

Research Article

Readmission After Ileostomy Creation: A Retrospective and Prospective Observational Study of Causes, Management and Clinical Risk Factors

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Abstract: **Introduction:** Ileostomy is frequently used for fecal diversion, but readmission after stoma creation remains common and is often related to potentially preventable complications, particularly dehydration. **Objective:** To evaluate the causes of readmission after ileostomy creation and describe clinical factors associated with readmission in a tertiary-care surgical population. **Methods:** This single-center retrospective and prospective observational study was conducted at Birsa Munda Government Medical College Shahdol. Hospital records from September 2022 to August 2025 were reviewed. Among 193 patients with new ileostomies, 31 patients readmitted within 90 days were included in the analytic cohort. Demographic, comorbidity, operative, laboratory and postoperative variables were assessed. **Results:** The 90-day readmission rate was 16.1% (31/193). Twenty patients (64.5%) were male and 11 (35.5%) females; mean age was 45.8±14.3 years. Ileostomy was most commonly created for ileal perforation (41.9%) and obstruction (35.5%). Dehydration was the leading cause of readmission (45.2%), followed by stoma obstruction (22.6%) and surgical-site infection (16.1%). Mean interval from ileostomy creation to readmission was 28.03 days, and mean interval from discharge to readmission was 20.64 days. Most patients were managed conservatively (80.6%), while 19.4% underwent surgery. Twenty-nine patients (93.5%) were discharged and two (6.5%) died during the readmission admission. Within the readmitted cohort, total leukocyte count was reported as significantly associated with age-stratified readmission characteristics ($P=0.01$), suggesting an important role for infection/sepsis in older patients. **Conclusion:** Readmission after ileostomy was clinically important, with dehydration accounting for nearly half of readmissions. Early identification of high-risk patients, structured stoma education, monitoring of stoma output and renal function, and early post-discharge follow-up may reduce preventable readmissions.

Keywords: Ileostomy; readmission; dehydration; high-output stoma; stoma obstruction; renal dysfunction; postoperative complications; colorectal surgery

INTRODUCTION

Ileostomy is a commonly performed surgical procedure used to divert fecal stream, protect a distal anastomosis, manage contamination or obstruction, or provide definitive diversion when restoration of intestinal continuity is not feasible. Although often technically straightforward, a new ileostomy produces substantial physiological and behavioral changes. Loss of colonic water and electrolyte absorption can result in high-output stoma, dehydration, electrolyte abnormalities and acute kidney injury. In addition, mechanical and local stoma complications such as obstruction, retraction, prolapse, stenosis and infection may require emergency assessment or hospitalization. Readmission therefore represents an important patient-safety and healthcare-utilization outcome.

The literature consistently identifies dehydration as a leading cause of unplanned readmission after ileostomy. Fish et al. reported that readmission was common and that serious postoperative complications, comorbidity burden and loop stoma were important predictors, while dehydration was particularly associated with later and

repeated readmission. [1] Messaris et al. similarly identified dehydration as the most common indication for readmission after diverting ileostomy creation and found postoperative diuretic use to be an important risk factor. [3] The present thesis was designed in this clinical context and specifically sought to determine the causes of readmission and factors associated with this event in a tertiary-care Indian surgical population.

More recent evidence supports the magnitude of the problem. A 2022 systematic review and meta-analysis including 71 studies and 82,451 patients estimated a pooled all-cause readmission rate of about 20% within 30 days, with dehydration-related readmission around 6%. The review emphasized that dehydration is potentially avoidable and carries substantial healthcare cost. [4] A systematic review focused on dehydration risk factors found that age ≥ 65 years, obesity, diabetes, hypertension, renal comorbidity, regular diuretic use, ileal pouch-anal anastomosis and shorter index length of stay were associated with dehydration-related readmission. [5]

