

Overlooked and Undertreated: National Shortfalls in Anorectal Evaluation for Gastroparesis-associated Constipation and Defecation Disorder

Mohamed H. Eldesouki

meldesouki@nymc.edu

New York Medical College

Eslam Rabea

Alexandria Main University Hospital

EzzEIDien A. Ibrahim

University of Missouri-Columbia

Tareq AlSaleh

AdventHealth Orlando

Mohamed ElZayat

Alexandria Main University Hospital

Muhammad M. Elsharkawy

Alexandria Main University Hospital

Swapna Gayam

West Virginia University

Amol Sharma

Medical University of South Carolina

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Abstract

Background:

Gastroparesis is a chronic motility disorder often accompanied by constipation. Defecation disorders are a common, treatable cause of refractory constipation; however, recognition and management in gastroparesis remain unclear. We assessed real-world rates of defecation disorder diagnosis and use of anorectal manometry (ARM) and pelvic floor therapies in gastroparesis with constipation, and related healthcare utilization outcomes.

Methods:

We conducted a retrospective cohort study using the TriNetX U.S. Collaborative Network (2000–2022). Adults with gastroparesis were identified, and rates of constipation, defecatory disorder diagnosis, ARM, biofeedback therapy (BFT), and pelvic floor physical therapy (PFT) were assessed. Among patients with gastroparesis and constipation, outcomes were compared between those with and without ARM after 1:1 propensity score matching. Outcomes included emergency department visits, hospitalizations, abdominal imaging, nasogastric tube (NGT) placement, gastrostomy tube placement, and total parenteral nutrition (TPN).

Results:

Among 295,016 patients with gastroparesis, 88,062 (29.9%) had constipation, but only 4,828 (1.4%) had a defecatory disorder diagnosis. Among those diagnosed, 1,291 (33.3%) underwent ARM and 147 (3.8%) received BFT. After matching, ARM was associated with lower odds of NGT placement (aOR 0.69, 95% CI 0.47–0.80), abdominal imaging (aOR 0.68, 95% CI 0.61–0.78), emergency department visits (aOR 0.80, 95% CI 0.78–0.85), and hospitalizations (aOR 0.58, 95% CI 0.44–0.76). No significant differences were observed in TPN or gastrostomy tube placement.

Discussion:

In this large, real-world cohort, defecatory disorders appear markedly under-recognized and pelvic floor-directed therapies underutilized in gastroparesis-associated constipation. Anorectal manometry was associated with reduced healthcare utilization, supporting earlier physiologic evaluation in refractory cases.

Introduction

Gastroparesis is a chronic dysmotility disorder defined by delayed gastric emptying in the absence of mechanical obstruction, leading to symptoms such as early satiety, postprandial fullness, nausea, vomiting, belching, and bloating.^{1,2} Gastroparesis is recognized as part of a broader spectrum of gastric neuromuscular dysfunction, which also encompasses abnormalities in gastric accommodation and coordinated motor activity.¹ Beyond upper gastrointestinal symptoms, patients with gastroparesis

frequently experience constipation, which may be severe and, in some cases, more debilitating than gastric symptoms themselves.³

Constipation is conventionally categorized into three major pathophysiologic subtypes: normal-transit constipation (including irritable bowel syndrome with constipation), slow-transit constipation, and pelvic floor dysfunction, also referred to as functional defecatory disorders.^{4–6} Accurate phenotyping is critical, as management strategies differ substantially across these subgroups. The diagnosis of gastroparesis requires objective confirmation of delayed gastric emptying, most commonly by gastric emptying scintigraphy or ¹³C breath testing, following exclusion of mechanical obstruction.^{7,8} In contrast, evaluation of constipation begins with a detailed history and physical examination, including a digital rectal exam, with specialized testing, such as anorectal manometry and colonic transit studies, reserved for patients with refractory symptoms or clinical features suggestive of defecation disorders or slow-transit constipation.^{9,10}

Management of normal- and slow-transit constipation typically relies on pharmacologic therapy, with osmotic laxatives (i.e., polyethylene glycol, milk of magnesia) and stimulant agents (e.g., bisacodyl, glycerin suppositories) considered as first-line treatments.^{9,10} Secretagogues, including lubiprostone and linaclotide, are commonly used in refractory cases, while surgical intervention is required in a small subset of patients with severe slow-transit constipation.^{9,10} In contrast, defecation disorders are optimally treated with biofeedback therapy (BFT) and pelvic floor therapies (PFT), which directly address underlying neuromuscular coordination abnormalities and are superior to laxative-based approaches in this population.^{9–12}

