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Systematic review

Predictors of treatment failure in CT-confirmed uncomplicated acute diverticulitis discharged from the emergency department: a systematic review

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Abstract

Background: Emergency discharge is an established option for selected adults with uncomplicated acute diverticulitis. Treatment failure is difficult to predict accurately. This focused review examined baseline clinical, laboratory, and computed tomography predictors alongside outpatient outcomes. **Methods:** Original studies published through 31 May 2026 were examined for computed tomography confirmation, outpatient management, and subsequent deterioration. Ten outpatient studies were summarized descriptively. Broader prognostic cohorts were considered separately because their populations and outcomes differed from immediate emergency discharge. **Results:** Selected outpatient cohorts recorded low admission rates, including 2/70, 3/66, 4/155, and 4/140 patients in four studies. A randomized outpatient trial recorded hospitalization in 8/242 participants without antibiotics and 14/238 receiving antibiotics. Persistent pain and oral intolerance accounted for several treatment escalations. Imaging associations were imprecise and differed between studies. Different outcome definitions and follow-up periods restricted comparisons of failure frequencies across treatment protocols. Broader cohorts identified free fluid, female sex, elevated C-reactive protein, systemic comorbidity, vomiting, and prolonged symptoms as prognostic signals. **Conclusions:** Outpatient outcomes were better after structured selection and follow-up. Inflammatory burden, imaging abnormalities, and symptom persistence warrant particular attention. The data supports individualized assessment rather than a universal discharge score, with explicit separation of readmission, complicated progression, and recurrent episodes when interpreting treatment failure across different clinical settings.

Keywords: Acute diverticulitis; uncomplicated diverticulitis; computed tomography; emergency department; outpatient management.

Introduction

Acute diverticulitis is a frequent cause of abdominal pain, emergency assessment, and healthcare expenditure worldwide, with clinical presentations ranging from localized inflammation to abscess formation and generalized peritonitis (1). Computed tomography (CT) establishes the diagnosis, identifies alternative causes of symptoms, and characterizes the inflammatory process more reliably than clinical suspicion alone (2). This distinction informs treatment selection because uncomplicated disease and established complications require different management pathways and carry different immediate risks (3).

Emergency guidelines support outpatient care for selected patients with uncomplicated diverticulitis who tolerate oral fluids, manage their care at home (4). The AVOD randomized trial challenged routine antibiotic treatment by identifying no significant improvement in recovery or prevention of complications among patients receiving antibiotics for CT-confirmed uncomplicated disease (5). The DIABOLO trial similarly found no significant differences in several adverse outcomes between observation and antibiotic treatment for a first

episode, reinforcing the importance of clinical severity and patient selection (6). These trials established a rationale for less intensive treatment, without directly validating an emergency discharge prediction instrument or demonstrating equivalent risk across all patient subgroups (5,6).

The updated Cochrane review found uncertainty around antibiotic effects on complications, emergency surgery, recurrence, and subsequent elective resection, reflecting limitations in event numbers and evidence certainty (7). Consequently, antibiotic prescribing and suitability for home management represent related decisions that require separate assessment of disease severity, host vulnerability, and practical support (2,4,7). A patient receiving oral antibiotics still requires evaluation for dehydration, uncontrolled symptoms, immunosuppression, and radiological findings that indicate a more extensive inflammatory process (2–4). Successful antibiotic omission in selected trial participants does not establish that every clinically stable patient has an equally favorable outpatient prognosis or an identical need for surveillance (5–7).

For emergency clinicians, the central decision concerns which apparently uncomplicated

presentations require closer observation despite a reassuring initial CT classification and acceptable vital signs (2–4). The distinction is important when persistent symptoms, elevated inflammatory markers, and systemic comorbidity coexist, since contemporary recommendations already use these features to guide treatment intensity. A focused synthesis needs to distinguish predictors measured before discharge from symptoms arising during follow-up, while separating genuine disease progression from recurrence after recovery. This review examined reported predictors of treatment failure following outpatient treatment, prioritized CT-confirmed emergency presentations, and evaluated the applicability of broader prognostic evidence to discharge decisions within contemporary clinical pathways.