Renal dysfunction is particularly important because ileostomy-related fluid loss may produce recurrent volume depletion and acute kidney injury, with potential progression to chronic renal impairment. In a New Zealand tertiary-center cohort, renal impairment at discharge and a Clavien-Dindo grade I complication independently predicted all-cause readmission; renal impairment, codeine prescription, comorbidity burden and BMI were associated with dehydration-related readmission. [2] Other studies have demonstrated associations between high stoma output, baseline creatinine, open surgery and higher ASA status and readmission for high-output dehydration. [6]

Importantly, readmission is not inevitable. Structured education and standardized ileostomy pathways have been shown to reduce dehydration and overall hospital returns. Van Loon et al. reported reductions in 30-day readmission and high-output/dehydration readmission after implementation of an ileostomy pathway. [7] Patient-centered protocols, early post-discharge contact, intake/output monitoring and targeted hydration strategies are therefore clinically relevant interventions.

The present study aimed to evaluate the causes of readmission after ileostomy creation and to identify clinical characteristics associated with readmission in patients treated at a tertiary-care center in central India.

MATERIALS AND METHODS

Study design and setting. This was a retrospective and prospective observational single-center study conducted in the Department of Surgery birsa munda government medical college shahdol. Hospital records from September 2022 to August 2025 were reviewed. The thesis describes a planned cohort of 60 patients for the prospective study component, with 30 retrospective and 30 prospective cases; however, the final results identify 193 new ileostomies during the overall study period, of whom 31 patients were readmitted within 90 days and formed the analytic readmission cohort.

RESULTS

During the study period, 193 new ileostomies were created and 31 patients were readmitted within 90 days, corresponding to a 90-day readmission rate of 16.1%. The thesis flow chart describes 14 retrospective and 17 prospective readmitted patients. [8] Among the readmitted cohort, 20 (64.5%) were male and 11 (35.5%) females. The largest age group was 40–50 years (10/31; 32.3%), and mean age was 45.8±14.3 years.

Indications for ileostomy included ileal perforation in 13 patients (41.9%), obstruction in 11 (35.5%), colorectal cancer in 4 (12.9%), rectovaginal fistula in 1 (3.2%), foreign body in the rectum in 1 (3.2%) and sigmoid volvulus in 1 (3.2%). [9]

Dehydration was the leading cause of readmission, occurring in 14 patients (45.2%), followed by stoma obstruction in 7 (22.6%), surgical-site infection in 5 (16.1%), retraction in 2 (6.5%), prolapse in 2 (6.5%) and stenosis in 1 (3.2%). [10] Mean time from ileostomy creation to readmission was 28.03 days, while mean time from discharge to readmission was 20.64 days.

Management was predominantly conservative: 25 patients (80.6%) received conservative treatment and 6 (19.4%) required surgical intervention. Among those undergoing surgery, the thesis reports one early stoma closure, one adhesiolysis with early stoma closure and four secondary suturing procedures following wound dehiscence. [11]

Eligibility. Adult patients (>18 years) undergoing ileostomy creation for gastrointestinal pathology and subsequently eligible for 90-day follow-up were considered. Patients younger than 18 years, patients whose 90-day readmission could not be assessed because of inpatient death or hospitalization exceeding 90 days, and ileostomies created for non-gastrointestinal pathology were excluded

Variables. Demographic variables included age and sex. Personal history of alcohol use, tobacco chewing and smoking and comorbidities including diabetes, hypertension, tuberculosis, chronic obstructive pulmonary disease and asthma were recorded. Operative variables included indication for ileostomy, operative approach, type of stoma, urgency of procedure and operative duration. Laboratory variables included hemoglobin, total leukocyte count, platelets, serum albumin, total protein, urea, creatinine, sodium and potassium. BMI, Charlson Comorbidity Index, Clavien-Dindo complication grade, ASA score and preoperative shock were also assessed. Shock was defined in the thesis as mean arterial pressure <65 mmHg. Time from stoma creation to readmission and time from discharge to readmission were recorded, as were readmission cause, management and final outcome.

