (67.8)
Former	61 (23.6)
Current	22 (8.5)
Discharge disposition	
Home with visiting nurse	153 (59.3)
Subacute rehabilitation facility	48 (18.6)
Home with no visiting nurse	30 (11.6)
Died	15 (5.8)
Other	6 (2.3)
Long-term acute care hospital	3 (1.2)
Acute rehabilitation center	3 (1.2)
Insurance status	
Insured	249 (96)
Uninsured	9 (4)

(*continues*)

TABLE 1.
Demographic and Pertinent Clinical Characteristics (n = 258) (*Continued*)

Abbreviations: BMI, body mass index; GI, gastrointestinal.
[a]All values are n (%) except where indicated.

17 patients were readmitted (6.6%); a GI medical diagnosis was the most common reason for readmission (n = 5; 1.4%), followed closely by infection/sepsis (n = 4; 1.3%). The average length of readmission at 30 days was 8.4 days (SD 8.4) and at 60 days it was 7 days (SD 6.4). At 30 days, 6 of the 49 patients were readmitted with concomitant ostomy-related complications; 4 of these patients (80%) were described as having ostomy pouching system problems. At 60 days, 3 of the 17 readmitted patients also experienced ostomy complications with 66% (n = 2) due to pouching system problems.

Emergency department (ED) visits within 30 and 60 days were also examined. Within 30 days, 26 (10%) patients were treated in the ED and of those 7 (2.7%) reported the visit to be ostomy related. At 60 days, 13 (5%) patients were treated in the ED and ostomy-related issues were found in only 4 (1.6%) of the sample.

Study variables that were associated with readmission within 30 days with a P value of ≤ .100 were entered into the multiple binary logistic regression model. These variables were: cardiovascular disease (P = .051), end-stage renal disease (P = .036), active oncology diagnosis (P = .071), higher length of index hospitalization (P = .051), admitting hospital diagnosis (P = .100), anatomic location of the stoma (P = .041), and leakage from the pouching system (P = .001). The anatomic location of the ostomy was the only significant predictor to emerge from the multivariable analysis (P = .025). Further pairwise contrasts revealed that patients who had a stoma in the transverse colon as compared to the descending/sigmoid colon were 4.5 times more likely to be readmitted within 30 days (odds ratio [OR] 4.529, 95% confidence interval [CI] 1.107-18.531, P = .036), while those with an ileal stoma as compared to the descending/sigmoid colon stoma were more than twice as likely to be readmitted within 30 days (OR 2.263, 95% CI 1.055-4.854, P = .036; Table 4).

This analytic process was repeated for readmissions within 60 days. Significant associations were found for length of index hospitalization (P = .060), high-output stoma (P = .011),

TABLE 2.
Ostomy- and Surgery-Related Characteristics (n = 258)

Variable	n (%)[a]
Type of ostomy	
Ileostomy	130 (50.3)
Colostomy	127 (49.2)
Jejunostomy	1 (0.4)
Stoma anatomic location	
Ileum	130 (50.4)
Descending/sigmoid colon	114 (44.2)
Transverse colon	13 (5)
Jejunum	1 (0.4)
Ostomy status	
Temporary	146 (56.6)
Permanent	112 (43.4)
Type of stoma created	
End	169 (65.5)
Loop	89 (35.5)
Preoperative stoma marking	131 (51)
ASA score, mean (SD)	2.7 (0.71)
Surgical procedure	
Hartmann's procedure	53 (20.5)
Colon resection with ostomy	47 (18.2)
Lower anterior resection/ileostomy	31 (12)
Abdominoperineal resection	29 (11.2)
Diversion for obstruction	22 (8.5)
Subtotal colectomy	20 (7.8)
Diversion for fistula	12 (4.7)
All other	44 (17)
Type of surgical procedure	
Robotic	96 (37)
Open	92 (36)
Laparoscopic	70 (27)
Case type	
Elective	168 (65)
Emergent	90 (35)
Intraoperative time, mean (SD), h	3.7 (2.1)

Abbreviation: ASA, American Society of Anesthesiologists.
[a]All n (%) except where indicated.

TABLE 3.
Ostomy- and Surgical-Related Complications (n = 258)

Ostomy-Related Complications	n (%)	Surgical-Related Complications	n (%)
High output	28 (10.9)	Abdominal abscess	30 (11.6)
Peristomal skin damage	25 (9.7)	Anastomotic leak	15 (5.8)
Leakage (pouching system failure)	16 (6.2)	Dehiscence	11 (4.3)
Mucocutaneous separation	11 (4.3)	Ileus	10 (4)
Stoma ischemia	9 (3.5)	Surgical site infection	8 (3.1)
Stoma retraction	4 (1.6)	Other complications	31 (12)

anastomotic leak ($P = .031$), and ileus ($P = .002$). Hospital length of index hospitalization was the only significant predictor to emerge using multivariable analysis ($P = .054$). Further pairwise contrasts revealed that patients with index hospitalizations between 15 and 21 days as compared to shorter lengths of admission were 6.6 times more likely to be readmitted within 60 days (OR 6.622, 95% CI 1.377-31.848, $P = .018$; Table 5).

