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Clinical Characteristics and Management of Recurrent Low-Risk Abdominal Pain in the Emergency Department

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Abstract

The primary driver for emergency department (ED) consultations is abdominal pain. A significant portion of these individuals present with cyclical symptoms linked to non-critical etiologies, such as gut-brain interaction disorders. This preliminary investigation aimed to outline the clinical profiles of patients experiencing recurrent, low-risk abdominal pain, focusing on pain intensity, clinical management, biopsychosocial elements, opioid utilization, and 30-day readmission frequencies. Adult ED patients presenting with episodic abdominal pain were enrolled in this prospective, observational pilot study at a single academic hospital between July 2022 and June 2023. Eligible participants had to report at least one comparable painful episode during the previous year, separated by periods of complete symptom alleviation. Individuals presenting with unstable clinical metrics or high-risk pathologies were excluded. Data collection encompassed patient-reported outcomes, social determinants of health, and electronic clinical records. The primary endpoints were pain intensity, opioid exposure, and 30-day ED return rates. The investigation tracked 101 enrolled subjects (mean age, 43.7 years; 65.3% female; 69.3% Black). The cohort demonstrated elevated pain intensity (mean triage pain score, 7.1 ± 2.6). Over half of the participants (56.4%) had a history of frequent computed tomography screening. Analgesic treatment included opioids for 50 participants (49.5%). Scores from the Patient-Reported Outcomes Measurement Information System (PROMIS)-29 revealed elevated risks regarding anxiety (T-score, 56.0 ± 11.1) and pain interference (T-score, 60.8 ± 8.2). Within 30 days of discharge, 11 participants (10.9%) returned to the ED. This pilot project indicates that individuals suffering from recurrent, low-risk abdominal pain experience a substantial symptom burden alongside high healthcare resource utilization. Developing focused interventions that target biopsychosocial dynamics and optimize pain control strategies could help mitigate ED readmissions and improve patient outcomes.

Keywords: Abdominal pain, Emergency department, Opioid use, Social determinants

Introduction

Within the United States, abdominal pain serves as the leading prompt for emergency department (ED) care, triggering roughly 7 million clinical visits annually [1]. Rather than experiencing an isolated event, many patients face a cyclical pattern marked by recurring symptoms and repeated ED assessments. Approximately 15% to 34% of individuals presenting with episodic abdominal pain meet the threshold for healthcare super-utilizers, which is defined as accumulating four or more ED visits annually [2]. The underlying causes of recurrent abdominal pain are highly diverse, spanning structural pathologies—such as chronic pancreatitis, diverticulitis, and inflammatory bowel disease—as well as nonstructural conditions, including disorders of gut-brain interaction [3-5].

Patients with episodic abdominal pain regularly undergo repetitive diagnostic testing, including comprehensive laboratory panels, computed tomography (CT) scans, and abdominal ultrasounds. Consequently, emergency presentations for these symptoms are highly resource-intensive and financially demanding [6]. Furthermore, between 44% and 59% of ED patients presenting with abdominal pain are treated with opioid analgesics, which carry inherent risks of adverse clinical events [7].

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Individuals seeking emergency care for low-risk abdominal pain frequently exhibit clinical symptoms that mirror acute, high-risk surgical crises. This diagnostic overlap often triggers intensive medical workups, exposing patients to unnecessary iatrogenic radiation, redundant laboratory assessments, substantial financial liabilities, and the initiation of opioid regimens that may elevate the long-term risk of physiological dependence, adverse side effects, and persistent misuse [8, 9].

This patient cohort could be managed more effectively within ambulatory care networks using a comprehensive biopsychosocial paradigm. Such a model prioritizes longitudinal continuity of care, addresses underlying psychosocial factors, and encourages lifestyle adjustments, thereby concurrently alleviating overcrowding in emergency departments and preserving vital acute care resources. Given the acute psychological stress, high economic costs, and general strain imposed on clinical infrastructure, individuals with cyclical abdominal pain highlight an ongoing deficit within current healthcare delivery models, leaving essential patient needs unaddressed. The present investigation was designed to systematically characterize patients experiencing recurrent abdominal pain, evaluating their symptom profiles, the utilization of opioid analgesics, the perceived effectiveness of pain control strategies, and the frequency of 30-day ED returns.

Materials and Methods

Ethics statement

This protocol received formal approval from the Institutional Review Board at The George Washington University (No. NCR213728). All participating patients provided written informed consent.