Statistical analysis. The thesis reports use of IBM SPSS version 13.0 for statistical analysis. Categorical variables were summarized using frequencies and percentages, and associations were tested using the statistical methods reported in the thesis. The source material specifically reports a significant association between total leukocyte count and age-stratified readmission characteristics ($P=0.01$). Because the supplied thesis does not provide a complete multivariable model comparing the 31 readmitted patients with the 162 non-readmitted patients, adjusted odds ratios for predicting readmission cannot be reconstructed and have not been invented in this manuscript.

Outcome after readmission was favorable in most patients: 29 (93.5%) were discharged and 2 (6.5%) died during the readmission hospitalization. The mean hospital stay after readmission was approximately 13 days in the summary, while the detailed results report 13.5 ± 4.2 days. [12]

Within the readmitted cohort, the age-stratified analysis showed that total leukocyte count was statistically significant ($P=0.01$), interpreted by the thesis as suggesting that older patients with sepsis/higher leukocyte counts had greater readmission risk. However, because the reported analysis is restricted to patients who were already readmitted, this finding should be interpreted as an association within the readmitted cohort rather than as a fully validated independent predictor of readmission in the complete 193-patient population.

Table 1. Age and gender distribution among readmitted patients.

Age group	Male n (%)	Female n (%)	Total n (%)
18–30	4 (12.9)	1 (3.2)	5 (16.1)
30–40	2 (6.5)	3 (9.7)	5 (16.1)
40–50	7 (22.6)	3 (9.7)	10 (32.3)
50–60	2 (6.5)	3 (9.7)	5 (16.1)
60–70	5 (16.1)	1 (3.2)	6 (19.4)
Total	20 (64.5)	11 (35.5)	31 (100)

Table 2. Indications for ileostomy creation.

Indication	N	%
Ileal perforation	13	41.9
Obstruction	11	35.5
Colorectal cancer	4	12.9
Rectovaginal fistula	1	3.2
Foreign body in rectum	1	3.2
Sigmoid volvulus	1	3.2
Total	31	100

Table 3. Causes of readmission.

Cause	N	%
Dehydration	14	45.2
Stoma obstruction	7	22.6
Surgical-site infection	5	16.1
Retraction	2	6.5
Prolapse	2	6.5
Stenosis	1	3.2
Total	31	100

Table 4. Management after readmission.

Management	N	%
Conservative	25	80.6
Surgery	6	19.4
Total	31	100

Table 5. Outcome after readmission.

Outcome	N	%
Discharged	29	93.5
Died	2	6.5
Total	31	100

Table 6. Selected clinical characteristics reported in the thesis.

Variable	Reported value
Mean age	45.8 ± 14.3 years
Male sex	20 (64.5%)
Female sex	11 (35.5%)
Mean BMI	24.16 ± 4.10 kg/m ²

Mean serum albumin	2.62 g/dL
Mean hemoglobin	9.91 $\pm$ 1.64 g/dL
Mean serum creatinine	2.6 mg/dL
Mean blood urea	85 mg/dL
Mean time: stoma creation $\rightarrow$ readmission	28.03 days
Mean time: discharge $\rightarrow$ readmission	20.64 days
Mean post-readmission hospital stay	13.5 $\pm$ 4.2 days