Methods

This review was structured according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses framework (Fig 1). PubMed, Scopus, Web of Science, and the Cochrane Central Register of Controlled Trials were searched from inception through 31 May 2026. Controlled vocabulary and free-text terms combined diverticulitis with uncomplicated disease, computed tomography, emergency department, outpatient treatment, ambulatory management, treatment failure, readmission, deterioration, and prognostic factors. Reference lists of relevant articles and reviews were examined for additional reports.

Eligible studies involved adults with CT-confirmed acute colonic diverticulitis initially selected for home treatment after emergency assessment. Randomized trials and prospective or retrospective cohorts were eligible when they reported failure outcomes or prognostic associations. Studies limited to ultrasound diagnosis, postoperative populations, case reports, and inseparable complicated disease were excluded from the directly applicable evidence. Extractable uncomplicated outpatient subgroups were retained. Isolated pericolic gas and discharge following brief observation were recorded as

boundary populations because classification and disposition definitions differed between studies.

Two authors independently screened titles and abstracts, assessed full texts, and extracted data using a standardized form. Disagreements were resolved through discussion and consensus. Full-text exclusion reasons were documented for transparency. Extracted variables included study design, setting, CT classification, outpatient eligibility, participant numbers, antibiotic treatment, follow-up arrangements, failure definitions, event counts, candidate predictors, and adjusted effect estimates with confidence intervals. Overlapping publications were checked to prevent duplicate population counting.

Treatment failure of unplanned admission, persistent disease requiring escalation, development of complications, drainage, or emergency surgery. Emergency revisits without admission were recorded separately. Outcomes were organized according to their reported observation windows, with short-term deterioration distinguished from recurrent episodes after recovery. Associations from mixed inpatient and outpatient cohorts were considered supplementary data, with attention to population differences and the absence of discharge-specific validation.

Prognostic-factor studies were assessed using the Quality in Prognosis Studies domains: participation, attrition, prognostic-factor measurement, outcome measurement, confounding, and statistical analysis. Randomized treatment comparisons were evaluated with the revised Cochrane risk-of-bias framework. Assessment was performed by both authors, with disagreements resolved by consensus. Narrative synthesis grouped findings into clinical, laboratory, imaging, and treatment-related factors. Adjusted associations were prioritized over univariable comparisons.

