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ORIGINAL ARTICLE

# Predicting the risk of dehydration and readmission among rectal cancer patients with ileostomy: a multicenter observational study

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**Abstract**
Dehydration is a frequent complication among rectal cancer patients after ileostomy, often resulting in hospital readmission. The Dehydration Readmission after Ileostomy Prediction (DRIP) score was used to identify patients at risk of dehydration-related readmission. The aim of this study is to assess the predictive value of the DRIP score for dehydration–electrolyte imbalance (DIE) and hospital readmission in a multicenter Italian cohort. A total of 306 patients with rectal adenocarcinoma who underwent anterior resection with protective ileostomy in 2022 were included. The main outcome measures were the incidence of early and late DIE, hospital readmission due to DIE, and correlations between the DRIP score and other clinical variables. Early DIE occurred in 16.3% of the patients, with 2.6% requiring readmission. Late DIE occurred in 13.7% of the patients, with 3.6% requiring readmission. The DRIP score was significantly correlated with early DIE. A high DRIP score was associated with an increased risk of early and late DIE. Independent predictors of early DIE included high BMI and early postoperative complications. Parastomal infection was the only independent predictor of late readmission. The DRIP score represents a useful tool for identifying patients at risk of early dehydration following ileostomy. While its ability to predict hospital readmission is limited, it provides clinically relevant risk stratification for early DIE and may support targeted postoperative monitoring strategies. Future studies should integrate dynamic patient-specific data to increase the predictive accuracy of the score and guide both inpatient and outpatient care.

**Keywords** Rectal cancer · Ileostomy · Surgery · Dehydration · Readmission

## Introduction

Rectal cancer remains a significant global health burden, and surgical resection plays an important role in the treatment pathway. Protective ileostomy is frequently employed to mitigate the clinical impact of anastomotic leakage, which is a potentially life-threatening postoperative complication in patients undergoing low anterior resection. Despite its ability to reduce the clinical consequences of leakages, the routine use of ileostomy is controversial because of the associated morbidity that impacts patient recovery and healthcare utilization. Dehydration remains among the most common and clinically significant complications, frequently leading to hospital readmission, particularly within the first 30 days post-discharge [1]. In patients who undergo ileostomy, dehydration is primarily due to high-output stomas (HOSs), which result from the loss of the absorptive capacity of the colon. After ileostomy creation, the loss of colonic absorptive capacity reduces water and electrolyte reabsorption, increasing the risk of fluid and electrolyte imbalance, particularly in the presence of high-output stoma. Normal ileostomy output typically ranges between 500 and 1500 mL per day, but in some patients, the output can exceed 1500 mL/day, especially during the immediate postoperative period, leading to significant fluid loss. This fluid loss can cause acute kidney injury, hypotension,

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dizziness, fatigue, and even life-threatening complications if not promptly identified and managed [2]. Hospital readmissions due to dehydration are alarmingly prevalent among patients who undergo ileostomy. Studies suggest that readmission rates within 30 days post-ileostomy range from 15 to 30%, with dehydration accounting for nearly one-third to half of these cases. The burden is not only clinical but also economic, as readmissions significantly increase healthcare costs and strain resources. Inadequate patient education, poor postdischarge follow-up, and insufficient outpatient support further compound the risk [3].

Recent research underscores the importance of proactive strategies to prevent dehydration-related readmissions. These strategies include structured preoperative education, early outpatient follow-up, home-based monitoring programs, and individualized fluid management plans [4–6]. Some institutions have implemented interventions such as ileostomy care pathways, specialized stoma nurse consultations, and oral rehydration solutions to mitigate dehydration risk [7]. Furthermore, risk stratification tools are being developed to identify patients most at risk of dehydration on the basis of factors such as age, comorbidities, and stoma output volume [8]. The Dehydration Readmission After Ileostomy Prediction (DRIP) scoring system, proposed by Chen et al. in 2018, is a valid scoring system involving patients and clinical factors that can be used to identify patients at risk of being readmitted due to dehydration after ileostomy. The DRIP score includes several items that are considered risk factors for dehydration and readmission after ileostomy [9]. This was a retrospective analysis of the outcomes of rectal cancer patients from a multicenter, prospective observational cohort study conducted by the Multidisciplinary Italian Study group for STOmas in high-volume colorectal surgery centers across Italy [10, 11].