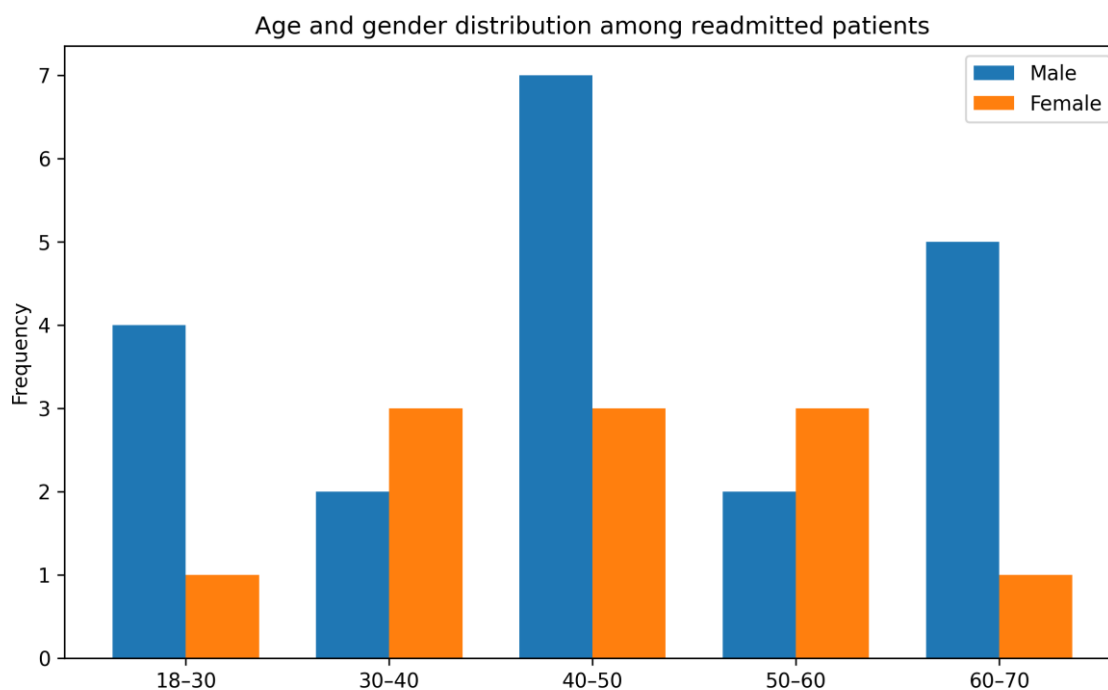


Figure 1. Age and gender distribution among readmitted patients.

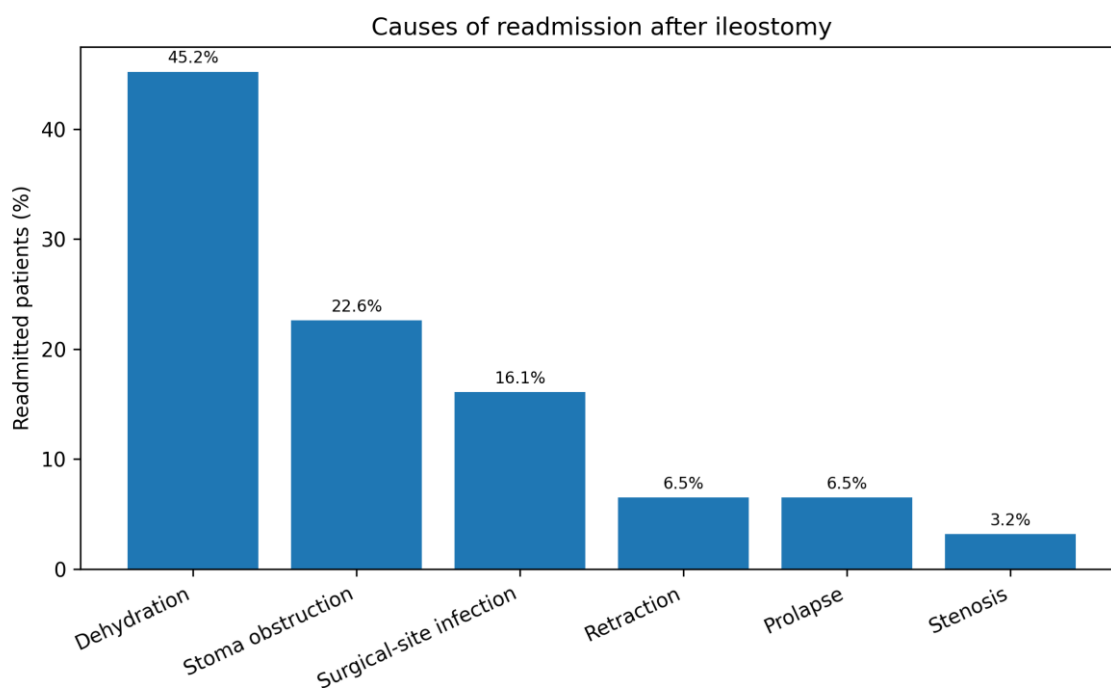


Figure 2. Causes of readmission after ileostomy creation.