Prokinetic agents used in gastroparesis, such as metoclopramide (the only FDA-approved therapy), domperidone (not FDA-approved in the US), and 5-hydroxytryptamine 4 (5-HT₄) agonists, including prucalopride, may improve both gastric emptying and colonic transit, offering potential benefit for patients with overlapping upper and lower gastrointestinal dysmotility.^{7,13} Prior studies suggest that 30% to 50% of patients with chronic constipation have underlying defecation disorders, a diagnosis that requires ARM for confirmation and BFT for effective treatment.^{3,14–17} Despite this, real-world utilization of anorectal testing and pelvic floor therapies remains strikingly low, raising concern that a substantial proportion of patients with defecation disorders are not appropriately identified or treated.¹²

Notably, data are limited regarding the prevalence of diagnosed defecation disorders and the use of anorectal testing and pelvic floor therapies among patients with gastroparesis and concomitant constipation in routine clinical practice. To address this gap, we leveraged a large, multicenter electronic health record database to (1) quantify the prevalence of diagnosed defecation disorders among patients with gastroparesis and constipation, (2) characterize real-world referral patterns for ARM, BFT, and PFT, and (3) evaluate the downstream clinical impact of ARM referral. Specifically, we compared healthcare utilization outcomes, including abdominal imaging, gastrostomy tube placement, nasogastric tube (NGT)

placement, total parenteral nutrition (TPN) use, hospitalizations, and emergency department (ED) visits between patients with gastroparesis who underwent ARM and those who did not.

Materials and Methods

Study Design and Data Source

We conducted a retrospective cohort study using the TriNetX U.S. Collaborative Network (Cambridge, USA), a federated, multicenter electronic health record (EHR) platform containing de-identified patient-level data from participating healthcare organizations. The database provides real-time access to demographics, diagnoses, procedures, medications, and laboratory data, enabling large-scale observational analyses. All data are de-identified in accordance with the Health Insurance Portability and Accountability Act (HIPAA) Privacy Rule, with expert determination applied at a network level. To protect confidentiality, counts of fewer than 10 patients are masked. Data are derived from source EHRs and standardized across sites using integrated natural language processing and harmonization tools. The TriNetX database does not include insurance claims data and excludes information from randomized controlled trials.

Study Population and Cohort Definition

Adult patients (≥ 18 years) with diagnosis of gastroparesis (ICD-10-CM: K31.84) who subsequently received a diagnosis of constipation (ICD-10-CM: K59.0) between January 2000 and May 2022 were identified. Two cohorts were defined:

- ARM cohort: patients with gastroparesis and constipation who underwent ARM (CPT: 91120)
- No ARM cohort: patients with gastroparesis and constipation, but did not have ARM during the study period.

Study Outcomes

Outcomes were assessed during follow-up beginning after the index event (ARM referral), with a median follow-up duration of approximately three years. Outcomes of interest included rates of emergency department visits, abdominal imaging (abdominal radiography, computed tomography, or magnetic resonance imaging), gastrostomy tube placement, TPN administration, NGT placement, and overall hospitalizations. Outcomes were identified using relevant procedural and billing codes in accordance with TriNetX reporting standards.

Statistical Analysis

All analyses were conducted within the TriNetX Analytics platform. To minimize confounding and address baseline differences, cohorts were matched 1:1 using propensity scores generated via logistic

regression. Covariates included age, sex, race, comorbid conditions, prior procedures, and medication use documented before the index date. Matching was performed using a greedy nearest-neighbor algorithm with a caliper of 0.1 pooled standard deviations of the logit of the propensity score. Covariate balance after matching was evaluated using standardized mean differences (SMD), with values < 0.1 indicating acceptable balance. For binary outcomes, adjusted odds ratios (aOR) with 95% confidence intervals (CI) were calculated. All statistical tests were two-tailed, and a p-value < 0.05 was considered statistically significant. Because TriNetX provides aggregate-level, de-identified data without patient-level identifiers, institutional review board approval was not required. Prevalence estimates were calculated as the proportion of patients with diagnosed defecation disorders among those with gastroparesis and constipation. Management patterns were assessed by determining the proportions of patients who underwent ARM, received BFT or PFT, and were prescribed secretory pharmacologic agents. Results are reported as counts and percentages in accordance with TriNetX aggregate data reporting requirements.