The primary aim of this study was to assess the clinical value of the DRIP score for dehydration–electrolyte imbalance (DIE) and for hospital readmission due to dehydration in an Italian population of rectal cancer patients with ileostomy. The secondary aims were to analyze the risk factors for dehydration and their correlations with readmission. The aim of this study was not to introduce a novel predictive model, but to provide a focused multicenter evaluation of the DRIP score in a homogeneous population of rectal cancer patients undergoing anterior resection with diverting ileostomy, and to explore its clinical applicability in this specific setting.

## Materials and methods

This was a retrospective secondary analysis of a multicenter, prospective, observational study that involved specialized colorectal surgery italian centers (participating in the MISSTO collaborative network) and included consecutive patients who underwent diverting ileostomy following rectal cancer resection; these patients were prospectively enrolled at each center in 2022. The inclusion criteria were patients over 18 years of age, patients with histologically confirmed adenocarcinoma of the rectum, colorectal or coloanal anastomosis, and patients undergoing protective ileostomy. The exclusion criteria included anterior rectal resection for conditions other than rectal cancer, other types of resections, previous colon or rectal surgery, or colostomy. Anonymized data were collected using an online form, and after the study, the collected data were transferred to an electronic database. After patient enrollment was completed, a minimum follow-up period of six months was implemented. The research adhered to the ethical guidelines outlined in the 1964 Declaration of Helsinki and its later revisions. All patient details and associated variables were documented in the database. The recorded baseline characteristics included age, sex, body mass index (BMI), American Society of Anesthesiologists (ASA) score, hypertension status, and rectal cancer location. For each hospital center that participated in the study, the presence of a nurse who specialized in stoma care in the hospital, a stoma service and a home care service for ostomy patients was registered. Follow-up was defined as the period between stoma creation and the end of the study, which included a minimum follow-up period of 6 months, as per the study protocol. For the purposes of this study, the following additional variables were analyzed: preoperative counseling provided by a stoma nurse, postoperative length of hospital stay, and early and late postoperative complications, including early and late postoperative dehydration and readmission. DIE was defined as a combination of clinical signs (e.g., fatigue, dizziness, and orthostatic hypotension) and/or laboratory evidence of a fluid and electrolyte imbalance (i.e., hyponatremia, hypokalemia, and an elevated creatinine level), frequently in the context of high stoma output (> 1500 mL/day), that required medical intervention, intravenous fluid administration, or hospital readmission [12, 13]. Early and late DIE were defined as episodes occurred within and after 30 days from the operation, respectively. DIE episodes and related readmissions were prospectively identified at each participating center according to the previous clinical and laboratory criteria and were recorded in a standardized electronic data collection form. Enhanced Recovery After Surgery (ERAS) protocols were not uniformly implemented across all participating centers, and detailed data regarding adherence to specific ERAS

**Table 1** DRIP score calculation and interpretation

| DRIP score calculation | |
|---|---|
| Hypertension requiring medication | 9 |
| ASA I-II classification associated with IBD | 7 |
| Age > 65 years old | 5 |
| Female sex | 5 |
| Reduced length of hospital stay | 5 |
| ASA III classification | 4 |
| Ileo Anal Pouch Anastomosis (IPAA) | 4 |
| Total | |

| DRIP score interpretation | |
|---|---|
| Range | Readmission risk |
| 0–2 | Very low |
| 3–8 | Low |
| 9–14 | Medium |
| 15–23 | High |
| 24–39 | Very high |