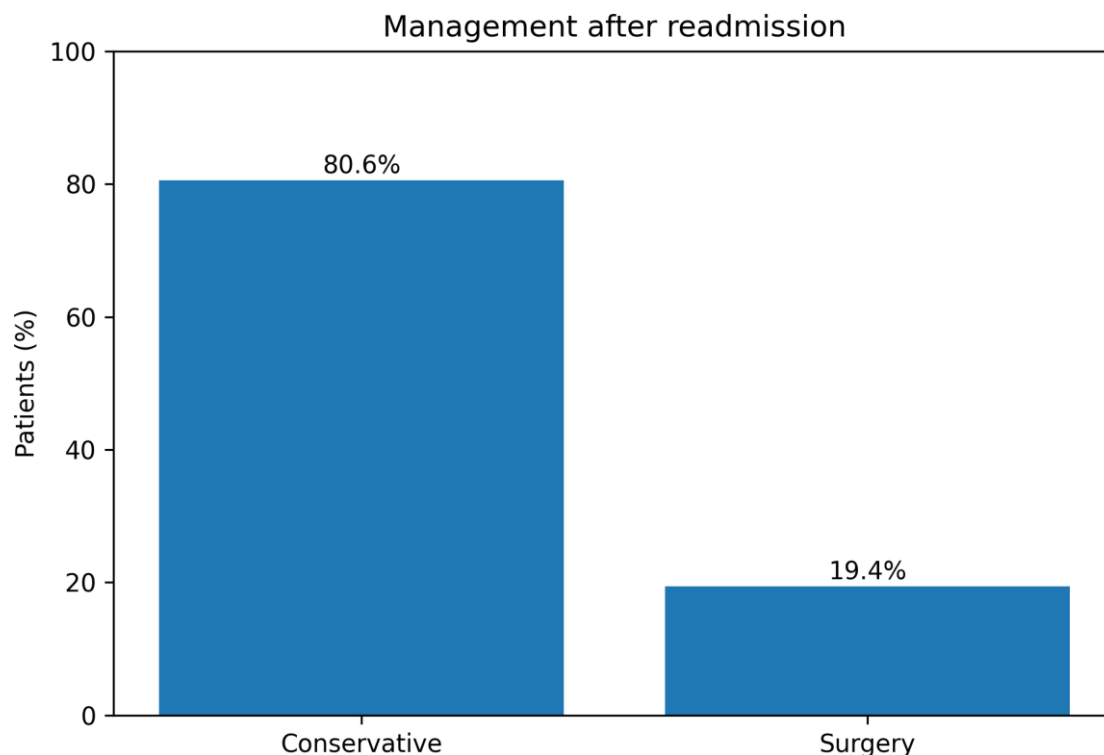


Figure 3. Management of patients after readmission.

