STUDY PROTOCOL

Title: **Acute Diverticulitis in the Frail Population: A Survey on Contemporary Management Approaches**

Protocol Version: 1

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Background and Rationale

Over the past three decades, the global population of individuals aged over 65 has doubled. These demographic shifts are reflected in perioperative statistics, as per-capita surgery rates have increased most markedly among older age groups (1,2). Projections indicate that by 2030, one in five older adults will undergo surgery each year.

Advanced age is a well-established risk factor for adverse outcomes in both surgical and non-surgical clinical contexts. Nevertheless, clinical experience and scientific evidence make it clear that age itself represents only one layer of added risk among surgical patients. The interplay of multiple risk factors collectively defines patient frailty, of which chronological age is merely one component (3).

Acute left-sided colonic diverticulitis is among the most common surgical emergencies. The likelihood of developing diverticular disease—and experiencing its acute complications—increases with age and can present with varying degrees of severity (4). Several classification systems stratify the severity of acute left-sided diverticulitis, from Hinchey's original staging and its subsequent modifications to the more recent, comprehensive scheme proposed by the World Society of Emergency Surgery (5,6). Decision-making algorithms based on disease severity and diagnostic findings are well documented in various guidelines; however, these recommendations assume an idealized patient profile and may not be readily applicable to every clinical scenario.

In real-world practice, frail patients pose a therapeutic challenge. Multiple comorbidities can prompt surgeons to adopt less aggressive strategies due to the objectively elevated risk of postoperative complications, a phenomenon well documented across numerous settings. To date, no studies specifically evaluate conservative versus surgical management in frail patients with acute diverticulitis. Recently, Laterza et al. published a retrospective series of 1,127 patients over 70 years old presenting to the emergency department with acute left-sided diverticulitis (7). They compared outcomes between frail and non-frail patients—frailty was assessed using the Clinical Frailty Scale (CFS)—and found that higher CFS scores were significantly associated with 30-day mortality and sepsis, regardless of whether patients underwent surgery or not. Hejazi et al., in a nationwide U.S. analysis of 10,807 patients over 65 treated conservatively, showed that frailty was not linked to diverticulitis recurrence but was a risk factor for increased mortality (8). Similarly, Rasheed et al. conducted a U.S. nationwide retrospective analysis and reported the same findings; they also noted that frail patients had a higher likelihood of requiring open colectomy and colostomy formation (9).

Objective of the Study

The study explores how patient frailty influences surgeons' treatment decisions for acute diverticulitis using a survey.

> *Primary aim*: Determine if and how frailty affects how aggressively surgeons treat diverticulitis.
>
> *Secondary aims*: Measure how often surgeons use frailty assessment tools in urgent settings, identify which frailty tools they use, find out which diverticulitis severity classification guides their treatment choices.

Study Design

This cross-sectional survey was conducted in accordance with the World Health Organization's guidelines for good research practice and the CHERRIES checklist for online surveys (10). Expert surgeons developed the questionnaire following an exhaustive literature review. The web-based, open-access survey targeted general and acute care surgeons of varying experience levels across different hospital environments and countries.

The English-language questionnaire comprised 23 mandatory items organized into four sections: (1) demographic information, personal and institutional experience (questions 1–7); (2-3) frailty assessment and diverticulitis severity evaluation (questions 8–11); (4) factors influencing therapeutic decision-making for acute diverticulitis in frail patients (questions 12–20), (5) plus an item assessing interest in a prospective study (21-23). The survey was estimated to require approximately 10 minutes to complete and was available online from 09/20/2025 to 12/31/2025.

Participants were recruited via LinkedIn, email, and personal invitations. The electronic questionnaire, tested for functionality, was hosted on Google Forms (Google LLC, Mountain View, CA, USA). Data were analyzed descriptively, reporting agreement percentages and medians with interquartile ranges, using SPSS version 26.0.

All contact information and data collected—processed anonymously—will be used to write a manuscript with the objectives described above. These data will also serve as the foundation for designing a multicenter prospective study aimed at identifying the optimal treatment for acute diverticulitis in frail patients.

References

1. Fowler AJ, Abbott TEF, Prowle J, Pearse RM. Age of patients undergoing surgery. British Journal of Surgery. 2019 Jul 1;106(8):1012–8.
2. Gottesman D, McIsaac DI. Frailty and emergency surgery: identification and evidence-based care for vulnerable older adults. Anaesthesia. 2022 Dec;77(12):1430–8.
3. Fried LP, Ferrucci L, Darer J, Williamson JD, Anderson G. Untangling the Concepts of Disability, Frailty, and Comorbidity: Implications for Improved Targeting and Care. The Journals of Gerontology Series A: Biological Sciences and Medical Sciences. 2004 Mar 1;59(3):M255–63.
4. Fugazzola P, Ceresoli M, Coccolini F, Gabrielli F, Puzziello A, Monzani F, et al. The WSES/SICG/ACOI/SICUT/AcEMC/SIFIPAC guidelines for diagnosis and treatment of acute left colonic diverticulitis in the elderly. World J Emerg Surg. 2022 Dec;17(1):5.
5. Sartelli M, Catena F, Ansaloni L, Coccolini F, Griffiths EA, Abu-Zidan FM, et al. WSES Guidelines for the management of acute left sided colonic diverticulitis in the emergency setting. World J Emerg Surg. 2016 Dec;11(1):37.
6. Sartelli M, Weber DG, Kluger Y, Ansaloni L, Coccolini F, Abu-Zidan F, et al. 2020 update of the WSES guidelines for the management of acute colonic diverticulitis in the emergency setting. World J Emerg Surg. 2020 Dec;15(1):32.
7. Laterza V, Covino M, Schena CA, Della Polla D, Russo A, Salini S, et al. Frailty is a prognostic marker of mortality and sepsis in patients ≥ 70 years with acute left-sided colonic diverticulitis. Int J Colorectal Dis. 2025 Jun 16;40(1):141.
8. Hejazi O, Colosimo C, Khurshid MH, Stewart C, Al Ma'ani M, Anand T, et al. Does frailty predict readmission and mortality in diverticulitis? A nationwide analysis. J Trauma Acute Care Surg [Internet]. 2025 Jun 19 [cited 2025 Jun 26]; Available from: https://journals.lww.com/10.1097/TA.0000000000004707
9. Rasheed W. Frailty in elderly patients with acute colonic diverticulitis is associated with worse in-hospital outcomes: A nationwide analysis. aog [Internet]. 2024 [cited 2025 Jun 26]; Available from: http://www.annalsgastro.gr/files/journals/1/earlyview/2024/ev-07-2024-06-AG_7379-0904.pdf
10. Eysenbach G. Improving the Quality of Web Surveys: The Checklist for Reporting Results of Internet E-Surveys (CHERRIES). J Med Internet Res. 2004 Sep 29;6(3):e34.