**Table 2** Statistical correlation between the DRIP score and outcome measures of DIE (early and late) and in-hospital readmission (for early and late DIE)

| Endpoint | n | Pearson r | *p* value |
|---|---|---|---|
| Early DIE | 306 | 0.157 | 0.006 |
| Late DIE | 306 | 0.087 | 0.130 |
| Readmission for early DIE | 306 | 0.096 | 0.093 |
| Readmission for late DIE | 306 | −0.029 | 0.616 |

components were not consistently available. So, ERAS was not considered for the purposes of this study. The DRIP score was calculated for each patient, and its correlations with the variables were analyzed. Hospital readmission risk was defined according to the classification of Chen et al.[9] (Table 1). Statistical univariate and multivariate analyses were performed to evaluate the factors influencing the rates of early DIE, late DIE and hospital readmission during the follow-up period. Each outcome measure was used as the dependent binary outcome. Univariable associations between each candidate predictor (an age > 70 years, sex, an ASA score > II, a BMI > the median, the presence of hypertension, preoperative counseling provided by a stoma nurse, a postoperative length-of-stay > the median, the occurrence of any early complication, the occurrence of a parastomal infection, the DRIP score, and the presence of an enterostomal nurse in the hospital, a dedicated outpatient clinic or a home-care service) and the outcome measures were explored with simple logistic regression; odds ratios (ORs) with 95% confidence intervals (CIs) are reported. Predictors for which p was < 0.10 in the univariable analysis were entered into a multivariable logistic regression model using forced entry. A two-sided p < 0.05 was considered to indicate statistical significance. All analyses were performed with Wizard for MacOS. Institutional differences were not adjusted for in the statistical models due to heterogeneity and incomplete ERAS adherence data.

## Results

A total of 306 patients (193 male patients; median age, 70 years; range, 33–88 years) from 46 hospital centers were included in the analysis. The median BMI was 24.73 kg/m2 (range 13.20–46.70 kg/m2), and the mean ASA score was greater than 2 in 130 patients (42.5%); moreover, 165 patients (53.9%) were affected by hypertension. All patients underwent anterior resection with colorectal anastomosis and protective ileostomy. Preoperative consultation between the patient and a stoma care nurse was carried out in 189 patients (61.8%). The median postoperative length of hospital stay after ileostomy was 7 days (range 3–92).

Early stoma-related complications (≤ 30 days after stoma creation) occurred in 56 patients (18.3%), and the most common complication was peristomal skin infection, which was observed in 22 patients (7.2%). The median DRIP score was 14 points (range 0–28). The risk of hospital readmission according to the DRIP score was very low/low in 91 patients (29.7%), medium in 101 patients (33.0%), and high/very high in 114 patients (37.2%). Dehydration–electrolyte imbalance (DIE) episodes occurred within 30 days of surgery for 50 patients (16.3%), and 8 (2.6%) required hospital readmission for medical management of the fluid–electrolyte imbalance. The median interval between discharge and readmission for early DIE was 16 days (range 8–19 days). DIE episodes occurred > 30 days after surgery in 42 patients (13.7%), 11 (3.6%) of whom required hospital readmission. The median time from discharge to readmission for late DIE was 37 days (range 37–211 days). An analysis of the correlation between the DRIP score and the four main outcomes of the study (early DIE, late DIE, in-hospital readmission for early DIE, and in-hospital readmission for late DIE) revealed that the DRIP score was directly and significantly correlated with the occurrence of early DIE (Pearson r: 0.157; $p = 0.006$). When patients were stratified according to DRIP risk categories, the incidence of early DIE increased progressively from the 8.8% (3/34) and 8.9% (5/56) of very low and low-risk group to the 12.9% (13/101) of medium risk to 25.2% (27/107) and 25% (2/8) of high and very-high-risk group. With respect to the occurrence of late DIE and in-hospital readmission for early DIE, a positive correlation was observed (Pearson r: 0.087 and 0.096, respectively), although this correlation was not statistically significant ($p = 0.130$ and 0.093, respectively). No correlation was found between the DRIP score and in-hospital readmission for late DIE (Pearson r: -0.029; $p = 0.616$) (Table 2). Analysis of the DRIP score in relation to in-hospital readmission risk revealed that a high or very high readmission risk is significantly correlated with the occurrence of early DIE (Pearson r = 0.186; $p = 0.001$). Conversely, a readmission risk of at least a medium level is significantly