Results

Rates of diagnosis of defecation disorder and utilization of BFT, ARM:

A total of 295,016 patients with gastroparesis were identified; a total of 88,062 (29.9%) had concomitant constipation, while only 4,828 (1.41%) patients were diagnosed with defecation disorder. Of those with defecation disorders, 1,291 (33.32%) were referred for ARM. Use of pelvic floor therapies was low, including 147 (3.79%) received BFT, while 1,779 (45.91%) received physical therapy, including pelvic floor training. Females constituted 90.8% of the cohort. For racial and ethnic distribution, Caucasians were 73%, African Americans were 17.6%, and Hispanics were 7%. Most of the patients were aged 25–45 years. A total of 2,147 (55.94%) patients with defecation disorders were prescribed secretory pharmacologic agents post-ARM. These findings highlight the underdiagnosis of defecation disorders and utilization of pelvic floor therapies. (Table 1)

Comparison of patients who were referred to ARM and those who were not.

Before propensity score matching, patients with overall constipation who underwent ARM were younger (46.6 ± 16.7 vs 51.6 ± 18.3 years; $p < 0.001$), more often female (88.2% vs 68.9%; $p < 0.001$), and White (73.9% vs 65.1%; $p < 0.001$) than those who did not undergo ARM. They also had higher prevalence of irritable bowel syndrome (26.4% vs 5.0%), autonomic nervous system disorders (9.9% vs 2.2%), systemic sclerosis (1.7% vs 0.7%), and Ehlers–Danlos syndromes (5.1% vs 0.9%). After 1:1 matching, each group had 3,662 patients, and baseline characteristics were well balanced (Table 2). After PSM, ARM was associated with significantly lower adjusted odds of emergency department visits (0.40% vs 0.48%; aOR 0.80, 95% CI 0.78–0.85; $P = .02$), abdominal imaging (19.77% vs 24.65%; aOR 0.68, 95% CI 0.61–0.78; $P < .01$), fewer overall hospitalizations (3.20% vs 5.30%; aOR 0.58, 95% CI 0.44–0.76; $P = .01$), and NGT placement (1.60% vs 2.30%; aOR 0.69, 95% CI 0.47–0.80; $P = .03$). There was no difference in TPN

(2.00% vs 2.10%; aOR 0.94, 95% CI 0.66–1.35; $P = .75$), and gastrostomy tube placement did not differ significantly (3.20% vs 2.60%; aOR 1.23, 95% CI 0.91–1.66; $P = .18$) (Fig. 1, Table 3).

Discussion

In this large, real-world analysis of nearly 300,000 patients with gastroparesis, constipation was present in 29.9% of the patients, underscoring the high burden of lower gastrointestinal symptoms in this population. However, only 1.41% of patients were diagnosed with defecation disorders, a strikingly low rate when contrasted with physiological studies suggesting 30–50% of patients with chronic constipation and up to 40% of patients with gastroparesis undergoing anorectal testing demonstrate pelvic floor dysfunction.^{8–10} This discrepancy strongly suggests substantial under-recognition of defecation disorders in routine clinical practice. Even among patients formally diagnosed with defecation disorders, care delivery gaps were evident. Only one-third of patients underwent ARM, the diagnostic standard for dyssynergic defecation, and fewer than 4% received BFT, the recommended first-line treatment.^{1,3,7,11} Although 45.9% were coded as receiving physical therapy, this proportion likely overestimates true pelvic floor-directed therapy, given the lack of specific procedural codes for pelvic floor rehabilitation. Collectively, these findings indicate that both diagnostic evaluation and guideline-concordant therapy are markedly underutilized in patients with gastroparesis and coexisting constipation.

Importantly, patients referred for ARM demonstrated significantly lower adjusted odds of emergency department visits, abdominal imaging, hospitalizations, and nasogastric tube placement after propensity score matching. While the absolute differences were modest, the consistency of reduction across multiple healthcare utilization metrics suggests a clinically meaningful downstream impact. Notably, no differences were observed in total parenteral nutrition use or gastrostomy tube placement, outcomes more reflective of severe upper gastrointestinal failure than anorectal dysfunction. These findings support the concept that identifying and addressing pelvic floor dysfunction may reduce acute care utilization and diagnostic redundancy without necessarily altering advanced nutritional support needs.