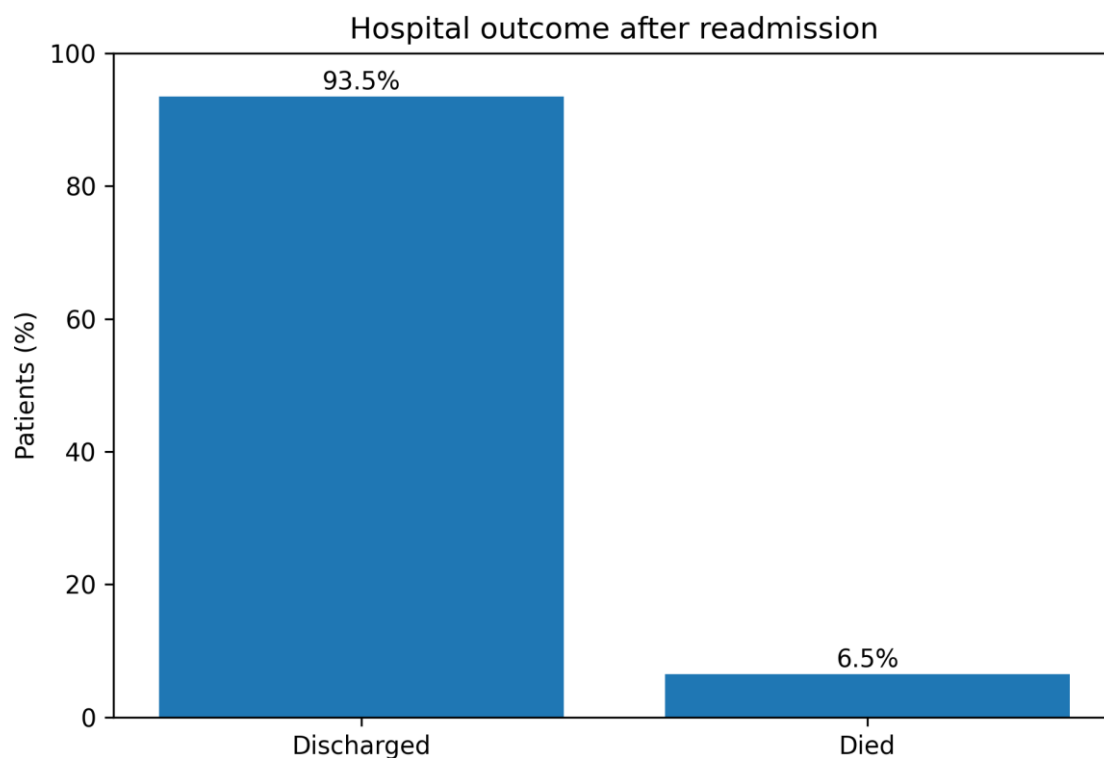


Figure 4. Hospital outcome after readmission.

DISCUSSION

The principal finding of this study is that readmission after ileostomy creation was clinically important, occurring in 16.1% of 193 new ileostomies within 90 days. Dehydration accounted for 45.2% of readmissions,

making it the dominant complication in this cohort. This finding is concordant with the international literature, in which dehydration is repeatedly identified as the most common preventable cause of readmission after ileostomy.

The 16.1% readmission rate in this cohort is lower than several published series but lies within the broad range reported in contemporary studies. Fish et al. found substantial readmission after ileostomy creation and demonstrated that serious postoperative complications, comorbidity burden and loop stoma were important predictors. [1] Charak et al. reported a 60-day readmission rate of 36%, with dehydration accounting for 39% of readmissions. [13] In contrast, the 2022 systematic review by Vogel et al., pooling 71 studies and more than 82,000 patients, found an approximately 20% pooled all-cause 30-day readmission rate and 6% dehydration-related readmission rate. [4] Differences in case mix, definitions, follow-up duration and discharge pathways likely explain much of the variation.

Dehydration was the leading cause in the present study, occurring in 14 of 31 readmitted patients. The clinical mechanism is intuitive: diversion of intestinal contents prevents normal colonic fluid and electrolyte absorption, while a high-output ileostomy may result in substantial sodium and water loss. The thesis also documented mean creatinine of 2.6 mg/dL and blood urea of 85 mg/dL among the readmitted population, findings that support the clinical relevance of volume depletion and renal dysfunction. [12] The broader literature confirms that ileostomy-associated dehydration is not merely a short-term event; it can contribute to acute kidney injury and progressive renal impairment. [14]

The importance of renal function is also supported by Liu et al., who found renal impairment at discharge to be independently associated with all-cause readmission (OR 2.819, 95% CI 1.087–7.310). Their meta-analysis identified age ≥ 65 years, BMI ≥ 30 , diabetes, hypertension, renal comorbidity, regular diuretic use, IPAA and length of stay as significant risk factors for dehydration-related readmission. [2,5] Several of these factors are clinically relevant to the current study, which documented hypertension, diabetes and respiratory disease among the readmitted patients.