Study setting and design

This prospective, case-cohort observational trial was conducted at The George Washington University Hospital in Washington, DC, USA, between July 4, 2022, and June 1, 2023. Presenting individuals were screened for recurrent, low-risk abdominal pain, with those exhibiting established high-risk clinical features systematically excluded. Enrolled study subjects completed a digital questionnaire assessing specific symptom phenotypes, medical comorbidities, and psychosocial vulnerabilities. Furthermore, data from an automated clinical report extracted from the electronic health record following the index encounter were reviewed to analyze 30-day post-discharge outcomes.

Study population

Adult candidates (aged ≥ 18 years) presenting to the ED with a primary complaint of abdominal pain who reported at least one prior presentation of comparable pain within the preceding year were screened for enrollment. Symptom recurrence was operationally defined as experiencing a comparable episode of abdominal pain a minimum of 30 days before the current ED visit, punctuated by a definitive window of complete symptom resolution, ensuring the pain was episodic rather than constant. Individuals were excluded from participation if they presented with altered mental status, were incarcerated or wards of the state, were pregnant, were non-English-speaking, or failed to fulfill all pre-specified low-risk criteria.

The low-risk parameters were adapted from the consensus guidelines established by the GRACE-2 (Guidelines for Reasonable and Appropriate Care in the Emergency Department 2) panel [1], which require the following clinical features:

1. Hemodynamically stable vital signs
2. An age range between 18 and 65 years
3. Absence of an active pregnancy
4. No history or physical signs indicative of acute intra-abdominal pathology
5. Absence of acute physical trauma within the preceding 7 days
6. No history of solid organ transplantation or therapeutic immunosuppression
7. No history of abdominal surgical intervention within 30 days and/or active neoplastic disease
8. No prior diagnosis of inflammatory bowel disease
9. No history of mechanical bowel obstruction
10. Absence of acute, severe psychiatric illness demanding immediate emergent stabilization

The study population comprised a convenience sample recruited by dedicated research personnel who screened presenting ED patients on weekdays between 9 AM and 7 PM. Following enrollment, participants underwent evaluation to determine pain intensity, symptom frequency, and their level of confidence regarding their clinical diagnosis. Validated screening instruments were deployed to assess chemical dependency risks (Alcohol, Smoking and Substance Involvement Screening Test, ASSIST) [10], social determinants of health (Accountable Health Communities [AHC] health-related social needs [HRSN]) [11], and health-related quality of life metrics (Patient-Reported Outcomes Measurement Information System [PROMIS]-29) [12].

Supplemental clinical endpoints, including specific emergency department therapies, disposition status, discharge diagnoses, and 30-day ED return rates, were retrieved from electronic medical records via automated reporting.

The primary ICD-10 (International Classification of Diseases, 10th Revision) diagnostic code linked to the index evaluation was recorded for each participant.

Analysis

Descriptive statistical methods were applied to synthesize demographic profiles, clinical data, and patient-reported outcome measures. Continuous variables, such as pain intensity rankings (quantified via a 10-point numerical rating scale) and PROMIS-29 standardized T-scores, were expressed as mean±standard deviation. Categorical measures, including biological sex, racial background, and opioid administration documentation, were presented as raw frequencies and percentage distributions.

Potential relationships between 30-day ED readmission events and baseline patient-reported outcomes were evaluated utilizing multivariate logistic regression models. These models were statistically adjusted to account for participant age and biological sex. Both unadjusted and adjusted odds ratios were analyzed, along with their corresponding 95% confidence intervals (CIs). All statistical computational tasks were executed using SAS version 9.4 (SAS Institute Inc.), with a two-tailed significance level of $P < 0.05$.

Results and Discussion

The final analysis tracked a total of 101 subjects who completed the protocol, exhibiting an average age of 43.7 ± 16.7 years **(Figure 1)**. Female subjects comprised the majority of the study population, with 66 individuals (65.3%) identifying as women and 34 individuals (33.7%) identifying as men. Regarding the racial composition of the sample, 70 participants (69.3%) identified as Black. High baseline pain intensity and multi-day symptom persistence were highly prevalent among the cohort. On a standard 10-point scale, the group averaged a pain score of 7.1 ± 2.6 at emergency triage, which decreased to 5.0 ± 3.4 at discharge. Acute pain management in the ED involved opioid administration for roughly half of the cohort (n = 50, 49.5%), and 13.9% left the department with an active opioid prescription **(Table 1)**.