DISCUSSION

Patients who undergo intestinal ostomy surgery are reported to have high rates of rehospitalization.[1-4,8] Identifying the risk factors that contribute to these readmissions is an important first step to reversing this trend. Therefore, the overall purpose of this study was to determine significant predictors of hospital readmission within 30 or 60 days for patients undergoing intestinal ostomies. Results of this study highlighted 2 significant risk factors predictive of readmission in this population, anatomical location of the stoma in either the transverse colon or ileum and the length of the patient's index hospitalization.

Our overall readmission rate at 30 days was 19% and was consistent with the previous literature. Kim and Hall[2] reported an overall readmission rate of 14% at 30 days for patients undergoing ileostomy surgery, while Sanaiha and colleagues[3] reported a rate of 15.3%. In one study, readmission rates at 30 days were reported as high as 30% for those undergoing ileostomy surgery.[9] At 60 days, our readmission rate dropped to 6.6%, while in previous studies, reported 60-day readmission rates have been higher following ileostomy creation at 21%[4] and 28%.[10]

In our study, the anatomic location of the ostomy emerged as a significant predictor for those readmitted within 30 days of the index hospitalization. We examined anatomic location of the stoma in addition to type of ostomy, as this can yield important information with regard to the type and character of effluent experienced by patients. In regression analysis, patients with an ileal stoma (ileostomy) or a transverse colostomy were more likely to be readmitted within 30 days when compared to those with a descending/sigmoid stoma. Findings from prior studies indicated that patients with ileostomies have higher hospital readmission rates; factors cited as predictive of readmission in this subgroup are variable and include dehydration, loop ostomies, high-output ostomies, anastomotic leaks, surgical site infection, and longer lengths of stay during index hospitalization.[4-6,9-11] While some predictors such as dehydration and high-volume output are usually linked to ileostomies, they also may occur in patients living with transverse colostomies.

In order to better understand this predictor, we further analyzed ostomy- and surgical-related complications and the anatomical location of the stoma. However, we did not find any significant associations between any surgical complications and anatomical location of the ostomy. In contrast, we found significant associations between ostomies of the ileum and stomas with high-volume effluent, leakage from the pouching system, and peristomal skin irritation during the index hospitalization. For those readmitted within 30 days, 5 out of the 49 patients also had issues related to the ostomy including frequent pouching system leakage (n = 4), and peristomal skin damage (n = 1), with all of these patients undergoing ileostomy creation. One patient with a jejunal stoma developed

TABLE 4.
Logistic Regression Analysis: 30-Day Readmission[a]

	Estimate (Regression Beta or Model Performance)	*P* Value	Odds Ratio (Confidence Interval)
Cardiovascular disease	0.687	.059	1.987 (0.974 to 4.053)
End-stage renal disease	0.984	.096	2.674 (0.841 to 8.509)
Active oncology diagnosis	−0.664	.071	0.515 (0.250 to 1.060)
Leakage	0.685	.286	1.984 (0.564 to 6.984)
Admission diagnosis	0.902	.146	2.464 (0.731 to 8.307)
Length of index hospital admission		.661	
Contrasts (length of index hospitalization)			
wk 1 vs wk 2	0.035	.932	1.036 (0.459 to 2.340)
wk 1 vs wk 3	0.208	.713	1.232 (0.405 to 3.743)
wk 1 vs wk 4+	0.729	.217	2.073 (0.652 to 6.596)
wk 2 vs wk 3	0.173	.771	1.189 (0.371 to 3.811)
Anatomic location (see contrasts)		*.025*	
Contrasts (location)			
Colon vs transverse	1.511	*.036*	*4.529 (1.107 to 18.531)*
Colon vs ileostomy	0.817	*.036*	*2.263 (1.055 to 4.854)*
Transverse vs ileostomy	−0.694	.310	0.500 (0.131 to 1.907)
Colon vs jejunostomy	16.559	.985	Inf (0, inf)
Transverse vs jejunostomy	15.049	.986	Inf (0, inf)
Ileostomy vs jejunostomy	15.743	.986	Inf (0, inf)
Intercept	−3.124	<.001	*0.044 (0.011 to 0.181)*

Abbreviation: Inf, infinity.
[a]Pseudo-R^2 (Tjur) = 0.133. Percentage of correct predictions: 73.23%. Receiver operating characteristic area under curve: 71.76%.

a stomal prolapse and was readmitted within 30 days. At 60 days, appliance failure occurred in 2 of the 17 patients and both were living with an ileostomy.