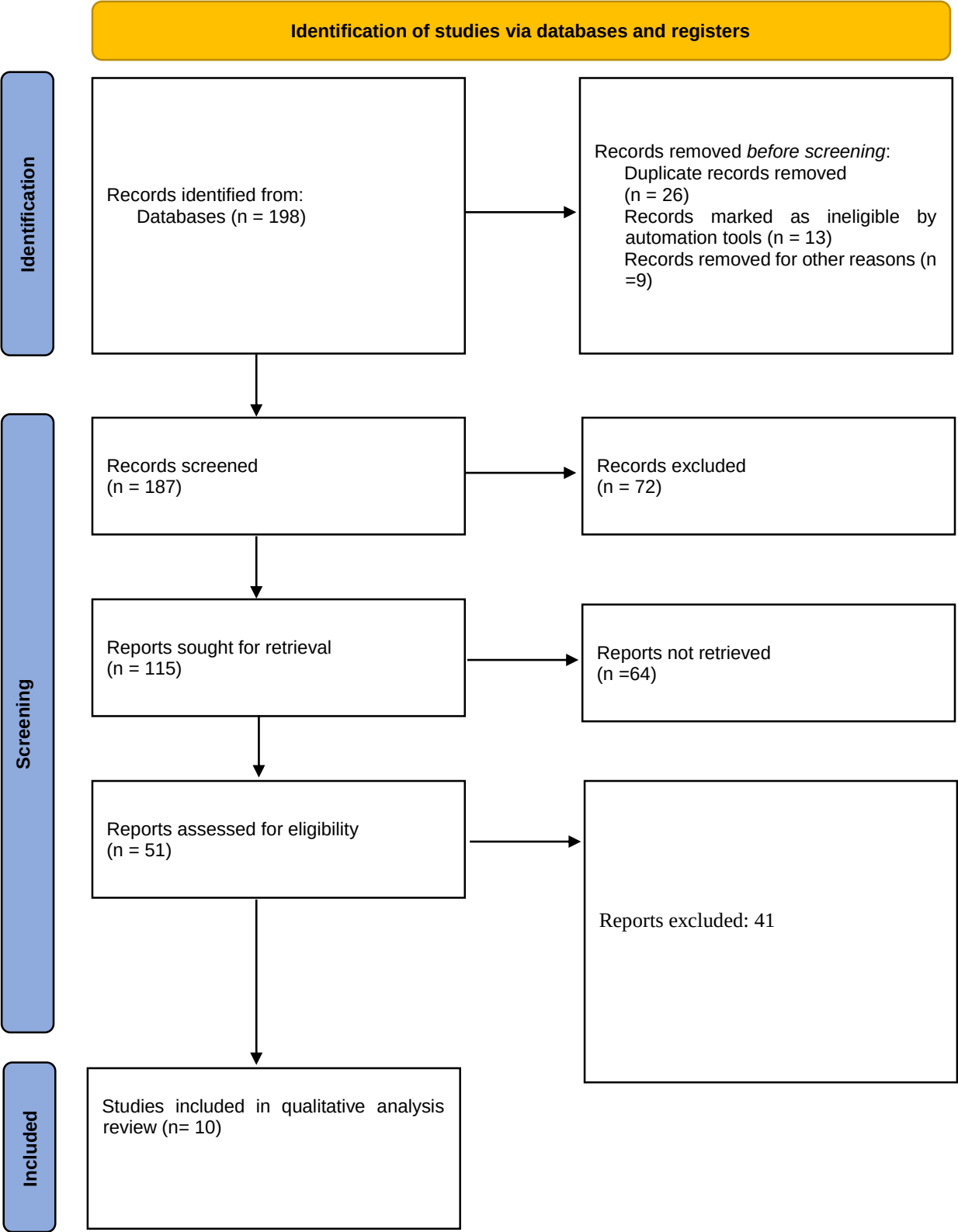


Figure 1: PRISMA flow chart

Results

Ten original studies reporting outpatient pathways were summarized, beginning with Alonso et al., who treated 70 CT-confirmed uncomplicated cases at home and recorded two admissions for persistent pain or vomiting (8). In the DIVER randomized trial, failure occurred in three of 66 discharged participants and four of 66 hospitalized participants, without a statistically significant difference between treatment settings (9). Isacson et al. reported four failures among 155 patients managed without antibiotics; three involved complications and one deterioration, with successful inpatient treatment and no surgery among these failures (10) (Table 1).

Mali et al. included 161 patients overall, of whom 140 received outpatient symptomatic treatment and four subsequently required admission during follow-up (11). Estrada Ferrer et al. reported successful non-antibiotic outpatient treatment in 32 of 36 patients with mild disease, separating this group from patients with moderate diverticulitis and initial hospitalization (12). In the modified Neff pathway evaluated by Mora-López et al., 33 of 254 discharged grade-zero cases returned to emergency care and 22 required admission, demonstrating that revisit and admission endpoints produced different apparent failure frequencies (13).

The DINAMO trial randomized 480 outpatients and recorded hospital admission in 8/242 participants without antibiotics and 14/238 receiving antibiotics, meeting its prespecified noninferiority criterion (14). Burgard et al. recorded four admissions among 220 outpatients, with leukocytosis associated with failure in univariable analysis and proximal free air retained in the reported adjusted analysis (15). The AmbUDiv study included 88 ambulatory patients within a 348-patient cohort; its twelve-month endpoint combined recurrent disease with initial treatment failure, limiting interpretation as an acute discharge-failure measure (16). Balhorn et al. compared 106 patients in each protocol-era group and found no significant readmission difference, with an odds ratio of 1.49 and a 95% confidence interval of 0.54–4.07 (17).

Supplementary predictor evidence arose from populations with broader eligibility, including Etzioni et al.'s 693 CT-investigated emergency discharges, among whom approximately 6% failed outpatient treatment (18). Female sex and CT free fluid were independently associated with failure, with adjusted odds ratios of 3.08 and 3.19, respectively, whereas age, leukocyte count, Charlson score, and antibiotic duration were not significant predictors (18). Bolkenstein et al. studied 565 patients treated without antibiotics across outpatient and inpatient settings, including 264 initial outpatients and twelve subsequent admissions among that outpatient subgroup (19). Higher C-reactive protein was associated with the study's broader failure endpoint, and a threshold above 170 mg/L had 20% sensitivity and 91% specificity, restricting its value as an isolated screening measure (19) (Table 2).