When evaluating how well patients understood their medical condition, 37 participants (36.6%) stated that a healthcare provider explicitly clarified the origin of their pain, whereas 22 individuals (21.8%) received an explanation but could not understand it. Notably, 26 subjects (25.7%) reported receiving no communication whatsoever regarding the etiology of their symptoms, and 2 participants (2.0%) could not recall whether they had been told. Furthermore, 14 individuals (13.9%) reported never having sought medical evaluation for this specific pain. Chronic diagnostic exposure was prominent; 57 subjects (56.4%) had undergone at least one CT scan within the previous 5 years to investigate these abdominal symptoms.

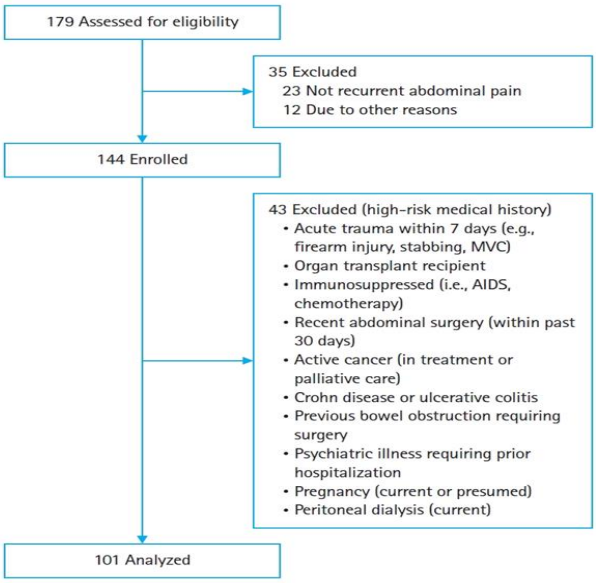

Figure 1. Study flowchart. MVC, motor vehicle collision.

Table 1. Demographic variables among participants (n = 101).

Category	Variable	Result
Demographic characteristics	Age (years)	43.7±16.7
	Sex	
	Male	34 (33.7)
	Female	66 (65.3)
	Other (transgender/nonbinary)	1 (1.0)

	Race	
	Black	70 (69.3)
	White	21 (20.8)
	Asian	2 (2.0)
	Other	4 (4.0)
	More than one race	1 (1.0)
	Preferred not to answer	3 (3.0)
	Ethnicity	
	Hispanic or Latino	5 (5.0)
	Not Hispanic or Latino	91 (90.1)
	Preferred not to answer	5 (5.0)
Insurance coverage	Medicaid	34 (33.7)
	Medicare	17 (16.8)
	Private insurance	25 (24.8)
	Uninsured	12 (11.9)
	Other insurance	13 (12.9)
Medical history	Hypertension	38 (37.6)
	Diabetes mellitus	18 (17.8)
	Congestive heart disease	5 (5.0)
	COPD	6 (5.9)
	Coronary artery disease	3 (3.0)
	Depression	26 (25.7)
	Anxiety	30 (29.7)
Pain assessment (0–10 scale)	Pain score at triage	7.1 ± 2.6
	Current pain score	6.1 ± 2.9
	Pain score at discharge	5.0 ± 3.4
Questionnaire responses	**Frequency of abdominal pain during the previous 7 days**	
	More than once daily	30 (29.7)
	Once daily	17 (16.8)
	On 2–6 days	36 (35.6)
	One day only	14 (13.9)
	Never	3 (3.0)
	Missing data	1 (1.0)
	Impact of abdominal pain on daily activities during the previous 7 days	
	Quite a bit or very much	67 (66.3)
	Not at all, a little bit, or somewhat	33 (32.7)
	Missing data	1 (1.0)
	Previous episode of similar symptoms	
	Within the previous week	20 (19.8)
	More than 1 week but less than 1 month	20 (19.8)
	Between 1 and 6 months previously	33 (32.7)
	Between 6 months and 1 year previously	14 (13.9)
	More than 1 year previously	10 (9.9)
	Unsure or unable to answer	3 (3.0)
	Missing data	1 (1.0)
	At least one CT scan for this abdominal pain within the previous 5 years	57 (56.4)
	Whether a healthcare provider explained the cause of the pain	
	Yes, the cause was clearly explained	37 (36.6)
	The cause was explained but not understood	22 (21.8)
	Never informed of the cause	26 (25.7)
	Uncertain whether the cause was explained	2 (2.0)
	Never consulted a physician	14 (13.9)
Medication administered in the ED	Opioid analgesic	50 (49.5)
	NSAID	21 (20.8)
	APAP	39 (38.6)
	Alternative analgesic therapy	12 (11.9)
Emergency department outcomes	CT imaging performed	61 (60.4)
	Ultrasound performed	20 (19.8)
	Discharged home	68 (67.3)
	Opioid analgesic prescribed at discharge	14 (13.9)

Values are reported as mean±standard deviation or number (%).