**Table 3** Statistical correlation between in-hospital readmission risk and outcome measures of DIE (early and late) and in-hospital readmission (for early and late DIE)

| Readmission risk (binary) | Outcome | r | *p* value |
|---|---|---|---|
| Readmission Risk High and Very High | Early DIE | 0.186 | 0.001 |
| | Late DIE | 0.043 | 0.449 |
| | Readmission for early DIE | 0.042 | 0.464 |
| | Readmission for late DIE | −0.077 | 0.177 |
| Readmission Risk Medium to High | Early DIE | 0.130 | 0.023 |
| | Late DIE | 0.132 | 0.021 |
| | Readmission for early DIE | 0.106 | 0.066 |
| | Readmission for late DIE | 0.048 | 0.407 |

**Table 4** Statistical analysis of factors related to the occurrence of early DIE

| Predictor | Univariable OR (95% CI) | *p* | Multivariable OR (95% CI) | *p* |
|---|---|---|---|---|
| **Any early complication** | **3.23 (1.65–6.32)** | **0.001** | **3.85 (1.57–9.43)** | **0.003** |
| **BMI > the median (24.7 kg m$^{-2}$)** | **2.28 (1.16–4.50)** | **0.017** | **2.14 (1.03–4.44)** | **0.042** |
| Hypertension | 2.85 (1.45–5.61) | 0.002 | 2.55 (0.73–8.95) | 0.143 |
| DRIP score (per point) | 1.06 (1.02–1.11) | 0.007 | 1.00 (0.91–1.10) | 0.941 |
| Parastomal infection | 3.29 (1.30–8.33) | 0.012 | 0.77 (0.21–2.77) | 0.689 |
| Hospital outpatient clinic present | 0.33 (0.15–0.71) | 0.005 | 0.36 (0.09–1.53) | 0.167 |
| Hospital enterostomal nurse present | 0.30 (0.13–0.73) | 0.008 | 0.82 (0.15–4.41) | 0.815 |
| ASA score > II | 1.74 (0.95–3.21) | 0.074 | 1.06 (0.46–2.42) | 0.897 |
| Age > 70 years | 1.25 (0.68–2.29) | 0.472 | – | – |
| Male sex | 0.77 (0.42–1.44) | 0.417 | – | – |
| Postop LOS > 7 days | 1.10 (0.60–2.01) | 0.766 | – | – |
| Preop counseling by a stoma nurse | 0.92 (0.49–1.70) | 0.779 | – | – |
| Hospital home-care service | 0.56 (0.27–1.14) | 0.111 | – | – |

associated with both early DIE (Pearson r = 0.130; $p = 0.023$) and late DIE (Pearson r = 0.132; $p = 0.021$) (Table 3). Statistical analysis of factors potentially related to early DIE revealed that after multivariable analysis, the occurrence of any early postoperative stoma-related complication and a BMI above the median remained independent predictors of early DIE, increasing the odds by ≈ fourfold and ≈ twofold, respectively (Table 4). In the univariate analysis of factors

**Table 5** Statistical analysis of factors related to the occurrence of late DIE

| Predictor | Univariable OR (95% CI) | *p* | Multivariable OR (95% CI) | *p* |
|---|---|---|---|---|
| **ASA score > II** | **1.99 (1.03–3.84)** | **0.041** | 1.68 (0.84–3.36) | 0.144 |
| Hypertension | 1.85 (0.93–3.68) | 0.078 | 1.66 (0.80–3.42) | 0.171 |
| Early complications | 1.47 (0.75–2.88) | 0.263 | – | – |
| DRIP score (per point) | 1.04 (0.99–1.08) | 0.130 | – | – |
| BMI > the median | 1.70 (0.84–3.41) | 0.138 | – | – |
| Age > 70 yrs | 1.15 (0.60–2.21) | 0.672 | – | – |
| Male sex | 0.67 (0.35–1.29) | 0.232 | – | – |
| Preop counseling by a stoma nurse | 0.95 (0.49–1.86) | 0.882 | – | – |
| Postop LOS > median | 1.09 (0.55–2.14) | 0.811 | – | – |
| Parastomal infection | 1.23 (0.42–3.60) | 0.705 | – | – |
| Hospital enterostomal nurse | 0.80 (0.33–1.93) | 0.612 | – | – |
| Hospital outpatient clinic | 0.74 (0.32–1.75) | 0.492 | – | – |
| Hospital home-care service | 0.62 (0.28–1.36) | 0.232 | – | – |