Across the evidence, oral intolerance and persistent pain frequently prompted reassessment or admission, although these features were often reasons for escalation rather than independently modeled baseline predictors (8,12,13). CT definitions varied, with several protocols including limited pericolic gas and others selecting more strictly localized inflammation, preventing automatic equivalence between their populations (11,14,15). Most studies assessed pathway safety rather than model performance, and differences in selection, monitoring, and endpoint timing prevented the derivation of a validated universal discharge score from their reported results (8–17). No timing or severity threshold was available across these observational cohorts (8–17).

Table 1. Original studies reporting outpatient pathways and outcomes

Study	Design and population	Management	Reported outcome and applicability
Alonso, 2010	Prospective; 70 CT-confirmed outpatients	Oral antibiotics	Admission: 2/70 (2.9%); persistent pain or vomiting (8).
Biondo, 2014, DIVER	Multicentre RCT; 132 participants, 66 outpatients	Antibiotics in both groups	Failure: 3/66 outpatients (4.5%) versus 4/66 inpatients (9).
Isacson, 2015	Prospective; 155 CT-confirmed outpatients	No antibiotics	Four failures (2.6%); three-month follow-up; no surgery among failures (10).
Mali, 2016	Prospective; 161 participants, 140 outpatients	Symptomatic treatment	Admission: 4/140 (2.9%); 30 days; limited pericolic air included (11).
Estrada Ferrer, 2016	Prospective; 36 mild-disease outpatients within a broader cohort	No antibiotics	Deferred admission: 4/36 (11.1%); moderate-disease group excluded here (12).
Mora-López, 2017	Prospective pathway; 254 discharged modified-Neff grade-zero episodes	Antibiotics; home monitoring	Admission: 22/254 (8.7%); emergency revisits: 33/254 (13.0%) (13).
Mora-López, 2021, DINAMO	Multicentre RCT; 480 outpatients	Antibiotics versus symptomatic treatment	Admission: 14/238 (5.8%) versus 8/242 (3.3%); follow-up to 90 days (14).
Burgard, 2024	Retrospective; 220 emergency discharges	Antibiotics; early review	Admission: 4/220 (1.8%); limited pericolic air included; one admission involved gastrointestinal bleeding (15).
Mohamedahmed, 2024, AmbUDiv	Retrospective multicentre; 348 participants, 88 ambulatory	Ambulatory stay below 24 hours	Twelve-month readmission: 10.2%; includes recurrence and initial failure (16).
Balhorn, 2025	Historical comparison; 106 patients per protocol-era group	Outpatient management protocol	Readmission OR 1.49 (95% CI 0.54–4.07); protocol groups differ from verified discharge-only cohorts (17).

Table 2. Prognostic findings and their applicability to emergency discharge

Factor	Source population	Verified finding	Interpretation
Female sex; CT free fluid	Etzioni; 693 emergency discharges	Adjusted OR 3.08 (1.31–7.28) and 3.19 (1.45–7.05), respectively	Broad CT spectrum; associations require confirmation in strictly uncomplicated cases (18).
Proximal extraluminal air	Burgard; 220 outpatients	Reported adjusted association; confidence interval included unity	Four failure events; discordant confidence interval and probability value (15).
Raised CRP	Bolkenstein; 565 mixed-setting patients	Above 170 mg/L: sensitivity 20%, specificity 91%	Mixed population and composite outcome; low sensitivity restricts standalone use (19).
Severe pain; leukocytosis; previous episodes	van Dijk; individual-patient-data analysis of 1,109 trial participants	Pain above 7 and WBC above $13.5 \times 10^9/L$ associated with adverse outcomes	Broad trial population; no subgroup with demonstrated antibiotic benefit (20).
CT collections; longer inflamed segment	van Dijk; DIABOLO imaging analysis	Collections: 25% versus 0%; segment length: 86 versus 65 mm, complicated versus uncomplicated course	Progression endpoint; direct-discharge subgroup unverified (21).
Systemic comorbidity; prolonged symptoms; vomiting; raised CRP	Rottier; 1,087 CT-confirmed cases	Adjusted OR: ASA 3/4, 4.43; symptoms above five days, 3.25; vomiting, 3.94; CRP above 140 mg/L, 2.86	Three-month complicated progression; broader setting than emergency discharge (22).