The coexistence of gastroparesis and constipation likely reflects heterogeneous pathophysiologic mechanisms. Delayed gastric emptying may contribute to downstream dysmotility through impaired propagation of enteric reflexes and delayed nutrient delivery.^{9,13} Whole gut transit studies have demonstrated prolonged colonic transit in subsets of patients with gastroparesis, supporting a generalized dysmotility phenotype.^{9,13,18} Conversely, pelvic floor dysfunction may independently contribute to symptoms of bloating, abdominal pain, and refractory constipation, potentially amplifying upper gastrointestinal symptom perception.¹⁴ Additionally, medications commonly prescribed for gastroparesis, including opioids, tricyclic antidepressants, and anticholinergic agents, may exacerbate colonic and anorectal dysfunction.^{4,5,9} Thus, constipation with gastroparesis should not be pursued secondary to gastric delay alone, and objective evaluation is warranted, particularly in refractory cases.

Clinical guidelines for major gastroenterology societies recommend anorectal testing in patients with chronic constipation who fail medical therapy or exhibit features of outlet obstruction, with biofeedback therapy as first-line treatment for confined dyssynergic defecation.^{1,15,19} Our findings show that, in practice, ARM is frequently deferred or omitted in patients with gastroparesis, even when constipation is present. The observed reduction in healthcare utilization among patients undergoing ARM may reflect several explanations: (1) improved diagnostic clarity, reducing repeated imaging and acute evaluations, (2) earlier implementation of targeted therapies such as BFT, and (3) more structured, multidisciplinary management pathways following physiologic testing. Although causality cannot be inferred, these associations support consideration of earlier anorectal evaluation of patients with gastroparesis and persistent constipation.^{20–23}

Structural barriers likely contribute to the underutilization observed. Anorectal physiology testing remains unevenly available across community settings, and biofeedback therapy requires specialized expertise, standardized protocols, and dedicated time.^{12,17,24} Reimbursement limitations and lack of provider familiarity further impede implementation. Even in academic centers, variability in ARM interpretation and limited pelvic floor therapy infrastructure may delay referral.^{25,26} Health system-level interventions, including standardized care pathways and electronic health record-based referral prompts for refractory constipation, may improve alignment with evidence-based practice.²⁷

This study has several strengths. It represents the largest evaluation to-date examining real-world patterns of anorectal testing and pelvic floor therapy utilization in patients with gastroparesis and constipation across diverse U.S. healthcare systems. The use of propensity score matching enhances comparability between cohorts and strengthens inference regarding associations with downstream outcomes. Limitations warrant consideration. Reliance on ICD and CPT codes introduces risk of misclassification and under-coding, particularly for defecation disorders, which are symptom-based and inconsistently coded. The absence of specific procedural codes for pelvic floor therapy likely inflated estimates of therapy utilization. Medication exposures, symptom severity, physiologic test results, and timing of therapy relative to outcomes could not be fully characterized. Residual confounding is possible despite propensity matching, and patients referred for ARM may represent a systemically different subgroup with greater specialty care access. Additionally, care delivered outside participating health systems may not be captured.

In summary, constipation is highly prevalent among patients with gastroparesis, yet defecation disorders are rarely diagnosed and even less frequently treated with evidence-based floor-directed pelvic therapies. Referral for anorectal manometry was associated with lower subsequent healthcare utilization, suggesting that earlier physiologic evaluation may reduce acute care burden. These findings support integrating structured anorectal assessment into the management algorithm for gastroparesis patients with persistent constipation and highlight the need to expand access to pelvic floor diagnostic and therapeutic services.

Abbreviations

ARM: Anorectal manometry

BFT: Biofeedback therapy

MRI: Magnetic resonance imaging

CT: Computed tomography

NGT: Nasogastric tube (often written as “NG tube”)

PFT: Pelvic floor training

PSM: Propensity score matching

TPN: Total parenteral nutrition

ICD-10-CM: International Classification of Diseases, Tenth Revision, Clinical Modification

ICD-10-PCS: International Classification of Diseases, Tenth Revision, Procedure Coding System

SD: Standard deviation

SMD: Standardized mean difference

aOR: adjusted Odds ratio

SMD: Standardized mean difference

Declarations

Funding

No external funding was received for this study.

Conflict of Interest Statement

Amol Sharma is supported by funding from the NIH and serves as a consult for Atmo Biosciences. The authors declare no conflicts of interest relevant to this manuscript.