Abbreviations: COPD = chronic obstructive pulmonary disease, CT = computed tomography, ED = emergency department, NSAID = nonsteroidal anti-inflammatory drug, and APAP = acetaminophen.
a) Self-reported.

Table 2 presents the compiled behavioral and quality-of-life questionnaire results, focusing on the psychological and physical dimensions of the PROMIS-29 instrument. Among the 101 individuals who completed these assessments, the average physical function T-score was 43.8 ± 10.2, indicating functional impairments relative to standard norms. Psychological distress was also pronounced, evidenced by an elevated mean anxiety T-score of 56.0 ± 11.1. Post-discharge tracking over a 30-day window revealed that 90 participants (89.1%) required no further ED care, while 7 individuals (6.9%) returned to the department a single time, and 4 individuals (4.0%) had two separate readmissions.

Table 2. Questionnaire scores among participants (n = 101)

Assessment domain	Measure	Result
PROMIS-29 Profile	Physical Function T-score	43.8 ± 10.2
	Anxiety T-score	56.0 ± 11.1
	Depression T-score	51.7 ± 10.5
	Fatigue T-score	54.3 ± 10.4
	Sleep Disturbance T-score	55.5 ± 9.9
	Ability to Participate in Social Activities T-score	52.2 ± 9.6
	Pain Interference T-score	60.8 ± 8.2
	Global Pain Score	7.0 ± 2.4
Moderate- to high-risk substance use (ASSIST)	Alcohol (n = 61)	9.2 ± 8.7
	Tobacco (n = 31)	14.9 ± 9.0
	Cannabis (n = 33)	14.1 ± 9.4
	Cocaine (n = 4)	14.5 ± 10.4
	Amphetamine (n = 3)	16.3 ± 10.6
	Sedatives (n = 2)	12.0 ± 0.0
	Hallucinogens (n = 6)	12.3 ± 9.9
	Opioids (n = 5)	11.6 ± 8.3
Simplified chronic pain scale	Grade 0 (no chronic pain)	68 (67.3)
	Grade 1 (mild or bothersome chronic pain)	17 (16.8)
	Grade 2 (high-impact chronic pain)	16 (15.8)
Health-related social needs (AHC-HRSN)	Financial hardship	37 (36.6)
	Employment-related needs	15 (14.9)
	Family and community support needs	23 (22.8)
	Educational needs	21 (20.8)
	Physical activity needs	59 (58.4)

Values are presented as mean ± standard deviation or number (%).
PROMIS, Patient-Reported Outcomes Measurement Information System; ASSIST, Alcohol, Smoking and Substance Involvement Screening Test; AHC, Accountable Health Communities; HRSN, health-related social needs.
a) A higher score indicates more adverse outcomes in the listed category, aside from physical function, where lower scores indicate adverse outcomes.
b) Global pain score is a 0–10 pain scale representing the patient's average pain in the last week.

Subsequent multivariate analyses evaluated potential correlations between 30-day readmissions and various demographic or baseline clinical factors. The model identified no statistically significant links between patient-reported metrics and subsequent ED utilization within the 30-day tracking window. While data trends suggested that severe chronic pain phenotypes and financial stress might elevate the risk of readmission, the broad range of the calculated CIs indicated substantial statistical uncertainty **(Table 3)**. These descriptive distributions suggest that individuals who frequently visit the emergency department may contend with higher levels of unmanaged pain or chronic underlying conditions that drive repeat medical evaluations. This pattern underscores the critical need for structured follow-up programs and targeted interventions to minimize avoidable ED dependency among high-risk groups.