related to the occurrence of late DIE, an ASA score > II was significantly associated with late DIE ($p = 0.041$). After multivariable adjustment (including all predictors with $p < 0.10$ in the univariable analysis), no variable reached statistical significance, although the presence of hypertension and a high ASA score continued to trend toward increased risk (Table 5). In the statistical analysis of factors influencing in-hospital readmission after early DIE, the occurrence of any early postoperative stoma-related complication was the only independent predictor, increasing the odds of in-hospital readmission for early DIE by ≈11-fold (p = 0.007) (Table 6). Statistical analysis of the factors influencing in-hospital readmission after late DIE revealed that the occurrence of parastomal infection was the only independent predictor of late in-hospital readmission for DIE, with a nearly fourfold increase in risk (p = 0.045) (Table 7).

## Discussion

Dehydration is a frequent and serious complication in patients who undergo diverting ileostomies, especially during the early postoperative period, and is a leading cause of hospital readmission. The DRIP score is a validated clinical tool that was developed to predict the risk of hospital

**Table 6** Statistical analysis of factors related to the need for in-hospital readmission due to early DIE

| Predictor | Univariable OR (95% CI) | *p* | Multivariable OR (95% CI) | *p* |
|---|---|---|---|---|
| **Any early complication** | **10.95 (1.92–62.38)** | **0.005** | **10.95 (1.92–62.38)** † | **0.007** |
| Male sex | 0.19 (0.04–0.94) | 0.042 | 0.20 (0.04–1.11) | 0.066 |
| Parastomal infection | 4.63 (0.88–24.45) | 0.071 | 0.55 (0.07–4.34) | 0.569 |
| Hypertension | 6.20 (0.75–51.04) | 0.090 | 5.39 (0.62–46.75) | 0.126 |
| DRIP score (per point) | 1.09 (0.98–1.21) | 0.103 | 0.91 (0.73–1.12) | 0.370 |
| BMI > the median | 5.13 (0.62–42.21) | 0.129 | – | – |
| Age > 70 yrs | 1.74 (0.41–7.39) | 0.456 | – | – |
| ASA score > II | 1.37 (0.34–5.56) | 0.664 | – | – |
| Preop stoma-nurse counseling | 4.46 (0.54–36.73) | 0.164 | – | – |
| Postop LOS > median | 1.06 (0.24–4.71) | 0.936 | – | – |
| Hospital enterostomal nurse | – | – | – | – |
| Hospital outpatient clinic | – | – | – | – |
| Hospital home-care service | 2.20 (0.54–9.01) | 0.271 | – | – |

**Table 7** Statistical analysis of factors related to the need for in-hospital readmission due to late DIE

| Predictor | Univariable OR (95% CI) | *p* | Multivariable OR (95% CI) | *p* |
|---|---|---|---|---|
| **Parastomal infection** | **3.68 (1.05–12.93)** | **0.041** | **3.74 (1.03–13.54)** | **0.045** |
| ASA score > II | 2.45 (0.70–8.54) | 0.161 | 2.31 (0.63–8.44) | 0.208 |
| Hypertension | 0.48 (0.14–1.66) | 0.244 | – | – |
| Age > 70 yrs | 1.84 (0.53–6.40) | 0.341 | – | – |
| Male sex | 1.03 (0.29–3.58) | 0.968 | – | – |
| BMI > median | 1.25 (0.36–4.37) | 0.725 | – | – |
| Preop stoma-nurse counseling | 0.70 (0.19–2.63) | 0.597 | – | – |
| Postop LOS > median | 1.36 (0.39–4.70) | 0.628 | – | – |
| Any early complication | 1.05 (0.31–3.60) | 0.940 | – | – |
| DRIP score (per point) | 0.98 (0.91–1.05) | 0.616 | – | – |
| Hospital enterostomal nurse | 0.91 (0.27–3.11) | 0.882 | – | – |
| Hospital outpatient clinic | 0.83 (0.24–2.86) | 0.769 | – | – |
| Hospital home-care service | 1.05 (0.32–3.43) | 0.938 | – | – |