Stoma obstruction was the second most frequent cause of readmission (22.6%). Mechanical problems may arise from edema, technical narrowing, adhesions or parastomal factors and can rapidly lead to dehydration and electrolyte imbalance. The frequency in the present cohort emphasizes that prevention of readmission requires both fluid-management education and surveillance for local stoma dysfunction. The meta-analysis by Vogel et al. found stoma outlet problems to account for a pooled approximately 4% of 30-day readmissions across studies. [4]

Surgical-site infection accounted for 16.1% of readmissions. Infection may represent a consequence of contaminated emergency surgery, poor nutritional status or wound complications. In this cohort, the mean serum albumin was 2.62 g/dL and mean hemoglobin was

9.91 $\pm$ 1.64 g/dL, suggesting that nutritional and hematological abnormalities were common among readmitted patients. The thesis also found Clavien-Dindo complications and ASA class to be clinically relevant variables. Although the sample is too small for definitive causal conclusions, these findings support careful preoperative optimization and postoperative surveillance.

Age deserves consideration. The largest age category among readmitted patients was 40–50 years, while the thesis identified total leukocyte count as statistically significant after dividing patients into <60 and >60 -year groups. The authors interpreted this as evidence that older patients with sepsis were more likely to be readmitted. [15] This interpretation is plausible, but should be presented cautiously because the comparison is confined to patients who had already experienced readmission. To establish an independent predictor of readmission, the analysis would need to compare readmitted and non-readmitted patients from the full cohort of 193 patients and provide an adjusted regression model.

Preventive pathways are increasingly important. Van Loon et al. demonstrated that a structured ileostomy pathway reduced 30-day readmission from 35.4% to 25.9% and reduced high-output/dehydration readmission from 15.5% to 3.9%. [7] Nagle et al. similarly reported a marked reduction in dehydration readmissions after implementation of a standardized educational program that included preoperative teaching, standardized materials, observed stoma management and post-discharge tracking of intake and output. [16] More recent prevention-bundle work has also shown that targeted interventions can substantially reduce dehydration-related readmission, with discharge stoma output emerging as a useful predictive marker. [17]

The high proportion of conservatively managed readmissions in the present cohort (80.6%) is encouraging because it indicates that many readmissions can be treated without reoperation. However, the requirement for hospitalization itself represents a burden for patients and healthcare systems. Early outpatient contact, stoma nurse review, daily output monitoring, clear hydration instructions, medication review and rapid access to laboratory testing may prevent progression from mild dehydration to clinically significant renal dysfunction.

Strengths and limitations. The study provides real-world data from a tertiary-care Indian surgical center and evaluates a broad range of demographic, comorbidity, operative and biochemical parameters. The major limitation is the small number of readmitted patients ($n=31$), which limits statistical power. The retrospective/prospective design introduces potential information bias, and the source thesis does not report a complete multivariable model using the 193-patient

denominator. Therefore, the observed association between leukocytosis and age-stratified readmission characteristics should not be presented as a validated independent predictor. In addition, the thesis contains a methodological discrepancy between the planned 60-patient study sample and the final observational cohort of 193 ileostomies with 31 readmissions; this should be clarified in the final journal submission.

CONCLUSION

Readmission after ileostomy creation was significant in this tertiary-care cohort, with a 90-day readmission rate of 16.1%. Dehydration was the commonest cause (45.2%), followed by stoma obstruction (22.6%) and surgical-site infection (16.1%). Most readmissions were managed conservatively and 93.5% of readmitted patients were discharged. Renal dysfunction, comorbidity, stoma-related complications and infection appear clinically important. A structured prevention program incorporating patient education, stoma-output monitoring, hydration and electrolyte guidance, medication review, renal-function surveillance and early post-discharge follow-up may reduce preventable readmissions. Larger prospective cohorts comparing readmitted with non-readmitted patients and using multivariable regression are required to develop a robust prediction model.

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10. Causes of readmission in source cohort: dehydration 45.2%, stoma obstruction 22.6%, surgical-site infection 16.1%, retraction 6.5%, prolapse 6.5%, stenosis 3.2%. Source thesis.
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