Table 3. Association between repeat ED visit within 30 days of index visit and patient-reported factors

Predictor	Adjusted OR (95% CI)a	Crude OR (95% CI)
PROMIS-29 profile		
Physical Function T-score	0.99 (0.92–1.06)	0.97 (0.92–1.04)
Anxiety T-score	1.06 (0.99–1.14)	1.06 (0.99–1.13)
Depression T-score	1.05 (0.99–1.12)	1.05 (0.99–1.11)
Fatigue T-score	1.04 (0.97–1.11)	1.02 (0.96–1.08)
Sleep Disturbance T-score	1.00 (0.94–1.07)	0.99 (0.93–1.06)
Ability to Participate in Social Activities T-score	0.95 (0.88–1.02)	0.95 (0.89–1.02)

Pain Interference T-score	1.03 (0.94–1.12)	1.02 (0.94–1.10)
Global Pain Score	1.34 (0.95–1.90)	1.36 (0.96–1.93)
ASSIST score		
Alcohol	1.02 (0.88–1.18)	0.98 (0.85–1.14)
Cannabis	1.70 (0.21–13.82)	1.04 (0.91–1.19)
Pain score at discharge	0.99 (0.81–1.20)	1.01 (0.84–1.21)
Simplified chronic pain scale		
Grade 0 (no chronic pain)	1 (Reference)	1 (Reference)
Grade 1 (mild or bothersome chronic pain)	0.60 (0.07–5.49)	0.55 (0.06–4.75)
Grade 2 (high-impact chronic pain)	2.02 (0.43–9.57)	2.01 (0.46–8.83)
AHC-HRSN domains		
Financial hardship	1.66 (0.45–6.18)	1.49 (0.42–5.25)
Employment-related needs	0.71 (0.07–6.86)	0.54 (0.06–4.52)
Family and community support needs	0.65 (0.12–3.41)	0.72 (0.14–3.60)
Educational needs	2.05 (0.51–8.27)	2.42 (0.64–9.22)
Physical activity needs	0.70 (0.18–2.75)	0.82 (0.23–2.87)

a) Adjusted by sex and age.
Abbreviations: ED = emergency department; OR = odds ratio; CI = confidence interval; aOR = adjusted odds ratio; PROMIS, Patient-Reported Outcomes Measurement Information System; ASSIST, Alcohol, Smoking and Substance Involvement Screening Test; AHC, Accountable Health Communities; HRSN, health-related social needs.

Abdominal complaints rank among the most common reasons for emergency care across the United States, representing a highly diverse spectrum of diseases that require vastly different diagnostic pathways, imaging strategies, and analgesic approaches. Due to diagnostic ambiguities and clinical anxieties regarding the complications of opioid therapies, patients with chronic abdominal pain are frequently left without definitive treatment options. Specifically, individuals experiencing recurrent, low-risk abdominal pain often present with symptoms that closely mimic high-acuity surgical emergencies. This clinical similarity drives intensive resource use—including repetitive imaging and emergency evaluations—despite a low likelihood of critical disease.

This patient population could be managed more sustainably within ambulatory care networks, allowing primary care physicians and gastroenterologists to focus on establishing long-term care plans, managing lifestyle parameters, and treating psychiatric comorbidities in a continuous, patient-centered manner. This study targeted individuals with low-risk abdominal symptoms to better map their clinical profiles and to evaluate the real-world utility of the GRACE-2 screening guidelines for benign presentations.

The data revealed that patients with recurrent pain achieved very little analgesic relief during their acute ED stay. Moreover, they reported that their pain heavily disrupted activities of daily living and frequently resulted in acute opioid administration during their evaluation. This prescribing trend deviates from clinical consensus statements advising practitioners to restrict opioid therapies to the minimum effective dose and to calibrate adjustments based on pain severity and side-effect profiles when treating chronic, non-malignant pain [13].

The high frequency of opioid use documented among low-risk patients suggests that emergency practitioners are not consistently adopting strategies to minimize the risk of drug dependence. Given how frequently these individuals seek emergency care, current prescribing habits expose a large patient population to unnecessary opioid-related adverse events, despite the availability of safer, more sustainable multi-disciplinary alternatives outside the acute care environment. While baseline trends indicate that high-impact chronic pain and socioeconomic disadvantages may elevate the probability of an emergency return, subsequent prospective trials using larger cohorts are required to clarify these relationships.

Refining diagnostic precision may lead to more effective clinical pathways, lower overall expenditures from repeated ED visits, and better health outcomes for patients with abdominal symptoms. The psychological desire for clear answers remains a primary driver of patients seeking emergency care, and clear patient education regarding a clinical diagnosis has been shown to confer independent therapeutic benefits [14]. In this cohort, patients experiencing recurrent pain did not appear to receive effective communication regarding the underlying mechanisms of their symptoms. By contrast, individuals presenting with more severe, structural conditions are statistically more likely to report that their medical team explained exactly “what was wrong, and the cause of their pain was clear.”