readmission due to dehydration within 30 days following ileostomy [9]. Although the DRIP score has been previously described, its validation in a homogeneous cohort of rectal cancer patients undergoing anterior resection with diverting ileostomy remains limited. In this context, in our study, the DRIP score was evaluated in a large, multicentric Italian cohort of rectal cancer patients who underwent protective ileostomy with the primary aim which was to assess the ability of the DRIP score to predict early and late dehydration–electrolyte imbalance (DIE) and hospital readmission due to dehydration. The risk factors for dehydration and readmission were also analyzed.

One of the most relevant findings of this study is that the DRIP score appears to be more effective in identifying patients at risk of early DIE than in predicting actual hospital readmission. While originally developed as a readmission prediction tool, our data suggest that its primary clinical value may lie in early risk stratification for dehydration, which precedes and only partially translates into readmission events. In this study, the DRIP score was significantly correlated with early DIE (Pearson r = 0.157, $p = 0.006$), confirming its potential as a screening tool to identify patients at increased risk of early dehydration. Our findings support those of Chen et al., who originally developed the DRIP score as a predictive model combining demographic and clinical risk factors associated with dehydration-related readmissions after ileostomy. Their study emphasized the importance of quantifying risk using a multivariable approach, including comorbidities such as hypertension and higher ASA scores—elements that are reflected in our data and findings [9].

In multivariate regression, the DRIP score itself did not maintain independent significance, likely because of collinearity with strong predictors such as early stoma-related complications and high BMI. Nevertheless, a DRIP score > 14 points remained significantly associated with early DIE according to both univariate and multivariate analyses ($p = 0.004$), suggesting that although not standalone, the score promotes increased clinical vigilance.

These findings are consistent with those in the literature, which shows that structured preoperative and postoperative risk stratification, including risk stratification tools such as the DRIP score, improves fluid management and outcomes in patients undergoing ileostomy [7, 14, 15].

The correlation between the DRIP score and late DIE (after 30 days) was weak and not statistically significant (Pearson r = 0.087; $p = 0.130$). This may reflect the changing risk profile over time, as post-discharge behaviors, outpatient follow-up, and patient education become more influential. A recent systematic review revealed that the effectiveness of interventions to prevent dehydration tends to diminish over time unless reinforced through structured

outpatient programs, suggesting that longer-term follow-up strategies might be needed to sustain benefits [3]. Similarly, the lack of significant predictors in multivariate models for late DIE in our cohort aligns with the more heterogeneous and less acute nature of late dehydration events, which may be more difficult to anticipate on the basis of static preoperative or perioperative variables. Although early and late readmission for dehydration occurred in 2.6% and 3.6% of the patients, respectively, the DRIP score was not significantly correlated with actual readmission events. This outcome may seem surprising given the name and intent of the score; however, it aligns with observations by some authors, who argued that readmission is a multifactorial outcome influenced by system-level factors such as outpatient access, patient adherence, and social support [5, 15, 16]

Nonetheless, when patients were stratified by DRIP score-derived tiers for readmission risk, a score in a high- or very-high-risk category was significantly associated with early DIE ($p=0.001$), and a score in a medium- to high-risk category was correlated with both early and late DIE ($p=0.023$ and $p=0.021$, respectively). This finding suggests that the categorical use of the DRIP score may be more clinically useful than continuous scoring when postdischarge planning is being guided.