Discussion

The principal finding is that favorable outpatient outcomes coexist with limited evidence for reproducible predictors specifically among patients discharged directly from emergency care. An individual-patient-data meta-analysis of AVOD and DIABOLO identified severe pain, elevated leukocyte count, and previous diverticulitis as factors associated with adverse outcomes, without identifying a subgroup benefiting from antibiotics (20). A CT reanalysis of DIABOLO associated fluid collections and a longer inflamed segment with complicated progression (21). Rottier et al. identified systemic comorbidity, symptoms exceeding five days, vomiting, and CRP above 140 mg/L as independent predictors of complicated progression in a broader CT-confirmed cohort, offering relevant contextual evidence rather than a discharge-specific rule (22).

Inflammatory markers represent measures of disease burden whose meaning depends on the population, outcome, and timing of measurement (19,20,22). The CRP threshold above 170 mg/L reported by Bolkenstein et al. had low sensitivity, so a value below that threshold did not reliably exclude failure across the entire study population (19). The lower threshold in Rottier et al. concerned progression to complicated disease over three months, creating an endpoint distinction that prevents direct interchangeability of these cutoffs (22). Baseline leukocytosis and leukocytosis during reassessment also answer different questions, since a follow-up measurement incorporates the patient's response after the discharge decision (15,20).

Imaging findings require equally careful interpretation because studies differ in their classification of contained extraluminal gas, free fluid, and small collections (3,4,21). The association between free fluid and failure in Etzioni et al. arose from a broadly selected emergency cohort, making applicability to strictly uncomplicated disease dependent on the original CT findings (18). Burgard et al. reported an adjusted hazard ratio of 11.72 for proximal air, with a confidence interval of 0.67–

206.28 and a probability value of 0.048, an internally discordant result requiring cautious interpretation (15). Its small event count further limits precision, while the absence of an air association in the DIABOLO imaging analysis argues against treating every radiological gas finding as an equivalent prognostic signal (15,21). Differences in access to reassessment limit transportability between healthcare systems, particularly when protocols provide daily contact or scheduled laboratory review (10). Such service characteristics warrant reporting alongside proposed predictors in subsequent emergency discharge studies (10).

Clinical selection and follow-up arrangements are integral to interpreting apparently low failure rates, since outpatient cohorts frequently exclude substantial comorbidity, immunosuppression, or inability to tolerate oral intake (4,8,10,11). Exclusion criteria describe the population studied and do not themselves establish independent associations with failure among discharged patients (8,11,17). Controlled antibiotic comparisons address treatment efficacy, whereas prognostic analyses address variation in outcome risk; these questions remain distinct even when they involve the same diagnosis (5–7,14,20). The twelve-month AmbUDiv outcome also illustrates the importance of separating recurrent episodes from failure to recover after the index presentation (16). Future prognostic studies require consecutive emergency discharge cohorts, standardized short-term outcomes, transparent adjustment for confounding, adequate event numbers, and external validation before a clinically useful numerical discharge score enters routine disposition decisions.

Conclusion

Outpatient treatment of CT-confirmed uncomplicated acute diverticulitis produced favorable outcomes in selected populations. The reported prognostic signals involved inflammatory burden, imaging abnormalities, systemic comorbidity, and persistent gastrointestinal

symptoms, with substantial variation in their applicability to immediate emergency discharge. No universally validated discharge prediction score emerged from the reviewed evidence. Treatment failure requires a standardized definition that separates emergency revisits, admission, complicated progression, and recurrence. Disposition assessment therefore rests on combined clinical and imaging evaluation, oral tolerance, symptom control, and access to reassessment.

Abbreviations

Abbreviation	Definition
ASA	American Society of Anesthesiologists
CI	Confidence interval
CRP	C-reactive protein
CT	Computed tomography
OR	Odds ratio
RCT	Randomized controlled trial
WBC	White blood cell count

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