Study Materials Availability

The data that supports the findings of this study are available from the TriNetX Research Network. Restrictions apply to the availability of these data, which were used under license for the current study and are not publicly available. Analytic methods are available upon reasonable request.

Analytic methods

All analyses were conducted using the TriNetX Advanced Analytics Platform, which provides built-in statistical tools for real-world evidence studies.

Author Contributions:

M.H.E. conceived the study, designed the analysis, performed data extraction and statistical analysis, and wrote the main manuscript. E.M.R., E.A.I., T.A., M.E., and M.M.E. contributed to data interpretation and manuscript drafting. S.G. and A.S. supervised the study, provided critical revisions, and contributed to study design. All authors reviewed and approved the final manuscript.

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Tables

Table 1 Prevalence of gastroparesis, constipation, and defecatory disorder, patient who underwent anorectal manometry, biofeedback and pelvic floor therapies	
Variables	Value
Gastroparesis	295,016
Overall constipation	88,062 (29.9%)
Defecation Disorder (DD)	4,828 (1.41%)
Referred for anorectal manometry (of DD cohort)	1,291 (33.32%)
Biofeedback (of DD cohort)	147 (3.79%)
Pelvic floor training (of DD cohort)	1,779 (45.91%)
Received secretory pharmacologic agents (of DD cohort)	2,147 (55.94%)

Table 2 Baseline characteristics before and after propensity score matching for the patients with gastroparesis and concomitant constipation						
Variables	Before propensity score matching			After propensity score matching		
	Anorectal manometry	Non-Anorectal manometry	P-value	Anorectal manometry	Non-Anorectal manometry	P-value
Number (n)	3,665	143,076	• -	3,662	3,662	• -
Age	46.6 +/- 16.7	51.6 +/- 18.3	<0.001	46.6 +/- 16.7	46.7 +/- 16.8	0.86
Demographics						
Female	3,233 (88.2)	98,580 (68.9)	<0.001	3,231 (88.2)	3,269 (89.3)	0.16
White	2,709 (73.9)	93,043 (65.1)	< 0.001	2,707 (73.9)	2,742 (74.9)	0.35
Hispanic or Latino	236 (6.4)	12,809 (9.0)	< 0.001	189 (6.1)	159 (5.2)	0.098
Black or African American	527 (14.4)	26,455 (18.5)	< 0.001	436 (14.1)	422 (13.7)	0.61
Comorbidities						
Irritable bowel syndrome	967 (26.4)	7,106 (5.0)	< 0.001	772 (25.0)	755 (24.5)	0.62
Autonomic nervous system Disorders	362 (9.9)	3,143 (2.2)	< 0.001	295 (9.6)	282 (9.1)	0.57
Systemic sclerosis	62 (1.7)	966 (0.7)	< 0.001	48 (1.6)	59 (1.9)	0.28
Parkinson's disease	42 (1.1)	1,474 (1.0)	0.495	36 (1.2)	28 (0.9)	0.32
Ehlers-Danlos syndromes	188 (5.1)	1,238 (0.9)	< 0.001	148 (4.8)	140 (4.5)	0.63
Medications						
Opioid use	1,632 (44.5)	61,522	0.067	1,351 (43.8)	1,377 (44.6)	0.51

		(43.0)				
Anticholinergics	318 (8.7)	15,989 (11.2)	< 0.001	262 (8.5)	251 (8.1)	0.61
Antidepressants	1,730 (47.2)	45,220 (31.6)	< 0.001	1,412 (45.8)	1,433 (46.5)	0.59
Bariatric Surgery Procedures	10 (0.3)	147 (0.1)	0.002	10 (0.3)	0 (0)	0.002

Table 3 Comparison of the outcomes between the ARM cohort and non-ARM cohort within three years for the patients with gastroparesis and concomitant constipation

Variables	Anorectal manometry		Anorectal manometry		aOR	95% CI	P-value
	Cohort		Cohort				
	3,662		3,662				
	Events	Risk	Events	Risk			
Emergencies Department visit	1,579	0.40	1,673	0.48	0.80	0.78 - 0.85	0.02
Abdominal Imaging	717	19.77	894	24.65	0.68	0.61 – 0.78	< 0.01
Overall Hospitalizations	1,172	3.2	194	5.3	0.58	0.44 – 0.76	0.01
Nasogastric Tube placement	59	1.60	84	2.30	0.69	0.47 – 0.80	0.03
Gastrostomy tube placement	117	3.20	95	2.6	1.23	0.91 – 1.66	0.18
Total parental nutrition	73	2.00	77	2.10	0.94	0.66 – 1.35	0.75
ARM: Anorectal manometry; aOR: Adjusted odds ratio							