Managing chronic abdominal symptoms effectively requires a multi-modal approach, prioritizing customized care plans that avoid escalating opioid doses. Existing consensus guidelines for chronic abdominal pain advocate for initial management using proton pump inhibitors, foundational dietary tracking, antidiarrheal compounds, and laxatives before introducing opioid analgesics [15]. Implementing these direct therapies can optimize objective pain scores while bypassing the secondary complications associated with opioid regimens. Furthermore, psychological interventions—including cognitive behavioral therapies and clinical hypnosis—have demonstrated robust efficacy in managing disorders of gut-brain interaction, such as irritable bowel syndrome [16].

Incorporating psychotherapeutic resources directly into emergency care protocols alongside conventional medical therapies could provide a meaningful strategy for lowering pain scores among patients with non-critical diagnoses. Additionally, psychiatric comorbidities are statistically more prevalent among individuals who meet the criteria

for frequent ED utilization [17]. Adopting a holistic biopsychosocial framework for pain management holds clear promise for mitigating pain intensity scores and preserving essential emergency department infrastructure.

Although socioeconomic parameters did not reach statistical significance in predicting repeat ED presentations, baseline trends indicate that financial and social determinants may shape healthcare-seeking behavior. Financial vulnerability appeared potentially linked to increased ED reliance, reflecting systemic barriers to ambulatory primary care and difficulties in navigating chronic disease management. Earlier literature has documented matching patterns, demonstrating that financial stress correlates with a patient identifying the emergency department as their primary source of medical care, while reporting unfavorable social determinants of health is predictive of actual ED presentation rates [18].

Employment status and educational attainment did not exhibit clear correlations, though workplace restrictions may impede adherence to outpatient follow-up, and higher educational attainment may foster proactive ambulatory care scheduling. Levels of physical activity demonstrated no clear impact, yet lifestyle modification remains a pillar of holistic health. These combined observations highlight the critical need for expanded, longitudinal investigations to fully decouple these socioeconomic relationships. Resolving financial barriers, expanding ambulatory access points, and reinforcing community-level social support structures could help minimize preventable reliance on the emergency department and optimize longitudinal clinical outcomes.

Limitations

The intrinsic limitations of this pilot study must be taken into account when interpreting the results. First, its single-center design within an academic medical center may limit the generalizability of these findings to other clinical settings or patient cohorts with different demographic or clinical distributions. Second, reliance on convenience sampling protocols during specific daytime hours introduces selection bias, potentially omitting individuals who seek emergency care overnight or early in the morning. Third, as a preliminary pilot project, the relatively modest sample size (n = 101) reduces the overall statistical power needed to isolate subtle associations and establish definitive causal linkages.

Additionally, gathering data via self-reported formats for variables such as pain interference and psychosocial factors introduces vulnerabilities to recall bias and social desirability effects. The systematic exclusion of non-English-speaking patients introduces an additional layer of selection bias, restricting the external validity of these insights within linguistically diverse environments. Furthermore, tracking clinical endpoints exclusively within a 30-day post-encounter window is too narrow to capture extended patterns of healthcare resource utilization or long-term clinical trajectories.

Despite adjusting for baseline age and biological sex, residual confounding remains a concern, as unmeasured variables may still influence the observed relationships between patient-reported outcomes and subsequent ED returns. Finally, the strict nature of the inclusion parameters, which systematically excluded high-risk clinical presentations, limits the direct translation of these findings to broader, unselected populations presenting with recurrent abdominal pain, including those with high-acuity underlying diagnoses. Resolving these limitations in future multi-center designs will be essential to expanding the clinical understanding and management of recurrent abdominal pain within emergency medicine.

Conclusion

This pilot study underscores the intricate challenges associated with managing recurrent abdominal pain within emergency medicine. The data demonstrate that individuals with non-critical, benign diagnoses regularly leave emergency evaluations feeling ambiguous regarding the root cause of their symptoms, while experiencing less effective pain mitigation compared to patients diagnosed with high-acuity illnesses. These findings highlight the necessity of adopting a more refined framework for evaluating and treating individuals presenting with recurrent, low-risk abdominal pain.

This work emphasizes the critical need for customized clinical strategies that incorporate non-pharmacological modalities alongside standard analgesic regimens. Future prospective trials should systematically evaluate biopsychosocial variables to refine clinical communication and optimize general management paradigms for low-risk abdominal pain within the emergency department framework.

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