Incidence rates of peristomal and stomal complications, especially in the first months following surgery, have been reported to be as high as 63%.[12] Salvadalena and colleagues evaluated 153 patients who underwent abdominal ostomy surgery and reported that those living with an ileostomy were 10 times more likely to develop severe peristomal skin complications defined as higher scores on the DET (deterioration, erosion and tissue) domains of the Ostomy Skin Tool as compared to those with a colostomy.[13,14] This result is consistent with our findings. Higher medical costs and longer hospitalizations have been associated with patients who experience peristomal skin complications,[15] thus contributing to their overall burden of illness and potentially impacting health-related quality of life.

TABLE 5.
Logistic Regression Analysis: 60-Day Readmission[a]

	Estimate (Regression Beta or Model Performance)	*P* Value	Odds Ratio (Confidence Intervals)
High output ("yes")	0.470	.480	1.600 (0.434 to 5.900)
Anas leak ("yes")	1.233	.111	3.431 (0.754 to 15.604)
ileus ("yes")	1.573	.070	4.823 (0.881 to 26.413)
Length of index hospital admission (see contrasts)		*.054*	
Contrasts (length of index hospital admission)			
wk 1 vs wk 2	1.050	.158	2.858 (0.666 to 12.273)
wk 1 vs wk 3	1.890	*.018*	*6.622 (1.377 to 31.848)*
wk 1 vs wk 4+	−0.227	.854	0.797 (0.071 to 8.912)
wk 2 vs wk 3	0.840	.188	2.317 (0.663 to 8.095)
wk 2 vs wk 4+	−1.277	.253	0.279 (0.031 to 2.496)
wk 3 vs wk 4+	−2.118	.066	0.120 (0.013 to 1.149)
Intercept	−3.742	<.001	*0.024 (0.008 to 0.075)*

[a]Pseudo-R^2 (Tjur) = 0.108. Percentage of correct predictions: 88.98%. Receiver operating characteristic area under curve: 78.97%.

Salvadalena and colleagues[13] also reported that patients with peristomal skin creases were approximately 3 times more likely to experience a peristomal skin complication as compared to those with no creases. Our study was a retrospective review of existing data, and we were unable to evaluate the influence of abdominal contour on peristomal skin complications. Slightly more than half of our patients (51%) underwent preoperative stoma siting and of these, 116 (88%) underwent elective procedures. Specifically, 75 out of 130 (57.6%) with ileostomies underwent stoma site marking, while only 3 of 10 (30%) patients with transverse colostomies had preoperative stoma site marking. This lower proportion may reflect the number of emergent cases within the sample prohibiting stoma site marking by WOC nurses. Nevertheless, we did not find any significant associations between stoma complications and preoperative stoma site marking by WOC nurses. Preoperative stoma site marking is a long-standing practice, endorsed by the Wound, Ostomy and Continence Nurses Society and the American Society of Colon or Rectal Surgeons.[16] In a recent meta-analysis, Hsu and colleagues[15] reported that stoma site marking was significantly associated with fewer parastomal hernias as well as fewer peristomal skin complications in patients with fecal stomas, affirming its value in minimizing some ostomy complications. Our findings may indicate an opportunity to improve preoperative stoma site marking.

Longer lengths of stay in the index hospitalization emerged as our second significant predictor within 60 days. Patients with index admissions varying from 15 to 21 days were found to be 6.6 times more likely to be readmitted when compared to those with lengths of stay shorter than 8 days. Fewer studies have examined readmission rates for intestinal ostomates up to 60 days. In one study of patients who underwent colorectal surgery procedures, significant predictors for readmission up to 60 days included loop stoma creation, higher Charlson comorbidity index scores, and intraperitoneal infections.[4] Phatak and associates[10] reported that dehydration was the most common reason for readmission within 60 days, which consequently resulted in delays in initiating adjuvant chemotherapy. In 2 studies that examined the impact of longer index hospitalizations, dehydration was found to be predictive at 30 days, but not 60 days.[5,8] In these studies, index hospitalizations were variable at lengths from as short as 4 days[8] to 1 week[17] and as long as 12 to 15 days.[5]

While it is tempting to deduce that longer lengths of hospitalization might be a proxy for postoperative burden of illness, including surgically related issues, bivariate analysis in our study analysis suggested 2 surgical complications (anastomotic leak and postoperative ileus) and 1 ostomy-related complication (high-output ostomy) were associated with a higher likelihood of hospital readmission. Other factors such as age and comorbidities were not found to be significantly associated with a 60-day readmission; however, at 30 days cardiovascular disease, end-stage renal disease, and active oncology diagnosis emerged as significant in bivariate analysis.