Figures

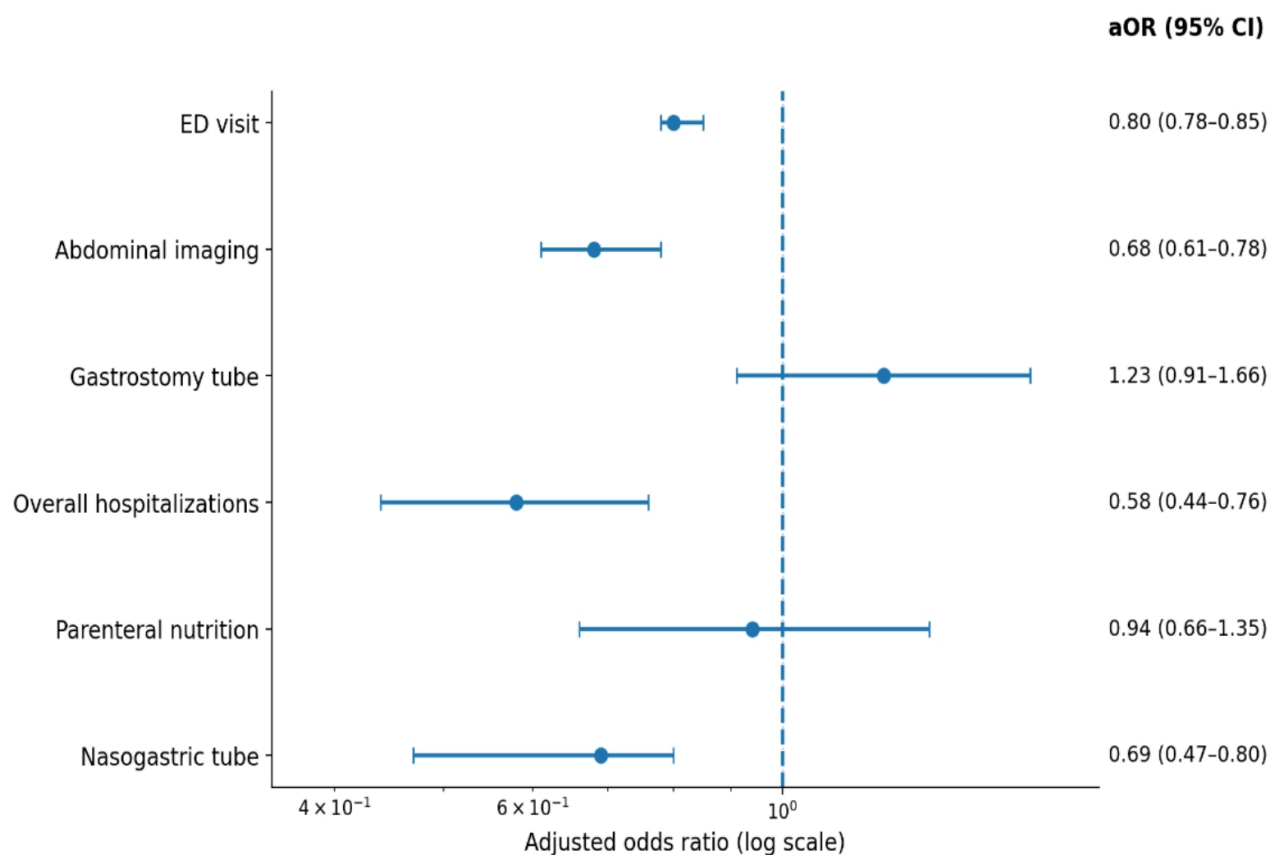


Figure 1

Forest Plot of the odds ratios for the comparison of the outcomes between the anorectal manometry and non- anorectal manometry cohorts

Forest plot displaying adjusted odds ratios (95% CI) for ED visits, abdominal imaging, gastrostomy tube placement, overall hospitalizations, parenteral nutrition, and nasogastric tube placement. Vertical dashed line at aOR=1.0 represents no difference. ARM = anorectal manometry; aOR = adjusted odds ratio; CI = confidence interval; ED = emergency department