In contrast, hospital readmission appears to be more strongly influenced by dynamic postoperative factors. In our cohort, early stoma-related complications were the strongest predictor of both early dehydration and readmission with a nearly fourfold increase in the risk of early DIE (OR = 3.85) and an 11-fold increase in the risk of readmission after early DIE (OR = 10.95). Also higher BMI independently increased the risk of early DIE, supporting previous observations that a high BMI is associated with altered fluid dynamics and increased vulnerability to volume loss. Furthermore, parastomal infection emerged as the only independent predictor of late readmission. These findings suggest that readmission is a multifactorial outcome, influenced not only by baseline risk but also by postoperative events and local complications.

Interestingly, hypertension was significant in the univariate analysis but was not retained in the multivariate models, possibly because of its overlapping influence with the other DRIP score components. The role of early parastomal skin infection, although significant for late readmission (OR = 3.74; $p=0.045$), warrants further exploration, as local inflammation may reflect broader fluid and metabolic derangements.

These findings reinforce calls from several authors for the integration of structured prediction tools, patient education, and postdischarge follow-up as key components of ileostomy-related care [4–6, 15, 17]. The DRIP score, while not perfect, provides a scalable, practical model that can be applied before discharge to triage patients into higher-risk categories. From a practical perspective, the DRIP score may help guide postoperative follow-up strategies. Patients in the low-risk category may be managed with standard education and routine follow-up, whereas those in the intermediate-risk group may benefit from early post-discharge contact, such as structured telephone follow-up and reinforced hydration counseling. Patients classified as high or very high risk could require intensified monitoring, including early outpatient review, laboratory testing, closer involvement of stoma care nurses, and, where available, ambulatory or home intravenous fluid support programs. Such a stratified approach may help reduce preventable dehydration-related complications. The findings also highlight that the DRIP score should not be used in isolation but rather as part of a multimodal clinical pathway. The institutional presence of stoma care nurses or outpatient clinics, while not statistically significant in this cohort, has been shown to lower readmission rates when fully integrated into perioperative protocols in other studies [18, 19].

The relatively limited sample size, despite the multicenter design, represents a potential limitation and may reduce the statistical power for detecting weaker associations. Moreover, the inclusion of multiple centers with different postoperative management protocols, discharge criteria, and outpatient follow-up strategies may have introduced inter-center variability, which could have influenced the observed rates of dehydration and readmission. This heterogeneity reflects real-world clinical practice but may also represent a source of bias. Moreover, the lack of uniform implementation and documentation of ERAS protocols across centers represents an important limitation, as perioperative pathways may significantly influence bowel function recovery, fluid management, and discharge timing, thereby affecting dehydration risk and readmission rates. Prospective validation in more diverse settings, including integration with real-time stoma output monitoring, could further increase the accuracy of the score. For these reasons, our group (Multidisciplinary Italian Study group for STOmas, MISSTO) recently launched the "multicenter prospective observational study to Prevent the risk of REadmission and DEhydration of patients with ileoSTOmy in elective colorectal surgery (PREDESTO study, clinicaltrials.gov identifier: NCT06824623)", with the aim of evaluating the use of the DRIP score in clinical practice to identify patients undergoing ileostomy who are at risk of developing postoperative or postdischarge dehydration and to evaluate possible actions to reduce dehydration and readmission rates. This study is currently ongoing, and we hope to obtain significant results [20]. In addition, future analyses will aim to investigate the downstream clinical impact of dehydration,

including its potential influence on adjuvant therapy timing and ileostomy closure.

In conclusion, the DRIP score is a valuable clinical tool for identifying patients at risk of early dehydration following ileostomy. The ability of the score to predict readmission is limited, but its capacity for risk stratification remains clinically relevant and may inform targeted interventions. While early complications are strong predictors, they occur postoperatively and cannot guide pre-discharge planning alone. The DRIP score represents a valuable tool for identifying patients at risk of early DIE following ileostomy. Although its ability to predict hospital readmission is limited, its role in early risk stratification remains clinically relevant. Integration of the DRIP score with postoperative clinical factors may improve patient monitoring and help guide tailored follow-up strategies.

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## Declarations

**Conflict of interest** The authors declare that they have no conflict of interest.

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