Implications for Clinical Practice and Research

Our research findings have highlighted important clinical considerations for care of ostomy patients in the postoperative period. For patients at higher risk for readmission following ostomy surgery such as those with ileostomies, or transverse ostomies or those with longer index hospitalizations, heightened surveillance in the immediate postoperative period may be needed to avert potential complications. We assert that communication and follow-up with the WOC nurse is a crucial part of this surveillance. In a study by Zheng and colleagues,[18] the introduction of a follow-up phone program for patients was successful in addressing stoma problems in a timely manner as well as providing psychological support to the ostomate. Ayik and coworkers[19] studied ostomy complications in 572 participants and found that strong outpatient support by the WOC nurse was needed to promptly address potential peristomal complications. Similar to our study, patients with ileostomies were found to be at highest risk for peristomal complications.

In our sample, 80% (n = 39) of patients readmitted within 30 days had been discharged to either home with a visiting nurse or a subacute rehabilitation facility during the index hospitalization. Both of these settings provide resources to help transition the postoperative patient. This finding highlights the importance of communication regarding ostomy-related needs of patients moving from an acute to a postacute care setting. This transition may include follow-up phone calls by the WOC nurse, provision of adequate ostomy supplies to cover the initial days after discharge, and written instructions for specific ostomy pouching needs. The WOC nurse in acute care might also consider partnering with local skilled nursing facilities and home care agencies to provide education and support to facility staff to make the care transition smoother.

Zelga and colleagues[20] completed a scoping literature review and identified lack of a WOC or ostomy nurse specialist, especially in the preoperative period as associated with a higher likelihood of stoma or peristomal complications. In our local geographic area, the current nursing shortage accelerated by the aging WOC nurse workforce and the COVID-19 pandemic has resulted in an absence of WOC nurses/ostomy specialty nurses both in home care agencies and in subacute rehabilitation facilities. This acute shortage of WOC nurses is an immediate concern with regard to the knowledge and comfort level of staff in providing ostomy care. Additional research is needed to determine whether this shortage is associated with a higher rate of hospital readmissions. Clinical practice guidelines established by the American Society of Colon and Rectal Surgeons strongly support the need for the specialty providers such as the WOC nurse in both the preoperative and postoperative phases for the patient undergoing ostomy surgery.[21] In a systematic review, Heerschap and Duff[22] identified that WOC nurses provide 9 key value-added services to patients including teaching and mentoring, with the most evidence supporting improved quality of life for ostomates. Therefore, the significant contributions of WOC nurses to patients with ostomies cannot be underestimated.

For patients at risk for readmission, heightened postoperative follow-up by the surgeon is also warranted, which may include more frequent postoperative office visits for earlier detection of impending complications. In patients with high-output stomas, prescribed algorithms to manage output have been developed and can provide a systematic approach to management of this condition.[23-25]

Patient engagement in this process is another facet of care to consider in patients at high risk for readmission. In 2 studies, the use of an ileostomy pathway inclusive of standardized patient education, and instructions for self-monitoring, was found to reduce the readmission rates.[26,27]

Opportunities abound for future research based on the results of this study. Studies examining the prevalence of WOC/ostomy specialist resources within the home-health and postacute care settings are needed to demonstrate the effects of a paucity of WOC/ostomy specialists within these levels of care. Research that examines the impact of increased surveillance as well as the integration of formalized protocols to manage high-output stomas on hospital readmission rates would also be worthwhile to determine the need for routine integration of these practices in the postoperative care of high-risk ostomy patients.

Strengths and Limitations

We recognize limitations to this study. Data were collected at a single-site study, which limits the generalizability of our findings. Our readmission timeframe was limited to 60 days; therefore, readmissions beyond this timeframe were unknown. However, we chose this timeframe to be consistent with the timeframes reported in the literature. Strengths of this study include the ability of our study team to obtain detailed information regarding each patient's admission from the electronic medical record. Partnering with medical/surgical staff nurses who were agile with the use of the electronic medical record was also integral to accurate and efficient data abstraction.

CONCLUSIONS

While the vast majority of these patients undergoing ostomy surgery will not encounter postoperative complications resulting in hospital readmission, there is a subset of patients that will. In this study, having an ileostomy or transverse colostomy were predictors of rehospitalization within 30 days, while longer index hospitalizations ranging from 15 to 21 days were predictors of readmission within 60 days. Identifying at-risk patients, developing a plan for heightened surveillance, and follow-up are essential strategies to minimize the risks associated with rehospitalization. By providing a more coordinated approach to care in the postoperative period for high-risk ostomy patients, improved patient outcomes can be realized for this vulnerable cohort of hospitalized patients.

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